About The Journal
International Journal of Scientific Study (IJSS) is a monthly journal publishing research articles after full peer review and aims to publish scientifically sound research articles in across all science like Medicine, Dentistry, Genetics, Pharmacy, etc.

Each article submitted to us would be undergoing review in three stages: Initial Review, Peer Review & Final Review.

All rights are reserved with journal owner. Without the prior permission from Editor, no part of the publication can be reproduced, stored or transmitted in any form or by any means.

Abstracting & Indexing Information
Index Medicus (IMSEAR), Global Index Medicus, Index Copernicus, Directory of Open Access Journals(DOAJ), Google Scholar, WorldCat, SafetyLit, WHO Hinari, Genamics Journal Seek Ulrichsweb Serials Solutions, International Committee of Medical Journal Editors(ICJME) Geneva Foundation for Medical Education & Research(GFMER), Socolar, Bielefeld Academic Search Engine(BASE), Research Bible, Academic Journals Database, J-Gate, Jour Informatics, Directory of Research Journal Indexing(DRJI), Scientific Indexing Services(SIS) Rubriq-Beta, SHERPA RoMEO, New Jour, EIJASR), IndianScience.in, CiteFactor, Scientific Journal Impact Factor(SJIF), Journal Index.net, ROAD, Global Impact Factor(GIF), International Society for Research Activity (ISRA), Advanced Science Index, OpenAccessArticles.com, etc

Information for Authors
The authors should follow “Instructions to Authors” which is available on website http://www.ijss-sn.com/instructions-to-authors.html. Authors should fill the Copyright Transfer form & Conflict of Interest form. Manuscripts should be submitted directly to: editor@ijss-sn.com.

Publication Charges
International Journal of Scientific Study aims to encourage research among all the students, professionals, etc. But due to costs towards article processing, maintenance of paper in secured data storage system, databases and other financial constraints, authors are required to pay. However discount will be provided for the non-funding quality research work upon request. Details about publication charges are mentioned on journal website at: http://www.ijss-sn.com/publication-charges.html.

Advertising Policy
The journal accepts display and classified advertising. Frequency discounts and special positions are available. Inquiries about advertising should be sent to editor@ijss-sn.com.

Publishing Details
Publisher Name: International Research Organization for Life & Health Sciences (IROLHS)
Registered Office: L 214, Mega Center, Magarpatta, Pune - Solapur Road, Pune, Maharashtra, India – 411028. Contact Number: +919759370871.
Designed by: Tulyasys Technologies (www.tulyasys.com)

Disclaimer
The views and opinions published in International Journal of Scientific Study (IJSS) are those of authors and do not necessarily reflect the policy or position of publisher, editors or members of editorial board. Though the every care has been taken to ensure the accuracy and authenticity of Information, IJSS is however not responsible for damages caused by misinterpretation of information expressed and implied within the pages of this issue. No part of this publication may be reproduced without the express written permission of the publisher.
Editorial Board

Founder & Editor In Chief

Dr. Swapnil S. Bumb – India (BDS, MDS, MPH, MSc, PGDHA, PDCR)
Assistant Professor, ACPM Dental College, Dhule, Maharashtra, India

Founder Editor

Dr. Dhairya Lakhani, India

Senior Editorial Board Member

Dr. Stephen Cohen – United States of America (MA, DDS, FACP, FICD)
Diplomate of the American Board of Endodontics
Senior editor for nine Editions of the definitive Endodontics Textbook - Pathways of the Pulp, and a Co-editor of the renamed 10 edition Cohen's Pathways of the Pulp.

Dr. Abdel Latif Mohamed – Australia (MBBS, FRACP, MRCPCH, MPAeds, MPH, AFARACMA, MScEpi, MD)
Professor in Neonatology, The Clinical School, Australian National University Medical School, Australia
Open Researcher and Contributor ID (ORCID): 0000-0003-4306-2933, Scopus ID: 13610882200

Dr. Bipin N. Savani – United States of America (M.D)
Professor of Medicine Director, Vanderbilt University Medical Center and Veterans Affairs Medical Center, Vanderbilt- Ingram Cancer Center, Nashville, TN, USA.
Associate Editor (previously co-editor) of the journal "Bone Marrow Transplantation" (official journal of the European Group for Blood and Marrow Transplantation - EBMT).
Editorial advisory board: Biology of Blood and Marrow Transplantation (official journal of the American Society of Blood and Marrow Transplantation.

Dr. Yousef Saleh Khader Al-Gaud, Jordan – (BDS, MSc, MSPH, MHPE, FFPH, ScD)
Professor (Full) - Department of Community Medicine
Jordan University of Science and Technology, Jordan, Irbid

Dr. P. Satyanarayana Murthy – India (MBBS, MS, DLO)
Professor and Head, Department of ENT and Head & Neck Surgery, Dr.Pinnamaneni Siddhartha Institute of Medical Sciences and Research Center, Chinnautapalli, Gannavaram
Editor - Indian journal of Otolaryngology (1991),
Editor, International Journal of Phonosurgery and Laryngology
Editor in Chief designate, Journal of Indian Academy of Otorhinolaryngology and Head & Neck Surgery

Dr. Sidakpal S. Panaich – United States of America (M.D)
Interventional Cardiology Fellow, Department of Cardiology, Michigan State University/Borgess Medical Center
Cardiology Fellow, Department of Internal Medicine/Cardiology, Wayne State University/Detroit Medical Center

Associate Editors

Dr. Silvana Beraj, Albania
Dr. João Malta Barbosa, United States of America
Dr. Anastasia M. Ledyavka, Russia
Dr. Asfandyar Sheikh, Pakistan
Dr. John Park, Scotland
Dr. Mohammad Saleh Kiswa, Jordan
Dr. Safaayya Kadiuane, India
Dr. Dorcas Naa Dedei Amyette, Kumasi, Ghana
Dr. Animasahun Victor Jide, Sagamu, Nigeria
Dr. Hingi Marko C., Mwanza City, Tanzania
Contents

ORIGINAL ARTICLES

A Study on N-terminal-pro Brain-type Natriuretic Peptide in Cirrhosis of Liver
*Palash Kumar Sanyal, Arup Bandyopadhyay*

Comparative Study of Pfannenstiel Cesarean Section versus Misgav Ladach Cesarean Section in Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar
*Seema Singh, Jyoti Bala*

Learning Style Preferences of Second-year Medical Students in Oman
*Sabitha Panambur*

Clinical Spectrum of Presentation of Obstructive Jaundice in Inflammation, Stone Disease, and Malignancy
*R Selvasekaran, G Nagalakshmi, Heber Anandan*

Comparative Study between Middle Meatal Antrostomy with and without Partial Middle Turbinectomy in Patients with Chronic Sinusitis
*Aswathi Gopi, M B Nishant, K B Rajamma*

Clinical Analysis of Diabetic Retinopathy in Type 2 Diabetic Patients and its Correlations with Biochemical Parameters
*B Pramila, N Sharmila*

Comparative Study between Intravenous Thiopentone Sodium and Propofol on the Recovery Profile of the Patients after Electroconvulsive Therapy
*Santosh N Bodkhe, Roshan M Shende, Pankaj R Bhople, Sonal Agrawal*

Evaluation of Chest Pain in Premenopausal Indian Women
*Mohd Suhel Siddiqui, Jitendra Kishore Bhargava, Anoop Kumar, Ishant Verma, Vandana Mahaur, Rahul Rai*

Computed Tomography Evaluation of the Patients Presenting with Headache at Tertiary Care Hospital of Bihar
*Manisha Kumari, Govind Kumar, Vinod Kumar, Umakant Prasad, Amit Kumar, Shishir Kumar, S K Suman*
Patterns and Correlates of Post-menopausal Symptoms in a Cohort of Gynecological Patients Attending Outpatient Department  
Kasikrishnaraja, Senthil Sainathan, M Indira  
40

Clinical and Biochemical Profile of Lean, Normal, Obese Type 2 Diabetes Mellitus  
S M Shavana, Zulfiqar H M Khan, Heber Anandan  
47

Pulmonary Tuberculosis in Elderly - Peculiarities and Dissimilarities: A Geriatric Clinic Experience  
Sandhyarani Moharana, M Lipika, Dhirendra Nath Moharana, Subhransu Sekhar Pattnaik, Santanu Padhy, Tapan Kumar Sahoo  
50

Outcome of Retrograde Interlocking Intramedullary Nailing for Fracture Shaft of Femur and Extra-articular Distal Femur  
Rajinder Singh, Sumeet Singh Charak, Mohinder Singh Chib, Khalid Muzafar, Mohd Haseeb  
54

An Audit of Management of Cases of Blunt Trauma Abdomen Resulting in Solid Organ Injury in a Tertiary Hospital Mumbai  
G Anuradha, G Abhay Kumar, Shilpa A Rao  
59

Correlative Study between Body Mass Index and Hypotension in Obese Patients Undergoing Cesarean Section under Spinal Anaesthesia  
C G Jayachandran, Linette J Morris  
63

Thyroid Function Abnormalities in Patients with Chronic Kidney Disease - A Prospective Study  
Aarathy Kannan, V Snramakrishnan, B Kannan, Heber Anandan  
68

Cranial Anthropometric Indices in Population of Rajasthan, India  
Chandrakala Agarwal, Rohin Garg, Pooja Pareek, Deepak Sharma, Santosh Kumar  
73

Study of Physical Functioning in Children with Congenital Adrenal Hyperplasia  
C Rekha, R Paramaguru, Vimala Sarojini, Seenivasan  
77

How Relevant are Surgical Profile Tests Done Pre-operatively in Minor and Medium Surgical Procedures? - An Analytical Clinical Study  
C G Jayachandran, S Harikrishnan, Linette J Morris  
84
A Prospective Study of Changes in the Refractive System of Eye during Pregnancy
Kalaiselvi Balasubramanian, Sangamithra Mathiyalagan, Gayatri Nagarajan 89

Study of Social and Cognitive Functioning in Children with Congenital Adrenal Hyperplasia
C Rekha, R Paramaguru, Shanthi Nambi, Seenivasan 93

Clinical and Radiological Evaluation of Patients of Proximal Tibial Fractures Treated with Long Proximal Tibial Locking Plate by Minimally Invasive Plate Osteosynthesis Technique

Study of Lab Parameters Predicting Post-discharge Mortality after Admission for Community-acquired Pneumonia: A Prospective Tertiary Hospital Care Based Study
Fayaz Ahmad Sofi, Aamir Rashid, Jan Mohammad, Ghulam Nabi Dhobi 103

A Radiology-pathological Correlation of Spinal Meningioma in a Tertiary Care Hospital - A Retrospective Study
A G Krishnaveni, P Kannan, Heber Anandan 108

Predictors of Intestinal Ischemia in Small Bowel Obstruction - A Prospective Study
Ritesh Bazaz, Sadhana Tiwari, Bikramjit Singh Sodhi, Jasmine Kokiloo 119

Prevalence of Lung Parenchymal Involvement in Cases of Tubercular Pleural Effusion - Comparative Study between Chest X-ray and Computed Tomography Thorax
Rahul Ranjan, M K Meghwani, Supriya Katiyar, Alok Kumar, C M Bhalla 125

Evaluation of Gastrointestinal Cause in Cases of Unexplained Anemia in Adults - A Study from Tertiary Care Center
Chitta Ranjan Panda, Kali Prasanna Swain, Sambit Kumar Behera, Rabindra Kumar Jena, Tapan Kumar Sahoo 130

Study of Hearing Outcome in Secretory Otitis Media in Children 3 to 12 Years of Age
Bency Benjamin, K B Rajamma 134
Effects of Ultraviolet Rays on the Eyes in a Tertiary Referral Hospital in Tamil Nadu
*N Sharmila, B Pramila*

Pericardiectomy for Constrictive Pericarditis - A Comprehensive Study Between Total and Subtotal Pericardiectomy by Left Aterolateral Thoracotomy
*G Josephraj, P Rani, M Muthukumar, S Naveen, P Manivannan, M Mohamed Yaser, Heber Anandan*

Utility of 128-slice Multi-detector Spiral Computed Tomography in Detecting Spectrum of Involvement in Acute Pancreatitis
*Bharatkumar Mudalgi, Manohar Kachare, Akshay Kulkarni*

Prevalence of Depression in Diabetes Mellitus and Its Determinants
*Amit Kumar Mishra, Sudhir Kumar, Arshad Ahmad, Govind Kumar, Krishna Kumar Singh, Kalyan Kumar Saha, Amrendu Kumar, Rajesh Kumar*

Functional and Radiological Outcome Analysis of Anterior Cervical Discectomy and Fusion in Cervical Spondylotic Myeloradiculopathy
*A Saravanan, N Deen Muhammed Ismail, S Mohan Kumar, E Rajarajan, Heber Anandan*

Accuracy of Diagnostic Peritoneal Paracentesis in Acute Abdomen Requiring Emergency Surgical Intervention
*J Rakesh Fernando, S Sendhurpandian, A Mohan Kumar, Heber Anandan*

Knowledge, Attitude and Practice toward Diabetic Retinopathy and Retinal Examination among Diabetic Population in Al-Hasa Region, Saudi Arabia: A Cross-sectional Study
*Abdullah Hisham Al-Mulla, Abdulaziz Khalid Al-Thafar, Marwan Abdulrahman Al-Shaikh Hussain, Sayed Ibrahim Ali, Saif Khuzaim Al-Dossary*

A Study on Changing Clinical Profile of Chronic Pancreatitis from a Tertiary Care Centre
*Chitta Ranjan Panda, Bijay Misra, Sambit Kumar Behera, Haribhakti Seba Das, Shivaram Prasad Singh*

Clinical Study of Lipid Profile Pattern in Acute Coronary Syndromes
*V Suresh Kumar, Madavaram Sreelatha*
Prevalence of Refractive Errors among the School going Children at a Tertiary Center of West Bengal  
Mita Saha (Dutta Chowdhury), Alok Ranjan, Md. Nazarul Islam, Sushmita Mukherji 179

Profile of Testicular Germ Cell Tumors in Kashmir: A Retrospective Analysis  
Syed Arshad Mustafa, Vinod Mitla, Saqib Zaffar Banday, Sanaullah Kuchay 183

Antibiotic Cement Impregnated Nailing in Management of Infected Non-union of Femur and Tibia  
A Saravanan, R Raj Ganesh, N Deen Muhammed Ismail, Heber Anandan 187

Spectrum of Reactive and Metastatic Pathologies in Evaluation of Peripheral Lymph Node in Tertiary Health Center  
Momota Naiding, Shipra Singh, Sikha Agarwal, R N Choubey 192

Various Prognostic Parameters in Carcinoma Breast Patients: A Prospective Study  
Vijay Kumar, Sunil Bhat, Atul Agarwal, Bikramjit Singh Sodhi 197

Study of Intraurethral Instillation of Tacrolimus for Urethral Involvement Following Lichen Sclerosus  
Ranjan K Dey, Imran Khan, Dawood Khan 204

Risk Stratification of Acute Myocardial Infarction in Rural Women  
S Selvamuthukumaran 209

Comparative Study of Ropivacaine and Levobupivacaine given Paravertebrally in Breast Cancer Surgeries  
Raghvendra Upadhyay, Rajan B Godwin, Mayura Setiya 212

Study of Left Ventricular Diastolic Dysfunction in Type 2 Diabetes Mellitus Patients  
V Suresh Kumar, Madavaram Sreelatha, K Ramesh, G Chandra Shekar 219

Comparative Study on Safety and Efficacy of Low-Molecular-Weight Heparins with Unfractionated Heparins in the Management of Coronary Artery Disease in A Rural Tertiary Care Hospital  
S Selvamuthukumaran 225
Correlative Study Between Clinical, Ultrasound and Histopathological Examination Features and the Management of Hemorrhagic Cysts of Ovary
C K Rajamma, C M Sheethal

Clinical Study of Incidence of Malignancy in Solitary Nodule of Thyroid
J Rakesh Fernando, S Edwin Kins Raj, A Mohan Kumar, Heber Anandan

Study and Compare the Efficacy of 2 Suture Materials: Poliglecaprone 25, Polyglactin 910 as Subcuticular Skin Stitches in Women Undergoing Elective Cesarean Section
Prashant A Uikey, Mrunalini Jagne, Surekha N Khandale

Acute Coronary Syndrome (ACS) in the Young: Angiographic Features and Risk Factor Analysis of Patients with ACS before the Age of 35 Years
Mohmad Iqbal Wani, Aamir Rashid, Jahangir Rashid Beig, Shahood Ajaz

Study of Postmortem Findings of Neck Structures in Cases of Asphyxial Deaths
Suresh Chand, Rishi Solanki, Anil Aggrawal, P C Dikshit, Rajesh Ranjan

Ketamine Pre-treatment to Alleviate the Pain of Propofol Injection - A Prospective, Double-blind, Randomized, Placebo, Controlled Study
Neha Mehra, Abhishek Khanna, Rajesh Ranjan, Pratibha Dabas, Pragati, Shoma Mukherjee

REVIEW ARTICLES
Development of Microencapsulation: A Review of Literature
Mohd Gayoor Khan, Vinod Gauttam, H S Chandel, Asra Ali, Kasma Tariq

Basics of Management of Medical Emergencies in Dental Office and Emergency Drug Kit
Khadijah Mohideen, B Thayumanavan, A Murali Balasubramaniam, K M Vidya, S Rajkumari, S K Indu Bharkavi

CASE REPORTS
A Case Report of Pancreatic Lipomatosis
Reema Kashiva, Ramshyam Agarwal, Dattatrya Patil
Rare Presentation of Angiomyolipoma and Renal Cell Carcinoma in a Young Male Child with Tuberous Sclerosis - A Case Report and Review of Literature

Sibi Chakravarthi, Hariharasudhan Sekar, Ramesh Babu, Sandhya Sundaram

Large Vesical Calculus Causing Labor Dystocia: A Case Report

Sangeeta Ramteke, Medha Davile, Purnima Bhandari, Mangala Sonak
A Study on N-terminal-pro Brain-type Natriuretic Peptide in Cirrhosis of Liver

Palash Kumar Sanyal¹, Arup Bandyopadhyay²

¹Chief Medical Officer, Department of Health, ESI Medical Services, Government of Puducherry, India, ²Professor and Head, Department of Physiology, MGM Medical College, Kishanganj, Bihar, India

Abstract

Background: Plasma N-terminal-pro brain-type natriuretic peptide (NT-proBNP) is a standard test for detection of heart failure. There is a conjecture that progressive heart failure occurs in cirrhosis of liver. This study is undertaken to investigate the plasma concentrations of NT-proBNP in a case of cirrhosis of liver.

Methods: 35 patients with pre-diagnosed cirrhosis of liver were divided into three groups according to the Child-Pugh classification: Grade A (n=11, 32%), B (n=12, 34%), and C (n=12, 34%). Blood pressure, electrocardiogram, and echocardiography were done in all these patients. Plasma NT-proBNP levels were determined in all these patients using an electrochemiluminescence sandwich immunoassay technique.

Results: The presence of heart failure (diagnosed clinically, left ventricular ejection fraction <50% and higher serum NT-proBNP level, with a cutoff value of >101 pg/mL) was correlated with degrees of severity of cirrhosis of liver according to Child-Pugh scoring (sensitivity, 87.60% and specificity, 72.73%; P < 0.001).

Conclusions: NT-proBNP which is a marker of the presence of heart failure was significantly correlated with progression of liver cirrhosis. In cirrhotic patients, high NT-proBNP value >101 pg/mL was shown to be a valuable non-invasive parameter in predicting the presence of heart failure. Therefore, serial measurements of NT-proBNP can be used in cirrhosis of liver for early detection of heart failure.

Key words: Cirrhosis of liver, Heart failure, N-terminal-pro brain-type natriuretic peptide

INTRODUCTION

The common clinical features associated with cirrhosis of liver patients are characterized by hyperdynamic circulation (increased cardiac output, heart rate, and plasma volume), normal or low arterial blood pressure (BP), and lowered peripheral resistance.¹-³ These pathophysiological changes occur due to interactions between systemic hemodynamic factors and neurohormones.⁴-⁹

In response to cardiac wall distension and stretching in heart failure, there is secretion of pro-brain-type natriuretic peptide (proBNP1-108), a 108-amino acid prohormone from the cardiomyocytes. This is due to neurohormonal activation in response to ventricular volume and pressure overload.¹⁰ The BNP and atrial natriuretic peptide (ANP) may be deemed as counterregulatory hormones acting against the sympathetic and renin-angiotensin-aldosterone systems (RAAS). Secretion of BNP and ANP cause natriuresis, vasodilation activation with a concomitant inhibition of the RAAS and adrenergic activity, inhibition of cardiomyocyte hypertrophy, angiogenesis promotion, and delay in the activation of cardiac fibroblasts, all of which give rise to improved myocardial relaxation.¹¹,¹² However, in heart failure with cirrhosis, elevated levels of N-terminal proBNP (NT-proBNP), were more confirmatory than elevated plasma levels of BNP as the latter correlated best with diastolic dysfunction mainly.¹³-¹⁶ However, there was no significant relation of NT-proBNP levels to other measures of hyperdynamic circulation, such as cardiac output or systemic vascular resistance.¹⁵ A study that evaluated the severity of disease compared to plasma levels of BNP in non-alcoholic cirrhotic patients found no significant BNP
level difference. Therefore, in this study NT-proBNP is used as a tool for diagnosis and detection of severity of heart failure in cirrhosis of liver.

The aim of this study is to investigate the association between plasma concentrations of NT-proBNP and severity of cirrhosis. The severity of liver disease was estimated by Child-Pugh score as well as by clinical means.

**MATERIALS AND METHODS**

The study included 35 adult male and female patients diagnosed with cirrhosis of liver from urban to suburban areas and attending. Age range of eligible patients was 30-70 years. The diagnosis of liver cirrhosis included a complex set of typical clinical findings including relevant medical history, presenting symptoms, decreased prothrombin time, hypalbuminemia with albumin-globulin inversion, hypergammaglobulinemia, advanced diffuse chronic hepatic lesion on abdominal ultrasound examination, and liver biopsy, whenever feasible.

Patients with liver cirrhosis with suspected malignant comorbidity, prior known cardiac ailment, advanced multiorgan disorders or infections, acute gastrointestinal bleeding, cardiac arrhythmias, ischemic or valvular heart disease, renal failure, along with those treated with pharmacological agents that potentially affect systemic circulation, such as beta-adrenergic blockers or nitrates were not included in the study. Patients treated with diuretics were included in the study. All patients signed an informed consent before the inclusion according to the approval of the ethics committee and following good clinical practice criteria.

The patients were asked to fast overnight and then, lie down for approximately 2 h before having blood samples taken and system hemodynamic parameters measured. The blood samples were used to measure liver function tests and NT-proBNP concentrations. BP measurement, electrocardiogram, and echocardiography were done in all patients. NT-proBNP in plasma was determined using an electrochemiluminiscence sandwich immunoassay method (Elecsys proBNP, Roche Diagnostics, Meylan, France).

**Statistical Analyses**

Appropriate parametric tests were used in the analyses, namely, Student t-test, ANOVA, and Pearson correlation. P < 0.05 was considered significant. IBM SPSS, version 19.0.0.1 (SPSS Inc., Chicago, IL, USA) was used.

**RESULTS**

This study included 35 patients with an age range from 3 to 70 years. Patients were divided into three groups according to the Child-Pugh classification: Grade A (n=11, 32%), B (n=12, 34%), and C (n=12, 34%).

Patients with Grade A cirrhosis of liver had a significantly higher serum NT-proBNP level (mean value 338.63 pg/mL), compared to Grade B cirrhotics (mean value 196.45 pg/mL), and Grade C cirrhotics (mean value 107.72 pg/mL). Tests on non-cirrhotic healthy persons (Control) showed the serum level of NT-proBNP was between 5 and 45 pg/mL. 100 pg/mL was taken as the cutoff value for the presence of heart failure in patients with liver cirrhosis (P < 0.001), with a sensitivity of 87.60% and specificity of 72.73%.

**DISCUSSION**

Our study showed an association between NT-proBNP and hepatic dysfunction as revealed by Child-Pugh gradation. With increasing disease stage, plasma NT-proBNP levels were greater and left ventricular ejection fraction was lower. This correlates with the hyperdynamic circulation theory based on a central hypovolemia and systolic dysfunction. Thus, NT-proBNP was shown as a possible marker of disease progression, with a massive increase in its level observed in advanced stages of liver disease, showing a positive association of NT-proBNP with cirrhosis of liver. In advanced cirrhosis with pronounced vasodilatation, central hypovolemia, and arterial hypotension, RAAS and sympathetic system are highly activated causing hyperdynamic circulation. Low mean arterial BP (MABP) found in cirrhosis of liver is said to be a result of reduced vascular reactivity to adrenaline and angiotensin-II because of increased release of nitric oxide.

Cirrhosis of the liver is a generic disease characterized by progressively increasing diffuse fibrosis of the liver concomitantly associated with nodular regeneration of the liver. Chronic alcoholism is by far the most common etiology of cirrhosis of the liver. However, in developing and tropical countries chronic malnutrition is supposed to be another big cause of this disease. Other important causes which are increasingly coming into picture are infections with Hepatitis A, B, and C. Previously, there were no known treatment for these conditions. However, in recent years, treatment of hepatitis A, B (including delta antigen), and C with the relevant antiviral compounds for a prolonged period not only cures the patients off the viral load but also in many cases totally reverses.
the fibronodular degeneration of the liver leading to a non-cirrhotic state of the liver, cured from the disease in question. For, alcoholic cirrhosis, complete stoppage of alcoholic drinks, preferably life-long, together with intake of hepatoregenerative drugs for a long period is the sheet anchor of treatment. For cirrhosis due to malnutrition, good and nutritious diet for a prolonged period might help. Sometimes, cirrhosis of liver might be due to toxicity, usually the common toxic agents are carbon tetrachloride, chloroform, arsenic, and so on; detoxication might help, but proper cure with disease-free state is very difficult to achieve. At the beginning, cirrhosis of liver is almost a symptom-free disease and is very difficult to diagnose clinically. However, as portal hypertension, the foremost complication of cirrhosis of liver gradually sets in, the symptoms begin to manifest. These include ascites, edema mostly affecting the lower limbs, caput medusae, palmar erythema, and occasional jaundice. Among, the other symptoms, the most common are anorexia, loss of weight, pallor, and extreme weakness.

It has been demonstrated that patients with cirrhosis of the liver have a lower cardiac index and systolic volume, higher values of peripheral vascular resistance, and MABP. In cirrhotic patients, portal hypertension evolves due to increased portal venous resistance together with increased blood flow within the portal venous system. Both are the consequence of splanchnic arterial vasodilation caused by endotoxemia, through the opening of portosystemic collaterals, which leads to reduced activity of RAAS and intestinal disturbance resulting in increased synthesis of vasodilators. As cirrhosis progresses, effective hypovolemia, and arterial hypotension progress and RAAS induces low renal perfusion, glomerular filtration rate, and subsequently sodium and water retention, which together aggravate systolic and diastolic dysfunction, leading to increased production of NT-proBNP.

Patients with cirrhosis and ascites present with lower BP, lower peripheral vascular resistance, and increased stroke volume. The association between NT-proBNP and ascites is currently deemed controversial. Woo et al. did not find differences in plasma NT-proBNP level between pre-ascitic and ascitic patients. However, Yildiz et al. found higher plasma NT-proBNP level in ascitic patients. Our study did not find any difference in plasma NT-proBNP level between patients with and without ascites. Probably, these results could be explained by high sodium intake and concomitant use of diuretic therapy, which lower BNP concentration.

A major limitation of our study is the small number of patients and further larger prospective studies are needed to confirm our results and establish the eventual use of this parameter in clinical practice.

**CONCLUSION**

In our study, it has been found that plasma levels of NT-proBNP were significantly correlated with severity or grades of cirrhosis of liver. Therefore, NT-proBNP measurement can be used as a marker of cardiac dysfunction commonly associated with cirrhosis of liver. This can be used for the purpose of early detection of heart failure in liver cirrhosis. However, a comparatively low number of patients is a limitation of this study.

**REFERENCES**


Comparative Study of Pfannenstiel Cesarean Section versus Misgav Ladach Cesarean Section in Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar

Seema Singh, Jyoti Bala

Abstract

Objective: The objective of the study was to assess the advantage of Misgav Ladach cesarean section in comparison to Pfannenstiel cesarean section.

Materials and Methods: The study was done over 12 months on 100 elective and emergency cesarean section.

Results: The duration of surgery, blood loss, and post-operative pain were significantly less in Misgav Ladach group.

Conclusion: Misgav Ladach technique of cesarean has many advantages and should be routinely used.

Key words: Cesarean section, Misgav Ladach, Pfannenstiel

INTRODUCTION

There is continuous search for new techniques in each operation. The technique should be safe, of short duration, simple, low cost, less post-operative morbidity and mortality.

Timonen et al. found that in Pfannenstiel cesarean section lag time to delivery was 8-10 min. On the other hand, Misgav Ladach Cesarean section offers the benefit of the incision to delivery interval being 4 min or less. It is best for very common indication of cesarean section which is fetal distress. In this operation, there is minimal use of sharp instruments, so blood loss is minimum. Uterus is sutured in a single layer, which also reduces the duration and cost of surgery. Post-operative pain is also less.

In view of the advantages claimed for the above technique, this study was undertaken to assess its efficiency, safety, duration, blood loss, need of suture material, and post-operative stay and to compare it with Pfannenstiel cesarean section in women undergoing primary cesarean section.

MATERIAL AND METHOD

All women posted for elective or emergency primary cesarean section were included in this study for common indication. They were divided into 2 Groups. 50 women went through Misgav Ladach and the other 50 went through Pfannenstiel cesarean section. Women with the previous cesarean section, obstructed labor, previous abdominal surgery, Placenta previa, Abruptio placenta, and rupture uterus were not included in the study. Informed consent was taken. All the operative procedure done was performed under spinal or general anesthesia. Operation time measured and blood loss was measured by used gauze, packs, and suction both. Suture material also counted. Pre- and post-operative care was similar in both groups.
RESULT

Table 1 shows the difference between two techniques and Table 2 shows the duration of operation and suture material used. Shortest duration of surgery was 15 min in Group 1 and 11 minutes in Group 2.

Table 3 shows the amount of blood loss which is significantly less in Group 2. There were two women in each group with blood loss of more than 1000 ml, and one had blood transfusion in Group-1. Group-1 had double layer closure of uterus so more suture material was used. Post-operative pain was assessed by decreased use of analgesic in Group 2.

DISCUSSION

Every obstetric department has to evaluate the means of reducing the time for cesarean section. Reduction in operating time, reduced the incidence of post-operative febrile morbidity and fewer adhesions of subsequent cesarean section. The originator of Misgav-Ladach method of cesarean section at General Hospital in Jerusalem compared it to a Pfannenstiel cesarean section.2 The amount of blood loss was decreased due to decreased use of knife and the technique also protects vessels. In the present studies, mean blood loss in Misgav Ladach technique was 294 ± 200 ml compare to Pfannenstiel group in which it was 455 ± 200 ml. Reduction in blood loss by the Misgav Ladach procedure has been previously shown by Darj and Nordström3 who in randomized study comparing 50 elective cesarean section reported the average bleeding with Misgav Ladach procedure to be for 448 ml and with Pfannenstiel procedure 608 ml. Mobilization was earlier in Group 2 patient and also oral analgesic was less required in Group 2 patient.

CONCLUSION

In this way, we see that Misgav Ladach technique is suitable for both emergency and elective operation. The reduction in pain and the speed of recovery enables the mother to look after the newborn. Hence, we should use this technique at all centers.

REFERENCES

Learning Style Preferences of Second-year Medical Students in Oman

Sabitha Panambur
Associate Professor, Department of Pharmacology, Oman Medical College, Sohar, Sultanate of Oman

Abstract

Introduction: Students have different learning styles. Knowledge of learning style preferences helps in implementing appropriate teaching and learning strategies.

Objective: The objective of this study is to explore the learning style preferences of second-year medical students of Oman Medical College, Sohar.

Methods: In this descriptive, cross-sectional study, we administered the index of learning styles questionnaire to 230 students to assess their preferences over four bipolar learning style dimensions: perception (sensing/intuitive), input (visual/verbal), processing (active/reflective), and understanding (sequential/global). We identified students as having either no preference or preference to any one learning style on each of four dimensions.

Results: The frequencies of students who had no preference were 53% on perception, 45% on input, 63% on processing and 61% on understanding dimensions. Varying number of students had preferences for sensing (38%), intuitive (09%), visual (47%), verbal (08%), active (16%), reflective (21%), sequential (34%), and global (05%) learning styles.

Conclusion: The nature of second-year medical training is conducive to intuitive and sequential learners, who can be advised to make the best use of their learning preferences; but not promising for sensing and global learners, who can be encouraged to develop learning style skills suitable to the learning situation. Lectures can be reformed by incorporating changes to address the requirements of visual, verbal, active and reflective learners. Thus, the knowledge of students’ learning preferences can provide background to construct effective teaching and learning interventions.

Key words: Index of learning styles, Instructional techniques, Learning preferences, Learning strategies, Learning style preferences

INTRODUCTION

Medical training is extremely challenging because of the enormous volume and complex nature of the knowledge which students are expected to master within a limited timeframe. This increases the responsibility of teachers to assist and guide students in their learning.1,2  
The first 2 years of medical school provide foundation for clinical learning and, especially in the second year, much of the teaching takes place in a classroom setting. As the educators search for better pedagogical strategies, one concept that is gaining focus is learning style.3 It is widely accepted that a classroom may consist of students carrying diverse learning styles, i.e., characteristic strengths and preferences in the ways they take in and process information.3 Teachers can make learning more interesting and rewarding if they consider these diversities while designing and delivering course material.4 For this, teachers should first learn their students’ learning style preferences. There exist several tools to measure the learning style preferences, and one among them is the index of learning styles (ILS).3  

We conducted a study to explore the learning style preferences of second-year medical students using the ILS. The ILS,4 a 44 question instrument developed by Felder and Solomon5 measures individual’s learning
preferences over four bipolar learning style dimensions: Sensing/intuitive type of information perception, visual/verbal channel for input of information, active/reflective method for processing the information and sequential/global way of understanding the information. A student's preference on a given scale may be strong, moderate, or almost nonexistent. Primarily designed to assess the learning style preferences of engineering students, the ILS has been validated for its use in undergraduate medical education. This questionnaire is easy to administer and available free of cost.

METHODS

This descriptive, cross-sectional study was approved by the Institutional Research Review Board and conducted on students undergoing second year of medical training at Oman Medical College, Sohar. Student participation was voluntary and anonymous. A total of 230 students completed the paper copy of the ILS questionnaire. Individual student's scores on each of the dimensions were calculated as per the instructions provided in the ILS scoring sheet and plotted on the ILS report form to identify the learning preferences, which then were mailed to students along with addendum on learning strategies. Data were presented as percentage of students with no preference and those having preferences (moderate/strong) to each learning style on each of four dimensions.

RESULTS

Percentages of students without preference were higher than that with preferences on perception (53%), processing (63%), and understanding (61%) dimensions. More number of students had preference for sensing (38%) over intuitive (09%), visual (47%) over no preference (45%) and verbal (08%), reflective (21%) over active (16%), and sequential (34%) over global (05%) learning styles (Table 1).

DISCUSSION

In this study, we tried to understand as to what type of information students preferred to perceive and how they preferred to take in, process, and understand information pertaining to second-year medical courses.

Individuals prefer to perceive either intuitive or sensing type of information. Intuitive learners prefer information that arises internally through memory, reflection, and imagination and are good at grasping new concepts. Sensing learners prefer to perceive information that is presented as facts, experiments. The second-year medical courses essentially deal with conceptual information, explicitly putting 38% sensing learners of this study into a disadvantage.

Visual and verbal are the two sensory modes through which the external information is taken in. Visual learners remember the best what they see: Pictures, diagrams, and flow charts. Verbal learners remember best the spoken and written explanations. The second-year medical courses essentially deal with conceptual information, explicitly putting 38% sensing learners of this study into a disadvantage.

The complex mental process by which perceived information is converted into knowledge can be grouped into two categories: Active experimentation and reflective observation. Active learners process information by experimenting, discussing, and explaining. Reflective learners process information introspectively. The fact that some of the students showed preferences in active/reflective dimensions calls for incorporating techniques in the passive lecture sessions to address the needs of both the categories.

Students understand information either sequentially or globally. Sequential learners understand information in logically ordered linear reasoning process whereas global learners make intuitive leaps in understanding the information. Medical learning is largely in favor of sequential than global learners.

Learning style tool will serve students to identify the preferences and deficiencies in one's learning style. This knowledge will empower the students to implement appropriate learning strategies that most suit their preferences and to develop skills in their less preferred

<table>
<thead>
<tr>
<th>Perception</th>
<th>Input</th>
<th>Processing</th>
<th>Understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing/intuitive</td>
<td>Sensing</td>
<td>Active/reflective</td>
<td>Sequential/global</td>
</tr>
<tr>
<td>Sensing</td>
<td>Sensing</td>
<td>Active</td>
<td>Sequential</td>
</tr>
<tr>
<td>No preference</td>
<td>No preference</td>
<td>No preference</td>
<td>No preference</td>
</tr>
<tr>
<td>38%</td>
<td>53%</td>
<td>47%</td>
<td>63%</td>
</tr>
<tr>
<td>Intuitive</td>
<td>Intuitive</td>
<td>Reflective</td>
<td>Global</td>
</tr>
<tr>
<td>Visual</td>
<td>Visual</td>
<td>No preference</td>
<td>No preference</td>
</tr>
<tr>
<td>No preference</td>
<td>No preference</td>
<td>45%</td>
<td>21%</td>
</tr>
<tr>
<td>09%</td>
<td>45%</td>
<td>08%</td>
<td>61%</td>
</tr>
<tr>
<td>Verbal</td>
<td>Verbal</td>
<td>No preference</td>
<td>No preference</td>
</tr>
<tr>
<td>No preference</td>
<td>No preference</td>
<td>63%</td>
<td>21%</td>
</tr>
<tr>
<td>08%</td>
<td>63%</td>
<td>21%</td>
<td>05%</td>
</tr>
<tr>
<td>Active</td>
<td>Active</td>
<td>Reflective</td>
<td>Global</td>
</tr>
<tr>
<td>No preference</td>
<td>Reflective</td>
<td>No preference</td>
<td>No preference</td>
</tr>
<tr>
<td>16%</td>
<td>63%</td>
<td>21%</td>
<td>05%</td>
</tr>
</tbody>
</table>

Table 1: Frequency of students having preferences (strong/moderate) and no preference on each of four learning style dimensions (n=230)
styles which will enable them to choose the learning approach that best befits the learning task in hand. Sensing and global learners of this study clearly needed recommendations to widen their repertoire of styles because the second-year teaching and learning setting are not very conducive to them.

Knowledge of their students’ learning preferences provides framework for teachers to design suitable instructional techniques that satisfy the needs of entire class. This can be achieved by trying to address each side of each learning style dimension at least some of the time in a class. When a large number of students in a class has a specific preference but their needs are not being addressed, teaching should be modified in their favor. This is applicable to the visual learners of this study who formed 47% of the sample in the input dimension.

Some of the strategies that appeal to a range of learning styles and applicable to present information in the preclinical lecture classes are: Make extensive use of diagrams, graphs, flow charts, photographs, videos to cater to the needs of visual learners; lecture with written explanations and provide reading material to satisfy verbal learners; occasionally pause during a lecture to allow time for thinking and formulating questions to encourage reflective learners; assign brief group problem-solving exercises in class followed by question-answer session to motivate active learners; provide big picture or overview of the lesson perhaps by briefing about the disease before starting lecture for reaching the global and sensing learners.

Students having no preference would be expected to shift between categories readily. Fairly large number of our students had no learning preferences and this finding especially over sequential/global, and sensing/intuitive dimensions are quite encouraging because students who had no preferences would also be as comfortable as sequential and intuitive learners with the existing teaching and learning situation. We noticed our students’ learning style preferences to be different from that of other studies.

The findings of this study need not be applicable to students of other years of medical training or students of other medical schools in the country. However, the study findings served a motive to further explore the association of students’ learning style preferences with their academic performance, the effectiveness of modifying the instructional methods congruent with students’ learning style preferences on their academic progress, and to learn the longitudinal variations in the learning style preferences of students.

**CONCLUSION**

This study helped students to gain insight into one’s own learning style strengths and areas of improvement in relation to the prevailing learning environment. The study findings encouraged teachers to introspect into one’s own teaching style and be mindful about variabilities in the learning styles within the classroom. The information provided by the study can potentially be utilized by students and teachers to enhance their educational experiences.

**REFERENCES**


How to cite this article: Panambur S. Learning Style Preferences of Second-year Medical Students in Oman. Int J Sci Stud 2017;5(4):7-9.

Source of Support: Nil, Conflict of Interest: None declared.
Clinical Spectrum of Presentation of Obstructive Jaundice in Inflammation, Stone Disease, and Malignancy

R Selvasekaran¹, G Nagalakshmi², Heber Anandan³

¹Assistant Professor, Department of Medical Gastroenterology, Tirunelveli Medical College, Tirunelveli, Tamil Nadu, India, ²Assistant Professor, Department of General Surgery, Tirunelveli Medical College, Tirunelveli, Tamil Nadu, India, ³Senior Clinical Scientist, Department of Clinical research, Dr. Agarwal’s Healthcare Limited, Tirunelveli, Tamil Nadu, India

Abstract

Introduction: The initial evaluation of obstructive jaundice involves distinguishing intrahepatic and extrahepatic biliary obstruction. Clinical data such as history, physical examination, and laboratory tests have been shown to accurately identify up to 90% of patients whose jaundice is caused by extrahepatic obstruction.

Aim: The aim of the study is etiological spectrum, treatment outcome of obstructive jaundice.

Materials and Methods: This prospective observational study was conducted in the Department of General Surgery, Tirunelveli Medical College Hospital. Patients of any age or sex admitted with complaints of jaundice, clinically and biochemically diagnosed to have obstructive jaundice were included in the study.

Results: Cholelithiasis accounts for about 22% of the overall etiology of obstructive jaundice and about 73.3% of the benign causes. Periampullary carcinoma appears to be the most common cause accounting for 34% of malignancies. Mortality due to the disease is 3% morbidities are 6% in overall population included in the study. Most of them who had malignant cachexia also had ascites.

Conclusion: The most common benign etiology was cholelithiasis. Ultrasonography of the abdomen is very accurate in diagnosing the presence of obstruction to the biliary tree, easily available, and cost-effective but operator dependant. Computed tomography abdomen is reliable in confirming the diagnosis and determining the level of obstruction.

Key words: Cholestasis, Gallstones, Klatskin tumor, Obstructive jaundice

INTRODUCTION

Disorders of the biliary tract affect a significant portion of the worldwide population, and the overwhelming majority of cases are attributable to cholelithiasis (gallstones). In the United States, 20% of persons older than 65 years have gallstones, and 1 million newly diagnosed cases of gallstones are reported each year.¹ Biliary obstruction refers to the blockage of any duct that carries bile from the liver to the gallbladder or from the gallbladder to the small intestine. This can occur at various levels within the biliary system. The major signs and symptoms of biliary obstruction result directly from the failure of bile to reach its proper destination.² The clinical setting of cholestasis or failure of biliary flow may be due to biliary obstruction by mechanical means or by metabolic factors in the hepatic cells. For the sake of simplicity, the primary focus of this article is mechanical causes of biliary obstruction, further separating them into intrahepatic and extrahepatic causes. Stone disease is the most common cause of obstructive jaundice.³ Gallstones may pass through the common bile duct (CBD) and cause obstruction and symptoms of biliary colic and cholecystitis. Larger stones can become lodged in the CBD and cause complete obstruction, with increased intraductal pressure throughout the biliary tree. Mirizzi syndrome is the presence of a stone
impacted in the cystic duct or the gallbladder neck, causing inflammation, and external compression of the common hepatic duct and thus, biliary obstruction. Of biliary strictures, 95% are due to surgical trauma and 5% are due to external injury to the abdomen or pancreatitis or erosion of the duct by a gallstone. Stone disease is the most common cause of biliary strictures in patients who have not undergone an operation. A tear in the duct causes bile leakage and predisposes the patient to a localized infection. In turn, this accentuates scar formation and the ultimate development of a fibrous stricture. Primary pancreatobiliary tract cancers and other local cancers that can cause compression of the biliary tract (e.g., liver, gallbladder) account for approximately 80,000 new cancer cases and an estimated 58,000 deaths in the United States.

Despite advances in diagnosis and treatment, the 5-year survival rate of the most commonly encountered malignancies, pancreatic cancer, and cholangiocarcinoma, remains dismal at <5%. Malignant biliary tract obstruction can also arise from gallbladder, duodenal, and ampullary cancers; metastatic cancers; or malignant lymphadenopathy.

**Aim**
The aim of the study is etiological spectrum, treatment outcome of obstructive jaundice.

**MATERIALS AND METHODS**

This prospective observational study was conducted in the Department of General Surgery, Tirunelveli Medical College Hospital. Institutional review board approval and informed consent from patients were obtained. Patients of any age or sex admitted with complaints of jaundice and clinically and biochemically diagnosed to have obstructive jaundice were included in the study.

**RESULTS**

The study comprised 50 patients with obstructive jaundice. The most common age group affected with obstructive jaundice in my study is 50-60 years. There is a male preponderance with about 56% of the affected patients being male (Table 1). Among 50 cases studied, 15 cases had a benign etiology and 35 cases had a malignant etiology accounting for 70%. This shows the high morbidity and mortality of the disease (Table 2).

The most common complaint was yellowish discoloration of skin and sclera accounting for 54%. Some patients had two chief complaints in combination such as abdominal pain and vomiting in malignancies (Table 3). Choledocholithiasis accounts for about 22% of the overall etiology of obstructive jaundice and about 73.3% of the benign causes (Table 4).

Periampullary carcinoma appears to be the most common cause accounting for 34% of malignancies (Table 5).

All the cases showed dilatation of intrahepatic biliary radicles. About 64% of cases had CBD dilatation in ultrasonography (USG). Both it revealed intrahepatic biliary radical (IHBR) and CBD dilatation was present in 24 cases in USG (Table 6).

<table>
<thead>
<tr>
<th>Table 1: Distribution of age group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group</td>
</tr>
<tr>
<td>&lt;30</td>
</tr>
<tr>
<td>31-40</td>
</tr>
<tr>
<td>41-50</td>
</tr>
<tr>
<td>51-60</td>
</tr>
<tr>
<td>61-70</td>
</tr>
<tr>
<td>&gt;71</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Distribution of etiology of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Etiology</td>
</tr>
<tr>
<td>Benign</td>
</tr>
<tr>
<td>Malignant</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3: Distribution of symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
</tr>
<tr>
<td>Jaundice</td>
</tr>
<tr>
<td>Abdominal pain</td>
</tr>
<tr>
<td>Vomiting</td>
</tr>
<tr>
<td>Abdominal distension</td>
</tr>
<tr>
<td>Itching</td>
</tr>
<tr>
<td>Loss of appetite</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4: Distribution of benign etiology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benign etiology</td>
</tr>
<tr>
<td>Choledocholithiasis</td>
</tr>
<tr>
<td>CBD stricture</td>
</tr>
<tr>
<td>Choledochal cyst</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5: Distribution of malignant etiology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malignant etiology</td>
</tr>
<tr>
<td>Periampullary carcinoma</td>
</tr>
<tr>
<td>Carcinoma head of pancreas</td>
</tr>
<tr>
<td>Liver secondaries with portal hepatitis nodes</td>
</tr>
<tr>
<td>Cholangiocarcinoma</td>
</tr>
<tr>
<td>D2 duodenal carcinoma</td>
</tr>
<tr>
<td>Klatskin tumor</td>
</tr>
<tr>
<td>Gallbladder carcinoma</td>
</tr>
</tbody>
</table>
Computed tomography (CT) abdomen both plain and contrast was done for all cases. It identified the etiology of obstruction in all the 50 cases. Other features such as ascites and lymphadenopathy were also noted. Thus, CT has better accuracy in identification of cause than USG (Table 7).

Mortality due to the disease is 3% of morbidities and 6% in overall population included in the study. Most of them who had malignant cachexia also had ascites (Table 8).

About 25 cases were treated surgically accounting for 50%. Other 32% were given palliative therapy in the form of chemotherapy and 2 cases received ascitic fluid tapping (Table 9).

About 44% cases were treated with triple bypass for biliary drainage and gastrointestinal drainage. 44% were treated with choledocholithotomy and choledochoduodenostomy for stone disease (Table 10).

Most of the cases were inoperable accounting for about 35% and they were treated with palliative therapy. Operated cases presented with other complications (Table 11).

**DISCUSSION**

The most common age group affected with obstructive jaundice appears to be 50-60 years of age accounting to about 38% and the mean age group affected is 52.5 years - youngest being 20 years and eldest being 85 years. The next most common age group appears to be 40-50 years and 60-70 years with 24% and 16%, respectively. Thus, it appears to be a disease of elderly age group. The most commonly affected sex is male. In my study, among the 50 cases, 28 patients are male accounting to about 56%. Malignant disease appears to be most common in elderly males. About 22 cases, among 28 are affected by malignant obstructive jaundice. The ratio of male:female appears to be 1.3:1 in our setup. This correlates with the study of Verma et al. in which the male:female ratio was 1.3:1 (56%:44%) and the most commonly affected age group was 50-60 years (mean age affected 50.4 years). The most common chief complaint appears to be yellowish discoloration of skin and sclera, i.e., jaundice in about 54% of patients. The next most common complaint is abdominal pain accounting to about 40%. Some patients have two complaints in combination such as abdominal pain and vomiting. Among the 8 cases with abdominal pain and vomiting, 5 are due to malignant etiology indicating outlet obstruction and 3 are due to benign etiology. Abdominal pain is present in most of the cases with stone disease. This goes with Siddique et al.’s study where abdominal pain was most common in benign disease (accounting to 51.66%). Abdominal distension is present in patients with ascites with advanced malignancy. Itching is present in 4% of cases and indicates deposition of bile

---

**Table 6: USG features**

<table>
<thead>
<tr>
<th>Sign</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBD dilatation</td>
<td>30 (64)</td>
</tr>
<tr>
<td>Growth</td>
<td>14 (30)</td>
</tr>
<tr>
<td>Stones</td>
<td>3 (6)</td>
</tr>
</tbody>
</table>

CBD: Common bile duct, USG: Ultrasonography

**Table 7: CT abdomen**

<table>
<thead>
<tr>
<th>Sign</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biliary tract dilatation</td>
<td>9 (30)</td>
</tr>
<tr>
<td>Ascites</td>
<td>10 (33)</td>
</tr>
<tr>
<td>Lymphadenopathy</td>
<td>11 (37)</td>
</tr>
</tbody>
</table>

CT: Computed tomography

**Table 8: Morbidity and mortality caused by obstructive jaundice**

<table>
<thead>
<tr>
<th>Morbidity and Mortality</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cachexia</td>
<td>25 (29)</td>
</tr>
<tr>
<td>Ascites</td>
<td>31 (36)</td>
</tr>
<tr>
<td>Liver secondaries</td>
<td>13 (15)</td>
</tr>
<tr>
<td>Anorexia</td>
<td>8 (9)</td>
</tr>
<tr>
<td>Goo</td>
<td>5 (6)</td>
</tr>
<tr>
<td>Cholangitis</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Death</td>
<td>3 (3)</td>
</tr>
</tbody>
</table>

**Table 9: Treatment given**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgery</td>
<td>25 (50)</td>
</tr>
<tr>
<td>Palliative treatment</td>
<td>16 (32)</td>
</tr>
<tr>
<td>Referral</td>
<td>6 (12)</td>
</tr>
<tr>
<td>Non-compliance</td>
<td>3 (6)</td>
</tr>
</tbody>
</table>

**Table 10: Type of surgery**

<table>
<thead>
<tr>
<th>Surgery</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triple bypass</td>
<td>11 (44)</td>
</tr>
<tr>
<td>Choledocholithotomy and choledochoduodenostomy</td>
<td>11 (44)</td>
</tr>
<tr>
<td>Other bypass procedures</td>
<td>3 (12)</td>
</tr>
</tbody>
</table>

**Table 11: Treatment complications**

<table>
<thead>
<tr>
<th>Complications</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uneventful</td>
<td>24 (48)</td>
</tr>
<tr>
<td>Inoperability</td>
<td>13 (26)</td>
</tr>
<tr>
<td>Biliary gastritis</td>
<td>8 (16)</td>
</tr>
<tr>
<td>Wound infection</td>
<td>4 (8)</td>
</tr>
<tr>
<td>Death</td>
<td>1 (2)</td>
</tr>
</tbody>
</table>

where abdominal pain was most common in benign disease (accounting to 51.66%). Abdominal distension is present in patients with ascites with advanced malignancy. Itching is present in 4% of cases and indicates deposition of bile
salts and bile pigments in nerve endings. These patients were treated with cholestyramine which acts as a bile acid sequestrant. The other complaint is loss of appetite which indicates mucosal edema of the gastrointestinal tract and growth causing outlet obstruction. Among the 50 cases studied 35 have malignant etiology accounting to about 70%. Only 30% have a benign etiology. This indicates the high morbidity and mortality of the disease. Most of the cases presented with advanced malignancy and most of the cases were elderly males. This correlates with accuracy to the study of Siddique et al. who have stated that malignancy was the most common cause (occurring 56.6% of the patients in his study). The most common benign etiology appears to be choledocholithiasis accounting for about 22% of the overall etiology and 73.3% of the benign etiology. Among the 11 cases with choledocholithiasis, 8 cases were females indicating the high prevalence of stone disease in females. 3 cases presented with benign stricture. 2 had distal CBD stricture; among which one underwent triple bypass and one underwent biliary bypass. One had a history of previous surgery and had a proximal CBD stricture and was referred to higher center as hepatic bypass could not be done in our setup. One patient was diagnosed to have choledochal cyst and was referred to higher center for further management. The most common malignant etiology appears to be periampullary carcinoma in my study. About 24% of the malignant etiology and 34% of the overall etiology of obstructive jaundice appears to be periampullary carcinoma. Among the 12 cases, 5 were treated with triple bypass and rest 7 were treated with palliative therapy. The next most common malignancy appears to be carcinoma head of pancreas. Among the 7 cases, 4 underwent triple bypass and 3 received palliative chemotherapy. Liver secondaries with porta hepatitis nodes were found to be the cause in 6 cases accounting to 12%. Among them, 2 had primary in the stomach and received palliative chemotherapy. One had primary in the breast and received palliative chemoradiotherapy. Rest 3 had unknown primary. They were treated with Tru-cut biopsy and appropriate chemotherapy according to the histology. Among the 5 cases with cholangiocarcinoma 1 was treated with surgery. 2 cases with duodenal carcinoma were treated with gastrointestinal bypass surgery. Other causes for malignant obstructive jaundice are Klatskin tumor and gallbladder carcinoma accounting to 4% and 2%, respectively. USG of abdomen was done in all cases. Intra hepatic biliary radicles dilatation in all cases and CBD dilatation in 64% of cases. 24 cases showed dilatation of both IHBR and CBD. Thus, ultrasound has a high sensitivity in diagnosing the presence of obstruction to biliary tree and helps in confirmation of diagnosis. However, results are operator dependant. Among the 35 cases with malignant disease USG was able to detect the growth in 14 cases, and among the 15 cases with benign disease, USG was able to detect the presence of stones in CBD in 3 cases. According to Bonheur et al. study, US is the procedure of choice for the initial evaluation of cholestasis and for helping differentiate extrahepatic from intrahepatic causes of jaundice. Even Assi et al. study stated that - USG should be the first and best initial imaging procedure in patients who have obstructive jaundice. CT Abdomen with both plain and contrast was done in all cases. It was able to diagnose the presence of obstructive jaundice and etiology of obstruction to biliary tree in almost all cases. It was able to diagnose the presence of ascites in 10 cases and lymphadenopathy in 11 cases. Thus, CT was found to be more sensitive and specific than USG. According to Bonheur et al. study - traditional CT scan is usually considered more accurate than US for helping determine the specific cause and level of obstruction. The important morbidity of the disease was found to be malignant cachexia found in 25 among the 35 cases with malignant etiology. Ascites was present in about 36% cases. Most of the cases with malignant cachexia had ascites. Most of them had controlled ascites. 2 cases had uncontrolled ascites and underwent repeated tapping. The next most common morbidity is liver secondaries due to advanced malignancy. 13 cases had this complication even at the time of presentation. Among them, 6 cases had liver secondaries with porta hepatitis nodes causing obstruction to biliary tree with primary elsewhere and rest had primary in the biliary tree such as periampullary region, head of pancreas, and Klatskin tumor with liver secondaries occurring due to advancement of disease. The other morbidities are anorexia, gastric outlet obstruction, and cholangitis. Mortality occurred in 3 cases. One with cholangiocarcinoma - patient underwent triple bypass and patient expired post-operatively. One with advanced carcinoma head of pancreas. Patient received palliative chemotherapy. One with metastatic carcinoma breast with liver secondaries and porta hepatitis nodes. Patient received palliative chemoradiotherapy and patient expired. The mortality rate is 6% of the cases. About 50% were treated with surgery indicating the availability of surgical therapy for the disease. However, many received only bypass procedures as surgical treatment due to the severity of the disease. 11 cases were treated with triple bypass; another 11 were treated with CBD exploration and choledochoduodenostomy for stone disease; 3 cases were treated with other types of bypass procedures for D2 duodenal carcinoma and biliary stricture. About 32% received palliative treatment such as chemotherapy, radiotherapy, and ascitic fluid tapping. Another 12% were referred to higher center, and 6% were non-compliant to treatment.

About 44% cases were treated with triple bypass for biliary drainage and gastrointestinal drainage. 44% were treated...
with choledocholithotomy and choledochoduodenostomy for stone disease. 12% were treated with other bypass procedures. Most common complication was inoperability as most patients presented to our hospital with advanced malignancy such as periampullary carcinoma, CA head of pancreas, cholangiocarcinoma, and porta hepatitis nodes and were given only palliative therapy. 16% presented with biliary gastritis post-operatively and were treated with sucralfate syrup. 8% had wound infection and were treated with culture, sensitivity, and appropriate antibiotics. 48% were discharged with good general condition. 13 cases which were operated did not have any complications. Verma et al. study has stated that -malignant obstructive jaundice is predominant in males compared to females. Benign obstruction is seen at a comparatively younger age group compared to malignant. Bhargava et al. study proved the same that ultrasound was found to be the preliminary investigation of choice for the diagnosis of the presence of obstruction and to some extent the level of obstruction.

CONCLUSION

Obstructive jaundice was found to affect male population most commonly and most commonly elderly age group with 50-60 years being 38% affected in my study. Malignancy was found to most commonly affect elderly male patients. The most common complaint was found to be jaundice in about 54%. Abdominal pain was the most common complaint in benign stone disease which affected females more. The most common etiology was found to be malignancy affecting about 70% of cases. Periampullary carcinoma was the most common malignancy accounting for 24% of the overall etiology. The most common benign etiology was choledocholithiasis with 73.3% of the benign etiology. USG of the abdomen is very accurate in diagnosing the presence of obstruction to the biliary tree, easily available, and cost-effective but operator dependant. CT abdomen is reliable in confirming the diagnosis and determining the level of obstruction. In malignancies, it gives information also about the operability of the tumor. The most common morbidity is malignant cachexia and ascites. Mortality rate in my study is about 6% all with advanced malignancy even at the time of presentation. 48% of the cases did not have any treatment complications among which 13 cases were treated by surgery. Thus, surgery is the best modality of treatment in all operable cases at the time of presentation, and bypass procedures have less post-operative morbidity and mortality.

REFERENCES

Comparative Study between Middle Meatal Antrostomy with and without Partial Middle Turbinectomy in Patients with Chronic Sinusitis

Aswathi Gopi¹, M B Nishant², K B Rajamma³

¹Resident, Department of ENT, Sree Gokulam Medical College and Research Foundation, Trivandrum, Kerala, India, ²Assistant Professor, Department of ENT, Sree Gokulam Medical College and Research Foundation, Trivandrum, Kerala, India, ³Professor, Department of ENT, Sree Gokulam Medical College and Research Foundation, Trivandrum, Kerala, India

Abstract

Background and Objective: Background and objective of the study were to compare between the outcome of middle meatal antrostomy with and without partial middle turbinectomy.

Materials and Methods: A total of 30 patients satisfying the inclusion criteria with chronic rhinosinusitis were taken as the study population. The study period was from December 2014 to October 2016. In each patient, one side was randomly taken as control (Group 1) and another side as a case (Group 2). Group 1 - underwent middle meatal antrostomy without partial middle turbinectomy. Group 2 - underwent middle meatal antrostomy with partial middle turbinectomy. Patients were followed up after 1, 3, and 6 weeks and 6 months after surgery. Evaluation and comparison were done between case and control groups regarding post-operative symptom relief, patency of middle meatal antrostomy and occurrence of synechiae.

Results: This study showed that after 6 months follow-up, 36.7% had persisting nasal discharge in Group 1 and 30.0% in Group 2. After 6 months follow-up, 50.0% had persisting nasal obstruction in Group 1 compared with 30% in Group 2. After 6 months follow-up, 70% patients included in Group 1 had patent methyl methacrylate (MMA) when compared to 83.3% in patients in Group 2, and 26.7% had synechiae in Group 1 postoperatively when compared to 3.3% in patients who had undergone MMA with partial middle turbinectomy (Group 2). Improvement in nasal obstruction and occurrence of synechiae was found to be statistically significant ($P = 0.047$ and 0.039, respectively).

Conclusion: This study concludes that partial middle turbinectomy can result in significant post-operative symptomatic relief and reduce the incidence of synechiae formation and thus help in improving surgical outcomes in patients with chronic rhinosinusitis.

Key words: Chronic rhinosinusitis, Functional endoscopic sinus surgery, Middle meatal antrostomy, Partial middle turbinectomy

INTRODUCTION

Chronic rhinosinusitis is one of the common conditions for which a patient seeks care from an otorhinolaryngologist. The disease affects a major proportion of the population worldwide and causes significant physical symptoms and emotional impairment adversely affecting the quality of life.

In this era, functional endoscopic sinus surgery (FESS) is widely used for the surgical management of chronic sinusitis. However, resection or preservation of middle turbinate in the absence of above-mentioned indicators during endoscopic sinus surgery is a matter of conflict. Those who oppose resection are in the opinion that, middle turbinate is an important anatomic and physiologic structure and unnecessary resection will lead to loss of landmark for future surgeries and causes increase post-operative complication. The other group who favor resection of turbinate is in the opinion that resection will cause improved visualization and decreases the chance of turbinate lateralization, formation of synechiae and stenosis of middle meatal antrostomy.

This study is hence undertaken to assess whether partial middle turbinectomy with middle meatal antrostomy has
any effect on symptomatic relief, post-operative healing and any reduction of complications in patients with chronic rhinosinusitis.

**Objective**
To compare between the outcome of middle meatal antrostomy with and without partial middle turbinectomy.

**MATERIALS AND METHODS**
A prospective study of 30 patients with clinical diagnosis of rhinosinusitis, computed tomography (CT) paranasal sinuses (PNS) showing disease in bilateral maxillary sinus and osteomeatal complex, not responding to routine medical line of treatment was done in the Department of ENT, Sree Gokulam Medical College and Research Foundation from December 2014 to October 2016. Patients having symptoms and signs of chronic maxillary sinusitis with CT scan PNS showing disease in maxillary sinus and osteomeatal complex was selected. Patients with concha bullosa and paradoxical curvature of middle turbinate were excluded. Each patient was explained about the study, and written consent was taken from all the participants in the study population for the planned surgery. A detailed history was taken, and clinical examination was done. Routine blood examination and CT paranasal sinus axial and coronal cuts were taken. Each patient was given a score according to Lund-Mackey scoring of CT paranasal sinus tabulated. For this study, a score of 1 or above was considered abnormal. All patients were preoperatively evaluated with diagnostic nasal endoscopy. Each patient was given a score according to Lund-Mackey endoscopic scoring system. Score for each side was summed up. For this study, a score of 1 or above was considered to be abnormal.

**RESULTS AND ANALYSIS**
In this study, data regarding sociodemographic variables such as age and sex were collected. The mean age of the study population was 38.37 ± 12.31 years. The percentage of males (56.7%) were found to be more when compared to females (43.3%).

Majority of the study population presented with nasal obstruction (70%) followed by headache (53.3%), nasal discharge (50%), postnasal discharge (46.7), sneezing (30), hyposmia (30%), facial pain (30%), dental pain (16.7), halitosis (16.7), epistaxis (23.3), and pain around eyes (13.3%).

The mean score according to Lund-Mackey scoring of CT paranasal sinus was calculated as 5.57. The mean score according to Lund-Mackey endoscopic scoring system was 2.47.

**Comparison of Post-operative Symptom Relief**

**Nasal discharge**
Postoperatively, after 1 week follow-up, 93.3% had nasal discharge in patients who had undergone methyl methacrylate (MMA) without partial middle turbinectomy (Group 1), when compared to 90.0%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 3 weeks follow-up, 73.3% had nasal discharge in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 66.7%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 weeks follow-up, 53.3% had nasal discharge in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 46.7%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 months follow-up, 36.7% had nasal discharge in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 30.0%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). The results are graphically represented in Graph 1.

**Nasal obstruction**
Postoperatively, after 1 week follow-up, 93.3% had nasal obstruction in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 90.0%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 3 weeks follow-up, 73.3% had nasal obstruction in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 63.0%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 months follow-up, 57.0% had nasal obstruction in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 47.0%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 months follow-up,
50.0% had nasal obstruction in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 30%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). The results are graphically represented in Graph 2.

**Patency of Osteomeatal Complex**

Postoperatively, after 1 week follow-up, all patients who had undergone MMA without partial middle turbinectomy (Group 1), and patients who had undergone MMA with partial middle turbinectomy (Group 2) had score 0 for patency of MMA. After 3 weeks follow-up, 10.0% had score 1 in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 10.0%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 weeks follow-up, 16.7% had score 1 in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 10.0%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 months follow-up, 30.0% had score 1 in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 16.7%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). The results are graphically represented in Graph 3.

**Synechiae**

Postoperatively, after 1 week follow-up, all patients who had undergone MMA without partial middle turbinectomy (Group 1), and patients who had undergone MMA with partial middle turbinectomy (Group 2) had score 0 for synechiae. After 3 weeks follow-up, 3.3% had score 1 in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to nil, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 weeks follow-up, 6.7% had score 1 in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to nil, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 months follow-up, 26.7% had score 1 in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 3.3%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). The results are graphically represented in Graph 4.

**DISCUSSION**

Chronic rhinosinusitis is a common health problem affecting a significant proportion of the population.

Pathogenesis of sinusitis was a point of interest from the 17th century onward. Zuckerkandl in early 19th century anatomically described PNS in detail and demonstrated the pathologies affecting it. Schneider suggested that mucous was secreted by the lining mucosa of PNS.

Transnasal sinus surgery began in 1886 when Miculitz reported on the endonasal fenestration of the maxillary sinus.
Later on, the anterior wall of the maxillary sinus was opened by surgeons through the canine fossa and was kept open for irrigation.\cite{2} Caldwell (1893), Spicer (1894) and later Luc in 1897 closed the canine fossa incision after an intranasal antrostomy and the removal of the infected mucosa.\cite{2}

Introduction of nasal endoscopy has revolutionized the treatment of chronic sinusitis. Hirschmann in 1901 used modified cystoscope to examine sinonasal cavity.\cite{3} Reichert in 1902 performed the first endoscopic sinus surgery using an endoscope to eradicate maxillary sinusitis, through the oroantral fistulae. Maltz in 1925 encouraged the use of endoscope for evaluation of sinonasal cavity. Hopkins invented the rod endoscope in 1950 following which, many surgeons used it for sinonasal surgery.\cite{3} Messeklinger in 1978 described the role of osteomeatal complex in the pathogenesis of maxillary sinusitis and he introduced the concept of FESS. Stammberger popularized this technique. Further development in FESS, was done by David Kennedy and Jim Zinreich after the implementation of modern imaging.

The invention and use of nasal endoscopy revolutionized the treatment of chronic sinusitis.

In this era, endoscopic sinus surgery is the most popularly used technique for the treatment of chronic rhinosinusitis with a history of failed medical treatment.

FESS is a minimally invasive technique which helps to eradicate the diseased mucosa improves ventilation of paranasal sinus and improves nasal occlusion clearance of mucus. Endoscope permits a better view of surgical field, more precise clearance of diseased mucosa and when compared to other conventional surgeries, it has fewer complications and a lower rate of recurrence. In spite of the advantages of FESS over other conventional techniques, the disease can persist after surgery. Recurrence of disease is mainly due to persisting anatomical obstruction and abnormal mucociliary clearance.

Various studies were conducted regarding the factors responsible for failure of FESS. Stenosis of natural ostium of maxillary antrum and formation of synechiae were found to be the major contributing factors causing recurrence of disease after FESS. Host factors such as duration of wound healing and proper post-operative management also decide the success rate of surgery.

The role of partial middle turbinectomy with FESS has been a matter of controversy. While some groups suggest that middle turbinate is an important landmark for future procedures and thus should be preserved, another group is of the opinion that resection of middle turbinate can help in getting a better view of surgical field, lower incidence of turbinate lateralization and better outcome.

A study conducted by El-Nasser showed that middle turbinectomy in nasal patients with rhinogenic headache can significantly reduce the symptom and thus gives better outcome.\cite{4}

A study was conducted by Ahmed-Hussien on the effect of nasal airflow resistance after middle turbinectomy. The study showed that when these two surgical techniques, i.e., FESS with preserved middle turbinate and FESS with resected middle turbinate were compared regarding mean post-operative nasal airway resistance, the study showed no significant statistical difference ($t$-test $P > 0.5$).\cite{5}

This study was intended to assess the role of partial middle turbinectomy with MMA in patients with chronic rhinosinusitis. 30 patients with bilateral chronic sinusitis were selected in this study. In each side, one side underwent MMA without partial middle turbinectomy, and the other side had MMA with partial middle turbinectomy. This was done to reduce the confounding factors such as nature of tissue reaction and immunological etiology.

In this study, data regarding sociodemographic variables such as age and sex were collected. The mean age of the study population was 38.37 ± 12.31 years. The percentage of males (56.7%) were found to be more when compared to females (43.3%).

Majority of the study population presented with nasal obstruction (70%) followed by headache (53.3%), nasal discharge (50%), postnasal discharge (46.7), sneezing (30%), hyposmia (30%), facial pain (30%), dental pain (16.7), halitosis (16.7), epistaxis (23.3), and pain around eyes (13.3%). A study conducted by Gulati et al. showed that the majority of the study group presented with nasal discharge (75%), followed by postnasal discharge (67.5%), nasal discharge (57.5%), headache (57.5%), and sneezing (45%).

The post-operative outcome in the two groups, patients who had undergone MMA without partial middle turbinectomy (Group 1), and patients who had undergone MMA with partial middle turbinectomy (Group 2) were assessed both subjectively and also by check endoscopy at fixed intervals of time.

This study shows that after 6 months follow-up, 63.3% had an improvement for nasal discharge postoperatively in patients who had undergone MMA without partial middle turbinectomy (Group 1) and 70% had an improvement.
for the same in patients who had undergone MMA with partial middle turbinectomy (Group 2). The $P$ value was 0.687 and showed that post-operative improvement for nasal discharge after partial middle turbinectomy was statistically not significant. A study conducted by Santosh et al. showed that, after 6 months follow-up, 20 out of 50 (40%) patients who had undergone MMA with partial middle turbinectomy had improvement for nasal discharge postoperatively when compared to 10 out of 50 (20%) patients who had undergone MMA without partial middle turbinectomy ($P = -0.029$).\(^6\)

The difference in result could be on account of subjective assessment of nasal discharge in this study against endoscopic assessment only in the study conducted by Santosh et al.

This study also assessed the improvement in nasal obstruction after partial middle turbinectomy. After 6 months follow-up, 50\% had improvement for nasal obstruction postoperatively in patients who had undergone MMA without partial middle turbinectomy (Group 1), and 70.0\% had an improvement for the same, in patients who had undergone MMA with partial middle turbinectomy (Group 2). The $P$ value was 0.047 and thus showed that post-operative improvement for nasal obstruction after partial middle turbinectomy was statistically significant.

A study conducted by Gulati et al. showed that, after follow-up, 50\% patients who had undergone MMA without partial middle turbinectomy had improvement for nasal obstruction when compared to 88\% in patients who had undergone MMA with partial middle turbinectomy ($P < 0.01$).\(^7\) Our findings confirm to the findings of the study conducted by Gulati et al.

Patency of middle meatal antrostomy was compared between the two groups. This study showed that, after 6 weeks follow-up, 83.3\% in patients who had undergone MMA without partial middle turbinectomy (Group 1) had patent MMA when compared to 90\% in patients who had undergone MMA without partial middle turbinectomy (Group 2).\(^7\) The $P$ value was 0.01 which showed statistical significance. The difference in findings is probably due to different methods used in assessment of width of MMA.

This study compared the rate of synechiae formation postoperatively between the two groups. It showed that after 6 months follow-up, 26.7\% had synechiae in patients who had undergone MMA without partial middle turbinectomy (Group 1) when compared to 3.3\% in patients who had undergone MMA with partial middle turbinectomy (Group 2). The $P$ value was 0.039 and found to be statistically significant.

A study conducted by Santosh et al. showed that after 6 months follow-up, 25\% had synechiae in patients who had undergone MMA without partial middle turbinectomy (Group 1) when compared to 5\% in patients who had undergone MMA with partial middle turbinectomy (Group 2). The $P$ value was <0.01.\(^6\)

Both studies show that the reduction in synechiae formation is a significant factor in post-operative periods of patients with MMA with partial middle turbinectomy.

In this study, patients who had undergone MMA with partial middle turbinectomy showed better post-operative symptomatic relief in nasal discharge and nasal obstruction when compared with patients who had undergone MMA without partial middle turbinectomy. The study also showed that MMA patency was improved in patients with resected middle turbinate when compared with preserved middle turbinate. The formation of synechiae postoperatively was significantly reduced in patients who had undergone MMA without partial middle turbinectomy.

**CONCLUSION**

This study was conducted to compare the outcome between middle meatal antrostomy with and without middle turbinectomy in patients with bilateral chronic sinusitis. The parameters assessed were post-operative symptom relief for nasal discharge and nasal obstruction, patency of MMA and synechiae formation assessed endoscopically. All the parameters showed improvement after MMA with partial middle turbinectomy when compared to MMA without partial middle turbinectomy. Two parameters, post-operative symptomatic relief of nasal obstruction and formation of synechiae was found to be statistically significant and in agreement with other similar studies. Nasal discharge and MMA patency, though improved, was not found to be statistically significant.
This study concludes that partial middle turbinectomy can result in post-operative symptomatic relief and significantly reduce the incidence of synechiae formation postoperatively and thus help in improving long-term surgical outcomes in patients with chronic rhinosinusitis.

REFERENCES

Clinical Analysis of Diabetic Retinopathy in Type 2 Diabetic Patients and its Correlations with Biochemical Parameters

B Pramila, N Sharmila
Associate Professor, Department of Ophthalmology, Government Vellore Medical College, Vellore, Tamil Nadu, India

Abstract

Introduction: Diabetic retinopathy, a microvascular complication of diabetes is one of the major tragedies in ophthalmology. It still remains among the leading cause of preventable blindness in the developing and developed worlds.

Aim: To correlate the metabolic changes with clinical manifestations of diabetic retinopathy.

Materials and Methods: A total of 55 diabetic patients between the age group of 40 and 70 years who attended ophthalmology OP of Government Vellore Medical College from April 2016 to April 2017 were included in the study. We recorded all their biochemical parameters, and detailed ophthalmic examination was done. The data were analyzed statistically by simple proportion

Results: Out of the 55 patients 35 patients had retinopathy and was found to be more in males and the age group of 40-60 years. Patients with high mean fasting blood sugar levels had a higher incidence of retinopathy. Similarly, patients with high glycosylated hemoglobin (HbA1c) had a higher risk of retinopathy. Patients with low mean total protein level and cholesterol levels above the normal values had a higher risk of retinopathy.

Conclusion: This study shows a male preponderance and the most common age group being 40-60 years. Of all the parameters, poor metabolic control of diabetes as evidenced by a high fasting blood sugar and a high HbA1c along with hyperlipidemia are the significant changes which can precipitate diabetic retinopathy.

Key words: Biochemical parameters, Diabetic retinopathy, Type 2 diabetes

INTRODUCTION

Diabetes mellitus is one of the common medical problems in the developing and developed world.

Fundamentally, diabetes mellitus is an abnormality of blood glucose metabolism due to altered insulin production or activity, clinically manifested by elevated blood levels of glucose in the blood. Diabetes mellitus causes numerous long-term systemic complications that have considerable associated morbidity.

Diabetic retinopathy, a retino-vascular complication of diabetes is one of the major tragedies of the ophthalmology in our present generation, always common and rapidly becoming still more common affecting the young as well as the aged predictable but not preventable and relatively untreatable chronic and progressive in its course, remains leading cause of blindness in the developing world.

Historical Review

The history of diabetes is as old as medicine. Susrutha in Indian medicine described diabetes as “honey urine.” Specific changes in ocular fundi were first described by Van Jaefer (1856) and later elaborated by Hirscherg (1890-91). Recent works have shown both clinically and histologically that retinopathy in diabetes is characteristic of that disease depending on the alteration in the walls of the capillaries accompanied by deposition of hyaline from which the typical appearance of microaneurysm hemorrhages and exudates results which mimic renal glomerular changes.
MATERIALS AND METHODS

A total of 55 diabetic patients within the age group of 40-70 years were included in the study.

A careful history was elicited from the patients regarding the duration of diabetes, diabetic control, and treatment. A thorough ophthalmic examination was done which included visual acuity measurement by Snellen’s chart, slit lamp examination to evaluate the anterior segment and fundus examination by indirect ophthalmoscopy, and slit lamp by microscopy. The following investigations were carried out in all patients:

1. Fasting blood sugar
2. Glycosylated hemoglobin (HbA1c)
3. Serum protein
4. Serum cholesterol
5. High-density lipoprotein cholesterol
6. Triglycerides
7. Low-density lipoproteins (LDLs).

RESULTS AND DISCUSSION

In this study, 55 visually symptomatic Type 2 diabetic individuals who attended Ophthalmology Department of Government Vellore Medical College from April 2016 to April 2017 were chosen. Type 1 diabetic patients were excluded from the study. Patients with diabetic nephropathy or any systemic illness were not included in the study.

Prevalence

Out of the 55 cases, 35 cases had retinopathy which shows a prevalence of 64%, may be taken as a prevalence of diabetic retinopathy in visually symptomatic individuals of Type 2 diabetes (Table 1).

Age Group

In this study, we found that the incidence of diabetic retinopathy is widely prevalent in the age group of 40-60 years. Risk of blindness increases with age of the patient (Table 2).

It was found that the incidence of diabetic retinopathy is more in males compared to females. In the WEDSR, UKPDS and other studies conducted men were found to be affected more when compared to women (Table 3).

Clinical Presentation

Among the 35 cases of diabetic retinopathy taken for study 18 of them had nonproliferative diabetic retinopathy (PDR) both severe and mild and 17 of them had proliferative diabetic retinopathy PDR. Among these 35 patients, 13 had maculopathy. All these diagnosis were confirmed after doing fundus fluorescein angiography (FFA). In FFA, 11 patients had an increase in foveal avascular zones, 16 patients had increased capillary drop out, and 12 patients had neovascularization over the disc, and 5 patients had neovascularization elsewhere (Table 4).

Biochemical Parameters

Fasting blood sugar

In diabetes without retinopathy, the mean fasting blood sugar level is 155.75 mg%. In diabetic retinopathy, the mean fasting blood sugar level is 204.97 mg%. This is statistically highly significant, P value being <0.05. This study proves that raised fasting blood sugar is an important determinant factor in occurrence of retinopathy. This study also correlates with similar studies conducted by Jackson et al. 1970, Hardin et al. 1956. The study was done by Pirart et al. also is in favor of good control (Table 5).

<table>
<thead>
<tr>
<th>Table 1: Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of cases</td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td>55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Age group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>&lt;40 years</td>
</tr>
<tr>
<td>40-60 years</td>
</tr>
<tr>
<td>60 years</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3: Sex ratio of diabetic retinopathy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
</tr>
<tr>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4: Clinical presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetic retinopathy</td>
</tr>
<tr>
<td>NPDR-mild</td>
</tr>
<tr>
<td>NPDR-severe</td>
</tr>
<tr>
<td>PDR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5: Fasting blood sugar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Mean±standard deviation</td>
</tr>
<tr>
<td>P value</td>
</tr>
</tbody>
</table>
HbA1c
The purpose of assessing the HbA1c is to have an idea about control of diabetes. In this study, the mean HbA1c level of the control group is 5.28% ranging from 4% to 8.5% in diabetes without retinopathy the mean HbA1c level is 8.19% ranging from 5% to 12.6%. In diabetic retinopathy, the mean HbA1c level is 7.61% ranging from 6% to 10.41%. Similar findings were found with studies by Kein et al. (1984), Gray et al. (1982) and Rand et al. (1984), and Nakayoshi et al. (1983).

In the WESDR – persons with poorer metabolic control as measured by higher HbA1c were found to be at a greater risk of having more frequent or severe retinopathy. Similar findings were noted by Krowlewki et al. Studies of twins suggest that increase HbA1c is not genetically determined but instead to the metabolic derangements. These studies indicate that to prevent hypoxic microvascular responses and in time, diabetic retinopathy it is necessary to regulate diabetes optimally by insulin, diet, and exercises to secure normoglycemia for as long periods as possible. This should decrease the formation of HbA1c in red cells. Regulation will also tend to increase level of plasma inorganic phosphate and formation of red cell 2-3 diphosphoglycerate (Table 6).4

Protein fractions
In diabetes without retinopathy, the mean total protein level is 6.735 g/100 ml. In diabetic retinopathy, it is 5.94 g/100 ml. There is a slight decrease the total protein value of diabetic retinopathy individuals when compared to those without retinopathy. This correlates with the study of Ditzel and Moniat who had established increased red blood cell aggregation due to the increase of fibrinogen and alpha-2 globulin with associated reduction of serum albumin and thereby lowering of the total protein level. Changes in serum proteins, lipoproteins, and protein bound carbohydrates in relation to pathologic alterations in the microcirculation of diabetic subjects (Table 7).5

Lipid profile
The total cholesterol levels in patients with retinopathy are 212 mg% and in patients without retinopathy are 206.55 mg% (Table 8).

With the above values, we can come to the conclusion that those with high cholesterol levels have 4 times higher risk of developing retinopathy. It shows that 68.2% of diabetic individuals with retinopathy have elevated cholesterol. This agrees with the previous studies which have shown generalized hypercholesterolemia, hypertriglyceridemia, and increase in LDLs in diabetics. Dornan et al. (1982) found PDR associated with raised cholesterol almost due to elevated LDL entirely. Mohan et al. (1984) studied Indian non-insulin dependent diabetes in Madras patients with diabetic maculopathy had higher cholesterol, especially LDL.

CONCLUSION
This study was conducted in a tertiary hospital in South India, and it shows male preponderance and most common age group of 40-60 years in this study the mean fasting blood sugar level was high which shows that increased fasting blood sugar level is an important determinant factor in the occurrence diabetic retinopathy. Cases with poor metabolic control measured by higher HbA1c were found to be at greater risk of having more frequent or severe retinopathy. A decrease in protein levels was found in patients with diabetic retinopathy. There were hypercholesterolemia and hypertriglyceridemia and a mild increase in LDLs in this study thereby showing that these changes do seem to play a major role in the development of retinopathy.

Diabetic retinopathy is an important devastating consequence of diabetes and a common cause of blindness in the developing and developed countries. Hence, early screening, regular follow-up and a good control of diabetes along with dietary habits and exercise can go a long way in the prevention of blindness due to diabetes.

REFERENCES
Pramila and Sharmila: Analysis of Correlation of Diabetic Retinopathy with Biochemical Parameters


Source of Support: Nil, Conflict of Interest: None declared.
Comparative Study between Intravenous Thiopentone Sodium and Propofol on the Recovery Profile of the Patients after Electroconvulsive Therapy

Santosh N Bodkhe¹, Roshan M Shende², Pankaj R Bhople¹, Sonal Agrawal³

¹Associate Professor, Department of Anesthesiology, SVNGMC, Yavatmal, Maharashtra, India, ²Assistant Professor, Department of Anesthesiology, SVNGMC, Yavatmal, Maharashtra, India, ³Junior Resident, Department of Anesthesiology, SVNGMC, Yavatmal, Maharashtra, India

Abstract

Introduction: The use of electroconvulsive therapy (ECT) to induce a generalized epileptic seizure was first described in 1938 and was performed without anesthesia for almost 30 years. Modification of treatment process, improvement in the anesthetic management, and greater attention to the preparation for emergencies have resulted in a high level of safety for ECT and its acceptance as a treatment in psychiatry.

Objectives: Objectives of the study were to study the recovery profile after electroshock in patients undergoing ECT with intravenous thiopentone sodium versus propofol.

Materials and Methods: This study was conducted on psychiatric patients (18-45 years), who belonged to the American Society of Anesthesiologists Grade I or II, and were already on medication. Each patient underwent a series of prescribed ECT. In this study, two treatment groups were included: ECT with thiopentone sodium (Group A) and ECT with propofol (Group B), as induction agents. A total 60 cases were included in the study. Un-paired t-test was applied for the analysis.

Results: No significant difference in the baseline value of oxygen saturation between the two groups. Duration of apnea was more in the propofol group; statistically not significant (P > 0.5). In the recovery profile, time taken for spontaneous eye opening was less in the propofol group; statistically not significant (P > 0.5). Time taken for verbal communication and phonation; for orientation of patient to name, place, and time; for patients sitting with support and sitting without support was less in the propofol group; statistically significant (P < 0.05). Mean sedation score was 2.40 with the thiopentone sodium group as against only 1.07 with the propofol group, and this difference was statistically significant.

Conclusions: Propofol was superior to thiopentone sodium with respect to recovery and side effects after ECT.

Key words: Electroconvulsive therapy, Propofol, Recovery profile, Thiopentone sodium

INTRODUCTION

The use of electroconvulsive therapy (ECT) to provoke a generalized epileptic seizure was first described in 1938 and was performed without anesthesia for almost 30 years.¹ The efficacy of ECT in alleviating an acute depression is dependent on the duration of the induced seizure.¹² Electroencephalographic (EEG) seizure activity lasting from 25 to 75 s allegedly produces the optimal antidepressant response. The patients experiencing initial seizure duration of 15 s (very short) or 120 s (very long) achieve a less favorable response to ECT.²³

Propofol is associated with less nausea and vomiting,⁴ faster emergence, better early psychomotor recovery, and better early cognitive recovery.⁵⁶ Initial concerns that
shorter seizures produced with propofol administration might compromise the efficacy, have not been empirically supported in the period immediately after ECT and have been offset by its demonstrated advantages.7,8

Thus, this study was undertaken to assess the recovery profile after electroshock in patients undergoing ECT with intravenous thiopentone sodium versus propofol.

MATERIALS AND METHODS

This was a prospective, randomized, single-blinded (patient), and noncrossover study. After obtaining clearance from the Institutional Ethics Committee, the study was carried out on psychiatric patients who attended the OPD and were hospitalized. This study was carried out on psychiatric patients, after clearance from the ethics committee. The patients belonged to the American Society of Anesthesiologists (ASA) Grade I or II and were already on medication for psychiatric disorder. A written valid informed consent was taken from the close relative of the patients, as the patients were mentally subnormal or having psychiatric disorder to understand nature and consequences of anesthesia and procedure. The study was conducted on adult patients in the age group of 18-45 years. Each patient underwent a series of prescribed ECT. In this study, two treatment groups were included: ECT with thiopentone sodium (Group A) and ECT with propofol (Group B), as induction agents. A total of 60 cases were included in the study. Inclusion criteria consisted of ASA Grade I and II (psychiatric patients without any major illness), age group of 18-45 years, no history of drug allergies or anaphylaxis while the exclusion criteria were: ASA Grade III or IV, age <18 years and >45 years, pregnancy, history of allergies and anaphylaxis. Anesthesia technique was standardized. The patient’s current medications were recorded and kept constant throughout the study. The following parameters were observed:

1. Fall in oxygen saturation.
2. Duration of seizures: Time from application of electrical stimulus to loss of clinical movement.
3. Duration of apnea: Time from induction of apnea by thiopentone sodium/propofol to the onset of first spontaneous post-ictal breath.
4. Time taken for spontaneous eye opening.
5. Time taken for verbal commands.
6. Time taken for phonation.
7. Time taken orientation in name, place and time.
8. Ability to sit with support.
9. Ability to sit without support.
10. Sedation score at the end 30 min:
    • 4: Asleep.
    • 3: Drowsy.
    • 2: Awake but not alert.
    • 1: Awake and alert.

Unpaired t-test was applied for the analysis of quantitative data and the following were considered: P > 0.05 - not significant, P < 0.05 - significant, P < 0.01 - very significant, P < 0.001 - highly significant.

RESULTS

Effect on Oxygen Saturation
The above data show that there was no significant difference in baseline value of oxygen saturation between the two groups. 2 min after ECT, fall in oxygen saturation was observed in both the groups but it was significant after 30 and 45 min (P < 0.5). However, the fall was not clinically relevant (Table 1).

Duration of Seizure
Seizure duration in the propofol group was less than the mean seizure duration in the thiopentone sodium group which was statistically extremely significant (P < 0.005) (Table 2).

Duration of Apnoea
Duration of apnea was more in the propofol group than the thiopentone sodium group. However, this was statistically not significant (P > 0.5) (Table 2).

Table 1: Comparison of SPO2 at various time intervals between Groups A and B

<table>
<thead>
<tr>
<th>TIME INTERVAL</th>
<th>SPO2</th>
<th>GROUP A Mean±SD</th>
<th>GROUP B Mean±SD</th>
<th>t-value</th>
<th>P-value</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Induction</td>
<td>99.00±0.64</td>
<td>99.03±0.62</td>
<td>-0.205</td>
<td>0.838</td>
<td>Not significant</td>
<td></td>
</tr>
<tr>
<td>Induction</td>
<td>99.13±0.82</td>
<td>99.23±0.68</td>
<td>-0.515</td>
<td>0.609</td>
<td>Not significant</td>
<td></td>
</tr>
<tr>
<td>Pre-ECT</td>
<td>99.53±0.78</td>
<td>99.47±0.63</td>
<td>0.366</td>
<td>0.716</td>
<td>Not significant</td>
<td></td>
</tr>
<tr>
<td>Post ECT-1</td>
<td>98.80±0.81</td>
<td>98.67±0.61</td>
<td>0.724</td>
<td>0.472</td>
<td>Not significant</td>
<td></td>
</tr>
<tr>
<td>Post ECT-2</td>
<td>98.90±0.92</td>
<td>98.73±0.69</td>
<td>0.792</td>
<td>0.432</td>
<td>Not significant</td>
<td></td>
</tr>
<tr>
<td>Post ECT-3</td>
<td>99.43±0.82</td>
<td>99.13±0.82</td>
<td>1.420</td>
<td>0.161</td>
<td>Not significant</td>
<td></td>
</tr>
<tr>
<td>Post ECT-4</td>
<td>99.40±0.72</td>
<td>99.47±0.63</td>
<td>-0.381</td>
<td>0.705</td>
<td>Not significant</td>
<td></td>
</tr>
<tr>
<td>Post ECT-5</td>
<td>99.47±0.68</td>
<td>99.53±0.73</td>
<td>-0.366</td>
<td>0.716</td>
<td>Not significant</td>
<td></td>
</tr>
<tr>
<td>Post ECT-10</td>
<td>99.10±0.76</td>
<td>99.23±0.68</td>
<td>-0.717</td>
<td>0.476</td>
<td>Not significant</td>
<td></td>
</tr>
<tr>
<td>Post ECT-15</td>
<td>99.03±0.77</td>
<td>99.13±0.78</td>
<td>-0.503</td>
<td>0.617</td>
<td>Not significant</td>
<td></td>
</tr>
<tr>
<td>Post ECT-30</td>
<td>98.83±0.70</td>
<td>99.23±0.73</td>
<td>-2.171</td>
<td>0.034</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>Post ECT-45</td>
<td>98.63±0.62</td>
<td>99.27±0.74</td>
<td>3.606</td>
<td>0.001</td>
<td>Significant</td>
<td></td>
</tr>
</tbody>
</table>

ECT: Electroconvulsive therapy, SD: Standard deviation
Recovery Profile

- Time taken for spontaneous eye opening was less in the propofol group than the thiopentone sodium group; statistically not significant (P > 0.5).
- Time taken for verbal communication and phonation was less in the propofol group than the thiopentone sodium group; statistically significant (P < 0.05).
- Time taken for orientation of patient to name, place, and time was less with the propofol group than with the thiopentone sodium group; statistically significant (P < 0.005).
- Time duration for patients sitting with support and sitting without support was less with the propofol group than with the thiopentone sodium group; statistically significant.
- Mean sedation score was 2.40 with the thiopentone sodium group as against only 1.07 with the propofol group; statistically significant (Table 2).

DISCUSSION

Seizure may not be visualized in many patients, and yet ECT produces effective seizure as evident by EEG. Although the motor seizure was not recorded, it was quantified by EEG monitoring. Propofol has been found to have more potent anticonvulsant effects during ECT than other IV anesthetics. However, the use of a minimally hypnotic dose of propofol (0.75 mg/kg) has been associated with a seizure duration that is comparable to standard hypnotic doses of methohexital. The use of propofol can significantly shorten the duration of seizure activity and its effect on the antidepressant action of ECT has been a concern. However, the ECT seizure duration in this study, after larger dose of propofol (1.5 mg/kg), was significantly longer than after thiopentone sodium, possibly because higher shock energy was delivered to patients in the propofol group.

In this study, it was found that duration of seizure in the propofol group was less than the mean seizure duration in the thiopentone sodium group, which was statistically extremely significant (P < 0.005).

Duration of apnea was more in the propofol group than the thiopentone sodium group. However, this was statistically not significant (P > 0.5).

Recovery profile: Time taken for spontaneous eye opening was less in the propofol group than in the thiopentone sodium group. However, this was statistically not significant (P > 0.5).

Time taken for verbal communication and phonation was less in propofol group than thiopentone sodium. This time for verbal communication and phonation was statistically significant (P < 0.05).

The time duration for patients sitting with support and sitting without support was less with propofol and the time duration recording was statistically significant. Mean sedation score was 2.40 with thiopentone sodium group as against only 1.07 with propofol group, and this difference was statistically significant.

In thiopentone sodium group (Group A): Fall in oxygen saturation from 99.00 ± 0.64 to 98.80 ± 0.81 was observed. It returned to base value after that.

In propofol group (Group B): Fall in oxygen saturation from 99.03 ± 0.62 to 98.67 ± 0.63 was observed in first 2 min after electroshock. The oxygen saturation returned to the base value by 3rd min. However, it was not clinically important.

On comparison of both the groups, it was found that the fall in saturation was not statistically significant up to 15 min. In
this study, the patient was ventilated with oxygen-enriched air via facemask and bag after induction. The ventilation was discontinued during shock and convulsion. Then, manual ventilation was restarted until the return of spontaneous respiration. This method is also recommended by royal college of psychiatrist.11 Oxygen flow of 6L/min was added to a self-inflating bag, thus delivering 0.40-0.50 FiO₂.

Lew et al.12 studied the oxygenation during ECT and found the saturation was decreasing in 60% patients in whom ventilation was continued throughout the convulsion and in 82.5% of patients in whom ventilation was discontinued. There was no significant change.

Seizure duration: In this study, the duration of seizure in the propofol group (Group B) was 18.63 ± 5.64 s and in the thiopentone sodium group (Group A) was 25.13 ± 7.96 s. The reduction in the duration of seizure following propofol was found to be statistically significant. Therefore, in this study, it was found that propofol reduced the seizure duration as compared to thiopentone sodium.

Boey and Lai13 found mean seizure duration of 37.5 s. Dwyer et al. reported 23.5 s, whereas Rouse and colleagues Simpson et al.14 reported it as 18 s. Comparison of the present study with these studies was difficult because of differences in doses of propofol and the methods of ventilation.

It has generally been considered that the duration of seizure is an important variable for the therapeutic efficacy of ECT.

Simpson et al. 198714 warned against the use of propofol on the group that reduction in ECT induced seizure duration would affect the efficacy of therapy and would increase the chance of failure to convulse and inadequate seizures may leading to inefficient therapy.

But work done by Dwyer et al. in 1988, Mitchell et al. in 1991, and Martonsson et al. 1994 showed that propofol significantly reduced the seizure duration without reducing the therapeutic outcome. They found the weaker trends of prolonged course of ECT, but these differences in the length and course were not statistically significant.

Seizure duration depends on many factors including concurrent drug therapy, the type and doses of anaesthetic induction agents, age of the patients and electric stimulation.

Recovery: After ECT, recovery was evaluated using sedation score, which was carried out at the end of 30 min
after induction. In addition, time taken for spontaneous eye opening verbal communication, phonation, orientation of patient to name, place and time (in comparison to pre-ECT questionnaire) and ability to sit with support and sit without support were noted.

Spontaneous eye opening: Spontaneous eye opening in 7.92 ± 2.94 min after induction with propofol and in 9.06 ± 3.06 min after inducing with thiopentone sodium recovery times of all measured variable were found to be more rapid with propofol. There were no statistically significant differences between two groups (P > 0.05).

Verbal communication and phonation: Time taken for verbal communication and phonation in patients induced with propofol were 10.07 ± 3.23 and 10.45 ± 3.54. In comparison, in the patients induced with thiopentone sodium time taken to achieve the same were 12.58 ± 3.71 and 13.08 ± 3.72 min, respectively. The difference in this time duration for verbal communication and phonation was considered to be significant (P < 0.05) between the two groups.

Orientation: Time taken for orientation of patient to name, place and time (in comparison to pre-ECT questionnaire) was 13.27 ± 4.38 min in patient induced with propofol and 18.57 ± 5.57 min in patients induced with thiopentone sodium. This time duration for patients to get oriented to name, place and time was found to be statistically significant (P < 0.005) (Figure 1).

CONCLUSION

It can be concluded from this study that propofol was superior to thiopentone sodium with respect to recovery after ECT, as there was a significant decrease in the time taken for spontaneous eye opening, verbal communication, phonation, orientation to name, place and time, sitting with support and without support. Sedation scoring, which was carried out at the end of 30 min after induction, showed the patients induced with propofol were awake in comparison to those induced with thiopentone sodium who was drowsy at the end of 30 min after induction. There was no difference with respect to oxygen saturation values.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Evaluation of Chest Pain in Premenopausal Indian Women

Mohd Suhel Siddiqui1, Jitendra Kishore Bhargava2, Anoop Kumar2, Ishant Verma3, Vandana Mahaur4, Rahul Rai1

1Assistant Professor, Department of Medicine, Netaji Subhashchandra Bose Medical College and Hospital, Jabalpur, Madhya Pradesh, India,
2Assistant Professor, Department of Chest and Tuberculosis, Netaji Subhashchandra Bose Medical College and Hospital, Jabalpur, Madhya Pradesh, India,
3Senior Resident, Department of Medicine, Netaji Subhashchandra Bose Medical College and Hospital, Jabalpur, Madhya Pradesh, India,
4Senior Resident, Department of Ophthalmology, Netaji Subhashchandra Bose Medical College and Hospital, Jabalpur, Madhya Pradesh, India

INTRODUCTION

Chest pain is a major source of concern for patients and physicians alike as it may harbor ger acute life-threatening cardiac events, yet many patients who describe chest pain typical of significant cardiac disease can actually be free of such disease. Chest pain is the chief complaint in about 1-2% of outpatient practice and in 20-30% of all emergency medical admissions, surprisingly <50% patients are given a final diagnosis of acute myocardial infarction and an organic etiology is demonstrable in only about 16% of such patients.1-3 About 50% of patients with non-cardiac chest pain (NCCP) and normal coronary anatomy had esophageal reflux or motility disorders,4 and 60% had evidence of breathing disorders.5 Patients with NCCP and no upper gastrointestinal (GI) disease has a higher
proportion of panic disorder (15%), obsessive-compulsive disorder (21%), and major depressive episodes (28%).

Premenopausal women are largely protected from heart disease. These women are more likely to have nonspecific chest pain symptoms than men and only half of women who had typical chest pain suggesting ischemia had stenotic coronary lesions (50% lumen diameter narrowing). The probability of having coronary artery disease (CAD) in a cohort of young patients (2/3rd of them being females) with atypical chest pain is low; patients with no typical features had only 2% chance of an abnormal coronary angiogram if aged <55 years. On the other hand, even women with proven CAD are more likely to present with atypical symptoms and have worse prognosis than men.

As is true with cardiac chest pain, both peripheral stimuli (as from the esophagus) and psychological factors interact in producing the final report of pain. In clinical practice, the presentation determines the order of cardiac and noncardiac investigations. Only recently American Heart Association had given a consensus on noninvasive testing in symptomatic females. It states that young women with low pretest probability of CAD should not be subjected to noninvasive test including exercise tread mill testing (TMT). AHA (2014) A more meticulous approach is needed for the assessment and management of female patients with chest pain. This can be done in many cases by the general practitioner, sometimes with the help of emergency chest pain clinics and easy referrals to a rheumatologist, a gastroenterologist or a psychiatrist. In our clinical experience, number of young premenopausal female patients present with symptoms of atypical chest pain, which brings a lot of apprehension, repeated consultations and expenses to leading to poor quality of lives for the patients and family. Still, long-term prognosis is relatively good.

Thus, we thought that it would be prudent to analyze chest pain in premenopausal females in a resource constrained setting. We aimed to study the clinical profile, assessment of risk factors and incidence of CAD in such population presenting with typical and atypical chest pain.

**MATERIALS AND METHODS**

This cross-sectional study included 56 premenopausal female patients aged 15-55 years attending the medicine outpatient department (OPD), cardiology OPD and the emergency department of Netaji Subhash Chandra Bose Medical College and Hospital (NSBMCH), Jabalpur, India, with complaints of chest pain. The spectrum of chest pain included all descriptions; including typical angina or chest pain characteristics considered atypical for ischemic heart disease. All etiologies for the chest pain were considered. Of these 6 patients were excluded due to noncompliance and lack of follow-up; thus a total of 50 subjects were studied. Patients with known CAD, diagnosed structural heart disease, acute coronary event, and pregnant women were not included in the study. The ethics committee of the institute approved the study. Each subject gave written informed consent before being included in the study. The guidelines lay down by ICMR (1994) and Helsinki declarations (modified 1989) were adhered to in all patients in the study.

The details of chest pain: Type, onset, duration, site, nature, intensity, radiation to other sites, aggravating and relieving factors, associated symptoms; and other coexisting diseases were analyzed. Patients were mainly categorized into those having chest pain considered typical for CAD and those having atypical chest pain. “Typical chest pain” was defined as pain felt under the sternum and characterized by a heavy or squeezing feeling often caused by exertion or emotions. It included pain experienced as discomfort or tightness, or pressure in the chest or in the back, neck, jaw, shoulders and arms (especially the left arm). Other types of chest pain were considered as “atypical chest pain.” Atypical pain included those at sites other than substernal location, and with other characters such as pricking, shooting, piercing, and burning.

Character of chest pain was recorded in the patient’s own language. It was found to fit into the burning, compression, crushing, dull aching, heaviness, pricking, sharp, and stabbing varieties. The intensity of chest pain was graded into mild (pain not interfering with daily activities), moderate (pain interrupting the daily activities), and severe (pain needing urgent medical attention). The site of pain was categorized into central, left sided, right sided, bilateral, and diffuse. The onset was divided into sudden (pain appearing and progressing over a period of <1 week) and insidious (slow onset pain progressing over a period of >1 week). The precipitating and relieving factors if any were noted. The associated symptoms of apprehension (nervousness and anxiety), palpitation, sweating, syncope, dyspnea, regurgitation, belching, nausea, vomiting, loss of consciousness, and abnormal behavior were noted. The family history and personal history including lifestyle, addictions, and oral contraceptive (OCP) usage were assessed. Detailed clinical examination which included vital signs, general and systemic examination was done.

Each patient was subjected to routine investigations including complete blood counts, fasting blood sugar, blood urea, serum creatinine, fasting lipid profile, electrocardiogram, creatine phosphokinase-MB (CPK-
MB), and chest X-ray. According to the history and relevant investigations, the patients were categorized into high risk and low risk groups for CAD. These patients were further investigated with echocardiography/Doppler study, cardiac enzymes, TMT, upper GI endoscopy and pulmonary function test. The subjects were also subjected to a psychiatric and orthopedic evaluation.

After detailed investigation the subjects were prescribed with multi-disciplinary measures based on the diagnosis ascertained. These patients were followed up for a period of 1 month and the response to the treatment was assessed. The response was graded subjectively into good (patient has no symptoms), average (patient has symptoms but of lower grade than initial), and poor (no notable difference in symptoms after treatment).

The various observations of the study were cross tabulated among each other and Chi-square test was applied to find out the statistical significance of the data.

RESULTS

Between June 2011 and May 2012 premenopausal female patients aged 15-55 years attending the medicine OPD, cardiology OPD and the emergency departments of NSBMCH, Jabalpur, India, with new onset of chest pain were screened. Patients were excluded if they had a history of CAD, structural heart disease, bronchial asthma, chronic obstructive airway disease, trauma, and inability to perform TMT. Pregnant women were also excluded from the study. 56 thus screened were included in the study. Six patients were non compliant and/or did not follow; thus, the data from 50 subjects were analyzed.

Results showed that the majority presented with atypical chest pain, accounting for 72% of the patients. The mean age of patients with atypical chest pain and atypical chest pain was 26.64 ± 6.49 and 29.10 ± 7.6 years; this difference was not statistically different. 68% of patients had chest pain for <1 month duration, 12% had chest pain of more than 6 months duration. Half of the patients had sudden onset of pain, another half had insidious onset. Majority of patients had dull aching (28%) and stabbing (24%) type of chest pain which predominantly was in central location (60%). Chest pain was most commonly associated with apprehension (74%) and palpitations (42%); patients commonly had more than one associated symptoms. In 56% of patients there no aggravating factors, in 30% exertion was the precipitating cause. In 54% patients, the pain was relieved spontaneously.

When characteristics of atypical and typical pain were compared, there was no statistically significant difference in regards to rapidity of onset, duration, and intensity of chest pain. 75% of patients with atypical chest pain had the duration of <1 month, only 5.6% patients had duration more than 6 months; majority (69.5%) had chest pain of mild to moderate intensity. Apprehension was statistically more commonly associated with atypical; palpitation was more commonly associated with typical chest pain. There was no significant difference between atypical and typical chest pain in terms of other accompaniments of chest pain and aggravating or relieving factors.

When risk factors, namely, age, diabetes mellitus, hypertension, high BMI, low high density lipoprotein, cigarette smoking, family history of premature CAD, and OCP use were assessed in patients with atypical and typical chest pain; only BMI ≥23 kg/m² was statistically more common with atypical chest pain. Overall, only in 5 (10%) females having chest pain, diagnosis of CAD was made; most common etiologies were painful musculo-skeletal conditions (34%), functional (30%), GI pain (reflux esophagitis 10%; gastritis 8%), pneumonia (4%), and mitral stenosis (4%). When the patients were subjected to resting electrocardiogram and cardiac enzymes estimation (CPK-MB and/or Troponin-I), none of the patients having atypical chest pain had a positive results; however, 2 (14.30%) patients of typical chest pain had both abnormal electrocardiogram and elevated cardiac enzymes to suggest acute coronary syndrome (ACS). ACS patients were then hospitalized and treated as per protocol. On resting echocardiography, among 14 patients with typical chest pain, 2 (14.3%) had regional wall motion abnormalities (those with ACS), 2 (14.3%) had left ventricular hypertrophy, and 1 (7.1%) had evidence of rheumatic heart disease (RHD). In total among them, 5 (35.7%) had abnormal echocardiography findings. This was in contrast to patients with atypical chest pain in whom only 1 (2.8%) had abnormal echocardiography finding of RHD; the difference being statistically significant. On subjecting the patients to TMT, 2 females having typical chest pain had evidence of CAD when compared to those with atypical chest pain in whom only 1 patient had evidence of CAD. When an overall diagnosis of CAD was entertained, 1 out of 36 females having atypical NCCP (2.7%) had CAD; on the other hand, 4 out of 14 (28.5%) female having typical cardiac chest had CAD (P < 0.05). When other diagnoses were compared between the two groups, atypical chest pain was significantly more associated with a psychiatric diagnosis, GI disease and musculoskeletal pain (Table 1).

DISCUSSION

This study is unique in the sense that evaluation of atypical chest pain in premenstrual females <55 years is seldom studied, although it is known that young females with...
ACS are less likely to present with pain when compared to men. Our study has shown that most of the females in this age group had atypical NCCP. In those having atypical chest pain, the probability of an underlying CAD is remote, yet possible.

Our study showed that 72% of premenstrual females presented with atypical chest pain, 50% of them had sudden onset and 66% of them had chest pain of <1 month duration. Mean age of patients with atypical and typical chest pain groups was similar (26.64 ± 6.49 and 29.10 ± 7.6 years, respectively). Majority in each group had centrally located pain (60%). When both group were compared, patients with atypical chest pain had significantly more apprehension, on the other hand those with typical chest pain complained more of palpitations. Otherwise, there was no difference in both groups in terms of aggravating and relieving factors. Cormier et al. estimated the relationship of chest pain with negative cardiac diagnostic studies to psychiatric illness. A total of 98 patients with chest pain and no prior history of organic heart disease underwent a structured psychiatric interview at the time of cardiac diagnostic testing, either coronary arteriography or TMT. Patients with negative cardiac test results were significantly younger and more likely to be female, endorsed a greater number of autonomic symptoms with their chest pain, and were more likely to report atypical chest pain. In another study on 307 patients with NCCP from China, the prevalence of NCCP was 13.9% (95% CI 13-15) and was higher in men than in women (16.6% vs. 11.9%, \( P = 0.002 \)). The median duration of NCCP was 24 months (range 0.1-360 months). Most (96%) subjects with NCCP had mild to moderate chest pain over the central chest area (50%). The frequency of chest pain was less than once per month to moderate chest pain over the central chest area (50%).

None of the risk factors for CAD were more commonly associated with females having typical chest pain; on the contrary, a BMI value of ≥23 kg/m² was significantly more commonly with atypical chest pain patients. This finding is seemingly odd, needs to be validated in larger population based studies. When other risk factors for CAD were evaluated by Sullivan et al., only diabetes was significantly more common in females with chest pain and abnormal coronary angiography when compared with those having chest pain and normal coronary angiography. Rest of the risk factors like history of premature CAD in family members, hypertension, dyslipidemia, and smoking did not differ in females with or without obstructive coronary

<table>
<thead>
<tr>
<th>Table 1: Final diagnosis in premenopausal females presenting with typical and atypical chest pain (n=50)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diagnosis</strong></td>
</tr>
<tr>
<td>CAD</td>
</tr>
<tr>
<td>Functional</td>
</tr>
<tr>
<td>Gastritis/reflux esophagitis</td>
</tr>
<tr>
<td>Mitral stenosis</td>
</tr>
<tr>
<td>Musculoskeletal pain</td>
</tr>
<tr>
<td>Pneumonia</td>
</tr>
</tbody>
</table>

Data are expressed as number (%), \( P < 0.05 \). CAD: Coronary artery disease.
arteries. In patients of CAD, females when compared with males, the risk factors usually do not differ from those in males; diabetes and dyslipidemia were probably an exception. Sullivan et al. demonstrated that diabetes imposes a greater risk of heart disease in women than in men; in another study high triglycerides level was an important risk factor in women.16,17

Overall, only in 5 (10%) females having chest pain, diagnosis of CAD was made; most common etiologies were painful musculo-skeletal conditions (34%), functional (30%), GI pain (reflux esophagitis 10%; gastritis 8%), pneumonia (4%) and mitral stenosis (4%). Ortiz-Olvera et al. assessed 31 patients (22 females) with NCCP after excluding CAD using upper GI endoscopy, ambulatory pH monitoring, stationary esophageal manometry and psychiatric evaluation. They showed that 14 (64%) and 8 females (36%) had gastroesophageal reflux disease (GERD) and functional pain disorder, respectively.18 In United States and Europe; musculoskeletal pain, GERD and nonspecific or functional pain disorders were among the most common causes of chest pain in patients visiting primary health-care centers; however in patients visiting emergency care centers, cardiac chest pain was the most common diagnoses entertained.19 In a study of 250 patients presenting in emergency department in an UK center, on non invasive testing 142 had cardiac pain (mean age 79 years, 58% male) and 108 atypical chest pain (mean age 60 years, 55% male). Of those with atypical pain, 40 were discharged without a diagnosis; in the remaining 68 the pain was thought to be musculoskeletal (25), cardiac (21), GI (12) or respiratory (10) in origin. On 1 year follow-up half of the patients with atypical pain had undergone further investigations and 14% had been readmitted. As a result the proportion of positive diagnoses had increased in each of the subgroups, with the commonest categories being musculoskeletal (27), cardiac (25), GI (14), and respiratory (12). The yield of investigative procedures was generally low (20%) but at the end of the year only 27 patients remained undiagnosed. The mortality rate was 2.9% (3 patients) compared with 18.3% in those with an original cardiac event, none of the patient who had a non cardiac diagnosis died.20

In our study, when an overall diagnosis of CAD was entertained, only 2.7% females having atypical NCCP had CAD in contrast to 28.5% females having typical cardiac chest pain and CAD. This suggests that in young females presenting with atypical chest pain, the chances of CAD in them is remote. Bhardwaj studied patients with typical and atypical chest pain with dynamic electrocardiogram changes who were subjected to coronary angiography. 33 patients had atypical chest pain out of which 22 were females and 11 were males. Mean age of the patients was 45.15 ± 10.18 years. Only 2 (6%) of these patients had CAD. This was in contrast to 39 patients who had typical chest pain, among them 92% had CAD.21

Studies in late 19th century suggested that the prognosis of angina or angina like pain was good, with mortality rates close to zero.22,23 An earlier study of 100 women with unexplained chest pain having some or all of the features of angina pectoris and normal selective coronary angiography. Atypical chest pain was seen in 76%; 46% gained relief of pain from nitroglycerin, and 40% had anxiety neurosis. Follow-up of remaining 86 patients for 6-30 months revealed that 50% had a decrease or disappearance of pain, and there was no adverse cardiac event or mortality.4

Recent studies have shown that prognosis of patients with NCCP is not benign as it was previously thought. Jespersen et al. conducted a retrospective study of cohort of 11223 patients with stable chest pain in 10 years referred for coronary angiography. They compared the results with 5705 participants from the Copenhagen City Heart Study. Results showed that significantly more women (65%) than men (32%) had normal coronary angiography. In the pooled analysis, the risk of major adverse cardiovascular event was higher with multivariable adjusted hazard ratios (HRs) of 1.52 (95% confidence intervals 1.27-1.83) for patients with normal coronary arteries; and 1.85 (95% confidence intervals 1.51-2.28) for patients with diffuse non-obstructive CAD when compared with the reference population. For all-cause mortality, normal coronary arteries and diffuse non-obstructive CAD were associated with HRs of 1.29 (95% confidence intervals 1.07-1.56) and 1.52 (95% confidence intervals 1.24-1.88), respectively.24

In Women's Ischemia Syndrome Evaluation (WISE) study, the cardiovascular events were most frequent in women with 4 or more cardiac risk factors, with the 5-years annualized cardiovascular event rate being 25.3% in women with non-obstructive CAD, 13.9% in WISE women with normal coronary arteries, and 6.5% in asymptomatic women.25

Being conducted in a resource constrained settings and unavailability of coronary angiography; we could not subject our patients for coronary angiography for confirmation of CAD. We think premenopausal women with low risk of CAD should not be subjected to invasive tests, neither is it indicated. However in patients with intermediate and high risks, it is warranted accordingly to guidelines of the American Heart Association. The sample size was small; moreover, ours was not a follow-up study to ascertain long-term prognosis of chest pain in premenopausal Indian females as well as to come up with some strategy for management of this selected subgroup. Despite these
shortcomings, we could draw some conclusion from this study. However, we suggest a long-term study with larger sample size to answer these questions in Indian scenario.

CONCLUSION

Atypical chest pain is common in premenopausal females, common causes being musculoskeletal, psychiatric and GI disorders; incidence of CAD in them is very low. As characteristics of chest pain and absence of risk factors cannot reliably predict NCCP, and there is a remote possibility of CAD in these females, a cautious approach and detailed evaluation which may include a coronary angiography is warranted.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Computed Tomography Evaluation of the Patients Presenting with Headache at Tertiary Care Hospital of Bihar

Manisha Kumari¹, Govind Kumar², Vinod Kumar¹, Umakant Prasad³, Amit Kumar³, Shishir Kumar⁴, S K Suman⁵

¹Senior Resident, Department of Radiodiagnosis, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India, ²Associate Professor, Department of Internal Medicine, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India, ³Assistant Professor, Department of Radiodiagnosis, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India, ⁴Assistant Professor, Department of Radiodiagnosis, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India, ⁵Professor, Department of Radiodiagnosis, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India

Abstract

Objective: (1) To evaluate the organic causes of headache in patients undergoing computed tomography (CT) scan of brain both with or without neurologic abnormality, (2) to know the age incidence, and (3) to know the sex incidence of the headache.

Materials and Methods: This study is a prospective observational study and has been done over a span of 1½ year (October 2015-March 2017) in the CT scan unit of Department of Radiodiagnosis, IGIMS, Patna. 2072 patients were enrolled in this study coming from various departments including General medicine, Neurology, Neurosurgery, Emergency, and Psychiatric department. Written consent has been taken from all the participating patients or from guardian (in case of minor patients). Patients were divided into three groups based on CT findings: (1) Those with no abnormality, (2) those with minor abnormality (not altering the patient management), and (3) those with clinically significant abnormality (altering the management protocol).

Results: CT detected abnormality constitute 9.84% in which major and minor abnormalities constitute 3.28% and 6.26%, respectively, that will help in further management. Headache is more common in females (59.31%). Most common age group affected is 21-40 years (51.64%).

Conclusion: The percentage of intracranial abnormalities detected by CT scan in this study was almost similar to previous studies provided normal neurological examinations. In the absence of neurological abnormality, CT scan did not offer any advantages.

Key words: Computed Tomography, Patients, Headache

INTRODUCTION

Headache is the most common complain of most of the patients presenting to Medicine, Neumedicine, and Psychiatriy department. It leads to derangement of the normal day-to-day activity as well as alteration of the mental health of the patients. Majority of the patients with headache does not require any imaging, especially if not accompanied with neurological deficit. Neuromaging is useful in case of recent onset headache and headache with progressive worsening or with change in headache pattern or associated with epilepsy, change in personality or histroy of trauma and presence of red flag signs (changes in headache pattern, new onset headache in people above 50 years of age, associated with systemic illness or personality change, raised intracranial pressure, early morning headache, or headache worsening with coughing, sneezing or straining). In recent years, there is increasing trend of recommending neuroimagining, especially in pediatric age group, in spite of normal neurologic baseline examination to exclude the possibility of intracranial mass.

MATERIALS AND METHODS

This study is a prospective observational study and has been done over a span of 1½ year (October 2015-March 2017)
in the computed tomography (CT) scan unit of department of Radiodiagnosis, IGIMS, Patna. The machine used is 128-slice helical MDCT (Toshiba Aquallion) scanner, and scanning was done from base of skull to the vertex. Plain (without contrast) as well as plain and contrast-enhanced CT scans were done.

2072 patients were enrolled in this study referred from various departments including General Medicine, Neurology, Neurosurgery, Emergency, and Psychiatric department. Written consent has been taken from all the participating patients or from guardian (in case of minor patients).

The study has been approved by the Ethical Committee of this institute (Graphs 1 and 2).

**Inclusion Criteria**

1. All patients above 5 years of age having headache coming first time for treatment.
2. Both male and female.

**Exclusion Criteria**

1. Patients below 5 years of age
2. Already diagnosed cases of intracranial abnormality
3. Those who are not willing for participate in this study

Two radiologists interpreted all the images.

Patients were divided into three groups based on CT findings: (1) Those with no abnormality, (2) those with minor abnormality (not altering the patient management), for example, calcified neurocysticercosis, midline calcification of falx, persistant cavum septum pellucidum and verga, senile degenerative changes and lacunar infarct/gliosis, and (3) those with clinically significant abnormality (altering the management protocol), for example, single or multiple ring or nodular enhancing lesion (either neurocysticercosis or tuberculoma), neoplastic mass, hydrocephalus, and focal edema (Figures 1-3).

**DISCUSSION**

In this study, we found that a total of 9.8% patients show some abnormalities in CT scan (Tables 1 and 2). Of these 6.56% of patients had minor abnormality, not requiring change in management, and 3.28% had major abnormality.

**Table 1: Spectrum of CT detected abnormalities**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major abnormality</td>
<td></td>
</tr>
<tr>
<td>Active granuloma</td>
<td>14</td>
</tr>
<tr>
<td>Neoplastic lesion</td>
<td>17</td>
</tr>
<tr>
<td>Intracranial hematoma</td>
<td>16</td>
</tr>
<tr>
<td>Hydrocephalus</td>
<td>5</td>
</tr>
<tr>
<td>Edema</td>
<td>3</td>
</tr>
<tr>
<td>Infarct</td>
<td>7</td>
</tr>
<tr>
<td>Extracranial cause (sinusitis, deviated nasal septum with bony spur, sinus osteoma, pseudotumor, etc..)</td>
<td>6</td>
</tr>
<tr>
<td>Minor abnormality</td>
<td></td>
</tr>
<tr>
<td>Calcified granuloma</td>
<td>43</td>
</tr>
<tr>
<td>Falx calcification</td>
<td>15</td>
</tr>
<tr>
<td>Persistent cavum septum pellucidum</td>
<td>9</td>
</tr>
<tr>
<td>Prominent cisterna magna</td>
<td>12</td>
</tr>
<tr>
<td>Senile degenerative changes</td>
<td>32</td>
</tr>
<tr>
<td>Gliosis/old infarct</td>
<td>16</td>
</tr>
<tr>
<td>Others (skull fracture, burr hole defect, leukomalacia, etc..)</td>
<td>9</td>
</tr>
</tbody>
</table>

CT: Computed tomography

**Table 2: Age distribution**

<table>
<thead>
<tr>
<th>Age (in years)</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-20</td>
<td>457 (22.06)</td>
</tr>
<tr>
<td>21-40</td>
<td>1070 (51.64)</td>
</tr>
<tr>
<td>41-60</td>
<td>452 (21.81)</td>
</tr>
<tr>
<td>61-80</td>
<td>87 (4.20)</td>
</tr>
<tr>
<td>&gt;80</td>
<td>6 (0.29)</td>
</tr>
</tbody>
</table>

The age group ranged from 5 to 85 year with mean of 32.27 year (±14.65 SD). Mean ages in male and female patient are 32.38 year (±16.12 SD) and 34.56 (±13.42 SD), SD: Standard deviation
requiring change in the management protocol. In a study, only 10% of patient’s organic causes were detected in CT scan imaging. According to a meta-analysis, major abnormalities detected in patients with unspecified headache ranged from 0.0% to 6.7% in ten studies.6 In a study conducted by Subedee also showed that minor and major abnormality was 7.14% and 3.57%, respectively.7 Observations in this study are close to other studies. There is limitation in our study because we did not have complete neurological evaluation record of all patients.

Headache was more common in females in our study and was similar finding in various other studies. It is having multifactorial etiology including tension, genetic factor, and fluctuating estrogen level during reproductive age groups.8

The most common age group affected was 21-40 years. 1070 (51.64%) patients came under this age group only. It is followed by 5-20 years and 41-60 years that include 457 (22.06%) and 452 (21.81%) patients, respectively. Jain et al. also found that headache was the most common in 21-40 years (68.3%) of age followed by age under 20 years (16.3%), and then, 41-60 years (12.4%) and hence supporting our findings.

Major abnormalities detected on CT scan were granuloma (either tuberculoma or neurocysticercosis), intracranial tumor (craniopharyngioma, cystic dermoid, central neurocytoma), colloid cyst, hydrocephalus, parenchymal hematoma, etc. Minor abnormalities include midline calcification, senile atrophic changes, calcified granuloma, persistent cavum, septum pellucidum and verga, gliosis, cisterna magna, etc. In six patients (0.29%), extracranial abnormalities were responsible for headache. They are deviated nasal septum with bony spur, sinusitis, retrobulbar pseudotumor, osteoma of ethmoid sinus, etc.

2072 patients were included in this study having headache. Of these 1868 (90.16%) patients showed no abnormality on CT images, while 204 (9.84%) patients showed some abnormalities. Of these 204 patients, 68 patients (3.28%) showed abnormalities that changed their management and 136 (6.56%) patients showed abnormalities that did not altered their management.

CONCLUSION

The study included 2072 patients with headache in age range between 5 and 85 years, with mean age of presentation in male and female is 31.38 years and 34.56 years, respectively.

The study showed that 9.84% patients showed some abnormalities in CT scan imaging. 3.28% and 6.56%
patients showed major and minor abnormalities, respectively. The most common major abnormalities were intracranial mass and were followed by intracranial hematoma, and then, active granuloma. Among minor findings the most common finding was calcified granuloma (including both tuberculosis and neurocysticercosis). It was followed by senile degenerative changes and benign calcification of midline falx.

The most common age group affected was 21-40 years. It included 51.64% of patient among the studied group. Female were affected more than male patients. Male to female ratio is 2:3.

Sometimes, despite the absence of red flag sign, CT scan of head is requested to relieve the anxiety of the patients and their relatives. However, this increases the radiation dose to the patients, especially in pediatrics population. Hence, the use of CT scan has to be balanced against the radiation dose. Although CT scan is very useful for the evaluation, it should never be allowed to replace the proper clinical history taking and detailed clinical examination.

**RECOMMENDATION**

When symptoms persist despite all the investigations and CT scan evaluation, an alternative imaging modality such as magnetic resonance imaging brain should be considered.

**REFERENCES**

5. Headaches: Diagnosis and Management of Headaches in Young People and Adults, NICE Clinical Guideline, September; 2012.
Patterns and Correlates of Post-menopausal Symptoms in a Cohort of Gynecological Patients Attending Outpatient Department

P Kasikrishnaraja¹, Senthil Sainathan², M Indira³

¹Associate Professor, Department of Psychiatry, IRT Perundurai Medical College, Perundurai, Erode, Tamil Nadu, India, ²Assistant Professor, Department of Psychiatry, IRT Perundurai Medical College, Perundurai, Erode, Tamil Nadu, India, ³Assistant Professor, Department of Obstetrics and Gynecology, IRT Perundurai Medical College, Perundurai, Erode, Tamil Nadu, India

Abstract

Objectives: The aim of this study is to assess the post-menopausal symptoms and to correlate it with parity and various sociodemographic data.

Materials and Methods: It was a cross-sectional study hospital-based assessment conducted at the Department of Obstetrics and Gynecology at IRT Perundurai Medical College. A total of 43 healthy participants who presented in the outpatient department were included in the study. All the 43 study participants filled out the menopausal rating scale (MRS) providing data for statistical analysis. The age of participants ranged from 40 to 60 years. Women with surgical menopause, receiving hormonal treatment, having serious medical comorbidities such as thyroid disorders, cardiovascular disorders, diabetes mellitus, and hypertension and those who refused to participate were not included. MRS was used to assess the post-menopausal symptoms assessing the urogenital, psychological, and physical domains.

Results: A total of 60 participants were identified, 17 were excluded and 43 participated. The menopausal age was lower and the total mean MRS score was higher among the study population. The parity and age of the participants were inversely correlated, and also parity and age at menopause were also inversely correlated. Musculoskeletal pain and depression were the most severe symptom cluster.

Conclusions: Menopausal symptoms were highly prevalent, often underdiagnosed with pain symptoms and psychological cluster predominating.

Key words: Depression, Menopause rating scale, Musculoskeletal pain, Post-menopause, Urogenital symptoms

INTRODUCTION

Menopause is the phase in women's reproductive life in which menstruation stops. The World Health Organization defines natural menopause as the permanent cessation of menstruation resulting from the loss of ovarian follicular activity without an obvious intervening cause and is confirmed only after 12 consecutive months of amenorrhea.¹ About 130 million Indian women are expected to live beyond menopause by 2015.² With scientific advancement, there is a general increase in women's life expectancy, thus many women were likely to live at least two decades' post-menopause, in an estrogen-deficient state.³ Some of the post-menopausal symptoms such as musculoskeletal pain, urogenital symptoms, and depression experienced women can be disruptive enough to affect the quality of life (QoL) in a negative way.⁴ More than 80% of women experience physical or psychological symptoms in the year approaching menopause with various distress and distribution in their lives, leading to decrease in QoL. Menopause-related symptoms have been extensively studied in Western countries, but very little data are available from developing countries, especially Southeast Asia.⁴ According to the Indian Menopause Society, there were about 65 million Indian women over
the age of 45 years in the year 2006. Hence, menopausal health demands even higher health-care resource in Indian population. In India, there are lesser health programs that cater to the specific health needs of post-menopausal women. This study is expected to bring out the magnitude of suffering due to health issues among post-menopausal women, which can be addressed at proper platform of sociocultural relevance. Early menopause: It is the time span between the spontaneous or iatrogenic menopause occurring between the age of 40 years and the accepted typical age of menopause for a given population. Delayed menopause: It is not only defined but also may be important in terms of the increased problems associated with the hyperestrogenism. Delayed menopause is 2 SDs over and above the natural average age of menopause in a given population. We may consider it to be beyond 54 years. Premenstrual bleeding is defined as uterine bleeding occurring after at least 1 year of amenorrhea. Commonly reported symptoms of premenstrual syndrome include hot flushes, night sweats, sleep disturbances, urinary frequency, vaginal dryness, poor memory, anxiety, and depression. This study is expected to bring out the magnitude and prevalence of post-menopausal symptoms in a rural population center Perundurai.

The instrument used in this study is the menopause rating scale (MRS). The MRS is a health-related QoL scale, developed in Germany (by The Berlin Center for Epidemiology and Health Research) in the early 1990s. Its intent was to measure the severity of urogenital, physical, and psychological symptom clusters and their impact on the QoL. The MRS is well accepted internationally. Just like most of the developing countries, it is difficult for women living in rural Turkey to obtain access to health-care services, and this is due to insufficient numbers of rural health-care personnel, reduced quality of health-care services, difficulties in accessing care due to economic reasons, low education level, and low socioeconomic status. The prevalence of inability to reach health services among women is a gender issue in India. Determining the applicability of the MRS as a screening test for rural women would assist rural health-care workers to identify women with severe menopausal symptoms and to refer them to secondary level or tertiary care physicians (gynecologists/psychiatrist) for appropriate medical attention.

**MATERIALS AND METHODS**

This is a cross-sectional interview-based descriptive study which was conducted in the small town of Perundurai from a cohort of post-menopausal women attending the outpatient department of IRT Perundurai Medical College. The study was conducted for 2 months from January to February of 2017. Simple random sampling method was followed among the women who fulfilled the criteria for post-menopausal state. Inclusion criteria for the study were post-menopausal women with at least 1 year of amenorrhea and those who had attained natural menopause in past 5 years. Post-menopausal women who have recently attained menopause that is within 5 years were included in the study to minimize recall bias. Inclusion criteria for the study were post-menopausal women with at least 1 year of amenorrhea and those who had attained natural menopause in past 5 years. Post-menopausal women who have recently attained menopause that is within 5 years were included in the study to minimize bias. Exclusion criteria were surgical menopause of any causes, those who did not consent and serious medical comorbidities like diabetes, cardiovascular diseases, etc.

A total of 70 post-menopausal women were approached and 43 women fulfilled the inclusion criteria and were included in the study. The total duration of amenorrhea was determined, and mean duration of menopausal period and the mean age at attaining menopause were also determined.

The study instruments consisted of pre-tested semi-structured interview-based oral questionnaire. The components of the questionnaire were as follows:

1. A pre-tested semi-structured questionnaire was used to assess the sociodemographic profile of the study population.
2. Age at attaining the menopause was determined and the duration of the menopausal period till the current study period was included.
3. Post-menopausal symptoms were determined using the validated interview-based MRS. The menopausal symptoms assessed in the study were self-reported symptoms by the study subjects. Menopausal symptoms assessed in the study were divided into six categories: Vasomotor, psychosomatic, psychological, sexual, urinary complaints, and “other.” The MRS is composed of 11 items assessing menopausal symptoms divided into three clusters: (a) Somatic–hot flushes, heart discomfort, sleeping problems, and muscle and joint problems (items 1-3 and 11, respectively); (b) psychological–depressive mood, irritability, anxiety, and physical and mental exhaustion (items 4-7, respectively); and (c) urogenital-sexual problems, bladder problems, and dryness of the vagina (items 8-10, respectively). Each item can be graded by the subject from 0 (not present) to 4 (1 = mild; 2 = moderate; 3 = severe; 4 = very severe). For a particular individual, the total score per each subscale is the sum of each graded item contained in that subscale. Total MRS score is the sum of the scores obtained for each subscale.
4. Socioeconomic parameters such as occupation, education, and income level were collected.

Informed consent and ethical clearance were obtained. The Statistical Package for the Social Sciences software Version 21.0 (SPSS, an IBM company) was used for analysis.

**Menopausal Status Definitions**
Concerning the menopausal status, the following definitions were used: pre-menopausal (women having regular menses and ≥12 menses during the past 12 months); perimenopausal (irregular menses, <12 menses during the past 12 months), and post-menopausal (no more menses in the past 12 months).

**Statistical Analysis**
Analysis was done using the Statistical Package for Social Sciences licensed version 21. The frequencies such as mean, median, mode, sum, and quartiles were calculated for the sociodemographic data. Cross tabulations were done for age at menopause and total MRS score. Non-parametric Pearson correlation was used to calculate the correlation coefficient between age, age at menopause, parity, and total MRS score.

**RESULTS**
A total of 60 participants were identified, of which 17 were excluded for several reasons (participation denial, history of hysterectomy with oophorectomy, and serious medical morbidities such as hypertension and/or diabetes). Therefore, 43 healthy participants filled out the MRS providing data for statistical analysis. The age of participants ranged from 40 to 60 years (mean 50 years; median: 50), of which 51.3% were aged 40-50 years; 48.7% (50-60 years). Parity-wise women in 51.2% of cases were para 2 and 30.2% were para 3. Religion wise 93% were Hindu, only 7% of the cases were Christians and Muslims combined. The income level of the participants ranged between 2000 Rs to 20000 Rs with a mean income of 7976 Rs and a median income of 6000 Rs (Tables 1 and 2, Figure 1).

<table>
<thead>
<tr>
<th>Table 1: Parity details of the study population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parity</td>
</tr>
<tr>
<td>N</td>
</tr>
<tr>
<td>43</td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>Mode</td>
</tr>
<tr>
<td>Std. Deviation</td>
</tr>
<tr>
<td>Skewness</td>
</tr>
<tr>
<td>Std. Error of Skewness</td>
</tr>
<tr>
<td>Range</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
<tr>
<td>Percentiles</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Frequency distribution of the parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parity</td>
</tr>
<tr>
<td>Valid</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Table 3 and 4 show that the mean age of attaining menopause was 46.2 years and the median age is 47 years and the mode being 47 years. The range of menopausal age varied between a minimum of 34 years and a maximum of 55 years. 58.1% of the participants attained menopause between 34 and 47 years (Figure 2).

Table 5 shows the mean number of years since the onset of menopause is 3.84 years.

Table 6 shows that the mean total score for the MRS scale was 20.53 and the median score was 21. The mode is 22.

The range of the total score varied between a minimum score of 11 to a maximum score of 29. 44.3% of the total MRS scores fell between 20 and 25.

Table 7 shows the frequency distribution of the total MRS score among the study population. A total score of 22 is found among 7 subjects which is 16.3% of the study.
The age at menopause was also inversely correlated with Pearson's correlation of $-0.88$ again it did not attain the significance level.

Table 10 shows that among the MRS subscale, psychological cluster and physical cluster of symptoms such as physical and mental exhaustion (cumulative score 102, mean score 2.37), joint and muscle discomfort (cumulative score 97, mean score 2.26), and depressed mood (cumulative score 98, mean score 2.28) ratings were higher than the other subscales. Surprisingly, hot flushes and heart discomfort scores were the lowest considering the lower age profile of the study population.

## DISCUSSION

During the menopausal phase, middle-aged women undergo a wide range of physical and psychological symptoms, of these, vasomotor and urogenital complaints have been considered the most frequent. Despite this, emotional and somatic symptoms, not necessarily related
Kasikrishnaraja, et al.: Patterns and Correlates of Post-Menopausal Symptoms

In the past years, there has been a growing research interest in determining the frequency of menopausal symptoms, and related biopsychosocial factors, found during the different phases of the menopausal transition.

In this sense, the MRS is also a menopause specific health-related QoL scale, validated in several languages, developed to measure age-/menopause-related complaints.

Estrogens act on the central nervous system (CNS) both through genomic mechanisms, modulating synthesis, release and metabolism of neurotransmitters, neuropeptides, and neurosteroids and through non-genomic mechanisms, influencing neuronal and cellular electrical excitability, synaptic function, and morphological features. Therefore, estrogen’s neuroactive effects are multifaceted and encompass a system that ranges from chemical to biochemical and genomic mechanisms.

Muscles joint aches. These symptoms have been considered as atypical as their presence may not only be limited to the menopausal transitional phase. The expression, magnitude, and frequency of these typical and atypical symptoms may vary from one women to another and possibly be influenced by factors not clearly defined.

In the past years, there has been a growing research interest in determining the frequency of menopausal symptoms, and related biopsychosocial factors, found during the different phases of the menopausal transition.

In this sense, the MRS is also a menopause specific health-related QoL scale, validated in several languages, developed to measure age-/menopause-related complaints.

Estrogens act on the central nervous system (CNS) both through genomic mechanisms, modulating synthesis, release and metabolism of neurotransmitters, neuropeptides, and neurosteroids and through non-genomic mechanisms, influencing neuronal and cellular electrical excitability, synaptic function, and morphological features. Therefore, estrogen’s neuroactive effects are multifaceted and encompass a system that ranges from chemical to biochemical and genomic mechanisms.

---

Table 6: Descriptive statistics of the total MRS score

<table>
<thead>
<tr>
<th>N</th>
<th>Valid</th>
<th>Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>20.53</td>
<td></td>
</tr>
<tr>
<td>Mode</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>3.996</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Percentiles</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>18.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7: Frequency distribution of the total MRS score

<table>
<thead>
<tr>
<th>Total MRS Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>Valid</td>
</tr>
<tr>
<td>15</td>
</tr>
<tr>
<td>16</td>
</tr>
<tr>
<td>18</td>
</tr>
<tr>
<td>19</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>21</td>
</tr>
<tr>
<td>22</td>
</tr>
<tr>
<td>23</td>
</tr>
<tr>
<td>24</td>
</tr>
<tr>
<td>26</td>
</tr>
<tr>
<td>28</td>
</tr>
<tr>
<td>29</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Table 8: Cross tabulation of total MRS score versus age at menopause

<table>
<thead>
<tr>
<th>MRS Score</th>
<th>Age at Menopause</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 9: Pearson’s correlation between age, age at menopause, and total MRS score

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Total MRS score</th>
<th>Age</th>
<th>Parity</th>
<th>Age At Menopause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>-0.087</td>
<td>0.14</td>
<td>-0.089</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.578</td>
<td>0.293</td>
<td>0.573</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Pearson Correlation</td>
<td>-0.087</td>
<td>1</td>
<td>-0.076</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.578</td>
<td>0.627</td>
<td>0.43</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td>Pearson Correlation</td>
<td>0.14</td>
<td>0.076</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.592</td>
<td>0.627</td>
<td>0.538</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>Age at menopause</td>
<td>Pearson Correlation</td>
<td>-0.088</td>
<td>0.076</td>
<td>0.096</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.573</td>
<td>0.538</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).

Table 10: Descriptive statistics of the MRS subscales

<table>
<thead>
<tr>
<th>MRS scale</th>
<th>Examined</th>
<th>Valid</th>
<th>Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>43</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>21.3</td>
<td>21.3</td>
<td>21.3</td>
</tr>
<tr>
<td>Mode</td>
<td>2.1</td>
<td>2.1</td>
<td>2.1</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>3.7</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Variance</td>
<td>54.2</td>
<td>54.2</td>
<td>54.2</td>
</tr>
<tr>
<td>Range</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Minimum</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Maximum</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>43</td>
<td>43</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
Clinical evidences show that, during the climacteric period, estrogen withdrawal in the limbic system gives rise to depressive moods, irritability, and anxiety and that estrogen administration improves these conditions. Despite the evidence pointing toward the direct effect of estrogens on the CNS, psychosocial factors are also important triggering factors for the presence and intensity of menopausal symptoms which also need to be taken into account during clinical assessment. It has been reported by Blümel et al.\textsuperscript{8} that psychological symptoms are frequent in the pre-menopause and are associated to vasomotor symptoms, situation, that correlates with the present findings and that a negative psychosocial environment is a factor that favors the development of these symptoms.

Estrogen exerts a positive effect over the urogenital system. The vagina, vulva, urethra, and trigone of the bladder all contain estrogen receptors and undergo atrophy when estrogen levels decrease. Symptoms related to urogenital atrophy include vaginal dryness, dyspareunia, urinary frequency, repetitive urinary tract infections, or urinary incontinence.\textsuperscript{9} In the present study, urogenital symptoms assessed with the MRS (vaginal dryness, bladder, and sexual problems) were found to be significantly higher among post-menopausal women. It has been reported by Chedraui et al.\textsuperscript{/Maturitas 57 (2007) 271-278 277} that approximately 75-85\% of postmenopausal women seek medical attention due to symptoms of vaginal atrophy and atrophic vaginitis\textsuperscript{10} and that dyspareunia leads to decreased interest in coitus, moreover as the frequency of coitus diminishes, vaginal lubrication declines further.

The prevalence and patterns of post-menopausal symptom clusters generally vary in different racial and ethnic groups. Population-based cohorts done among Caucasians have reported a higher prevalence of post-menopausal symptoms (40-70\%),\textsuperscript{11-13} whereas those from Asian countries have generally reported a lower prevalence (10-50\%).\textsuperscript{14}

Ahuja\textsuperscript{15} in his PAN India survey reported that the perimenopausal age in Indian women is 44.69 ± 3.79 years. This PAN India survey was based on the data collected from 21 cities and 26 doctors all over India among a total of 2184 subjects.

The mean menopausal age of the Indian women as interpreted from the survey is 45.59 ± 5.59 years which is generally much lesser than the Western population. They also reported an inverse correlation between parity and age of menopause which is broadly in alignment with our study. In our study, the mean age at menopause is 46.23 years. Ahuja also reported an inverse correlation between parity and age of menopause which again is replicated in our study.

The most prominent reported symptom in our study was physical and mental exhaustion, muscle discomfort, and depressed mood, similar results were reported by several studies conducted in Asian women.\textsuperscript{16,17}

Prevalence of menopausal symptoms was found to be relatively low in Asian women compared with Western women.\textsuperscript{18,19}

A study by Sowers \textit{et al.}\textsuperscript{20} reported significant differences in frequency of menopausal symptoms across different ethnic groups. In their study, Caucasian women were found to have more severe symptoms in all domains of the menopausal symptom cluster than other ethnic groups, and the frequency of vasomotor symptoms was high in African-American woman. There was significant difference among different ethnicities. Chinese and Japanese-American reported significantly fewer symptoms than the Caucasians, Africans-Americans, or Hispanics.\textsuperscript{21}

Menopausal symptoms are significantly influenced by various sociodemographic factors, socioeconomic stressors, physical health, and individual's perception about menopause. Apart from ethnic and other sociodemographic differences, the differences in study design, sample size, age range, distribution of menopausal status of participants, and the instruments used may also account for discrepant findings.

In our study, PM woman had significantly higher scores in the physical domain then psychological domain, pain symptoms predominate in our study.

There are several limitations in our study. First, this survey was cross-sectional study, hospital based having small sample size, which might not reflect the situation in the community. Second, in the MRS scale, women were asked to provide data about menstruation retrospectively experienced in the preceding weeks, regularity of menstruation, and past menstrual period, and, hence recall bias is a possibility, especially in some elderly women.

**CONCLUSION**

The study attempted to find out the prevalence of menopausal symptoms and correlated with sociodemographic variables regarding menopause in small town Perundurai, Erode district of Tamil Nadu Where the health-care system is fairly advanced than other taluks of the state. Menopausal symptoms were highly prevalent with physical cluster and mood symptoms predominating. The menopausal symptoms were highly underdiagnosed as most of the sufferers were more likely to consult other specialties such
as medicine and orthopedics for pain symptoms and other vasomotor symptoms.

REFERENCES


How to cite this article: Kasikrishnaraja P, Sainathan S, Indira M. Patterns and Correlates of Post-menopausal Symptoms in a Cohort of Gynecological Patients Attending Outpatient Department. Int J Sci Stud 2017;5(4):40-46.

Source of Support: Nil, Conflict of Interest: None declared.
Clinical and Biochemical Profile of Lean, Normal, Obese Type 2 Diabetes Mellitus

S M Shavana¹, Zufire H M Khan², Heber Anandan³

¹Assistant Professor, Department of Medicine, Tirunelveli Medical College, Tamil Nadu, India, ²Medical Officer, Government Headquarters Hospital, Tenkasi, Tamil Nadu, India, ³Senior Clinical Scientist, Dr. Agarwal’s Healthcare Limited, Tirunelveli, Tamil Nadu, India

Abstract

Introduction: Type 2 diabetes mellitus (DM) is the most prevalent form of diabetes seen worldwide. Epidemiological data over the past decades have shown that the pattern and profile of Type 2 DM are very different in India compared to the West.

Aim: To study the clinical and biochemical profile of lean, normal, and obese Type 2 DM.

Materials and Methods: 100 patients Type 2 DM patients were divided into three groups. Group A includes body mass index (BMI) < 18.5 kg/m² (lean body weight Type 2 DM) and Group B includes BMI, between 18.5 and 24.9 kg/m² (normal weight Type 2 DM). Group C includes BMI > 30 kg/m² (obese Type 2 DM).

Results: Waist-hip ratio with increase in BMI. Among 100 patients studied, 64 patients have abnormal waist-hip ratio. Lean diabetics have more severe hyperglycemia with poor metabolic control. Similarly, post-prandial values were also high in lean Type 2 DM patients. Regarding lipid profile of lean Type 2 diabetes patients, all the parameters were lower in lean diabetics compared to all other groups. Lean Type 2 diabetes had a favorable lipid profile compared to normal weight and obese diabetics.

Conclusion: Lean diabetics have high fasting blood glucose level. Thus, early diagnosis and timely intervention, coupled with lifestyle modifications must be targeted toward this lean group of diabetics.

Key words: Biochemical profile, Body weight, Diabetics

INTRODUCTION

Diabetes mellitus (DM) is a group of metabolic disorders characterized by a deficiency of insulin secretion and/or insulin effect, which causes hyperglycemia, disturbances of carbohydrate, fat and protein metabolism, and a constellation of chronic complications. Diabetes is and will remain a threat to global health. Worldwide diabetes probably affects 150 million people. The incidence of diabetes is showing an alarming rise in developing countries, particularly in India.¹ 60-80% of the diabetics in developed countries are obese. Whereas in India we find that clinical profile of diabetics is different.² Most of the patients attending our diabetic clinic are not obese as defined by existing parameters such as body mass index (BMI). It is interesting to note that most patients fall in normal weight group and some even lean group. Obesity in Type 2 diabetes is less common in Indian population compared to western population.³ ⁴ Hence, it is worth studying the clinical profile of lean Type 2 diabetes, by comparing with normal and obese population with Type 2 diabetes.

Aim

To study the clinical and biochemical profile of lean, normal, and obese Type 2 DM.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of General Medicine, Annal Gandhi Memorial Government Hospital, Trichy. 100 patients Type 2 DM patients were divided into 3 groups. Group A includes BMI < 18.5 kg/m² (lean body weight Type 2 DM) and Group B includes BMI, between 18.5 and 24.9 kg/m² (normal weight Type 2 DM). Group C includes
BMI >30 kg/m² (obese Type 2 DM). A detailed history were taken from each person, i.e., age of onset, duration, any positive family history, dietary pattern, presenting complaints - at the time of diagnosis. Detailed examination was done for all the hundred patients to find out various complications, if any. Biochemically, blood glucose (both fasting and post-prandial), blood urea, serum creatinine, and lipid profile were analyzed in all the three groups. Selection of cases included in the study was selected as per the records available with them. Duration of disease, BMI, waist-hip ratio, current blood glucose, urea, serum creatinine, and lipid profile was taken into consideration. Exclusion criteria: Presence of history of pulmonary tuberculosis. Presence of other chronic illnesses that could affect body weight such as chronic liver disease and chronic kidney disease. Type 2 diabetes patients with age of onset <30 years. History wise, particularly in lean patients those who were normal or obese at the time of presentation, but lost body weight significantly after the detection of Type 2 DM, patients with a history of cancer/human immunodeficiency virus infection. Overweight patients with BMI between 25 and 30.

RESULTS

In our study, we found there is no particular age group for lean diabetics. However, 24.5% of lean diabetics belong to 51-60 years of age, 57.1% of normal weight patients between 41 and 50 years, and 55.6% of obese patients belong to <40 years age group. There is statistically significant relationship exist in our study between sex and BMI. Slightly higher incidence of female was observed lean body weight group (21.2%) and in normal body weight (51.9%) group. In obese, there is male preponderance (37.5%). The family history of diabetes is present only in 9.6% of lean diabetics, in comparison to 35.4% in normal, and 54.8% in obese diabetics. Hence, there is lesser incidence of family history among the lean diabetics. There is a linear increase in number of patients having abnormal. Waist-hip ratio with increase in BMI. Among 100 patients studied, 64 patients have abnormal waist-hip ratio. Among that, it is 12.5% in lean, 42.2% in normal, and 45.3% in obese Type 2 diabetics. Even though, 19% (19) of diabetics patients are lean based on BMI, 8 among them have abnormal waist-hip ratio. Hence, waist-hip ratio is a better indicator than BMI for assessment of obesity. Lean diabetics have more severe hyperglycemia with poor metabolic control. Lean persons have higher fasting blood sugar levels than obese and normal weight Type 2 diabetes patients (Table 1). Similarly, post-prandial values were also high in lean Type 2 DM patients. This has been explained by probable low beta cell reserve among lean diabetics. Hence, lean diabetics are insulinopenic and highly insulin sensitive (Table 2). Regarding lipid profile of lean Type 2 diabetes patients, all the parameters were lower in lean diabetics compared to all other groups. Moreover, lean diabetics have slightly higher high-density lipoprotein (HDL) value as compared to normal and obese diabetics, which is statistically significant. Furthermore, free cholesterol value in lean diabetics is not as high as compared to obese patients. Hence, lean diabetics have favorable lipid profile as compared to normal and obese diabetics. In contrast to the previous studies, in our study the triglyceride (TGL) levels were not significantly high in lean diabetics (Tables 3-6).

| Table 1: Distribution of FBS in study groups
<table>
<thead>
<tr>
<th>FBS</th>
<th>Lean Group A</th>
<th>Normal Group B</th>
<th>Obese Group C</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>4</td>
<td>9</td>
<td>11</td>
<td>0.243</td>
</tr>
<tr>
<td>Abnormal</td>
<td>15</td>
<td>40</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>49</td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>

FBS: Fasting blood sugar

| Table 2: Distribution of PPBS in study groups
<table>
<thead>
<tr>
<th>PPBS</th>
<th>Lean Group A</th>
<th>Normal Group B</th>
<th>Obese Group C</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>1</td>
<td>6</td>
<td>5</td>
<td>0.544</td>
</tr>
<tr>
<td>Abnormal</td>
<td>18</td>
<td>43</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>49</td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>

PPBS: Post-prandial blood sugar

| Table 3: Distribution of total cholesterol in study groups
<table>
<thead>
<tr>
<th>Total cholesterol</th>
<th>Lean Group A</th>
<th>Normal Group B</th>
<th>Obese Group C</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>16</td>
<td>25</td>
<td>10</td>
<td>0.001</td>
</tr>
<tr>
<td>Abnormal</td>
<td>7</td>
<td>24</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>49</td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>

| Table 4: Distribution of TGL in study groups
<table>
<thead>
<tr>
<th>TGL</th>
<th>Lean Group A</th>
<th>Normal Group B</th>
<th>Obese Group C</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>16</td>
<td>27</td>
<td>20</td>
<td>0.083</td>
</tr>
<tr>
<td>Abnormal</td>
<td>3</td>
<td>22</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>49</td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>

TGL: Triglyceride

| Table 5: Distribution of HDL in study groups
<table>
<thead>
<tr>
<th>HDL</th>
<th>Lean Group A</th>
<th>Normal Group B</th>
<th>Obese Group C</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>12</td>
<td>22</td>
<td>12</td>
<td>0.201</td>
</tr>
<tr>
<td>Abnormal</td>
<td>7</td>
<td>27</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>49</td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>

HDL: High-density lipoprotein
Table 6: Distribution of LDL in study groups

<table>
<thead>
<tr>
<th>LDL</th>
<th>Lean Group A</th>
<th>Normal Group B</th>
<th>Obese Group C</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>12</td>
<td>8</td>
<td>4</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Abnormal</td>
<td>7</td>
<td>41</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>49</td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>

LDL: Low-density lipoprotein

DISCUSSION

Our study includes 100 patients with Type 2 diabetes. Among them, normal weight (49%), obese patients (32%), and lean Type 2 diabetics (19%) were identified. In our study, there is no statistically significant relationship between age and BMI observed. However, a study conducted by Mukhyaprana et al. observed mean age of onset of diabetes in lean were 60.34 ± 13.5 years. In Gohel et al. study, it was between 30 and 40 years. In our study, lean Type 2 diabetes patients were slightly higher in female sex (21.2%) which was statistically significant. A study conducted by Mukhyaprana et al. observed most lean Type 2 DM were males (65% of total lean) Type 2 DM which was statistically not significant. Positive family history was present only in 9.6% of patients with lean body weight Type 2 DM as compared to 35.4% in normal weight and 54.8% in obese patients with Type 2 DM which were statistically significant. A study conducted by Mukhyaprana et al. observed positive family history in 45% of lean and 62.6% in normal body weight diabetics. Study conducted by Gohel et al. observed low incidence of positive family history (20%) in lean as compared to 40% in normal and 44% in obese patients. In our study, 12.5% of lean diabetes had abnormal waist-hip ratio as compared to 42.2% in normal and 45.3% in obese patients. Waist-hip ratio had a statistically significant relationship with BMI. The previous study conducted at Mukhyaprana et al. observed 48% of lean diabetics had abnormal waist-hip ratio, stating that a significant number of lean diabetics (48%) had abnormal waist-hip ratio. The waist-hip ratio may thus be a more sensitive indicator of obesity in Indians. In our study, a significant proportion of lean persons had higher fasting blood sugar levels than obese patients with Type 2 diabetes, which was statistically significant as compared to normal and obese patients with Type 2 diabetes. This has been explained based on low-beta cell reserve in these patients. Similar results were also observed in study conducted by Mukhyaprana et al. Fasting blood sugar was 177.08 ± 105.1. Post-prandial blood sugar values in lean Type 2 DM patients were higher, even though statistically not significant. Analysis of lipid profile in our study showed interesting results. Type 2 lean diabetics, had lower incidence of dyslipidemia as compared to all other groups, even though only HDL relationship with BMI was statistically significant. In our study, HDL values were slightly higher in lean diabetics as compared to normal and obese patients which were statistically significant. Furthermore, free cholesterol value in lean diabetics was not high as compared to normal weight and obese patients. TGL values in lean diabetics were not very high as compared to normal and obese diabetics. Previous studies by Banerji et al. and Das et al. had showed slight increase in TGL and HDL in lean diabetics. Japanese study by Ikeda et al. showed no major differences in lipid profile in lean diabetics, irrespective of glycemic status. Lean Type 2 diabetes had a favorable lipid profile compared to normal weight and obese diabetics.

CONCLUSION

Majority of Type 2 diabetes patients in our population are having normal weight than lean body weight. Lean diabetics have more severe hyperglycemia and poor metabolic control. They are more prone for infections. Hence, we conclude that early initiation of insulin in lean Type 2 diabetics is expected to achieve good glycemic control and to prevent future complications.

REFERENCES

Pulmonary Tuberculosis in Elderly - Peculiarities and Dissimilarities: A Geriatric Clinic Experience

Sandhyarani Moharana¹, M Lipika², Dhirendra Nath Moharana³, Subhransu Sekhar Pattnaik⁴, Santanu Padhy⁵, Tapan Kumar Sahoo⁶

¹Associate Professor, Department of Physiology, Shrirama Chandra Bhanj Medical College, Cuttack, Odisha, India, ²Senior Resident, Department of Obstetrics and Gynaecology, Shrirama Chandra Bhanj Medical College, Cuttack, Odisha, India, ³Professor, Department of Medicine, Pandit Raghunath Murmu Medical College, Baripada, Odisha, India, ⁴MD, Department of Skin and VD, Shrirama Chandra Bhanj Medical College, Cuttack, Odisha, India, ⁵Junior Resident, Department of Community Medicine, Shrirama Chandra Bhanj Medical College, Cuttack, Odisha, India, ⁶Consultant, Department of Radiation Oncology, Junior Consultant in Department of Radiation Oncology, HCG Panda Curie Cancer Hospital, Cuttack, Odisha, India

Abstract

Introducion: Pulmonary tuberculosis (TB) is caused by the organism's mycobacterium TB complex, the most widespread and serious of all human infections, still a major infectious disease worldwide. Despite the implementation of strong TB initiatives, this highly infectious disease continues to affect all vulnerable populations, including the elderly population.

Aim of the Study: The aim of this study is to find out the difference in manifestation of pulmonary TB in between adults and geriatric population.

Material and Methods: A total of 50 patients in the age group of 18-59 years and 56 patients aged 60 years or above who were diagnosed to have and treated for pulmonary TB were prospectively studied during the period December 2014 to November 2015.

Results: Majority patients were male in both adult and geriatric arms. Cough, dyspnea, chest pain, night sweats, and nonspecific presentations seen more in geriatric group of the patients in comparison to adult patients. Sputum smear examination showed positive in 29/56 geriatric patients and 31/50 adult patients aged 18-59 years. In geriatric group, out of 56 pulmonary TB patients, 18 cases detected in upper lobe and 19 cases found in lower lobe lung, whereas, in adult group, out of 50 pulmonary TB patients, 24 cases detected in upper lobe and only 2 cases detected in lower lobe lung. Among geriatric patients, a significantly less proportion of patients were cured compared to adults aged 18-59 years (38/56 versus 46/50; P = 0.019).

Conclusion: TB in geriatric population is a bigger problem with regards to its presentation and treatment. Lower lobe TB is more common in the elderly population and there are more chances of multidrug resistance TB in the geriatric population.

Key words: Elderly, Geriatric, Pulmonary, Tuberculosis

INTRODUCTION

Pulmonary tuberculosis (TB) may cause no or mild signs and symptoms in contrast to the prolonged disease course that is common in post-primary or adult type disease. Atypical clinical manifestations of TB in older persons can result in delay in diagnosis and initiation of treatment; higher rates of morbidity and mortality from this treatable infection can occur. Underlying illnesses, age-related diminution in immune function, the increased frequency of adverse drug reactions, and institutionalization can complicate the overall outcome in elderly patients with TB. A high index of suspicion for TB in this vulnerable population is, thus, undoubtedly justifiable.¹ Acute or chronic diseases, malnutrition, and the biological changes associated with aging can disrupt protective barriers, impair microbial clearance mechanisms, and contribute to the expected age-related diminution in cellular immune responses to Mycobacterium TB.² The diagnosis of TB can be difficult, and this treatable infection is sometimes documented only on post-mortem examination. In addition, therapy for TB in elderly individuals is challenging.
because of the increased incidence of adverse drug reactions. Furthermore, institutionalized elderly persons are at high risk for reactivation of latent TB and are susceptible to new TB infection.²

**MATERIALS AND METHODS**

During the period December 2014 to November 2015, 50 patients in the age group of 18-59 years and 56 patients aged 60 years or above who were diagnosed to have and treated for pulmonary TB in medical outpatient service and medical ward at Srirama Chandra Bhanja Medical College Hospital, Cuttack, Odisha were prospectively studied. In all of them, a detailed history was obtained and physical examination was done. The clinical, bacteriological, radiographic presentation of pulmonary TB, and treatment outcome were compared in both the groups.

All of them underwent the laboratory tests such as sputum smear examination for acid-fast bacilli, blood urea and serum creatinine, fasting and post-prandial blood sugar, liver function tests, urinalysis, chest radiograph (posteroanterior view), 12 lead electrocardiogram, Mantoux test (5 tuberculin units), and serological testing for test for human immunodeficiency virus. All patients received thrice-weekly intermittent directly observed treatment strategy treatment as per Revised National Tuberculosis Control Programme (RNTCP) guidelines. Treatment outcomes were recorded as per RNTCP guidelines.

**Aim and Objective**
The aim of this study is to find out the difference in manifestation of pulmonary TB in between adults and geriatric population.

**Statistical Analysis**
Continuous variables are summarized as mean ± standard deviation. Categorical variables are summarized as percentages.

**RESULTS**

We observed that the gender distribution was similar in adults aged 18-59 years (male:female = 32:18) and geriatric (male:female = 40:16) patients. In the geriatric group, 33 (59%) patients were in age group 60-65 years, 15 (26%) were in the age group 65-70 years, and the remaining 8 (14%) were aged over 70 years. In the 18-59-year-old adults, 12 (24%) patients were aged 18-30 years, 23 (46%) were in the age group 31-45 years, and the remaining 15 (30%) were aged 45-59 years. Salient presenting symptoms are shown in Table 1. In comparison to adults, aged 18-59 years, cough, dyspnea, chest pain, night sweats, and non-specific symptoms were more frequently seen in geriatric patients.

In geriatric patients, malnutrition (64%), followed by anemia (30%), hypertension (HT) (24%), chronic obstructive pulmonary disease (COPD) (18%), diabetes mellitus (DM) (14%), and renal dysfunction (6%) were the comorbid conditions. In the 18-59-year-old adults, patients’ malnutrition was seen in 60% patients, followed by anemia (42%), DM (8%), COPD (6%), and HT (6%). There was no statistically significant difference in sputum smear positivity and grading between geriatric patients and adults aged 18-59 years (Table 2).

On radiological examination, geriatric patients had a statistically significant higher occurrence of lower lobe infiltrates (P = 0.005) compared with adults aged 18-59 years; all other radiological findings were comparable (Table 3).

Among geriatric patients, a significantly less proportion of patients were cured compared to adults aged 18-59 years.
(38/56 versus 46/50; \( P = 0.019 \)); treatment failure and death were comparable between the groups (Table 4). Side effects of anti-TB treatment in the geriatric patients and in the adults 18-59 year age group are highlighted in the Table 5.

The drug resistance profile was studied after completion of 2 months of antitubercular therapy. The suspicion of drug resistance was suspected depending on the clinical status, radiological status, and overall wellbeing of the patient. Anybody not showing satisfactory progress was subjected to drug sensitivity trial. Multidrug resistance (MDR) status (resistance to rifampicin and isoniazid) and extended drug resistance (XDR) pattern (resistance to rifampicin, isoniazid, and aminoglycosides and few other second-line drugs) were categorized and put in tabulated forms (Table 6).

**DISCUSSION**

In the present study, male patients predominated in both the geriatric (72%) and 18-59 year old (60%) adults. Similar findings were reported in other studies, where the proportion of male patients ranged from 61-67.6%.\(^5\,^3\,^5\)

In the present study, in comparison to 18-59-year-old adult patients, geriatric patients had a higher occurrence of cough, dyspnea, chest pain, night sweats, and non-specific symptom. In other studies, cough, fever, chest pain, and night sweats were more frequently described in adults aged 18-59 years compared to geriatric patients.\(^5\,^7\) but the difference was not statistically significant.

In our study, lower lobe involvement was more often seen in geriatric patients compared with adults aged 18-59 years (statistically significant). Atypical presentation observed in the geriatric patients in our study is consistent with the results reported in other studies.\(^5\,^9\) Such atypical presentation may delay the diagnosis of pulmonary TB in geriatric patients. Similar observations were reported in other published studies.\(^1\,^8\,^10\,^-\,^18\)

Sputum smear examination in the present study showed no significant difference in the geriatric and 18-59-year-old adult patients. This observation is similar to that documented in other studies.\(^6\,^9\,^19\) Thus, our observations suggest that sputum smear examination is a simple useful tool for the diagnosis of pulmonary TB in the geriatric population.

In the present study, comorbidities such as HT, COPD, and DM were more often reported in the geriatric patients compared with adults aged 18-59 years. These findings are in concurrence with the reports from other studies.\(^4\,^6\,^19\,^-\,^21\)

Outcome of treatment in the present study was poor in the geriatric patients compared to adult patients in our study. These findings are in comparison with observation documented in another study.\(^22\)

The adverse drug reactions observed in the study were mild and transient. The most common adverse event in the study was gastrointestinal discomfort which was higher in the geriatric age group compared to the adult group. In other studies also, gastrointestinal discomfort was the most common adverse event.\(^9\,^19\) In the present study, skin rash, ocular symptoms, arthritis, liver, and renal function abnormalities were higher in the geriatric patients compared to adult patients. These findings are in accordance with observations in other studies.\(^9\,^19\)

Adherence to TB treatment can be particularly challenging the duration of treatment in long, combination therapy is required, and side effects may be unpleasant. Furthermore, patients often experience rapid improvement in symptoms, which may obfuscate the importance of continuing prolonged treatment with drugs that may be perceived as unnecessary.\(^23\)

**CONCLUSION**

Family support, including financial assistance, collecting medication, and emotional support, appeared to be a strong
influence on patient adherence to treatment. Further, there is a possibility of MDR-TB as a result of reinfection with a drug-resistant strain of TB. The drug sensitivity tests should be done at the RNTCP center and such center should be made widely available. TB in geriatric population is a bigger problem with regards to its presentation and treatment. Lower lobe TB is more common in the elderly population, and there are more chances of MDR-TB in the geriatric population. Hence, it is necessary to keep our elderly away from TB infection.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Outcome of Retrograde Interlocking Intramedullary Nailing for Fracture Shaft of Femur and Extra-articular Distal Femur

Rajinder Singh, Sumeet Singh Charak, Mohinder Singh Chib, Khalid Muzafar, Mohd Haseeb
Department of Orthopaedics, Government Medical College and Hospital, Jammu, Jammu and Kashmir, India

Abstract

Introduction: Retrograde nailing represents an established fixation method for fractures of the distal femur and offers in femoral shaft fractures an alternative to the existing technique of antegrade nailing. The aim of this study was to investigate in a prospective analysis the results of retrograde nailing in extra-articular distal femoral fractures and femoral shaft fractures. Emphasis was posed on the long-term functional outcome, especially in daily activities.

Materials and Methods: Retrograde femoral nailing was used from November 2015 to December 2016 in Government Medical College Hospital for the treatment of selected distal femoral (AO/ASIF-type 33) and femoral shaft fractures (AO/ASIF-type 32) in 20 patients with 20 fractures. The mean age of patients was 42.7 years (minimum: 21/maximum: 103) and 70, 7% presented with ipsilateral local pathologies or associated entities.

Results: Osseous healing occurred in 13.7 weeks on an average. Post-operative complications requiring reintervention were seen in 2/20 (14.6%) fractures. All patients were evaluated with a mean follow-up period of 6 months using the functional score of the modified knee-rating system based on knee-rating scale of “The Hospital for Special Surgery.” Results of study were graded as excellent, good, fair, and poor according to the criteria of knee-rating scale of “The Hospital for Special Surgery.” There were 7 (35%) excellent, 11(55%) good, 1(5%) fair, and 1 (5%) poor results.

Conclusion: Retrograde nailing represents a reliable fixation method for extra-articular (33-A1-3) fractures of the supracondylar area. In femoral shaft fractures, retrograde inserted nails offer a valuable alternative, especially when the proximal femoral approach is obstructed.

Key words: Distal femoral fractures, Femoral fractures, Functional outcome, Retrograde nailing

INTRODUCTION

Femoral fractures usually require operative treatment to avoid severe local and general adverse sequelae. While in the treatment of femoral shaft fractures, intramedullary nailing (IMN) early became the golden standard, operative strategies in distal femoral fractures refrained to classic plate osteosynthesis (open reduction and internal fixation [ORIF] procedures) for a long period, though it was associated with high complication rates.\(^1\)\(^-\)\(^3\) The introduction of so-called biological plating - techniques decreased complication rates and the need for bone grafting dramatically even when conventional implants were used.\(^4\)\(^-\)\(^6\) In the recent years, two implants were specially designed for the distal femur and specially adapted for minimally invasive procedures with less compromise of local vascularity: The plate/fixator system of less invasive stabilization system- distal femoral (LISS-DF), locking compression plate-DF for extramedullary, and retrograde nails for intramedullary fracture stabilization.\(^7\)\(^-\)\(^9\) However, the technique of retrograde IMN is not only restricted to the supracondylar area but also represents an attractive alternative in femoral shaft fractures.\(^10\)\(^-\)\(^13\) Prospective analysis of the results of retrograde femoral nailing technique in our institute was done with special regard to the functional outcome.
MATERIALS AND METHODS

From 11/2015 until 12/2016, 20 patients with 20 fractures of the femur have been treated in our institutions with a retrograde femoral IMN. Gender distribution was male predominant representing 16 males (80%) and 4 females (20%) with a mean age of 42.7 years (minimum: 24 / maximum: 70). Left side 15/20 (75%) was affected more as compared to 5/20 (25%).

Most injuries were caused by high energy trauma (n = 16/20, 80%) resulting from MVA (n = 12) and falls from a height (n = 6), while less energy trauma was less observed (n = 4/20, 20%). Isolated and associated injuries were balanced representing 10/20 (50%) each.

According to the AO/ASIF, fracture classification 8/12 (40%) belonged to type 33 (distal femur) and 12/20 (60%) to type 32 (femoral shaft). Most frequently, 33 A-1 (n = 4) and 33 A-2 (n = 7) fractures types were encountered in the distal femur, no 33 B and 33 C were included while type 32 A-1 was predominantly seen (n = 5) in shaft fracture, followed by 32 A3 and B3 (n = 3) (Figure 1). In one patient, retrograde nailing was used for repair of a non-union of the femoral shaft after unreamed antegrade nailing. In distal femoral fractures (AO/ASIF type 33), the use of retrograde IMN was free to the estimation of the treating surgeon. In femoral shaft fractures (AO/ASIF type 32), the use was restricted to cases where the fracture line extended into the distal dia-metaphyseal area or where distal nail insertion seemed favorable due to the injury pattern (e.g., floating knee injury) or a problematic proximal approach (e.g., inlying implant) (Table 1). Distal femoral nail (DFN) of stainless steel 316L and for left and right use consists of 160-460 mm (20 mm increments) long nail with 1.5 mm radius of curvature for anatomic fit, of which is available in 9, 10, 11, 12, and 13 mm diameter. Distally, the nail can be locked statically or dynamically using the round locking mediolateral hole. Proximally, the nail can be locked statically through mediolateral hole. Intraoperatively, patients were operated within 2 weeks (10/20, 50%) to type 32 (femoral shaft). Most frequently, fractures types were balanced representing 10/20 (50%) each.

RESULTS

All other fractures were stabilized with the retrograde DFN. All the isolated fractures were operated within 1st week (10/20, 50%), and fractures with associated injuries were operated within 2nd and 3rd weeks (10/20, 50%). Reduction of the fracture was in all cases indirectly accomplished either manually by traction or external fixation. Mean operation time lasted 96.25 min (minimum: 60 min / maximum: 125 min). Post-operative full weight bearing was adapted to individual fracture anatomy, estimated quality of stabilization, and concomitant injuries. It was started in femoral shaft fractures after 12.3 weeks on an average (minimum: 10 - maximum: 14) compared to distal fractures after 13.9 weeks (minimum: 10 - maximum: 16). Osseous healing in acute fractures took slightly longer in shaft fractures with 13.3 weeks (minimum: 12 - maximum: 24) than in distal fractures with 11.4 weeks (minimum: 11 - maximum: 15) (Table 1). Adequate fracture healing was observed in 19/21 fractures (95%), while delayed union developed in one case only.

Complications were seen in 5/20 fractures (25%) but required reintervention in only 2/20 (10%) (Table 2). Varus Malalignment was seen in two patients, but both were not corrected as deviation was mild. Distal screw failure was complained by 6 cases. No case of implant failure and refracture was observed. Examination included X-rays of the affected limb and clinical evaluation of the patients according to the criteria of knee-rating scale of “The Hospital for Special Surgery.” there were 73 (35%) excellent, 115 (55%) good, 1 (5%) fair, and 1 (5%) poor results (Table 3).

The mean arc of motion in shaft fractures consisted of 119.3° on an average (minimum: 85°/maximum: 135°) and fractures associated with injuries had 115.5° (Table 4). Two cases had extension lag of 10° which improve by physiotherapy. Rest, all the cases achieved full extension.

Table 1: Data (mean values) of 20 fractures treated with retrograde IMN in 20 patients

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Femoral shaft fx (n=10)</th>
<th>Distal femoral fx (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>46.6</td>
<td>38.8</td>
</tr>
<tr>
<td>Operative duration (min)</td>
<td>101</td>
<td>88</td>
</tr>
<tr>
<td>Full weight bearing (weeks)</td>
<td>12.3</td>
<td>13.9</td>
</tr>
<tr>
<td>Osseous healing (weeks)</td>
<td>13.3</td>
<td>11.4</td>
</tr>
</tbody>
</table>

The distal fragment was opened under direct vision and fluoroscopic control at the entry point by the use of a guide wire and a cannulated reamer. The femoral shaft was only reamed in very narrow medullary space. Post-operative mobilization/physiotherapy started immediately, and weight bearing was adapted to the fracture type, concomitants, the estimated quality of osteosynthesis, and bone stock. Patients were assessed at regular intervals of time both clinically and radiologically for 6 months, and function outcome was assessed using the modified knee-rating system based on knee-rating scale of “The Hospital for Special Surgery.”
DISCUSSION

Operative treatment of distal femoral fractures is frequently problematic, as in young patients and high energy trauma, many comminuted areas are found, while in elderly patients, a poor bone stock and/or inlying implants are present. Plate osteosynthesis of these injuries by conventional technique (ORIF) adds considerable surgical trauma and impairment of the local vascularity, which is mirrored in high rates of septic complications and primary non-unions. The introduction of indirect fracture reduction techniques and soft tissue preserving approaches significantly reduced these complications regardless the use of extra- or intramedullary implants. Specially designed implants for the anatomy of the distal femur and minimal invasive techniques are the LISS internal fixator and retrograde femoral nails. Both philosophies cover most indications of distal femoral fractures and provide specific biomechanical advantages. However, in an individual fracture, the selection of implant is influenced by the grade of articular comminution as well as the design of eventually inlying implants and the personal preference of the surgeon. However, patients with a poor bone stock due to severe osteoporosis or pathologic fracture benefit from minimal blood loss and early weight bearing in retrograde IMN. Schmeiser found in 14 patients with tetra-/paraplegia after spinal cord trauma an average ROM of the operated knees of 108° at dismission and 100% fractures healing at follow-up examination 11 months on average after the trauma. Especially, the vulnerable and atrophic soft-tissue envelope of the knee area is very well preserved in these patients as the implant is completely submerged beneath the bone surface, while painful soft tissue irritation caused by the prominent implant edges represents a common problem in LISS osteosynthesis with reported hardware removal rates between 3% and 14%. Except the distal femur, retrograde IMN offers a reliable alternative in the treatment of femoral shaft fractures, especially when they extend into the distal metaphysis or when problems of the piriform fossa approach exist. The latter problem is frequently encountered in the elderly population, where obstruction of the femoral canal by inlying implants/prostheses is reported up to 50%. Furthermore, high rates of ipsilateral femoral pathologies are seen in patients over 55 years, pre-existing impairment of the locomotor system, or associated ipsilateral local problems. These cases as well as deformities of the proximal femur (severe hip dysplasia and girdlestone hip) represent an ideal indication for retrograde nailing, which offers sometimes the only realistic and reliable alternative.

Table 2: Complications in 20 patients/20 fractures with retrograde IMN of the femur. Overall rate: 20 fractures (%) re-intervention rate: 2/20 (10%)

<table>
<thead>
<tr>
<th>Complication</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurovascular injury</td>
<td>None</td>
</tr>
<tr>
<td>Infection</td>
<td></td>
</tr>
<tr>
<td>Superficial</td>
<td>One</td>
</tr>
<tr>
<td>Deep</td>
<td>None</td>
</tr>
<tr>
<td>Malunion</td>
<td></td>
</tr>
<tr>
<td>Varus &gt; 5</td>
<td>2</td>
</tr>
<tr>
<td>Valgus</td>
<td>None</td>
</tr>
<tr>
<td>Recurvatum &gt; 5</td>
<td>One</td>
</tr>
<tr>
<td>Procurvatum</td>
<td>None</td>
</tr>
<tr>
<td>Shortening ≥ 2 cm</td>
<td>(1S)</td>
</tr>
<tr>
<td>Delayed union</td>
<td>(1)</td>
</tr>
<tr>
<td>Non-union</td>
<td>None</td>
</tr>
<tr>
<td>Patellar impingement</td>
<td>None</td>
</tr>
<tr>
<td>Distal screw pain</td>
<td>6</td>
</tr>
<tr>
<td>Breakage of distal screw</td>
<td>0</td>
</tr>
<tr>
<td>Refracture</td>
<td>None</td>
</tr>
<tr>
<td>Screw missing the locking hole proximal to fracture</td>
<td>2</td>
</tr>
<tr>
<td>Extensor lag</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 3: Functional outcome after retrograde IMN in 20 patients

<table>
<thead>
<tr>
<th>Results</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>7 (35)</td>
</tr>
<tr>
<td>Good</td>
<td>11 (55)</td>
</tr>
<tr>
<td>Fair</td>
<td>1 (5)</td>
</tr>
<tr>
<td>Poor</td>
<td>1 (5)</td>
</tr>
</tbody>
</table>

Table 4: Range of motion

<table>
<thead>
<tr>
<th>Range of motion</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;120</td>
<td>7 (35)</td>
</tr>
<tr>
<td>110-120</td>
<td>8 (40)</td>
</tr>
<tr>
<td>100-110</td>
<td>4 (20)</td>
</tr>
<tr>
<td>&lt;100</td>
<td>1 (5)</td>
</tr>
</tbody>
</table>
treatment option. Due to a quicker approach and lesser X-ray exposure, retrograde nails may also be preferable in femoral shaft fractures with extreme adipositas, pregnancy, or polytrauma. In associated patellar or tibial fractures (floating-knee injury) (Figure 2), the retrograde nailing of femoral shaft fractures offers an elegant way to stabilize all fractures from one small incision.\textsuperscript{24-26}

Comparing the results of antegrade and retrograde femoral, IMN reveals no significant differences in respect to operation time, radiation exposure, technical complications, and bone union rates.\textsuperscript{27,28,13} Thigh pains are dominant in antegrade nailing\textsuperscript{7,12,13} while minor knee pains seem to be slightly dominant and quite common in retrograde nailing\textsuperscript{27,3} with rates between 13% and 60%.\textsuperscript{21,30} However, development of knee pains\textsuperscript{29} seems not to be influenced by trans- or para-patellar approach. Concern has been issued in the literature about possible intra-articular lesions due to insertion of the nail into the femoral groove, namely, the posterior cruciate ligament, and some authors advocate arthroscopic control of the nails entry point.\textsuperscript{35} On the other hand, Carmack\textsuperscript{32} found that identification of an optimal entry point (in line with the long femoral axis a.p. and lateral) by fluoroscopic control alone resulted in 100% of portals located within a safe area in relation to the patellofemoral joint and without harm to the PCL. Thus, we consider in daily routine fluoroscopic control of the entry point sufficient as we saw no ligamentous instability related to nail insertion and rarely saw axial malalignment ($n = 2/20; 410\%$) indicating an incorrect starting point. The overall complication rates of LISS and retrograde nailing are comparable,\textsuperscript{7,15,17} and the risk of intra-articular infection after retrograde IMN is low within 18%.\textsuperscript{33}

Retrograde IMN provides reliable fracture healing\textsuperscript{9,33} and good functional results, even in the elderly age group,\textsuperscript{34,23,28,21,35} or in extreme osteoporosis.\textsuperscript{19} Thus, excellent and satisfactory results, according to Neers classification, are found in 72-85%\textsuperscript{23,35} of geriatric collectives. El Kawy\textsuperscript{28} emphasized the benefit of early mobilization provided by IMN without decrease of mobility, though he observed in his collective a high rate (35\%) of post-operative malalignment. A survey of the literature found an average mobility of the knee joints operated with retrograde IMN for distal femoral fractures of 104° and femoral shaft fractures of 127°. The authors Wagner and Weckbach.\textsuperscript{35} attributed the better results in femoral shaft fractures to the fracture location, the younger age of the patients group, and the absence of any pre-existent lower extremity pathology. Although we cannot draw clear conclusions from our small collective, our data support that an increased age in our distal femoral fracture group influenced the functional outcome as well as the motion of the knee joint. Most functional deficits were based on a decreased knee joint motion, which mainly resulted from concomitant and pre-existing disabilities. On the other hand, the retrograde IMN proofed to be a reliable treatment option in both distal and femoral shaft fractures due to minimal rates of persisting pains and instabilities, thus providing a pre-requisite for early mobilization.

CONCLUSION

To us, retrograde nailing represents an established stabilization method in extra-articular distal femoral fractures (AO/ASIF classification 33-A1-3). In femoral shaft fractures (AO/ASIF classification 32), the retrograde technique offers a reliable alternative to antegrade nailing and may be in some situations even advantageous, especially in the presence of hip pathologies/implants which are increasingly common in elderly patients. Especially, this age group benefits from retrograde IMN by early post-operative mobilization of the patients combined with a minimal compromise of local vascularity and an almost complete submerging of the implant, which reduces soft tissue irritation and makes the implant feasible even in persons of poor general status.

REFERENCES

2. Bong MR, Egol KA, Koval KJ, Kummer FJ, Su ET, Iesaka K. Comparison of the liss and a retrograde inserted supracondylar intramedullary nail for

Figure 2: (a and b) Pre-operative radiographs, (c and d) post-operative radiographs
Singh, et al.: Retrograde Nailing in fracture shaft of femur and Extra Articular Distal femur

An Audit of Management of Cases of Blunt Trauma Abdomen Resulting in Solid Organ Injury in a Tertiary Hospital Mumbai

G Anuradha¹, G Abhay Kumar², Shilpa A Rao³

¹Registrar, Department of Surgical Oncology, Vikram Hospital, Bangalore, Karnataka, India, ²Consultant Surgeon, Malur, Kolar, Karnataka, India, ³Professor, Department of General Surgery, KEM Hospital, Mumbai, Maharashtra, India

Abstract

Background: In an age of speeding, road rage and increasing traffic accidents the incidence of trauma as a whole and subsequently blunt abdominal trauma, is on the rise. It's a major cause of mortality and morbidity in the 15-44 years age group. Identification of serious intra-abdominal pathologies many times requires a high index of suspicion and appropriate, timely investigation as they may not manifest during initial period of injury.

Methodology: This was a prospective study of blunt abdominal injuries conducted during the period from May 2011 to October 2013 at KEM Hospital Surgery Department. All the cases visited during this period formed the sample. Initial data - the history in detail, clinical examination and investigation results were recorded as per the case record form. Line of management of the patient- whether operative or conservative - was according to the decision and clinical discretion of the on-call/managing surgical unit. The patient was followed up till discharge/death.

Result: Majority patients were in the age group of 21-40 years, accounting for 61%. 46% of blunt abdominal trauma from road traffic accident, 36% were due to fall from height. Out of the 82 who were conserved, 5 required nonoperative intervention. 16.67% with splenic trauma patients and 10.5% of liver trauma patients needed surgical intervention, the rest being successfully conserved.

Conclusion: Most cases of blunt abdominal trauma were from road traffic accident and fall injuries. Most of the patients had associated injuries. Spleen was the most common organ involved followed by liver. Computed tomography is the gold standard for diagnosis of abdominal injuries in patients of trauma.

Key words: Audit, Blunt, Mumbai, Solid organ injury, Trauma

INTRODUCTION

In an age of speeding, road rage and increasing traffic accidents the incidence of trauma as a whole and subsequently blunt abdominal trauma, is on the rise. It's a major cause of mortality and morbidity in the 15-44 years age group.¹ Identification of serious intra-abdominal pathologies many times requires a high index of suspicion and appropriate, timely investigation as they may not manifest during initial period of injury.

Blunt trauma secondary to motor vehicle accidents, motorcycle accidents, falls, assaults, and striking of pedestrians are the most frequent mechanisms of abdominal injury.²

The solid organs of the abdomen are the liver, the spleen, the kidneys, and the pancreas. As a result, they tend to fracture, tear or rupture when struck with significant force. These tears have a tendency to bleed primarily or secondarily due to increased blood supply to these organs or due to avulsion of vessels within.

The management of blunt trauma abdomen has undergone a paradigm shift from imminent explorations, as was the
dictum, to a conservative and more selective management today due to the better intensive monitoring of patients aided by noninvasive technology. In modern trauma centers in the 21st century, advances in noninvasive technology such as ultrasound and computed tomography (CT) have improved the evaluation and management of trauma victims. Furthermore, development of newer therapeutic modalities - such as embolization of bleeding vessels, ultrasound or CT guided drainage and advances in critical care management have increased the scope of nonsurgical management.

Selective nonoperative management (NOM) of solid organ injuries has become the standard of care today, as there is reduced surgical intervention and consequently reduced transfusions, lower morbidity, and shorter length of stay. Patients eligible for this line of management include those who remain hemodynamically stable and who do not have associated injuries that require laparotomy. Furthermore, necessary is the availability of intensive monitoring. The patient is strictly observed by serial physical and radiological examinations. Operative interventions need to occur expeditiously in hemodynamically unstable patients. This study was conducted to know the patterns of organ injury due to blunt abdominal trauma presenting to a tertiary care center and also to study the factors affecting the outcome of significant blunt trauma abdomen involving solid organs.

**METHODOLOGY**

This was a prospective study of blunt abdominal injuries conducted during the period from May 2011 to October 2013 at KEM Hospital Surgery Department. All the cases visited during this period formed the sample of the study which amounted to 100. All new as well as referred cases with blunt trauma abdomen admitted to our surgical emergency >12 years old, with proven solid organ injury were included in the study. Patients with death within 2 h of admission or arrival to the hospital, blunt trauma abdomen leading to hollow viscus injury and isolated hemoperitoneum without any evidence of solid organ injury till the end of patient’s hospital stay were excluded from the study sample. Ethical clearance was obtained from Institutional Ethical Clearance Committee. Primary survey and resuscitation were done as per clinical condition of the patient. After securing the airway, breathing, and circulation, secondary survey was carried out as per guidelines. Institution of intravenous fluids with a wide bore line, insertion of Foley’s urinary catheter and nasogastric tube and endotracheal intubation was done as per clinical necessity.

Relevant blood investigations, importantly hemoglobin level with pack cell volume (PCV)/hematocrit, serum creatinine, electrolyte, and blood sugar values were obtained on an urgent basis from the 24 h functioning e-lab at our center. Grouping and cross-matching of adequate units of blood and transfusion as and when necessary were done in the meantime.

Once the patient was clinically stable necessary precautions to stabilize spine were taken and relevant imaging such as chest and erect abdominal X-rays with regional X-ray of suspected bone injury sites and sonography of chest, abdomen, and pelvis in the FAST format were obtained. If and when indicated, CT brain/chest/abdomen-pelvis was done.

Initial data - the history in detail, clinical examination and investigation results were recorded as per the case record form. Line of management of the patient - whether operative or conservative - was according to the decision and clinical discretion of the on call/managing surgical unit. Indications for any managerial decision were recorded. Further course with all details was recorded in the pro forma. The patient was followed up till discharge/death.

Ultrasonography was done with the curvilinear 5.0C50 (3-5 MHz) and linear 10-5 (5-10 MHz) transducers on sonoline G50 model of Siemens.

Hemoglobin, PCV and other parameters of complete blood count were obtained on the fully automated hematology analyzer (PCE-210 of Erma Inc.) with a capacity of 60 samples per hour and which functions on the principle of volume impedance.

CT scan was performed on the Philips Brilliance 64-slice CT scanner and was reported by the resident doctor on call.

**RESULTS**

Most of the cases, i.e., 92 were males. Majority patients were in the age group of 21-40 years, accounting for 61% of the cases (Table 1). 77 patients presented within 24 h of trauma, 30 of who presented within 6 h, and 37 within 12 h of injury. The rest 23 patients presented up to 3 days of trauma except two patients who presented after 25 and 45 days after being treated elsewhere, referred for complications. Table 2 depicts the mode of injury of the mentioned cases.

Among the 31 patients who had either tachycardia or hypotension, only 10 patients had isolated abdominal solid organ injury. Hemoglobin at presentation ranged from 7.1 to 15 g%. Average Hb was 11.31 g% (Table 3).

The overall mean duration of stay was 19.21 days whereas, for patients with isolated solid organ injury, it was much
Anuradtha, et al.: Audit of cases of blunt trauma abdomen

lesser, i.e., 7.69 days. Pancreatic injuries had a mean stay of 38.4 days. Overall 29 required whole blood/PCV for resuscitation initially or later in the course. Majority could be successfully conserved and only 18 needed surgery during their course. Out of the 82 who were conserved, 5 required nonoperative intervention (Table 4). Out of the 18 patients operated, 11 (61%) were emergency splenectomies for splenic injuries, 4 (22%) were for liver injuries, and 2 (11%) for pancreatic injury. All renal injuries were conservatively managed.

Complications of NOM included infected splenic hematoma requiring pigtail insertion in 1 case, bilious collection requiring drainage in 1 case, significant delayed bleeding requiring intervention (1 case managed by vascular intervention and 4 cases managed with laparotomy), pancreatitis and its complications of pancreatic necrosis and fluid collection in 3 cases of pancreatic injury, 2 of which eventually needed surgery and 1 required drainage.

There were four deaths, none in the operated group. Causes were acute respiratory distress syndrome due to polytrauma, MI and mass effect secondary to cerebral compression due to a head injury.

DISCUSSION

Majority of cases were males (92%), mean age being 32 years. This is in conformity with most other studies as in that by Maurice et al. were mean age was 27 years. It is known that men being more susceptible to road traffic accidents and forceful assault, are more commonly involved in trauma of any form.

Table 1: Distribution according to demographic variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Females</td>
<td>08</td>
</tr>
<tr>
<td></td>
<td>Males</td>
<td>92</td>
</tr>
<tr>
<td>Age</td>
<td>&lt;20</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>21-30</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>31-40</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>41-50</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>51-60</td>
<td>06</td>
</tr>
<tr>
<td></td>
<td>61-70</td>
<td>01</td>
</tr>
<tr>
<td></td>
<td>71-80</td>
<td>02</td>
</tr>
</tbody>
</table>

Table 2: Distribution based on mode of injury

<table>
<thead>
<tr>
<th>Mode of injury</th>
<th>Number of patients (n=100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road traffic accidents</td>
<td>46</td>
</tr>
<tr>
<td>Fall from height</td>
<td>33</td>
</tr>
<tr>
<td>Assaults</td>
<td>9</td>
</tr>
<tr>
<td>Others</td>
<td>12</td>
</tr>
</tbody>
</table>

Although majority (67%) presented to our hospital within 12 h of injury, 30% presented within 6 h and 23% patients presented up to 3 days after injury. This could be attributed to the fact that KEM Hospital is one of the major tertiary referral centers to which patients are referred from all over Maharashtra. Primary care in such cases was given elsewhere. In some cases, patients were referred to multiple other centers before they came to this center.

Road traffic accidents formed the majority (46%) but less than half of cases in this study. In most studies as by Velmahos et al. and Raza et al., this was 77% and 92%, respectively. Fall from height also contributed a significant proportion. This finding might call for preventive measures.
at construction sites and tall buildings apart from safe traffic policies. Assault and other forms of domestic blunt trauma contributed to the rest (21%) of the cases. Hence, the modes of injuries which can lead to significant blunt abdominal trauma are varied. 17% of patients had no abdominal signs. In a collected series of 955 patients, Powell et al. reported that clinical evaluation alone has an accuracy rate of only 65% for detecting the presence or absence of intraperitoneal blood.

Spleen was the most common organ (66%) involved followed by liver (38%). It was noted that after advent of CT scan, liver is the most common organ involved in blunt trauma, but this was not corroborated in our study despite 100% use of CT scan.

Comparing our findings with Velmahos et al., 66% versus 50% had a splenic injury; 38% versus 48%, a liver injury; 7% versus 19%, a renal injury; 15% versus 11%, 2 organs injured; an 0% versus 7%, all 3 injured.

The pancreas was not included in the studies alongside other solid organs which are unique to our study. 5% had pancreatic involvement, with only one isolated pancreatic trauma. Indeed in blunt trauma to abdomen, pancreas is rarely involved alone.

Conservative management was successful in majority of patients (82%). Rate of primary operative intervention was the highest with pancreas (20%) followed by spleen (10.6%). 7 of the 18 patients were operated because of failure of NOM. The highest rate of failure was with pancreas (50%) and spleen (6.8%). With liver, it was 2.8%, i.e., only one case out of 35 conserved cases. This is in accordance with the study results which have concluded that splenic injury of higher grade is a risk factor for failure of NOM.

One patient of delayed splenic bleeding due to ruptured pseudoaneurysm on the 8th day of trauma underwent splenic artery embolization which was successful. This calls for more active application of vascular interventional procedures in patients with bleeding solid organs due to trauma, so as to avoid a laparotomy as studies have shown them to be quite effective even in hemodynamically unstable patients.

Duration of stay was much higher in the operated group (17.17 days in operated group vs. 8.06 days in nonoperative group) due to higher grades of trauma, hence more associated injuries, and also failure of conservative management after a period of time. Of importance is the pancreatic injury whose average duration of stay was 38.4 days, way more compared to other isolated solid organ injuries. This is attributed to the fact that the process of traumatic pancreatitis and pancreatic ductal injury are inherently much more morbid in their pathophysiology owing to the biochemical composition of the pancreas as compared with liver, spleen or kidney whose injury poses bleeding (resulting in hemoperitoneum) as the most important effect.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Correlative Study between Body Mass Index and Hypotension in Obese Patients Undergoing Cesarean Section under Spinal Anaesthesia

C G Jayachandran¹, Linette J Morris²

¹Assistant Professor, Department of Anaesthesiology, Government Medical College, Thiruvananthapuram, Kerala, India, ²Professor and Head, Department of Anaesthesiology, Government Medical College, Thiruvananthapuram, Kerala, India

Abstract

Background: Prevalence of obesity is increasing worldwide with rapid changes in dietary habits. Obese pregnant patients tend to labor abnormally with a tendency to either need instrumental or cesarean section delivery. They are also at risk when superimposed with diabetes and pre-eclampsia. Obese pregnant patients are an anesthetic risk directly related to maternal mortality and morbidity. They are considered as a high-risk group by the anesthetists even during their antenatal care.

Materials and Methods: A total of 126 pregnant patients undergoing cesarean section under spinal block in the Department of Obstetrics and Gynecology were included in this study. The patients were divided into two groups; Group A consisted of women with body mass index (BMI) less than 30 kg.m² and Group B with BMI more than 30 kg.m². Before spinal block, noninvasive blood pressure recording was done thrice at 5 min intervals to obtain an average basal systolic blood pressure (SBP). Hypotension was defined as a fall in SBP of 25-30% of the baseline or below 85-90 mmHg. The incidence of pregnancy diabetes and hypertension was recorded. Episodes of hypotension, mean fall in SBP, volume of crystalloids used and amount of vasopressors used were observed in the main groups as well as subgroups of Group B.

Results: A total number of 126 patients were included and divided into two groups of 63 each (Group A: Non-obese and Group B: Obese). The incidence of gestational diabetes among the Group A patients was 5/63 (07.93%), and in Group B it was 19/63 (30.15%) which was significant statistically with \( P = 0.017 \). Mean episodes of Hypotension during the spinal block in Group A were 3.06 ± 1.33 compared to 5.46 ± 1.72 episodes in Group B which was statistically significant with \( P = 0.00001 \). The use of vasopressors was smaller in Group A; 2.91 ± 1.04 when compared to Group B; 6.17 ± 1.12 and it was significant with \( P = 0.00001 \).

Conclusion: The obese pregnant patients have higher risk of developing hypotension after spinal anesthesia for cesarean section. This study sample showed that pregnant patients with BMI more than 30 kg.m² were a risk factor for developing hypotension after spinal anesthesia undergoing cesarean section. The numbers of hypotension episodes were more, and the amount of vasopressors used was more. The results indicate that the techniques of anesthesia used in such patients should be improved to avoid consequences in the mother and the newborn.

Key words: Pregnancy, obesity, Body mass Index, Hypotension, Cesarean section, Spinal anaesthesia and Spinal anaesthetics

INTRODUCTION

The WHO considers obesity as a worldwide phenomenon especially among women and categorized it based on the association of body mass index (BMI) and comorbidities. It classified obesity as overweight ≥25 kg.m², pre-obese 25-29.9 kg.m², and obese Classes 1, 2, and 3 ranging from 30 to 34.9 kg.m², 35 to 39.9 kg.m² and ≥40 kg.m², respectively.¹ The maternal morbidity in pregnant women increases due to comorbid diabetes, hypertension,² and respiratory disorders such as asthma and sleep apnea, thromboembolic phenomenon, cardiomyopathy,³ higher incidence of cesarean sections, and higher number of urinary infections, and surgical wound infections.⁴⃣ The obese pregnant women have a limited physiological reserve due to obesity being...
superadded to pregnancy and the physiological reserve is proportional to the duration of obesity before pregnancy. The status of prevalence of obesity in India is that it has reached an epidemic proportion, affecting 5% of the country’s population. Saha and Saha submitted in their National Family Health Survey that there is an increased trend towards overweight or obesity in Indian women from 10 in 1998-9 to 14.6 in 2005. Among the Indian states that topped the list of rates of obesity were Punjab (30.3% males and 37.5% females), Kerala (24.3% males and 34% females), and Goa (20.8% males and 27% females). Obesity also results in neonatal consequences such as increased rate of congenital anomalies, stillbirths, and macrosomia, birth weight more than 4500 g, and intrauterine growth retardation. The relatively less frequent complications include shoulder dystocia and stillbirth. Spinal, epidural, or combined anesthesia are widely used in obstetrics, both for cesarean section and labor analgesia. Hypotension after spinal anesthesia is directly related to greater mortality and even more so in obstetric patients especially in obese individuals. The incidence besides being greater is associated with serious maternal-fetal consequences, with the spectrum ranging an increased incidence of nausea and vomiting to fetal hypoxia due to changes in uteroplacental blood flow with consequent fetal acidosis. Hypotension after administration of regional anesthesia is defined as systolic blood pressures <85-90 mm Hg or a decrease of more than 25-30% from the pre-anesthetic basal systolic value. In the light present review of literature a study was conducted with an aim to evaluate and correlate the incidence of hypotension in obese pregnant women with BMI >30 kg.m² undergoing cesarean section under spinal anesthesia.

Inclusion Criteria
1. Pregnant women aged 25-40 years were included
2. Full term pregnant women (more than 35 weeks gestational age) were included
3. Patients with BMI ≤29.9 kg.m² were included in Group A
4. Patients with BMI ≥30 kg.m² were included in Group B.

Exclusion Criteria
1. Pregnant women aged below 25 and above 40 years were excluded
2. Patients with <35 weeks gestational age were excluded
3. Patients on doses of anticoagulants that contraindicated spinal anesthesia, thrombocytopenia, bleeding disorders, maternal cardiomyopathy, history of coagulopathy, twin pregnancy, and those who refused to participate in the study were excluded
4. Patients with previous history of anesthetic complications were excluded.

WHO classification based on BMI was used in patients in this study. Thorough medical examination was done after eliciting detailed history related to all systems. Before spinal block, noninvasive blood pressure recording was done thrice at 5 min intervals to obtain an average systolic basal blood pressure (SBP) to guide the anesthetist in administering vasopressors during the procedure. Pulse rate and oximetry were continuously recorded. Ringer’s lactate infusion started at the same time of anesthesia was administered for a total of 10 ml/kg until delivery. For spinal block, 15 mg of 0.5% hyperbaric bupivacaine was used. For spinal block 12.5-15mgof 0.5% hyperbaric bupivacaine was used (depending upon height of the patient). For sedation 1.5 to 2 mg of midazolam was administered slow intravenously. In 80 seconds, the uterus was dislocated, the blood pressure was measured every 2 min, volume of crystalloids infused and total doses of vasopressors administered were recorded. Hypotension was defined as a fall in SBP of 25-30% of the basal blood pressure or fall to below 85-90 mmHg. In the presence of hypotension, the anesthesiologist administered a bolus of 6 mg of mephentrine or 6 mg of ephedrine, whichever considered appropriate. All anesthesia techniques, doses, and conduction followed the standard textbook descriptions. All the data were recorded in a printed pro forma, and standard statistical methods were used to analyze them.

RESULTS
A total of 126 patients attending the Department of OBG, Government Medical College Hospital were divided into...
two groups based on their BMI. Patients with ≤30 kg·m⁻² are grouped as “A” and patients with BMI ≥30 kg·m⁻² were grouped as “B”. The incidence of gestational diabetes among the Group A patients was 5/63 (07.93%), and in Group B it was 19/63 (30.15%) which was significant statistically with \( P = 0.017 \) (\( P = 0.05 \) taken as significant) \( \text{(Table 1).} \) The incidence of gestational hypertension among the Group A patients was 10/63 (15.87%), and in Group B it was 22/63 (34.92%) which was significant statistically with \( P = 0.031 \) (\( P = 0.05 \) taken as significant) \( \text{(Table 1).} \) Mean episodes of hypotension during spinal block in Group A were 3.06 ± 1.33 compared to 5.46 ± 1.72 episodes in Group B which was statistically significant with \( P = 0.00001 \) \( \text{(Table 1).} \) The mean fall in SBP among the Group A patients was 22.62 ± 2.06 mmHg and in Group B it was 29.59 ± 6.44 mmHg and it was significant statistically \( \text{(P at 0.00001)} \) \( \text{(Table 1).} \) However, the incidence of hypotension independent of the number of episodes or their severity was 85.71% in Group A, and 90.47% in Group B. Overall, the episodes of hypotension during spinal block were smaller in Group A than in Group B. The mean volume of crystalloids used in Group A was 1288 ± 169.62 ml, and in Group B it was 1624.83 ± 166.62 ml, and the difference was significant statistically with \( P = 0.00001 \) \( \text{(P significant at 0.05)} \). The use of vasopressors was smaller in Group A; 2.91 ± 1.04 when compared to Group B; 6.17 ± 1.12 and it was significant with \( P = 0.00001 \) \( \text{(Table 1).} \)

In the subgroups of Group B, the mean SBP was 27.42 ± 5.50 mmHg in patients with BMI ≥30-34.9 kg·m⁻², 26.50 ± 3.12 mmHg in patients with BMI ≥35-39.9 kg·m⁻², and 31.44 ± 6.12 mmHg in patients with BMI ≥40 kg·m⁻². The data were not significant statistically \( \text{(P at 0.761 and 0.832, respectively)} \) \( \text{(Table 2).} \)

**DISCUSSION**

As a result of physiological weight gain during pregnancy especially in those with pre-existing obesity experience a limited respiratory reserve. In supine position, cardiovascular and respiratory embarrassment occurs due to diminished lung volumes and capacities and ventilation-perfusion ratio. Aortocaval compression due to bulky uterus adds on the cardiac workload. Spinal anesthesia is the most common regional block used in cesarean sections. The higher incidence of hypotension observed in obese parturient women might be due to the greater extension of a higher sympathetic blockade caused by compression of the subarachnoid space by the gravid uterus and preganglionic sympathetic blockade, leading to reduced sympathetic tone of the arterial circulation, and peripheral arterial vasodilatation. During and after labor there is a significant increase in cardiac output, reaching up to 75% above pre-pregnancy levels. In this study, the mean fall in SBP among the Group A patients was 23 ± 6.2 mmHg, and in Group B it was 31 ± 3.12 mmHg, and it was significant statistically \( \text{(P = 0.43)} \). For every increase in 100 g of adipose tissue in obese pregnant women the cardiac output increases by 50 mL/min. There is also hypervolemic circulation during pregnancy leading to hypertrophy of left ventricle followed by gradual myocardial dilation against the sustained increase in blood pressure generated by the hypervolemic state, occasionally leading to systolic dysfunction. On the other hand, pre-gestational hypertension could be exacerbated resulting increase in baseline heart rate and cardiac output, which can lead to diastolic dysfunction. The incidence of gestational diabetes among the Group A patients was 5/63 (07.93%), and in Group B it was 19/63 (30.15%) which was significant statistically with \( P = 0.024 \) \( \text{(P = 0.05 taken as significant)} \). Obese pregnant women are susceptible to cardiac contractility defects and conductivity of the cardiac electric stimulus due to hyperinsulinemia and insulin resistance resulting in fat deposits that might be also seen in the myocardium. In the subgroups...

**Table 1: The incidence of comorbidities and mean values of SBP, episodes of hypotension and volumes of crystalloids and vasopressors used in the study and control groups \( (n=63) \)**

<table>
<thead>
<tr>
<th>Observation</th>
<th>Group A</th>
<th>Group B</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestational diabetes (%)</td>
<td>05 (07.93)</td>
<td>19 (30.15)</td>
<td>0.017</td>
</tr>
<tr>
<td>Gestational hypertension (%)</td>
<td>10 (15.87)</td>
<td>22 (34.92)</td>
<td>0.031</td>
</tr>
<tr>
<td>Mean episodes in hypotension</td>
<td>3.06±1.33</td>
<td>5.46±1.72</td>
<td>0.00001</td>
</tr>
<tr>
<td>Mean fall in SBP mm/Hg</td>
<td>22.62±2.06</td>
<td>29.59±6.44</td>
<td>0.00001</td>
</tr>
<tr>
<td>Mean volume of crystalloids used (mL)</td>
<td>1288.32±169.62</td>
<td>1624.83±166.62</td>
<td>0.00001</td>
</tr>
<tr>
<td>Mean amount of vasopressors used</td>
<td>2.91±1.04</td>
<td>6.17±1.12</td>
<td>0.00001</td>
</tr>
</tbody>
</table>

SBP: Systolic blood pressure

**Table 2: The episodes of hypotension and SBP in the obese subgroups \( (n=63) \)**

<table>
<thead>
<tr>
<th>Observation</th>
<th>BMI ≥30-34.9 kg·m⁻²</th>
<th>BMI ≥35-39.9 kg·m⁻²</th>
<th>BMI ≥40 kg·m⁻²</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean SBP</td>
<td>27.42±5.50</td>
<td>26.50±3.12</td>
<td>31.44±6.12</td>
<td>0.761</td>
</tr>
<tr>
<td>Mean episodes of hypotension</td>
<td>6.80±2.1</td>
<td>7.12±3.20</td>
<td>7.98±1.10</td>
<td>0.832</td>
</tr>
</tbody>
</table>

SBP: Systolic blood pressure, BMI: Body mass index
of Group B, the mean SBP was 27.42 ± 5.50 mmHg in patients with BMI ≥30-34.9 kg/m², 26.50 ± 3.12 mmHg in patients with BMI 35-39.9 kg/m², and 31.44 ± 6.12 mmHg in patients with BMI 31.44 ± 6.12. The data were not significant statistically (P = 0.761 and 0.832, respectively). To an anesthetist obesity and pregnancy represents many risk factors such as delayed gastric emptying time, airway inaccessibility, unpredictability in spinal blockade especially during emergency cesarean sections. The last mentioned risk factor is due to reduce cerebrospinal fluid which is inversely proportional to the increased BMI.18,24,25 In this study, mean volume of crystalloids used in Group A was 1342 ± 378 ml, and in Group B it was 1712 ± 538 ml, and the difference was significant statistically with P = 0.043 (P significant at 0.05). Nani and Torres concluded from their study that prophylactic measures against occurrence of hypotension in obese parturient are little effective as the regulation of the vascular tonus especially venous is more important than maintenance of the venous return altered by aorto-cava compression. The lack of statistical significance in the number of hypotensive episodes and the severity of hypotension among overweight, obese, and morbidly obese patients; i.e., maybe aorto-cava compression is less important than possible metabolic and cardiovascular alterations associated to the increased BMI.26 The mean episodes of hypotension during spinal block in Group A were 6.21 ± 2.34 compared to 8.42 ± 3.6 episodes in Group B which was statistically significant with P = 0.038 (Table 1) in this study. In this study, the use of vasopressors was smaller in Group A; 4.88 ± 2.50 when compared to Group B; 7.46 ± 4.10 and it was significant with P value at 0.048. Sometimes the profound hypotension in morbidly obese patients may be refractory to measures such as intravenous vasopressors and intravenous crystalloids and may require intensive care admission, resuscitation, and monitoring. For optimal care, antepartum screening and evaluation by anesthesiologists is warranted.27-29

CONCLUSIONS

The obese pregnant patients have a higher risk of developing hypotension after spinal anesthesia for cesarean section. This study sample showed that pregnant patients with BMI more than 30 kg/m² were a risk factor for developing hypotension after spinal anesthesia undergoing a cesarean section. The number of hypotension episodes were more, and the amount of vasopressors used was more. The results indicate that the techniques of anesthesia used in such patients should be improved to avoid consequences in the mother and the newborn.

REFERENCES

9. Saha UC, Saha KB. A trend in women’s health in India - What has been achieved and what can be done. Rural Remote Health 2010;10:1260.
How to cite this article: Jayachandran CG, Morris LJ. Correlative Study between Body Mass Index and Hypotension in Obese Patients Undergoing Cesarean Section under Spinal Anaesthesia. Int J Sci Stud 2017;5(4):63-67.

Source of Support: Nil, Conflict of Interest: None declared.
Thyroid Function Abnormalities in Patients with Chronic Kidney Disease - A Prospective Study

Aarathy Kannan¹, V Sriramakrishnan², B Kannan³, Heber Anandan⁴

¹Senior Resident, Department of Medicine, Sundaram Arulrhaj Hospital, Tuticorin, Tamil Nadu, India, ²Associate Professor, Department of Neurology, Thoothukudi Government Medical College and Hospital, Tuticorin, Tamil Nadu, India, ³Senior Assistant Professor, Department of Neurology, Thoothukudi Government Medical College and Hospital, Tuticorin, Tamil Nadu, India, ⁴Senior Clinical Scientist, Department of Clinical Research, Dr. Agarwal’s Healthcare Limited, Tirunelveli, Tamil Nadu, India

Abstract

Introduction: The kidney normally plays an important role in the metabolism, degradation, and excretion of several thyroid hormones (THs). It is not surprising therefore that impairment in kidney function leads to disturbed thyroid physiology. All levels of the hypothalamic-pituitary-thyroid axis may be involved, including alterations in hormone production, distribution, and excretion.

Aim: The aim of this study is to study the correlation between TH dysfunction and severity of renal diseases and to differentiate primary thyroid diseases from thyroid dysfunction due to chronic renal failure.

Materials and Methods: Patients with chronic renal failure who are on conservative management were included in the study. Thyroid profile would be done in all patients who fulfill the inclusion criteria.

Results: Excluding patients with hypothyroidism, T₃ level is low in 46% of the patients, and T₄ level is low in 20% of the patients. Excluding 5 hypothyroidism patients who have low T₄ values, 9 (21.33%) other patients had T₄ level below normal and low T₃ syndrome. Number of patients with low T₃ does not correlate with severity of renal disease.

Conclusion: Chronic kidney disease leads to significant changes in the TH levels, which need to be interpreted carefully in these patients.

Key words: Chronic kidney disease, Low T₃ syndrome, Thyroid dysfunction

INTRODUCTION

The function of the thyroid gland is one of the most important in the human body as it regulates majority of the body’s physiological actions. The thyroid produces hormones (T₃ and T₄) that have many actions including metabolism, development, protein synthesis, and the regulation of many other important hormones. Any dysfunction in the thyroid can affect the production of thyroid hormones (THs) (T₃ and T₄) which can be linked to various pathologies throughout the body. The interactions between kidney and thyroid functions are known for years.¹⁻³ THs are necessary for growth and development of the kidney and for the maintenance of water and electrolyte homeostasis. On the other hand, the kidney is involved in the metabolism and elimination of TH. From a clinical practice viewpoint, it should be mentioned that both hypothyroidism and hyperthyroidism are accompanied by remarkable alterations in the metabolism of water and electrolyte, as well as in cardiovascular function.⁴⁻⁵ All these effects generate changes in water and electrolyte kidney management. Moreover, the decline of kidney function is accompanied by changes in the synthesis, secretion, metabolism, and elimination of TH. Thyroid dysfunction acquires special characteristics in those patients with advanced kidney disease.⁶ On the other hand, the different treatments used in the management of patients with kidney and thyroid diseases may be accompanied by changes or adverse events that affect thyroid and kidney function, respectively.

Aim

The aim of this study is to study the correlation between TH dysfunction and severity of renal diseases and to
differentiate primary thyroid diseases from thyroid dysfunction due to chronic renal failure.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of General Medicine, Aarupadai Veedu Medical College Hospital, Puducherry. Patients with chronic renal failure who are on conservative management were included in the study. Inclusion criteria: Symptoms of uremia for 3 months or more, elevated blood urea, serum creatinine, ultrasound evidence of medical renal disease, bilateral contracted kidneys - size <8 cm in male and size <7 cm in female, poor corticomedullary differentiation, Type 2 or 3 renal parenchymal changes, and supportive laboratory evidence of chronic renal failure such as anemia, urine specific gravity, and changes in serum electrolytes. Exclusion criteria: Patients who underwent peritoneal dialysis or hemodialysis, nephrotic range of proteinuria, low serum protein, especially albumin, history of long time hypothyroidism, other conditions such as acute illness, recent surgery, trauma or burns, and diabetes mellitus. Patients with liver diseases, patients taking drugs altering thyroid profile like amiodarone, steroids, dopamine, phenytoin, estrogen pills, and iodine containing drugs were excluded. Thyroid profile would be done in all patients who fulfill the inclusion criteria. Informed consent was obtained from all patients. Detailed clinical history and clinical examination were undertaken with preference to thyroid and renal diseases. The following investigations were performed urine for specific gravity and broadcast, peripheral smear for anemia and burr cells, renal parameters such as blood urea, serum creatinine, and creatinine clearance (using Cockcroft-Gault formula), serum calcium and phosphorous, 24 h urine protein, and serum protein to rule out nephrotic syndrome and hypoproteinemia, respectively.

RESULTS

50 patients with chronic renal failure who were on conservative management were studied. Among 50 patients, 10 patients were female and 40 patients were male. The age varied from 12 to 70 years. Among 50 patients, 10 patients were 30 years and below, 33 patients were in the age group of 30-60 years, and 7 patients above 60 years. The duration of chronic renal failure in this study varied from 3 months to 5 years. The creatinine clearance varied from 6 to 34 ml/min. 20 patients had glomerular filtration rate (GFR) 10 ml/min accounting for 40%, 20 patients had GFR 11-20 ml/min accounting for another 40%, and remaining 10 patients had GFR more than 20 ml/min (accounting for 20%) (Table 1). Blood urea varied from 64 to 170 mg/dl and serum creatinine varied from 3 to 17.2 mg/dl. 24 h urinary protein excretion was <1 g/day in all the patients in this study group. Serum calcium and phosphorous were normal in all the patients. 80% of the patients had anemia with peripheral smear revealing normocytic normochromic anemia in 72% and hypochromic anemia in 8% of the patients. T4 level in this study varied from 0.2 to 2 ng/ml. The mean value of T4 is 0.67 ng/ml (Table 2). Age comparison of low T3 syndrome in Table 3 shows about 30% of chronic renal failure patients below 30 years of age have low T3 syndrome. The percentage increases to 51.51% in the age group 31-60 years. This is probably due to increased chronic renal failure patients in this age group. In age above 60 years, 42.85% have low T3 syndrome. Sex incidence in this study, 50% of males have low T3 syndrome, and only 30% of the females have low T4 syndrome (Table 4).

Ultrasound study of the abdomen showed evidence of

<table>
<thead>
<tr>
<th>Table 1: Distribution of level of GFR in CRF patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>GFR</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>&lt;10 ml/min</td>
</tr>
<tr>
<td>11-20 ml/min</td>
</tr>
<tr>
<td>&gt;20 ml</td>
</tr>
<tr>
<td>GFR: Glomerular filtration rate, CRF: Chronic renal failure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Serum concentration of TH in CRF patients studied</th>
</tr>
</thead>
<tbody>
<tr>
<td>THs</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Serum T3 ng/ml</td>
</tr>
<tr>
<td>Serum T4 µg/dl</td>
</tr>
<tr>
<td>Serum TSH µIU/ml</td>
</tr>
<tr>
<td>TSH: Thyroid-stimulating hormone, TH: Thyroid hormones, SD: Standard deviation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3: Distribution of low T3 and T4 among various levels of TSH in the study group of CRF patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSH level µIU/ml</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>≤7</td>
</tr>
<tr>
<td>7.1-20</td>
</tr>
<tr>
<td>&gt;20</td>
</tr>
<tr>
<td>TSH: Thyroid-stimulating hormone, CRF: Chronic renal failure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4: Analysis of thyroid dysfunction in this study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thyroid dysfunction</td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td>Low T3 syndrome</td>
</tr>
<tr>
<td>Low T4 syndrome</td>
</tr>
<tr>
<td>Hypothyroidism</td>
</tr>
</tbody>
</table>
chronic renal failure in all patients. Contracted kidney was present in 90% of the patients. Remaining patients had poor corticomedullary differentiation. Among these 28 patients, 5 patients had low serum T₃ and T₄ and high thyroid-stimulating hormone (TSH) values more than 20 µIU/ml. They also had symptoms of hypothyroidism. These patients as per the criteria were grouped under “primary hypothyroidism.” Only 6 patients had slightly elevated TSH ranging between 9 and 14 µIU/ml. In this group, only 3 patients had low T₃ level, among which only one patient had few clinical features of hypothyroidism. Hence, these 6 patients did not satisfy the criteria for hypothyroidism fully. Hence, all 23 patients were grouped under “low T₃ syndrome” or “sick euthyroid syndrome” (Table 5).

Dry, flaky skin was present in 15 patients, of whom only 4 patients were hypothyroid. Sinus bradycardia was present in 7 patients.

Hypothyroidism did not show any linear correlation with GFR. Increased number of hypothyroid patients of about 2 in number was present in GFR 11-20 ml/min, whereas only 3 patients had hypothyroidism in GFR <10 ml/min.

Excluding 5 hypothyroidism patients who have low T₃ values, 9 (21.33%) other patients had T4 level below normal and low T₃ syndrome. Number of patients with low T4 does not correlate with severity of renal disease (Table 6). The mean value of T4 excluding hypothyroidism patients was normal at all the stages of renal failure (Table 7). None of the patients had T4 value above normal level.

Excluding the patients with primary hypothyroidism, the mean value is 0.71 ng/ml. This value was in low normal limit. Excluding hypothyroidism, T₃ levels were studied in relation to GFR. It was found that mean value of serum T₃ is low (0.538 ng/ml) only in patients with GFR <10 ml/min (Table 8). The mean value is low normal in patients with GFR more than 10 ml/min. According to the study, number of patients with low T₃ independently increases with increase in severity of the renal failure irrespective of low T₃ levels.

Serum T₃ level in the study varies from 0.5 to 9.5 µg/dl. Mean value of serum T₃ among 50 patients 5.62 µg/dl, excluding hypothyroid patients, the mean value is 5.99 µg/dl. This value is within low normal level of T₃.

Values of TSH vary from 0.6 to 27 µIU/ml with mean value in 6.53 µIU/ml. Excluding hypothyroidism, mean value is 4.75 µIU/ml. This shows normal serum level of TSH. Among the 50 patients, TSH was normal in 38 patients (76%) and values between 7.1 and 20 µIU/ml in 7 patients (14%). It was elevated more than 20 µIU/ml in 5 patients (10%). According to our study, in patients with low T₃ syndrome, the mean values of TSH in various stages of renal failure are within normal range. However, the values of TSH did not show any linear correlation with GFR.

**DISCUSSION**

Thyroid dysfunction in chronic renal failure was extensively studied by Ramirez et al.² Apart from his study, various studies conducted in this line have showed different results. In this study, patients only on conservative management were studied. This is because thyroid profile undergoes changes due to dialysis independent of that due to chronic renal failure. Dialysis also changes the previous serum status of TH in the patients with renal failure. Many studies have been conducted by comparing chronic renal failure patients on conservative management and hemodialysis by Ramirez et al.⁷ and Kayima et al.⁸ Many studies conducted in chronic renal failure patients showed low T₃ values. Low T₃ had been reported in Ramirez et al.⁷ Hegedüs et al.⁹ and Beckett et al.¹⁰ studies, that too in cases of severe renal failure. Ramirez et al.⁷ study showed a linear correlation between the mean serum T₃ and T₄ and severity of renal failure. As with other studies, mean T₃ level in our study

---

**Table 5: Analyses of serum T₃, T₄, and TSH excluding hypothyroidism**

<table>
<thead>
<tr>
<th>Thyroid dysfunction</th>
<th>Patients with normal values (%)</th>
<th>Patients with low values (%)</th>
<th>Patients with high values (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₃</td>
<td>22 (44)</td>
<td>23 (28)</td>
<td>Nil</td>
</tr>
<tr>
<td>T₄</td>
<td>35 (70)</td>
<td>10 (20)</td>
<td>Nil</td>
</tr>
<tr>
<td>TSH</td>
<td>38 (76)</td>
<td>Nil</td>
<td>7 (14)</td>
</tr>
</tbody>
</table>

TSH: Thyroid-stimulating hormone

---

**Table 6: Distribution of low T₃ and T₄ syndrome with relation to the creatinine clearance**

<table>
<thead>
<tr>
<th>Creatinine clearance ml/min</th>
<th>Low T₃ syndrome</th>
<th>Low T₄ syndrome</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤10</td>
<td>13 (65)</td>
<td>6 (30)</td>
</tr>
<tr>
<td>11-20</td>
<td>7 (35)</td>
<td>3 (15)</td>
</tr>
<tr>
<td>&gt;20</td>
<td>3 (30)</td>
<td>1 (10)</td>
</tr>
</tbody>
</table>

---

**Table 7: Distribution of thyroid dysfunction in this study among various creatinine clearance levels**

<table>
<thead>
<tr>
<th>Creatinine clearance ml/min</th>
<th>Patients (%)</th>
<th>Low T₃ syndrome (%)</th>
<th>Hypothyroidism (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤10</td>
<td>20 (40)</td>
<td>13 (65)</td>
<td>3 (15)</td>
</tr>
<tr>
<td>11-20</td>
<td>20 (40)</td>
<td>7 (35)</td>
<td>2 (10)</td>
</tr>
<tr>
<td>&gt;20</td>
<td>10 (20)</td>
<td>3 (30)</td>
<td>Nil</td>
</tr>
</tbody>
</table>
Table 8: Correlations of THs with severity of renal failure excluding hypothyroidism

<table>
<thead>
<tr>
<th>Creatinine clearance ml/min</th>
<th>Mean T₃ µg/dl</th>
<th>Standard deviation</th>
<th>Mean T₄ µg/dl</th>
<th>Standard deviation</th>
<th>Mean TSH µIU/ml</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 10 (n=17)</td>
<td>0.538</td>
<td>0.40</td>
<td>5.02</td>
<td>2.10</td>
<td>5.22</td>
<td>4.25</td>
</tr>
<tr>
<td>11-20 (n=18)</td>
<td>0.82</td>
<td>0.43</td>
<td>6.69</td>
<td>2.17</td>
<td>3.77</td>
<td>3.78</td>
</tr>
<tr>
<td>&gt; 20</td>
<td>0.8</td>
<td>0.31</td>
<td>6.32</td>
<td>2.04</td>
<td>5.72</td>
<td>5.00</td>
</tr>
</tbody>
</table>

TH: Thyroid hormones

was reduced below normal in GFR <10 ml/min. In higher GFR, it was present in low normal T₃ level and there was no linear correlation between T₃ level and GFR which is consistent with Avasthi et al. study. Mean T₄ level in this study is within normal limits in all levels of GFR, but it is in low normal level and also it does not correlate with the severity of renal failure. In this study, not all the patients with chronic renal failure have low T₃ and T₄. It is estimated that only 58% (29 patients) of patients have thyroid profile abnormality. Remaining 42% of patients have normal thyroid profile. Among 58% of these patients, excluding primary hypothyroid patients 28% have only low T₃ level with normal T₄ level. Remaining 20% have both low T₃ and T₄ level. The percentage of patients having low T₃ and T₄ gradually increases, with decrease in GFR. The patient who will develop such change in thyroid profile is not known. Excluding hypothyroidism, mean TSH level in our study is within normal limits. The mean TSH levels are also within normal limits for the various ranges of GFR. However, TSH level does not show any linear correlation with the severity of renal failure. This is consistent with the study conducted by Spector et al.12 and Ramirez et al.13 These studies demonstrated abnormality in hypophyseal mechanism of TSH release in uremic patients as the TSH response to the thyrotropin-releasing hormone (TRH) was blunted. Other studies conducted by Joseph et al.15 and Hardy et al.14 revealed low T₃, T₄ level with high TSH level suggesting maintenance of pituitary-thyroid axis. In this study, excluding those with hypothyroidism, 7 patients had mild elevation of TSH with low T₃ level. Among these patients, T₄ is within normal limits in 4 of the patients. In the remaining 3 patients, T₄ is below normal. There were no clinical features suggestive of hypothyroidism in these patients. Investigations such as FT₃, FT₄, TRH response, and antithyroid autoantibodies can be done to diagnose hypothyroidism in these patients. Our study is consistent with the results of Ramirez et al.17 study showing low T₃, low T₄ and normal or mild elevation of TSH. Yet, it is unclear that to what extent these changes are responsible for the manifestations of uremic syndrome. From the various studies, it has been suggested that this thyroid profile derangements are a part of body adaptation mechanism. As stated previously, hemodialysis and continuous ambulatory peritoneal dialysis have shown to affect the thyroid profile independently of chronic renal failure. Furthermore, drugs like heparin, furosemide used during dialysis will affect the thyroid profile. Kayima et al.8 and Gomez-Pan A et al.15 have conducted studies regarding the effect of dialysis on chronic renal failure patients with thyroid dysfunction. These studies showed no significant improvement in thyroid profile after repeated hemodialysis. However, in the patients who have undergone renal transplant surgery, most of the thyroid function parameters returned to normal with TSH below normal. Previous studies by Quion-Verde16 reported a high prevalence of hypothyroidism in chronic renal failure. It was estimated to be about 5% in patients with terminal renal failure. Detail study by Kaptein et al.5,17 estimated the prevalence of primary hypothyroidism was about 2.5 times much frequent in chronic renal failure and dialysis. The hypothyroidism in chronic renal failure was estimated to range between 0 and 9.5%. Kaptein et al.2 study also estimated the presence of antithyroid antibody titer in 6.7% of chronic renal failure. In our study, the hypothyroidism is present in 10% of the patients but does not correlate with the severity of the renal failure. The symptoms of hypothyroidism were distributed equally in both hypothyroid and chronic renal failure patients. Signs of hypothyroidism were more common in chronic renal failure without hypothyroidism than with hypothyroidism. Hence, diagnosis of hypothyroidism in chronic renal failure mainly rest on TSH level which should be very high (>20 MIU/dl) with low serum T₃. In this study, no patient had clinical or biochemical features of hyperthyroidism.

CONCLUSION

TH dysfunction occurs in 58% of the chronic renal failure patients. Incidence of hypothyroidism is increased in patients with chronic renal failure. Both clinical and biochemical parameters are essential to diagnose hypothyroidism in patients with chronic renal failure. Excluding patients with hypothyroidism, T₃ level is low in 46% of the patients and T₄ level is low in 20% of the patients. Number of patients with low T₃ and T₄ syndrome progressively increases with severity of renal failure. Serum level of T₃ and T₄ has no correlation with the severity of renal failure. Alteration in the values of T₃ and T₄ occurs as a part of body’s adaptation mechanism to conserve energy.
REFERENCES


How to cite this article: Kannan A, Sriramakrishnan V, Kannan B, Anandan H. Thyroid Function Abnormalities in Patients with Chronic Kidney Disease - A Prospective Study. Int J Sci Stud 2017;5(4):68-72.

Source of Support: Nil, Conflict of Interest: None declared.
Cranial Anthropometric Indices in Population of Rajasthan, India

Chandrakala Agarwal¹, Rohin Garg², Pooja Pareek³, Deepak Sharma⁴, Santosh Kumar⁵

¹Professor and Head, Department of Anatomy, RUHS College of Medical Science, Jaipur, Rajasthan, India, ²Assistant Professor, Department of Anatomy, Teerthanker Mahaveer Medical College and Research Centre, Moradabad, Uttar Pradesh, India, ³Senior Demonstrator, Department of Anatomy, Mahatma Gandhi Medical College, Jaipur, Rajasthan, India, ⁴Senior Demonstrator, Department of Anatomy, RUHS College of Medical Science, Jaipur, Rajasthan, India, ⁵Senior Lecturer, Department of Anatomy, Jaipur Dental College, Jaipur, Rajasthan, India

By measuring these changes, classification system of cranial and facial parameters can be created which assesses both the head and face with the help of indices associated with growth patterns. Hence, we planned the present study to assess cranial anthropometric indices in a known population of Rajasthan, India.

INTRODUCTION

Width and length of bones of both face and skull is increased by the post-natal craniofacial growth and development. These development changes also result in significant alteration in the proportions of these bones which further result in the morphologic variation in the vertical, transverse, and anteroposterior plane of the space till the point of skeletal maturity.¹

By measuring these changes, classification system of cranial and facial parameters can be created which assesses both the head and face with the help of indices associated with growth patterns. Hence, we planned the present study to assess cranial anthropometric indices in a known population of Rajasthan, India.

Anthropometry of soft tissue is categorized under the heading of direct quantitative methods. It is non-invasive in nature and uses areas that are covered by hair or areas that would be observed distorted through indirect anthropometry.² Farkas et al. established the differences between direct and indirect measurement methods with clinical assessment.³,⁴ Hence, we planned the present study to assess cranial anthropometric indices in a known population of Rajasthan, India.

Abstract

Background: Width and length of bones of both face and skull is increased by the post-natal craniofacial growth and development. By measuring these changes, classification system of cranial and facial parameters can be created which assesses both the head and face with the help of indices associated with growth patterns. Hence, we planned the present study to assess cranial anthropometric indices in a known population of Rajasthan, India.

Materials and Methods: The present study included assessment of a total of 200 participants, out of which 100 were male and 100 were female. Only participants with 18 years and above were included in the present study. Patients were made to sit on a chair in relaxed position. Head of the participants were placed in normal anatomic position, and a spreading caliper was used for taking the measurement using stretched anatomical landmarks. Cephalic index was measured by assessing various anatomic parameters. Categorization of the head shape, on the basis of cephalic index, was done. All the results were recorded and analyzed using SPSS software.

Results: Mean value of breadth of the head was found to be 187.52 mm and 176.87 mm in males and females, respectively. Cephalic index in males and females was found to be 74.72 and 76.85, respectively. Significant results were obtained while comparing the cephalic index among males and females. 53 males and 35 females showed dolichocephalic type of the head based on the cephalic index while mesocephalic head type was present in 34 and 48 males and females, respectively.

Conclusion: Comparatively, more head length and breadth occurs in males in comparison with females.

Key words: Cephalic index, Head breadth, Head length

Corresponding Author: Dr. Rohin Garg, Department of Anatomy, Teerthanker Mahaveer Medical College and Research Centre, Moradabad, Uttar Pradesh, India. E-mail: rohingarg99@gmail.com
MATERIALS AND METHODS

The present study involved assessment of normal healthy appearing males and females of Rajasthan origin. A total of 200 participants were included in the present study, out of which 100 were male and 100 were female. Only participants with 18 years and above were included in the present study. All the parameters were measured four times and mean value was obtained which was used as standard value for assessment.

Patients were made to sit on a chair in relaxed position. Head of the participants was placed in normal anatomic position, and a spreading caliper was used for taking the measurement using stretched anatomical landmarks.

Parameters Measured

- Length of head: Measurement done from glabella to the inion
- Width of the head: Measurement done below the nasion to the gnathion
- Cephalic index: Head length × 100/Head breadth.

Method given by Williams et al., which utilized the cephalic index, was used for the determination of head shape.

Categorization of the head shape, on the basis of cephalic index, was done into following four categories:
1. Dolichocephalic
2. Mesocephalic
3. Brachycephalic
4. Hyperbrachycephalic.

All the results were recorded and analyzed using SPSS software.

RESULTS

Head length in males and females was found to be 140.12 mm and 135.94 mm, respectively (Table 1 and Graph 1). Mean value of breadth of the head was found to be 187.52 mm and 176.87 mm in males and females, respectively. Cephalic index in males and females was found to be 74.72 and 76.85, respectively. Significant results were obtained while comparing the cephalic index among males and females (Table 1) (P < 0.05). 53 males and 35 females showed dolichocephalic type of the head based on the cephalic index while mesocephalic head type was present in 34 and 48 males and females, respectively (Table 2 and Graph 2). Only 1 participant in the males and 5 participants in females showed presence hyperbrachycephalic type of the head.

DISCUSSION

For the determination of racial traits, various methodologies have been used in the past which utilized various cranial capacities, cranial indices, and

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Mean value in males</th>
<th>Mean value in females</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Head breadth</td>
<td>187.52</td>
<td>176.87</td>
<td>0.01</td>
</tr>
<tr>
<td>2.</td>
<td>Head length</td>
<td>140.12</td>
<td>135.94</td>
<td>0.01</td>
</tr>
<tr>
<td>3.</td>
<td>Cephalic index</td>
<td>74.72</td>
<td>76.85</td>
<td>0.01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Type of head</th>
<th>Number of males</th>
<th>Number of females</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dolichocephalic</td>
<td>53</td>
<td>35</td>
</tr>
<tr>
<td>2.</td>
<td>Mesocephalic</td>
<td>34</td>
<td>48</td>
</tr>
<tr>
<td>3.</td>
<td>Brachycephalic</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>4.</td>
<td>Hyperbrachycephalic</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

Graph 1: Various parameters of all the participants

Graph 2: Types of heads on the basis of cephalic index

Table 1: Various parameters of all the participants

Table 2: Types of heads on the basis of cephalic index
observations such as craniometry. Craniometry refers to the technique of measurement of skull bones. In the field of physical anthropology, cephalic index was first used for the classification of the ancient human remains which were found in Europe. In the 19th and late 20th century, the theory became closely associated with the racial anthropological development. Hence, we planned the present study to assess cranial anthropometric indices in a known population of Rajasthan, India.

In the present study, we observed that males were having comparatively higher cephalic index in comparison with females (Table 1 and Graph 1) ($P < 0.05$). Dolichocephalic was most common type of head type found in males (Table 2 and Graph 2). Gupta et al. conducted a study on 600 adults which included 300 males and 300 females. They evaluated the head length, head width, and assessed the relationship of these two parameters with each other. After evaluating these two parameters, they calculated the cephalic index. All the data obtained were assessed, compiled, and analyzed. The average head length and breadth in their study was found to be 139.51 mm and 186.88 mm in males and 136.19 mm and 177.74 mm in females, respectively. From the results, they concluded that dolichocephalic and mesocephalic types of the head are more common in males and females, respectively.

Schaaf et al. compared the standard anthropometric cranial measurements with the measurement obtained from cranial photographs. They assessed a total of 122 children belonging to the age group of 3 months to 15 months of age. They obtained standardized digital images in the supracranial view and cranial anthropometric measurements. Quick Ceph software was used for the assessment of the photographs. For indicating the degree of cranial deformity, the cephalic index and cranial vault asymmetry index were used. They classified the children into plagioccephaly, brachycephaly, and the combination of both. The photographic method satisfied the limits of agreement and showed slightly lower values represented by the respective bias. From the results, they concluded that for quantifying cranial deformities, digital photography is a reliable tool.

Wilbrand et al. randomly analyzed 30 infants that were diagnosed with plagioccephaly, brachycephaly, or a combination of both conditions. Each group in their study consisted of 10 patients each. They analyzed the following parameters: Circumference, length, width, and oblique distance from the frontotemporal area (ft) to the lambdoid suture on each side of the head (ld). All the results were recorded and analyzed. They observed that mean inter-observer variability was lower than 0.182 mm (2), and mean intra-observer variability was lower than 1.131 mm (2). From the results, they concluded that for the quantification of early childhood head deformities, standardized measurements are highly reproducible. Torres-Restrepo et al. assessed the agreement between cranial and facial classification obtained by clinical observation and anthropometric measurements among a known pediatric population. They analyzed 8-15-year-old children in their cross-sectional study. Initially, they determined the pattern of the skull using indirect clinical observation method and on visual equivalence of right eurion-left eurion and glabella-opisthocranion anthropometric points, as well as the facial type. They observed that out of 313 children included in the study, 172 were females. The agreement between the direct and indirect facial index measurements was 0.189, and the cranial index was 0.388, indicating poor concordance. From the results, they concluded that no direct agreement is observed between direct measurements conducted with an anthropometer and indirect measurements through visual evaluation. Mendonca et al. conducted a comparative study to assess the craniofacial measurement by traditional calipers to computed tomography and three-dimensional photogrammetry. From the results, they concluded that underestimation of anterior-posterior and biparietal values occurs with caliper measurements in comparison with digital imaging.

## CONCLUSION

From the above results, the authors concluded that in males, comparatively, more head length and breadth occurs in males in comparison with females which exhibit sexual dimorphism. However, future studies are recommended for better exploration of this field.

## REFERENCES

8. Akhter Z, Begum JA. Stature estimation using head measurements in


Source of Support: Nil, Conflict of Interest: None declared.
Study of Physical Functioning in Children with Congenital Adrenal Hyperplasia

C Rekha1, R Paramaguru2, Vimala Sarojini1, Seenivasan3

1Assistant Professor, Department of Paediatrics, ACS Medical College and Hospital, Velappanchavadi, Tamil Nadu, India, 2Assistant Civil Surgeon, Department of Paediatrics, Thiruvallor Government Hospital, Tamil Nadu, India, 3Assistant Professor, Department of Pediatrics, Institute of Child Health and Hospital for Children, Chennai, Tamil Nadu, India

Abstract

Background: Congenital adrenal hyperplasia (CAH) is an autosomal recessive disorder causing deficiency of enzymes involved in adrenal steroidogenesis. Steroid replacement therapy plays a vital role in the treatment. Hyperandrogenism due to the accumulation of intermediate metabolites is the important cause of symptoms. These hormonal imbalances would result in growth abnormalities and hence should be monitored stringently.

Aims and Objectives: The aim of this study is to study the physical functioning in children with CAH on treatment and to compare simple virilizers and salt wasters.

Materials and Methods: A total of 55 children between 2 and 12 years of age who met the inclusion and exclusion criteria were enrolled in the study. Detailed history, anthropometry, body mass index (BMI), blood pressure, X-ray for bone age, and 17-hydroxy progesterone levels were obtained.

Observation and Results: In our study, 82% (n = 45) were females and only 18% (n = 10) were males. CAH in males has been under diagnosed in our population. As expected salt-wasting type constituted the majority about 62% (n = 34). Simple virilizing type was only 38% (n = 21). Mean dose of steroid administered to our patients in this study is 16.3 ± 4.4 mg/m2 body surface area. Mean height z-score in our study was −0.2±2.1. About 67% (n = 37) of the total population had their height z-scores between −2 and +2. About 11% (n = 6) of them were >+3 z-score and 9% (n = 5) of them were <-3 z-score. Among the patients with height z-scores >+3 z-score, 5 patients were on recommended dose. 47% (n = 26) of our patients had normal BMI. 20% (n = 11) of them were obese while 18% (n = 10) of them were overweight.

Conclusion: 20% of the total study population had abnormal growth profile, and 53% of the kids had abnormal BMI due to infrequent monitoring. Hence, frequent monitoring of height, weight, and BMI is essential for all patients with CAH irrespective of the type of disease. Based on the clinical findings and hormonal assays, individualized dosage modification should be done regularly.

Key words: Congenital adrenal hyperplasia, Hydrocortisone, Hydroxyprogesterone, Hyperandrogenism, Virilization

INTRODUCTION

Congenital adrenal hyperplasia (CAH) is defined as a genetic problem involving steroidogenesis in adrenal gland due to enzyme deficiencies, most common being 21 hydroxylase deficiency.1 This would lead to by-product deficiency and accumulation of intermediate metabolites, thereby stimulating pituitary gland to produce more adrenocorticotropic hormone (ACTH). ACTH stimulates adrenal gland resulting in hyperplasia.2 The accumulated metabolites are the cause for symptoms in CAH, in addition to steroid deficiency. Cortisol was used for its treatment first in the year 1950.3 Deficiency of specific enzymes involved in steroidogenesis in the adrenal would result in a lack of cortisol with or without aldosterone. This would also cause excessive production of precursors. These are then converted to androgens and hence hyperandrogenic features.

Most common enzyme deficiencies constituting CAH include 21-hydroxylase deficiency, 11-beta hydroxylation
deficiency, 3-beta hydroxysteroid dehydrogenase deficiency, 17-alpha hydroxylase deficiency, and 17, 20 lyase deficiency. Actions of glucocorticoids include increase in gluconeogenesis, increase in lipolysis, and redistribution of fat resulting in truncal obesity and moon facies when in excess. Skeletal maturation is inhibited by glucocorticoids. Decrease serum calcium levels by decreasing absorption from the intestine and increasing excretion in the kidneys and hence lead to osteoporosis. 21-hydroxylase deficiency may be of two types:
1. Classical

Classical type is again reclassified into:
1. Salt wasting
2. Simple virilizing.

CAH and Its Effect on Physical Growth
Children with CAH have alterations in their growth pattern. The cause may be either hyperandrogenism or hypercortisolism when treated with excess steroids. In some children, in spite of steroids used at physiological doses, there may be growth alteration. The reason quoted for the same is transient hypercortisolism immediately after the absorption of the drug which has been used for long term. Other reason may be increased serum cortisol level up to supraphysiological doses during initiation of treatment, in the first year of life. This is the main cause for the delayed bone maturation and short stature in the adult life. Other causes quoted were that the inadequate suppression of hyperandrogenic state which may advance the bone age in children but ultimately cause early epiphyseal fusion resulting in short stature among adults. Other reason for early epiphyseal fusion in some may be due to central precocious puberty. Studies have stated that though clinical examination is the most efficient way of monitoring the adequacy of treatment, still day to day changes could not be reflected, and hence, it is recommended to use biomarkers such as androstenedione for perfect monitoring. For these patients, whom there had been a reduction in growth, treatment with short-term growth hormone replacement and GnRH analog would result in a growth of about 11 cm than expected. Selection of patients for such a treatment is based on presence of psychological stress and adjustment difficulties owing to their short stature.

In our study, we are going to observe the growth pattern of CAH children who are on treatment with standard treatment regimen. The treatment goal in CAH is to attain normal growth and development by judicious dosing of glucocorticoid and mineralocorticoid and close monitoring to avoid under- and over-treatment. To meet the balance between too little or too much steroids is the major challenge, especially in children with varied growth potential. There had been a very few studies on physical functioning in our CAH population. Hence, we are proceeding with this study.

Aims and Objectives
The aim of this study is to study the physical functioning in children with CAH on treatment and to compare simple virilizers and salt wasters in various aspects.

MATERIALS AND METHODS

Design of the Study
This was a descriptive study (cross-sectional).

Place
Pediatric Endocrinology Department, Institute of Child Health, Department of child guidance clinic, ICH.

Period of the Study
The period of duration was from February 2015 to August 2015.

Sample Specifications - Case Definition
All clinically and biochemically confirmed cases of CAH on treatment at endocrinology department.

Inclusion criteria
All children from 2 to 12 years who were diagnosed as CAH and on treatment were included in the study.

Exclusion criteria
Other causes of growth abnormalities: Familial short stature, growth hormone deficiency, nutritional causes, chronic systemic diseases, chronic medications unrelated
to CAH, and known psychiatric illness were excluded from the study.

Sample size - all children with above inclusion criteria who presented during the study period.

Ethical committee clearance was obtained from the institutional review board.

Children of age 2-12 years diagnosed to have CAH and satisfying the inclusion and exclusion criteria were recruited into the study, after obtaining informed parental consent.

Subjects with CAH those satisfying the inclusion and exclusion criterion were enrolled into the study.

Detailed history and old record analysis to look for the following:
- Type of the disease - salt wasting or simple virilizing,
- Age at diagnosis,
- Consanguinity,
- Siblings affected or not,
- Antenatal history,
- Social and demographic data,
- Period of drug intake,
- Compliance,
- Dose adjustments,
- Hospital admissions and school absentism.

Anthropometric measurements: Height, weight, and BMI calculation are plotted on standard charts and assigned proper z-scores.

Blood pressure measurement - both systolic and diastolic checked thrice (on three different occasions) and average of the three taken. Sexual maturity rating is done for all children as per Tanner’s staging. Features of steroid excess - cushingoid features, obesity, hypertension, striae, and hepatomegaly were noted. Systemic examination done to rule out all other causes. Investigations done include X-ray for bone age and biochemical - levels of 17-hydroxyprogesterone.

RESULTS

A total of 55 children with CAH on treatment were studied in the age group between 2 and 12 years. As shown in Figure 1, 82% of our study population were females and only the remaining 18% were males. 42% of our total population were between 8 and 12 years. 29% of them were between 2 and 4 years, and 29% of them were between 5 and 7 years. Among girls, 38% were between 8 and 12 years, whereas among boys, 60% were between 8 and 12 years. Between 5 and 7 years, 20% of the total boys and 31% of the total girls were included in the study. The difference was not statistically significant. 84% of them were diagnosed in the neonatal period during salt-wasting crisis, and only 16% were diagnosed later. The difference is not statistically significant with a P value of 0.078, about 62% were salt wasters and 38% were simple virilisers. The difference is statistically significant as the p value is 0.03253. A total of 16% had their siblings affected, and it was significantly associated with simple virilizing type of disease at P = 0.0196 in our study.

In this study, 67% of the total population had normal height z-scores as in Table 1. 20% of them had either short stature (9%) or tall for their age (11%). Height (score) was not associated with types of disease at P = 0.2658. 72% of the kids had their weight z-score normal. 7% of them had fallen under >+3 z-score. Weight (score) was not associated with types of disease at P = 0.1076. Only 47% of them had normal BMI as in Table 2.

In our study, about 27% of the total kids are found to have features of steroid excess as in Figure 2. Cushingoid features are more with salt wasters though the difference is not statistically significant. 78% of them had normal blood pressure. 22% of them had their BP in the pre-

### Table 1: Distribution of height z-scores

<table>
<thead>
<tr>
<th>Height (z-score)</th>
<th>Types of disease</th>
<th>Fisher's exact test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Salt-wasting (%)</td>
<td>Simple-virilizing</td>
</tr>
<tr>
<td>&lt;3</td>
<td>2 (6)</td>
<td>3 (14)</td>
</tr>
<tr>
<td>−2 to 3</td>
<td>4 (12)</td>
<td>0</td>
</tr>
<tr>
<td>2 to 3</td>
<td>21 (62)</td>
<td>16 (76)</td>
</tr>
<tr>
<td>&gt;3</td>
<td>3 (9)</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>34 (100)</td>
<td>21 (100)</td>
</tr>
</tbody>
</table>
hypertensive stage. Systolic BP percentiles were not associated with types of disease at $P = 0.7505$. The difference was due to chance. In this study, only 24% of them had the expected fair control levels of 17OHP. 44% of them were under tight control. 33% of them had higher levels of the hormone. 17OHP was not associated with types of disease at $P = 0.729$. The difference was due to chance. In this study, about 4% of them had advanced bone age by 3 years and 4% of them had delayed bone age by 2 years as shown in Table 3. Bone age was not associated with types of disease at $P = 0.5053$. The difference was due to chance. (−2 imply that the bone age is delayed by 2 years and 3 indicate that bone age is advanced by 3 years).

**DISCUSSION**

This study was conducted at the Endocrinology Department of Institute of Child Health and Hospital for children at Chennai between the period of February 2015 and August 2015. We studied the demographic characteristics and physical functioning in CAH children. CAH is the most common cause of hyperandrogenism in children. Incidence of the disease is as high as 1 in 15,000.

Totally 55 children between 2 and 12 years of age who met the inclusion and exclusion criteria were enrolled in the study. Although the incidence of the disease does not have any significant sex difference, it has been shown that CAH in males has been underdiagnosed in our population. There had been studies stating that incidence of the disease is more in boys than girls between 0 and 12 years. The reason for discrepancy in our study may be due to:

1. Male children may go undiagnosed in simple virilizing type.
2. Males with salt-wasting type may die undiagnosed.

The main cause for this is the absence of newborn screening programs for CAH in India.

Median age of diagnosis in our study is <1 month, though the range may be from 1 to 72 months. Similarly in a study done by Silva et al., the range of age at diagnosis was between 0 and 79 months with a median age of 2.9 months. The reason for this wide range in age at diagnosis is mainly the difference in cultural practices leading on to ignorance among parents. Interview with these parents has shown us the hesitancy in bringing their kids to the notice of physician. In our study, the proportion of girls being diagnosed in the neonatal period is more up to 89% ($n = 40$) than boys (60%). On the whole, about 84% of the kids were diagnosed at the neonatal period in our study. Most of them were diagnosed with salt-wasting crisis. This is again due to the absence of newborn screening programs. However, still, range of age at initial diagnosis is wide in our population compared to many other studies. Male children may have advanced bone age as the only sign, and hence, it is diagnosed very late or else left undiagnosed.
In our study, as expected salt-wasting type constituted the majority about 62% (n = 34). Simple virilizing type was only 38% (n = 21). In the study done by Mueller et al.,2 it has been shown that even among the male population, prevalence of salt-wasting type is about 70%. Sanchez et al., in their study, clearly stated that boys were more diagnosed as salt wasters compared to girls (boys - 80% were salt wasters and only 50% girls were salt wasters). The cause for this discrepancy in our study may be due to the early death of salt waster males before being diagnosed to have the disease. Hence, it is very clear that early diagnosis and treatment are essential for the prevention of mortality in our patients. This again explains the role of newborn screening programs.

Mean dose of steroid administered to our patients in our study is 16.3 ± 4.4 mg/m² body surface area. Among females, it is 16.3 ± 4.56 mg/m², and among males, it is 15.5 ± 3.8 mg/m². Hence, dose requirement among females may be higher and this may be because of the reason that more salt wasters in our study are females. The recommended dose is 15-20 mg/m². Few articles have quoted that the dose required should be maintained at a very low levels ranging from 10 to 15 mg/m². The physiological production of steroids in our body is only in the rate of 4-8.7 mg/m². Hence, in our study, about 75% of the total kids receive within or less than this recommended range, whereas the remaining 25% of the kids receive slightly higher dose than recommended. The reason is due to the poor compliance, hyperandrogenic state may not be controlled with the so-called physiological dose, and hence, the requirement may go high in some. Other cause is the failure to decrease the dose after stepping up during stress period. Poor follow-up by some of these patients is yet another cause.

Among the 75% of these patients, few of them (7%) take only 5-10 mg/m². This group of children either may have good control with this small amount of drug or may not be under strict follow-up (in our study, two kids who were reported to take this amount of drug were found to have a very high 17OHP levels and not under good control). Hence, we can conclude that 50% of these kids who were with low dose than recommended can still have normal control when they were followed up stringently with both clinical assessment and laboratory analysis.

CAH has an autosomal recessive inheritance pattern. Hence, history regarding consanguinity was taken into account. In our study, it has been shown that 85% (n = 47) of kids were born of consanguineous marriage and remaining 15% (n = 8) alone were born of non-consanguinity. About 88% (n = 30) of the salt wasters and 81% (n = 17) of simple virilisers were born of consanguineous marriage. Although the difference is not statistically significant, from our study, it appears that majority of salt wasters were born of consanguineous marriage.

Considering sibling history, we had 4 pairs of siblings being affected and all the 8 were enrolled in the study. One kid has lost her sister due to salt-wasting crisis. Hence, totally 16% (n = 9) of these kids had a positive sibling history. The difference according to the two types of disease was statistically significant (P < 0.05). This had clearly shown the lack of knowledge about the prenatal diagnosis and treatment for CAH in some areas. Dexamethasone treatment should have been given to the mothers immediately after confirming pregnancy. If these kids were diagnosed early and started on treatment early, even from the antenatal period, outcome would have been better.

Anthropometric measurements which are included in our study are height, weight, and body mass index. These measurements are plotted on standard charts. CAH is a disease which is well known to cause alteration in growth patterns, which may be due to both disease process and treatment of the same. Hence, it is vital to measure height at regular intervals. In our study, influence of type of disease, dose of steroid, and various other factors on height were studied. Mean height z-score in our study was −0.2±2.1 among the patients with height z-scores >+3 z-score, 5 patients were on recommended dose, and only one of them was on low dose. However, all 6 of them had 17OHP values above normal range. Hence, this suggests that the requirement of steroids in these patients for control of hyperandrogenic state is higher. Out of the five patients with height z-scores <−3, only two of them were taking more than recommended dose of steroids. Three of them had their 17OHP values less than the normal range. Hence, in these patients, the steroid dose should be slowly decreased.

Considering the type of disease, among the salt wasters, 62% (n = 21) were between −2 and +2 z-score. Among the simple virilisers, 76% (n = 16) were between −2 and +2 z-score. The difference is not statistically significant. About 7% of our patients were on inadequate steroid dose. Inadequate steroid dose would result in hyperandrogenism and hence would increase the height percentiles. In our study, out of the four kids who were on inadequate dose, two of them had their height z-score more than +3. It has also been proved in one study9 that children treated with 15 mg/m² had better growth velocity than children treated with a dose of 25 mg/m². Hence, proper growth monitoring and change in steroid dose accordingly is essential. If not monitored, they may land up as dwarf adults. The reason for loss of final height in most of them is quoted as the initial loss of linear growth
during the first 2 years of life due to the hypercortisolism in this period.

BMI status of these patients was thus studied which showed that about 20% \((n = 11)\) of them were obese while 18% \((n = 10)\) of them were overweight. Among the 11 obese patients, eight of them were on an excess dose of steroids. Hence, regular monitoring of BMI is essential for all CAH patients. Among the types, 52% \((n = 12)\) of simple virilisers had normal BMI, whereas only 41% \((n = 14)\) of the salt wasters only had normal BMI. The difference is not statistically significant. However, in some studies, it has been clearly shown that simple virilisers have significantly increased BMI than reference values.

We have also studied for the features of steroid excess in our population. In our study, about 27% \((n = 15)\) of the total population had cushingoid features. Among salt wasters about 29% \((n = 10)\) and among simple virilisers, about 24% \((n = 5)\) had features of steroid excess. This difference was not statistically significant.

17OHP levels were compared between the two groups. Levels between 0.59 and 3.44 ng/ml were taken as normal from the laboratory reference values. From the results obtained, only about 24% \((n = 13)\) of the total study population had their 17OHP levels within their normal limits. 44% \((n = 24)\) of the patients had their levels below 0.59 ng/ml and hence could have been closely monitored with steroids. The disadvantage is that they may remain on high levels for a long time. The advantage is that they may have lower levels of steroid excess, which may be beneficial for the patient. Hence, we could conclude that monitoring of 17OHP levels is essential for all CAH patients. Among the patients, 52% \((n = 12)\) of simple virilisers had normal BMI, whereas only 41% \((n = 14)\) of the salt wasters only had normal BMI. The difference is not statistically significant.

Bone age measurements were done using X-rays in our study. It is compared with the chronological age and found that 51% \((n = 28)\) of the total population had bone age corresponding to their chronological age. 4% \((n = 2)\) of them had their bone age advanced by 3 years, and 4% \((n = 2)\) had delayed bone age. Comparing between the two types of disease, 67% \((n = 14)\) of the simple virilisers and 41% \((n = 14)\) of the salt wasters had normal bone age. None of the simple virilisers had their bone age advanced by 3 years, but 6% \((n = 2)\) of salt wasters had the same. Although not statistically significant, it could be considered from our study that salt wasters may have poor control over their bone age than simple virilisers.

Limitations of the study are (1) growth velocity should be ideally measured rather than height, (2) other hormonal assays such as androstenedione should have been additionally measured for appropriate determination of hyperandrogenic state, and (3) small sample size.

## CONCLUSION

Hence, from our study in our population, we found that despite being on standard treatment regimen, due to the absence of frequent monitoring both clinically and biochemically, about 20% of these kids had abnormal growth, 53% had abnormal BMI, 27% had features of steroid excess, 22% in the prehypertensive stage, 33% with poorly controlled biochemical marker, and 14% with abnormal bone age though not statistically significant. Comparing both salt wasters and simple virilisers, simple virilisers had more abnormal growth profiles than salt wasters. Features of steroid excess and abnormal BMI were more among salt wasters though not statistically significant.

Hence, we could conclude that modification of the treatment dosage should be individualized based on the clinical features and biochemical parameters of that particular kid. It is very essential to strictly monitor height, weight, and BMI for all patients with CAH irrespective of the type of disease, for better outcomes. Based on the clinical findings and hormonal assays, hydrocortisone and fludrocortisone levels should be modified at regular intervals. About 16% of them had positive sibling history, hence, the need for prenatal diagnosis and treatment should be emphasized.

## REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
How Relevant are Surgical Profile Tests Done Pre-operatively in Minor and Medium Surgical Procedures? - An Analytical Clinical Study

C G Jayachandran¹, S Harikrishnan², Linette J Morris³

¹Assistant Professor, Department of Anaesthesiology, Government Medical College, Thiruvananthapuram, Kerala, India, ²Associate Professor, Department of Anaesthesiology, Government Medical College, Thiruvananthapuram, Kerala, India, ³Professor and Head, Department of Anaesthesiology, Government Medical College, Thiruvananthapuram, Kerala, India

Abstract

Background: All the patients undergoing surgery are ordered to undergo a battery of tests collectively named as surgical profile. The advantage of surgical profile is to reduce morbidity and mortality during and immediately after surgery. It also tends to reduce the cost of perioperative care and pre-operative anxiety. Surgical profile also includes few additional tests undertaken following clinical examination to reduce the surgical-anaesthetic risk.

Aim: The advantage of ordering pre-operative surgical profile in evaluating the surgical risk in patients undergoing minor and medium surgical procedures.

Materials and Methods: The present study is a prospective and descriptive cross-sectional study of 1150 patients evaluated pre-operatively during the pre-anesthetic checkups in the Department of Anaesthesiology, Government Medical College Hospital, Thiruvananthapuram, Kerala. Patients undergoing minor and medium surgeries belonging to American Society of Anesthesiologists Grade-I; aged 3 to 50 years were included in the study. The surgical profile ordered in them were hemoglobin, total blood count, erythrocyte sedimentation rate, coagulation profile, electrocardiogram, X-ray chest, fasting blood sugar, serum creatinine, blood urea, sodium and potassium levels, viral screening and Hbs Ag. Few additional tests were ordered to confirm the clinical diagnosis of the condition of the patients wherever necessary to help reduce intraoperative time.

Results: Totally, 10,395 investigations were carried out pre-operatively for the 1150 patients. Among the total tests, 175 were observed as abnormal (15.21%). Among the patients with abnormal laboratory tests a change in approach for further management was undertaken in 62/175 (35.42%) but overall incidence of change in the treatment course was (62/1150), 05.39%.

Conclusion: Pre-operative surgical profiles should not be undertaken as a tradition, but should be based on thorough clinical examination, nature of surgical procedure, anesthetic technique, and clinical status of the patient.

Key words: Anaesthesia, Minor surgical procedures, Medium Surgical Procedures, Surgical profile tests and ASA task force

INTRODUCTION

After thorough clinical examination, surgical patients require a series of tests to assess the functioning of different systems of their body. These may be to confirm the diseases as evidence-based medicine are in vogue and those for helping surgeon and anesthesiologists to assess the general fitness of the patient for surgery. This workup is also called as surgical profile in a planned procedure. Anesthesiologist’s role as part of the team to plan the modality of anaesthesia for a specific procedure with the help of relevant investigations is crucial. In recent times, such a practice has been subject of close scrutiny due to low significance and higher cost. Surgical profile in otherwise healthy patients is invariably of little value in detecting diseases and in changing the anaesthetic management or outcome.¹ Preoperative evaluation of surgical patients with the help of surgical profile should be aimed at reducing morbidity and preferably, should be ordered

Access this article online

www.ijss-sn.com

Month of Submission : 05-2017
Month of Peer Review : 06-2017
Month of Acceptance : 07-2017
Month of Publishing : 07-2017

Corresponding Author: Dr. S Harikrishnan, Department of Anaesthesiology, Government Medical College, Thiruvananthapuram, Kerala, India. E-mail: harikrishnans248@gmail.com
by the anaesthesiologist. \textsuperscript{2} When an anaesthesiologist orders the preoperative tests, apart from securing more appropriate clinical profile the consequent incidences of surgery cancellations are reduced. \textsuperscript{3,4} A prospective cross-sectional study in healthy patients showed that nearly 72.5\% of preoperative tests ordered by surgeons were considered not indicated by anaesthesiologists. \textsuperscript{5,6} Delahunt and Turnbull analyzed the blood tests before surgery and correlated them with the difference they made to the management while there were abnormal results detected, it was found that the management was not altered in any case due to the blood testing. \textsuperscript{7} Greer and Irwin suggested that routine pre-operative blood tests are not required for those patients who are clinically well and asymptomatic. \textsuperscript{8} Rohrer et al. have shown that preoperative screening tests for clotting disorders that were not suspected on the basis of detailed history and examination are not necessary and not recommended to be carried out routinely. \textsuperscript{9} Few authors defined routine tests as compulsory tests for all patients regardless of the findings obtained from clinical evaluation. \textsuperscript{10,11} Among the list of tests, there are serum creatinine, blood urea, and urine biochemical changes, blood count and coagulation studies, X-ray and electrocardiogram examinations, among others. \textsuperscript{10} However, literature data indicate that these tests are not cost-effective and neither related to any perioperative complications. \textsuperscript{8,10} This should not lead to an incidence of under investigation however. Further, studies have shown that performing routine screening tests in patients who are otherwise healthy is invariably of little value in detecting diseases and in changing the anaesthetic management or outcome. \textsuperscript{10} Thorough clinical assessment is a prime factor in patient's preoperative assessment and this should be followed by investigations in necessary patients; established from the study by Shah et al. \textsuperscript{12} When the surgical profile was undertaken without basis of clinical history, may lead to increased risk for the patient, especially when false-positive results motivate further investigations. It may lead to unnecessary postponement of surgery, prolonging hospital stay and subjects the patient to the risk of hospital infections. \textsuperscript{13} There was no significant correlation with perioperative complications and the pre-operative abnormal tests with a prevalence of 0.5-12\% in a study population of 544 patients by American Society of Anesthesiologists (ASA). \textsuperscript{14} In an observation conducted retrospectively to review medical records, it was estimated that hospital savings were approximately US$80,000 annually just by eliminating preoperative testing not indicated for the 5100 patients they studied. \textsuperscript{5} The present study was conducted to study the advantage of ordering pre-operative surgical profile in evaluating the surgical risk in patients undergoing minor and medium surgical procedures.

**MATERIALS AND METHODS**

The present study was a prospective and descriptive cross-sectional study of 1150 patients evaluated pre-operatively during the pre-anesthetic checkups in the Anaesthesiology department, Government Medical College Hospital, Thiruvananthapuram, Kerala.

**Study Period**

A study conducted between March 2014 and February 2016. Institutional Ethical clearance was obtained and approved consent letter was used.

**Inclusion criteria**

1. Patients undergoing minor and medium surgeries were included.
2. Patients belonging to ASA Grade-I were included.
3. Patients aged 3-50 years were included.

**Exclusion criteria**

1. Patients undergoing major surgeries were excluded.
2. Patients belonging to ASA Grade-II and III were excluded.
3. Patients aged below 3 years and above 50 years were excluded.
4. Patients with previous history of surgeries were excluded.
5. Patients with history of myocardial infarction, diabetes mellitus, uremia, and bleeding disorders were excluded.
6. Patients with psychiatric disorders were excluded.
7. Patients with inconclusive diagnosis were excluded from the study.

The surgical profile ordered in them were hemoglobin, total blood count, erythrocyte sedimentation rate, coagulation profile, electrocardiogram, X-ray chest, fasting blood sugar, serum creatinine, blood urea, sodium and potassium levels and viral screening and Hbs Ag. Few additional tests are ordered to confirm the clinical diagnosis of the condition of the patients wherever necessary to help reduce intra-operative time. A proforma was filled showing the laboratory data, their abnormalities in these tests, and if any change in approach was also noted. Change in approach included ordering new tests, referral to a super specialist or postponement and abandoning of surgeries. The surgical profile was ordered by the surgeon previously preoperatively and additional tests, according to his routine, without interference from the anaesthesiologist. All the data were analyzed using standard statistical methods. The results were assessed using descriptive statistics.

**OBSERVATIONS AND RESULTS**

After applying the exclusion criteria among the 3437 patients who underwent anaesthetic checkups, 1150 patients were
included in the study (34.35%). Among them, 798 were males (69.39%) and the remaining 352 were females (30.60%). The age and sex distribution of the study group was tabulated in Table 1.

The natures of surgeries labeled under minor and medium type are shown in the Table 2.

Totally, 10,395 investigations were carried out pre-operatively for the 1150 patients. Among the total tests, 175 were observed as abnormal (15.21%). Among the patients with abnormal laboratory tests a change in approach for further management was undertaken in 62/175 (35.42%) but overall incidence of change in the treatment course was (62/1150), 05.39%. Hematological laboratory tests conducted in the present study were for hemoglobin in all patients; 1150 (100%), total blood count in 1150 (100%), and coagulation profile in 724/1150 (62.95%). The number of abnormal results in these tests were 26 (0.26%), 21 (0.82%), and 01.65%, respectively, and the overall change in approach for treatment was 4 (0.34%), 5 (0.43%), and 3 (0.26%), respectively (Table 3).

DISCUSSION

As a tradition ordering surgical profiles as a pre-anaesthetic precursor was being considered as a valuable tool for evaluation of fitness in all the surgical patients in the Government Medical College Hospital, Thiruvananthapuram. This has helped determine and decide the fitness for anaesthesia and surgery. However, in the recent times in India, this practice is subjected to close scrutiny by the patients and consumer act implementers.

In addition, these tests aggregate to high costs of total billing. In such a context, the present study was conducted to observe and analyze the laboratory results and the influence of abnormal tests in changing the course of further management during and after surgeries. According to the American College of physicians, laboratory tests performed should always have a clinical justification and to be undertaken with selective and restrictive criteria. In the present study, total investigations done pre-operatively were 10,395 for the 1150 patients included in the study. Among the total tests, 175 tests showed abnormal parameters to the age of the patients (15.21%). Among the patients with abnormal laboratory tests a change in approach for further management was undertaken in 62/175 (35.42%) but overall incidence of change in the treatment course was (62/1150), 05.39%. Those patients who showed abnormal results were given further treatment and special laboratory investigations to rule out diseases in the specific systems were undertaken. However, all the 1150 patients underwent successful surgeries and remained clinically healthy post-operatively. In few similar studies, it was observed that detecting abnormalities in laboratory tests of clinically healthy patients does not influence change in treatment usually. Review of literature shows little evidence that the patients with abnormal results are certain to develop increased post-operative mortality. Moreover, studies conducted by many authors suggest that the pre-operative tests would be unnecessary if a careful clinical evaluation is performed. A surgical profile on the other hand increases the expenditure by the Hospital as well as the risk to the Health personnel requesting for other special investigations entailing risks and complications for the patients. In contrast, many a times if the abnormal laboratory results are not recognized by the treating physician, it becomes a legal issue and liability on the part of treating surgeon than not ordering the test itself. Insecurity during clinical examination leads to indiscriminate ordering of pre-operative laboratory tests in addition to the false belief that more number of tests would protect the treating surgeon legally. If the tests are considered independent of each other and the number of tests conducted, they would result in more chances of obtaining an abnormal report. If a laboratory test shows normal report or an abnormal report without any clinical implication, no further treatment can be initiated and the test remains without utility; on the other hand currently available anaesthetic drugs and techniques are safe enough toward the kidney or heart and if the tests are performed with a purpose of finding out the contraindication to drugs, then

<table>
<thead>
<tr>
<th>Type of surgery</th>
<th>Name of surgeries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor</td>
<td>Endoscopic procedures in ENT</td>
</tr>
<tr>
<td></td>
<td>Cataract surgery</td>
</tr>
<tr>
<td></td>
<td>Superficial skin surgeries</td>
</tr>
<tr>
<td></td>
<td>Myringoplasty</td>
</tr>
<tr>
<td></td>
<td>Biopsies</td>
</tr>
<tr>
<td></td>
<td>Septoplasty</td>
</tr>
<tr>
<td></td>
<td>FESS</td>
</tr>
<tr>
<td></td>
<td>Fracture reduction</td>
</tr>
<tr>
<td></td>
<td>Tibial nail removal</td>
</tr>
<tr>
<td></td>
<td>Intra-peritoneal and intra-thoracic</td>
</tr>
<tr>
<td></td>
<td>ENT-laryngeal and head and neck</td>
</tr>
<tr>
<td></td>
<td>Orthopedic</td>
</tr>
<tr>
<td></td>
<td>Neurosurgical</td>
</tr>
<tr>
<td></td>
<td>Uro- Gynaecological</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of surgery</th>
<th>Name of surgeries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium</td>
<td>Endoscopic procedures in ENT</td>
</tr>
<tr>
<td></td>
<td>Cataract surgery</td>
</tr>
<tr>
<td></td>
<td>Superficial skin surgeries</td>
</tr>
<tr>
<td></td>
<td>Myringoplasty</td>
</tr>
<tr>
<td></td>
<td>Biopsies</td>
</tr>
<tr>
<td></td>
<td>Septoplasty</td>
</tr>
<tr>
<td></td>
<td>FESS</td>
</tr>
<tr>
<td></td>
<td>Fracture reduction</td>
</tr>
<tr>
<td></td>
<td>Tibial nail removal</td>
</tr>
<tr>
<td></td>
<td>Intra-peritoneal and intra-thoracic</td>
</tr>
<tr>
<td></td>
<td>ENT-laryngeal and head and neck</td>
</tr>
<tr>
<td></td>
<td>Orthopedic</td>
</tr>
<tr>
<td></td>
<td>Neurosurgical</td>
</tr>
<tr>
<td></td>
<td>Uro- Gynaecological</td>
</tr>
</tbody>
</table>
Table 3: The number of tests performed, number of test positive, and change in the course of management in the study (n=1150)

<table>
<thead>
<tr>
<th>(Total tests - 10,395)</th>
<th>Number and % of tests</th>
<th>Number and % of abnormal tests - 175 (15.21)</th>
<th>Change in approach to the management - 62 (35.42)</th>
</tr>
</thead>
<tbody>
<tr>
<td>type of tests performed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>1150 (100)</td>
<td>26 (0.26)</td>
<td>04-0.34</td>
</tr>
<tr>
<td>Total blood count</td>
<td>1150 (100)</td>
<td>21 (01.82)</td>
<td>05-0.43</td>
</tr>
<tr>
<td>Coagulation profile</td>
<td>724 (62.95)</td>
<td>12 (01.65)</td>
<td>03-0.26</td>
</tr>
<tr>
<td>Fasting blood sugar</td>
<td>838 (72.86)</td>
<td>21 (02.50)</td>
<td>04-0.34</td>
</tr>
<tr>
<td>Blood urea</td>
<td>1104 (96)</td>
<td>11 (0.99)</td>
<td>03-0.26</td>
</tr>
<tr>
<td>Serum creatinine</td>
<td>1104 (96)</td>
<td>09 (0.81)</td>
<td>03-0.26</td>
</tr>
<tr>
<td>Serum sodium and potassium</td>
<td>426 (37.04)</td>
<td>14 (03.28)</td>
<td>05-0.43</td>
</tr>
<tr>
<td>ECG</td>
<td>778 (67.65)</td>
<td>23 (02.95)</td>
<td>07-0.60</td>
</tr>
<tr>
<td>X-ray chest</td>
<td>821 (71.39)</td>
<td>18 (02.19)</td>
<td>08-0.69</td>
</tr>
<tr>
<td>HbsAg</td>
<td>1150 (100)</td>
<td>08 (0.69)</td>
<td>08-0.69</td>
</tr>
<tr>
<td>Viral screening</td>
<td>1150 (100)</td>
<td>12 (01.04)</td>
<td>12-01.04</td>
</tr>
</tbody>
</table>

EGC: Electocardiogram

these tests remain futile. In the present study, the number of abnormal results among hematological tests; hemoglobin 26 (0.26%), total blood counts 21 (01.82%), and coagulation tests 12 (01.65%) and the overall change in approach for treatment was 4 (0.34%), 5 (0.43%), and 3 (0.26%), respectively (Table 3). As per the practice advisory for pre-anesthesia evaluation - ASA task forces studies, routine hemoglobin abnormal findings represented 0.5-43.8% of cases and requirement for change in approach represented 0-28.6%. Their routine hematocrit was abnormal in 0.2-38.9% of cases and change in clinical approach in 0-100% of cases; routine coagulation tests showed abnormalities in BT, PT, aPTT, or platelet count represented 0.8-22% of cases and required change in approach in 1.1-4% of cases. Review of literature shows that the incidences of finding abnormal hematocrit and hemoglobin values as well as serum urea and creatinine are very common but there is no proof that this would lead to increased morbidity or mortality during or after surgeries. Electocardiogram (ECG) was undertaken in 778/1150 patients (67.65%) in this study and abnormal finding was noted in (02.95%); 7 patients (0.60%) required a change in approach to further treatment in the present study (Table 3). The practice advisory for pre-anesthesia evaluation - ASA task force studies, routine ECG results were documented as abnormal in 7-42.7% of cases and required change in clinical approach in 9.1% of cases. As per guidelines of American College of Cardiology/American Heart Association recently, ordering ECG as a routine in surgical profile for low risk patients undergoing surgery is not useful moreover may even be harmful. Similar observation was made by Correll et al. while investigating values of preoperative ECG; no benefit was found in anticipating cardiovascular complications when compared to medical history. 821 patients (71.39%) underwent X-ray chest as a surgical profile in the present study and abnormal findings were noted in 18 (02.91%) of them; change in approach to management was noted in 8 (0.69%) patients (Table 3). In ASA-task force studies routine X-ray, results were abnormal in 2.5-60.1% of cases and change in clinical approach in 0-51%. In their systematic review of surgical profiles Joo et al. commented that the abnormalities noted on X-ray chests increases with increasing age and risk factors of patients but these changes do not in any way alter the perioperative or post-operative course of management. 838 patients (72.86%) underwent fasting blood sugar estimation as a surgical profile in the present study and abnormal findings were noted in 21 (02.50%) of them; change in approach to management was noted in 4 (0.34%) patients (Table 3). In the present study, serum sodium and potassium were conducted in 426/1150 patient (37.04%) and abnormal finding was noted in 14 (03.28%); change in approach to treatment was made in (0.43%) patients. ASA task force studies showed preoperative routine Potassium estimation showed 1.5-12.8% of abnormal results. ASA task force agrees that preoperative tests should not be ordered routinely. In preoperative cases, it should be ordered in a selective manner with the purpose of guiding or optimizing perioperative management. Reducing the number of laboratory tests results thereby decreasing operating costs, time, and medical stress associated with false positive results.

CONCLUSIONS

Preoperative surgical profiles should not be undertaken as a tradition, but should be based on thorough clinical examination, nature of surgical procedure, anesthetic technique and clinical status of the patient. They should be undertaken with the sole purpose to guide and optimize perioperative care of the patients. Selective ordering of these tests reduces stress, time consumed, and cost of surgeries; remains as a more rational conduct on the part of surgeon and the anesthesiologist.
REFERENCES


How to cite this article: Jayachandran CG, Harikrishnan S, Morris LJ. How Relevant are Surgical Profile Tests Done Pre-operatively in Minor and Medium Surgical Procedures? - An Analytical Clinical Study. Int J Sci Stud 2017;5(4):84-88.

Source of Support: Nil, Conflict of Interest: None declared.
A Prospective Study of Changes in the Refractive System of Eye during Pregnancy

Kalaiselvi Balasubramanian¹, Sangamithira Mathiyalagan², Gayatri Nagarajan³

¹Associate Professor, Department of Ophthalmology, Thanjavur Medical College, Thanjavur, Tamil Nadu, India, ²Assistant Professor, Department of Ophthalmology, Thanjavur Medical College, Thanjavur, Tamil Nadu, India, ³Post-graduate Student, Department of Ophthalmology, Thanjavur Medical College, Thanjavur, Tamil Nadu, India

Abstract

Background: Pregnancy affects every system of the body with the ocular structures bearing no exception. Ocular changes can be physiologic, pathologic or as a modification of pre-existing condition.

Aim and Objectives: The aim was to study the physiological variations in refractive status and keratometry of eye during the three trimesters of pregnancy.

Methods: 60 pregnant females with no ocular and systemic co-morbidities visiting the Obstetrics out-patient department at Thanjavur Medical College, Thanjavur were examined for visual acuity for distance and near, objective & subjective refraction and keratometry through the three trimesters from January 2016 – March 2017.

Results: In this study of 60 pregnant females, myopic shift was seen in 65% cases, near vision were unaffected, new or change in glass prescription needed in 16.67% and corneal steepening observed in 63.33%.

Conclusion: Physiological changes of pregnancy in the eye are mostly subtle, asymptomatic, transient, and harmless and expected to return to pre-pregnant state after delivery or cessation of breastfeeding. But they come to aid in a fraction of the symptomatic patients with asthenopia and blurred vision, to reassure the patients, identify and relieve them from non-specific, unexplained headaches, eye fatigue and in postponing refractive surgeries.

Key words: Females, Headache, Keratometry, Pregnancy, Refractive error

INTRODUCTION

Pregnancy is a period of immense joy coupled with excitement as the feeling of carrying a little soul within the woman is magnificent. However, the physiological expenditures involuntarily occurring in women for the perpetuation of mankind are enormous.¹² Ocular changes during pregnancy can be physiologic, pathologic, or as a modification of pre-existing condition.³⁴ Physiologic changes include anterior segment changes such as dry eye syndrome, fall in the intraocular pressure, decreased corneal sensitivity, increased corneal thickness, steepening of corneal curvature, accommodative insufficiency altogether causing alterations in the refractive status of the eye, and contact lens intolerance.⁵⁶ Pregnancy is also found to cause asymptomatic visual field defects, formation of Krükenberg spindles, and adnexal changes such as chloasma, spider angiomas, and ptosis.⁷⁸ Most of the ocular changes are transient and harmless in majority, prominent during the third trimester and return to pre-pregnant state after delivery or after cessation of breastfeeding.

The estrogen and the aldosterone together cause excessive sodium reabsorption from renal tubules and produce fluid retention. The fluid retention in the ocular tissue manifests as corneal edema leading to steepening in the corneal curvature which in turn causes myopic shift in the refractive status of eye. These effects, in turn, affect the visual acuity, produce asthenopic symptoms, and need for new glass prescription and unpredictable refractive surgery.

Corresponding Author: Dr. Kalaiselvi Balasubramanian, 39-D, Surabhi Apartments, New Daniel Thomas Nagar, Thanjavur - 613 005, Tamil Nadu, India. Phone: +91-9444138478. E-mail: kalai.selvi70@yahoo.com
outcomes. Hence, the prescription of contact lenses or planning of refractive surgeries should be postponed till the cessation of breastfeeding until the refractive status becomes stable.

Aim of the Study
The aim of the study is to study the changes in the refractive system of eye during pregnancy in the study population.

Objectives
To study the following parameters in pregnant females:
• To study the variations in refractive status during the three trimesters of pregnancy.
• To study the variations in keratometry during the three trimesters of pregnancy.

Inclusion criteria
Pregnant mothers 20-35 years. First three viable pregnancies.

Exclusion criteria

MATERIALS AND METHODS
Patients with newly diagnosed pregnancy with no systemic and ocular comorbidities attending the Obstetrics Outpatient Department at Thanjavur Medical College from January 2016 to March 2017 were taken up for the study. A detailed history regarding defective vision, headache, pain, irritation, burning sensation, and redness of eyes were noted. Visual acuity for distance was checked using Snellen chart, near vision using Roman test charts, objective and subjective refraction, and automated keratometry to measure the K value was recorded during first, second, and third trimesters. The data were analyzed and the results were obtained.

RESULTS
Majority of the patients were in the age group between 24 and 27 years (36.67%) (Table 1 and Figure 1).

In the first trimester, majority of the patients were emmetropes (71.67%), and the remaining were myopes (28.33%) (Table 2).

Of the 60 females, myopic shift was noted in 39 females (65%). Among the 43 emmetropic patients, 27 patients (62.79%) showed myopic shift and 16 patients (37.21%) remained emmetropic during the second and third trimesters. Among the 17 myopes, 12 patients showed myopic shift and five patients retained the same refractive error (Table 3 and Figure 2).
showed corneal steepening, 14 (23.33%) patients had the same curvature while a small proportion of eight patients (13.33%) showed flattening changes during the second and third trimesters (Table 5 and Figure 3).

**DISCUSSION**

The second and third trimester results were compared with the first trimester results. Asthenopic symptoms were present in 12 patients (20%) including defective vision in two patients (3.33%) in our study.

Myopic shift was observed in 39 patients (65%) among the study group. Pizzarello et al. studied (2003) found that 14% of the pregnant females had changes in visual acuity, refractive error, and myopic shift.7

Total 10 patients (16.67%) needed new glass prescription in the study Group. Five cases of the pre-pregnant emmetropes needed new glass prescription and five of the pre-pregnant myopic patients required change in their glass prescription. Sharma et al. (2006) observed 14% of women needed new glass prescription.10

Our study did not demonstrate any near vision defect during and post-pregnancy. Study by Duke-Elder showed accommodative insufficiency and paralysis during lactation.11 Pilas-Pomykalska et al. have reported transient changes in accommodation during pregnancy.12

In our study, 38 patients (63.33%) showed corneal steepening during pregnancy. The remaining patients consisted of 14 patients (23.33%) with same K values throughout pregnancy and eight patients (13.33%) with mild flattening during pregnancy. Park et al. found increase in corneal curvature during the second and third trimesters which resolved completely after delivery or cessation of breastfeeding.13

**CONCLUSION**

In the study group comprising emmetropes in majority, myopic shift was observed, near vision were unaffected, and steepening in the corneal curvature were noted with advancement of pregnancy. Despite the changes in the refracting structures during pregnancy, a large proportion of the study group remained asymptomatic.

The knowledge of the physiological changes comes to aid in reassuring the patients of the transient nature of the new onset refractive errors, identifying, and relieving them from non-specific, unexplained headaches and eye fatigue, and importantly in postponing refractive surgeries.

**REFERENCES**

Balasubramanian, et al.: Changes in the Refractive System of Eye during Pregnancy


Source of Support: Nil, Conflict of Interest: None declared.
Study of Social and Cognitive Functioning in Children with Congenital Adrenal Hyperplasia

C Rekha¹, R Paramaguru², Shanthi Nambi³, Seenivasan⁴

¹Assistant Professor, Department of Paediatrics, ACS Medical College and Hospital, Chennai, Tamil Nadu, India, ²Assistant Civil Surgeon, Department of Paediatrics, Thiruvallor Government Hospital, Thiruvallur, Tamil Nadu, India, ³Professor, Department of Child Psychiatry, Institute of Child Health and Hospital for Children, Chennai, Tamil Nadu, India, ⁴Assistant Professor, Department of Pediatrics, Institute of Child Health and Hospital for Children, Chennai, Tamil Nadu, India

Abstract

Background: Congenital adrenal hyperplasia (CAH) is a genetic problem of steroidogenesis in adrenals. Due to a particular enzyme deficiency causing lack of steroids, negative feedback involving hypothalamic-pituitary-adrenal axis is lost. This would result in increased production of adrenocorticotrophic hormone and corticotropin-releasing hormone which may have their effects on learning and memory. CAH is the most common cause of hyperandrogenism which may influence the psychological behavior in girls leading to psychiatric manifestations such as aggressiveness and attention-deficit hyperactivity disorder (ADHD). The prevalence of these behavioral and cognitive impairment is studied here.

Aims and Objectives: Aims and objectives of the study were to study the social and cognitive functioning in children with CAH on treatment and to determine the prevalence of aggression and ADHD in CAH children.

Materials and Methods: In total, 55 children from 2 to 12 years satisfying the criteria were enrolled in the study. Complete history recorded, physical examination done, and blood 17-hydroxyprogesterone and bone age were measured. Materials used include social adaptive behavior from Vineland social adaptive behavior scale, child behavior checklist to look for any aggressiveness, intelligence quotient (IQ) assessment using - Gesssel’s for children between 2 and 3 years, Binet Kamat test for children 3-6 years, and Malin’s intelligence scale for more than 6 years.

Observation and Results: About 53% of the population had adequate adaptability and 40% of them had moderately low adaptability. 7% had low adaptability. 20% of the total study population were found to be aggressive as per child behavior checklist. Aggressiveness and gender were not dependent to each other in CAH. 15% of the total population had attention-deficit hyperactivity disorder (ADHD), 16% of the girls, and only 10% of the boys had ADHD. 53% of the total population had only borderline IQ levels IQ distribution pattern among the two sex is not much different from the total with a \( P = 0.4375 \).

Conclusion: From our study, we conclude that nearly half of the children with CAH had only borderline IQ and low social adaptability. Hence, all CAH patients should be subjected to psychological and cognitive assessment at least once a year.

Key words: Adaptability, Aggressiveness, Cognition, Congenital adrenal hyperplasia, Hyperandrogenism

INTRODUCTION

Adrenal glands are two small endocrine structures located just above the kidneys. Congenital adrenal hyperplasia (CAH) is a genetic problem involving steroidogenesis resulting in enzyme deficiencies in adrenal gland. The accumulated metabolites due to the enzyme deficiencies are the cause for symptoms in CAH, in addition to steroid deficiency. Hypothalamic-pituitary-adrenal axis is essential for production and regulation of adrenal steroids. Adrenocorticotrophic hormone (ACTH) has a pulsatile release, and more secretion is during the early morning hours. In CAH, when this axis is disturbed the negative feedback is lost¹ and hence would result in increased production of ACTH and corticotropin-releasing hormone (CRH). These abnormally elevated hormones have their effects on learning and memory through their action on amygdala.²
CAH and Effects on Social Functioning

CAH is a disorder where female babies are born with excess of male sex hormones, and hence naturally a sexual dimorphic behavior could be expected from these girls. There are certain personality traits which are specific for a particular sex. For example, traits such as dominancy and assertiveness are more specific for men whereas tender-mindedness and empathy are more specific for girls. Hence in conditions causing hyperandrogenism as in CAH, there had been modifications in these behaviors. Increased male pattern behavior and increased aggressiveness may occur in these group of children. There had been studies quoting that early hormonal environment is one of the most powerful determinants of sex differences in personality. Affected girls especially have increased tendency to have a male playmate, male activity preferences and increased tendency to fight and physical aggression. Androgen excess in the early periods of brain development will affect the neural differentiation, cell survival and neural connectivity and neurochemical characterization.

There are also proved evidences stating increased incidence of psychiatric disorders such as autism and attention deficit hyperactive disorder in these children. This may be again because of the hyperandrogenic state. In general, males tend to have more incidence of psychiatric disorders owing to their natural androgenic state. Early androgen exposure also has lead to the predisposition of these children to specific learning disabilities. There are multiple domains in which a child with CAH may have deficit including communication, socialization, and daily living skills. Physiological cause for these increase in aggression and male-typical behavior is increase in androgen receptors in medial amygdaloid nucleus in children having high prenatal androgen exposure. In many studies, it has been quoted that when these children are exposed to a negative situation, amygdala would be hyperactive than a normal person. Melanocortin-4 receptors are mainly involved in the modulation of anxiety and depression-like behavior in amygdala. CAH is a condition where there is increased ACTH and CRH. These hormones would act on these receptors situated in amygdala and cause those psychiatric symptoms and aggression.

CAH and Cognition

Cognition includes process of thinking, reasoning, memory, comprehension judgment, and problem solving. There are innumerable number of studies stating that steroid hormones influence cognitive functioning. Cognitive functioning and intelligence is directly related to social adjustment and aggression. As these group of children have social maladjustment and aggression, intelligence assessment becomes essential. There are innumerable scales for assessment of intelligence quotient (IQ):

1. Wechsler’s intelligence scale for children
2. Malin’s intelligence scale for Indian children
3. Binet-Kamath test (BKT)
4. Seguin-form board test
5. Wais adult intelligence scale.

And scores based on which cognitive impairment can be categorized into:
1. 90-110 - Normal
2. 70-89 - Borderline impairment
3. 50-69 - Mild impairment
4. 35-49 - Moderate impairment
5. 20-34 - Severe impairment
6. <20 - Profound impairment.

CAH is the condition which carries the risk for both hormonal imbalance starting from the intrauterine life and steroid treatment both of which may have an effect on cognition. Studies have quoted that high androgen levels were shown to impart changes in the synaptic plasticity in hippocampal CA1 cells in juvenile rats. In the same study, it also been clearly stated that elevated androgens may reduce social cognitive performance. Androgens also delay cerebral maturation in the prenatal and perinatal periods especially of the left cerebral hemisphere which would lead on to abnormalities in neuronal migration or abnormal connectivity. High levels of ACTH levels may also reduce the emotional learning and memory. This action is exerted mainly through their action on melanocortin receptors in amygdala. Studies have also quoted decreased amygdala volume in CAH patients. Steroids used for the treatment of CAH can exert their effect on cognition through two ways – (1) Organizational alteration and (2) activational alteration. Children with salt-wasting type have lower IQ compared to simple virilizing type. The cause may be due to the diffuse brain injury during episodes of hypotension and hyponatremia which would further impair their IQ. There had been documented white matter lesions in magnetic resonance imaging leading to visuospatial impairment which is essential for solving arithmetic problems. Hence, their visuospatial and cognitive skills are also poor.

There had been many studies regarding the growth and physical features in CAH. Recent studies suggest that children with CAH also suffer from behavioral and cognitive disorders. Since there had been very few studies on behavioral and cognitive functioning in India, we proceed on with this study.

Aims and Objectives of the Study

Aims and objectives of the study were to study the social and cognitive functioning in children with CAH on treatment and to determine the prevalence of aggression and ADHD in CAH children.
MATERIALS AND METHODS

- Design of the study: Descriptive study (cross-sectional)
- Place: Pediatric Endocrinology Department, Institute of Child Health, Department of Child Guidance Clinic, ICH
- Period of the study: February 2015 to August 2015
- Sample specifications:
  - Case definition: All clinically and biochemically confirmed cases of CAH on treatment.

Inclusion Criteria

- All children from 2 to 12 years who were diagnosed as CAH and on treatment.

Exclusion Criteria

- Other causes of growth abnormalities: Familial short stature, growth hormone deficiency, nutritional causes, chronic systemic diseases
- Chronic medications unrelated to CAH
- Known psychiatric illness
- Sample size - All children with above inclusion criteria who presented during the study period.

Ethical committee clearance was obtained from the institutional review board.

Manoeuvre

Children of age 2-12 years diagnosed to have CAH and satisfying the inclusion and exclusion criteria were recruited into the study, after obtaining informed parental consent.

Subjects with CAH those satisfying the inclusion and exclusion criterion were enrolled into the study. Detailed history regarding the type of the disease, age of diagnosis, family history, developmental history, period of drug intake, and compliance were taken. Physical examination done and X-ray for bone age and blood 17-hydroxyprogesterone (17OHP) levels were done.

Following this, psychological assessment done:

1. Social adaptive behavior from Vineland social adaptive behavior scale
2. Child behavior checklist (CBCL) to look for any aggressiveness
3. IQ assessment using:
   • Gessel’s for children between 2 and 3 years
   • BKT for children 3-6 years
   • Malin’s intelligence scale for more than 6 years.

Social Adaptive Behavior

Vineland social adaptive behavior scale is used for obtaining a composite score which roughly corresponds to the social quotient. Subdomain raw scores are computed from identification of basal and ceiling items. Domains include receptive, expressive, written language, personal, domestic, community communication, daily living skills, and socialization. Standardized scale score (V-scale score) is determined based on age and domain standard score is then obtained. Then, sum of all these domain standard scores is obtained based on this scoring social adaptive levels are classified as:

<table>
<thead>
<tr>
<th>Adaptive level</th>
<th>V-scale</th>
<th>Standard score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1-9</td>
<td>20-70</td>
</tr>
<tr>
<td>Moderately low</td>
<td>10-12</td>
<td>71-85</td>
</tr>
<tr>
<td>Adequate</td>
<td>13-17</td>
<td>86-114</td>
</tr>
<tr>
<td>Moderately high</td>
<td>18-20</td>
<td>115-129</td>
</tr>
<tr>
<td>High</td>
<td>21-24</td>
<td>130-160</td>
</tr>
</tbody>
</table>

CBCL

CBCL estimates the externalizing disorders and internalizing disorders in children. It classifies them into normal range, borderline and in clinical range based on the scores obtained. Separate list of questions for boys and girls and also for children <6 years and more than 6 years exist in CBCL. Somatic problems, anxious/depressed/withdrawn, social, thought problems, attention problems, hyperactivity, rule breaking behavior, and aggressive behavior were included in the study. In our study, aggression is given importance and concluded either child is aggressive, borderline aggressive or normal.

Gessel’s Child Behaviour Schedule

From the age of 4 months, the child’s development can be assessed based on motor development, language development, adaptive behavior, and personal-social behavior. The developmental age and its corresponding development quotient can be derived. In this study children between 2 and 3 years this test is administered.

BKT for General Mental Abilities

BKT is applied to all children above 3 years of age for obtaining IQ. For each age, 6 standardized questions are present and based on the child’s performance their mental age is calculated. Basal age (where all 6 items are correct) and terminal age (where all 6 items are failed) is calculated. Mental age is calculated from the number of items which are being answered between the two basal and terminal age. In this study children between 3 and 6 years this test is administered.

Malin’s Intelligence Scale for Indian Children

Malin’s test is applied to children from 6 to 15 years of age for IQ; in this study, age group of 6-12 years this test is done. This is an Indian adaptation of Wechler’s intelligence scale for children. Full-scale IQ comprises 11 subsets – 6 for verbal intelligence which includes...
Information, comprehension, arithmetic, similarities, vocabulary, and digit span. 5 for performance intelligence which includes picture completion, picture arrangement, block design, object assembly, coding, and mazes.

**Statistical Methods**

The history, anthropometry, physical examination findings, psychological examination, and laboratory investigations were collected from the children included in the study and recorded in data collection form. The data entered in the excel sheet. Data analysis was performed using epidemiological information package in computer. Frequencies, means, percentage, standard deviations, fisher’s exact test, coefficient of correction values, and P value were calculated using SPSS software frequencies.

**OBSERVATION AND RESULTS**

In total, 55 children with CAH on treatment were studied in the age group between 2 and 12 years. In this study, as shown in Table 1, 53% of the population had adequate adaptability and 40% of them had moderately low adaptability. 7% had low adaptability. Social adaptive behavior was not associated with types of disease at \( P = 0.5648 \). The difference was due to chance. 20% of the total study population was found to be aggressive as per child behavior checklist as in Figure 1. Aggressiveness was not associated with types of disease at \( P = 0.7309 \). The difference was due to chance. There was no statistical significant association between aggressiveness and gender at \( P = 1.000 \). That is, aggressiveness and gender were not dependent to each other in CAH. 15% of the total population had ADHD as in Table 2. ADHD was not associated with types of disease at \( P = 0.696 \). The difference was due to chance. In our study, 16% of the girls and only 10% of the boys had ADHD. However, the difference is not statistically significant as the \( P = 1.000 \).

About 53% of the total population had only borderline IQ levels as in Table 3. IQ range was not associated with types of disease at \( P = 0.5473 \). The difference was due to chance. IQ distribution pattern among the two sex is not much different from the total with a \( P = 0.4375 \) and hence not statistically significant.

**DISCUSSION**

This study is conducted at Endocrinology Department of Institute of Child Health and Hospital for Children between the period of February 2015 and August 2015. We studied the social and cognitive functioning in CAH children. CAH is the most common cause of hyperandrogenism in children. Incidence of the disease is as high as 1 in 15,000.

In total, 55 children with CAH between 2 and 12 years of age were enrolled into the study. Among them, \( n = 45 \) (82%) were females and only \( n = 10 \) (18%) were males. Salt wasting type constituted the majority about \( n = 34 \) (62%). Simple virilizing type was only \( n = 21 \) (38%). Social adaptive behavior of these children was studied using Vineland adaptive behavior scale. \( n = 29 \) (53%) of the kids had adequate adaptive behavior. \( n = 22 \) (40%) of the kids had moderately low adaptive behavior. Among these 22 kids, seven kids had been on excess steroid dose than recommended and 17OHP levels seen among these 22 showed eight of them with high levels and eight had less than normal range. \( n = 4 \) (7%) of the kids had low adaptive levels. Among these four kids, one kid had been on excess steroid dose than recommended and two of them had 17OHP levels less than normal range. Comparing the two varieties of disease, simple virilisers have better adaptive levels than salt wasters, though not statistically significant.

Aggressiveness is one of the features associated with hyperandrogenic state. Many studies have proved that girls with CAH are more aggressive than unaffected girls.
They have also stated that girls and boys with CAH do not differ much in aggressiveness. In our study, \( n = 11 (20\%) \) of the affected kids were aggressive. Among the general population between 2 and 17 years, the prevalence of aggression is 2-16%. Among males, it is 6-16% and among females it is 2-9%. Our study has shown a higher proportion of patients with aggressiveness than in the general population. In our study, aggressiveness is screened from CBCL. Between the types of disease, \( n = 5 (24\%) \) of the simple virilisers and \( n = 6 (18\%) \) of the salt-wasters were aggressive. The difference is not statistically significant.

Incidence of ADHD among general population is 5-12%. In our study, about \( n = 8 (15\%) \) of our population were found to have ADHD based on CBCL. Studies have shown higher incidence of psychiatric disorders such as ADHD and autism among these children.\(^{12}\) Among the two disease types, salt wasters (18%, \( n = 6 \)) were found to be more affected than simple virilisers (15%, \( n = 2 \)). Comparing between boys and girls, in our study girls (16%, \( n = 7 \)) were found to be more affected than boys (10%, \( n = 1 \)) though not statistically significant.

Mean full-scale IQ in our study is 84.6 ± 9.8, but in one study,\(^{12}\) it was found to be 84.5. Among the total population about \( n = 24 (43\%) \) of them had normal IQ scores. About \( n = 29 (53\%) \) of the patients were in the borderline level in our study, salt wasters were more affected than simple virilisers, though not statistically significant. It has been stated in other studies also that salt wasters have lower IQ scores than simple virilisers.\(^{11}\) Between the two sex, not much of difference was noted. \( n = 2 (4\%) \) of the total population had IQ scores between 50 and 70. Both were on excess steroid dose (>20 mg/m\(^2\)). Their 17OHP levels were also uniformly very low. Among the 29 patients with borderline impairment, about \( n = 12 (41\%) \) of them had very low 17OHP levels. Hence based on all these factors, the dose should be adjusted adequately to maintain the needed control over the hyperandrogenic state.

Major limitations of the study include:

1. Other hormonal assays like androstenedione in addition to 17OHP should have been measured for appropriate determination of hyperandrogenic state.
2. Small sample size.

### CONCLUSION

From our study, we found out that, nearly half of the children with CAH had only borderline IQ and low social adaptability. Hence, we could conclude that all CAH patients should be subjected to psychological and cognitive assessment at least once a year as they are more prone for cognitive impairment and psychiatric disorders like ADHD. Regular dosage modification should also be done based on clinical, biochemical, and psychological findings.

### REFERENCES

10. Maheu FS, Merke DP, Schroth EA, Keil MF, Hardin J, Poeth K, et al. Steroid abnormalities and the developing brain: Declarative memory for...


Source of Support: Nil, Conflict of Interest: None declared.
Clinical and Radiological Evaluation of Patients of Proximal Tibial Fractures Treated with Long Proximal Tibial Locking Plate by Minimally Invasive Plate Osteosynthesis Technique

P D Deokate¹, Rahul G Puranik¹, A R Kale², V S Patil³

¹Assistant Professor, Department of Orthopaedics, B. J. Government Medical College, Pune, Maharashtra, India, ²Associate Professor, Department of Orthopaedics, B. J. Government Medical College, Pune, Maharashtra, India, ³Associate Professor, Department of Orthopaedics, Padmashree D Y Patil Medical College, Pune, Maharashtra, India

Abstract

Introduction: Treatment of proximal tibial fractures is challenging because of limited soft tissue cover and less vascularity. Open reduction and internal fixation with plate cam result in extensive devitalization of soft tissue leading to wound healing problems. Minimally invasive plate osteosynthesis (MIPO) is a new technique which is becoming widely accepted for treatment of periarticular fractures.

Aims and Objectives: To evaluate functional and radiological outcome in proximal tibial fractures treated with MIPO.

Materials and Methods: In this, 32 patients of proximal tibial fractures with diaphyseal extension or comminution were included. These fractures were treated with long proximal tibia locking plate by MIPO technique. They were followed up to 1 year post-operatively for assessing function and radiological outcome using modified Rasmussen’s functional and radiological scores, respectively.

Results: This study included 32 patients of proximal tibia fractures treated with MIPO technique. Of the 32 case, 12 patients (37.5%) had excellent result, 14 (43.75%) had good, four (12.5%) were fair, while two (6.25%) had poor function outcome. For the radiological assessment, there were three patients (9.37%) with excellent result, 24 (75%) with good, three (9.37%) with fair, while two (6.25%) with poor result.

Discussion: Proximal tibial fractures are seen in high energy trauma which is associated with soft tissue injury and sometimes neurovascular injuries too. MIPO technique maintains a biological favorable environment for healing by reducing soft tissue trauma caused by surgical exposure.

Conclusion: Treatment by MIPO technique after improvement of the soft tissue condition gives good results from radiological as well as functional point of view. The use of long plates spanning the length of the fracture also gives adequate stability to allowing for fractures union and soft tissue healing.

Key words: Biological plating, Fractures, Minimally invasive plate osteosynthesis technique, Proximal tibia

INTRODUCTION

Treatment of proximal tibial fractures is challenging because of limited soft tissue cover and less vascularity. There are various treatment options for these fractures starting from closed reduction with casting to open reduction and internal fixation with plate. Open reduction and internal fixation with plate cam result in extensive devitalization of soft tissue leading to wound healing problems. In our study, we managed these fracture by minimally invasive plate osteosynthesis (MIPO) technique with plates.

MIPO is a new technique which is becoming widely accepted for treatment of periarticular fractures in which we reduce and stables the fracture without opening the fracture site with minimum incision, providing a favorable...
environment for fracture healing, which is also called as biological fixation.

**Aim and Objectives**

1. To evaluate functional outcome in proximal tibial fractures treated with minimally invasive plate osteosynthesis
2. To evaluate radiological outcome in proximal tibial fractures treated with minimally invasive plate osteosynthesis.

**MATERIALS AND METHODS**

This prospective study was conducted from May 2015 to June 2017. In this, 32 patients of proximal tibial fractures with diaphyseal extension or comminution were included. Open fractures, fracture with neurovascular injury, pathological fracture, and fracture in immature skeleton were excluded. Fracture was classified by Schatzker Classification.

After written informed consent, patients were operated under spinal anesthesia. Tourniquet was applied to upper thigh. Tibial incisions taken are proximal and distal to fracture site. Reduction was achieved by indirect reduction techniques with help of pointed reduction forceps, external fixator in some cases. Long plate slid through tunnel spanning entire length of the fracture. Each side fixed with minimum six cortices. Wound closed in layers. Intravenous antibiotics were given 1 pre-operative and 5 post-operative days. Static quadriceps and ankle range of motion exercises started first post-operative day and knee range of motion started from second post-operative day onward. Post-operative X-ray taken on day 2 and patients were discharged after 6 days. All patients were followed up after 15 days for suture removal, 1 month, 6 weeks, 3, 6, 9, and 12 months. X-rays were taken at each follow-up and union assessed. Function outcome was assessed using modified Rasmussen criteria for clinical assessment and radiological outcome was assessed using modified Rasmussen criteria for radiological assessment.

**RESULTS**

In our study, 32 patients of proximal tibia fractures were included and treated with MIPO technique after indirect reduction of fractures. There were 10 females and 22 males with mean age of 45.12 years. Right tibia was involved in 19 cases while left was involved in 13 cases. Ten patients had intra-articular fractures, and 22 had extra-articular proximal tibial fractures. Mean time for operation was 8 days, delay attributed to skin and soft tissue conditions. Mean operative time was around 67 min. Radiological union was achieved in all cases with a mean for union being 18 weeks. All patients were followed for minimum period of 1 year for functional assessment. There were 2 superficial wound infections which resolved after debridement and intravenous antibiotics.

Radiological and functional results were classified in four categories as per modified Rasmussen criteria. Of the 32 case, 12 patients (37.5%) had excellent result, 14 (43.75%) had good, four (12.5%) were fair, while two (6.25%) had poor function outcome. For the radiological assessment, there were three patients (9.37%) with excellent result, 24 (75%) with good, three (9.37%) with fair while two (6.25%) with poor result (Tables 1-4) and (Figure 1).

**DISCUSSION**

Proximal tibial fractures are seen in high energy trauma which is associated with soft tissue injury and sometimes

<table>
<thead>
<tr>
<th>Table 1: Modified Rasmussen criteria for clinical assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parameters</strong></td>
</tr>
<tr>
<td>Pain</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Occasional</td>
</tr>
<tr>
<td>Stabbing pain in certain position</td>
</tr>
<tr>
<td>Constant pain after activity</td>
</tr>
<tr>
<td>Significant rest pain</td>
</tr>
<tr>
<td>Walking capacity</td>
</tr>
<tr>
<td>Normal walking capacity for age</td>
</tr>
<tr>
<td>Walking outdoor for more than 1 h</td>
</tr>
<tr>
<td>Walking outdoor 15 min to 1 h</td>
</tr>
<tr>
<td>Walking &lt;15 min</td>
</tr>
<tr>
<td>Walking indoor only</td>
</tr>
<tr>
<td>Wheelchair or bed ridden</td>
</tr>
<tr>
<td>Knee extension</td>
</tr>
<tr>
<td>Normal</td>
</tr>
<tr>
<td>Lack of extension &lt;10°</td>
</tr>
<tr>
<td>Lack of extension &gt;10°</td>
</tr>
<tr>
<td>Lack of extension &gt;20°</td>
</tr>
<tr>
<td>Total range of motion</td>
</tr>
<tr>
<td>Full</td>
</tr>
<tr>
<td>At least 120°</td>
</tr>
<tr>
<td>At least 90°</td>
</tr>
<tr>
<td>At least 60°</td>
</tr>
<tr>
<td>&lt;60°</td>
</tr>
<tr>
<td>Stability</td>
</tr>
<tr>
<td>Normal stability in extension and 20° flexion</td>
</tr>
<tr>
<td>Abnormal stability in 20° flexion</td>
</tr>
<tr>
<td>Instability in extension &lt;10°</td>
</tr>
<tr>
<td>Instability in extension &gt;10°</td>
</tr>
<tr>
<td>Power of quadriceps</td>
</tr>
<tr>
<td>Grade 5</td>
</tr>
<tr>
<td>Grade 3-4</td>
</tr>
<tr>
<td>Grade &lt;3</td>
</tr>
<tr>
<td>Maximum score</td>
</tr>
<tr>
<td>Excellent</td>
</tr>
<tr>
<td>Good</td>
</tr>
<tr>
<td>Fair</td>
</tr>
<tr>
<td>Poor</td>
</tr>
<tr>
<td>Poor</td>
</tr>
</tbody>
</table>
Deokate, et al.: Clinical and Radiological Evaluation of Proximal Tibial Fractures Treated with MIPO Technique

Table 2: Modified Rasmussen criteria for radiological assessment

<table>
<thead>
<tr>
<th>Parameters</th>
<th>None</th>
<th>&lt;5 mm</th>
<th>6-10 mm</th>
<th>&gt;10 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Articular depression</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Condylar widening</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;5 mm</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-10 mm</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;10 mm</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varus-valgus angulation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10°</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10° to 20°</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;20°</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osteoarthrosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None/no progress</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Progression by 1 grade</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Progression by &gt;1 grade</td>
<td>-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum score</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>9-10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>7-8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td>5-6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>&lt;5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Clinical assessment by modified Rasmussen criteria

<table>
<thead>
<tr>
<th>Clinical result</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>12 (37.5)</td>
</tr>
<tr>
<td>Good</td>
<td>14 (43.75)</td>
</tr>
<tr>
<td>Fair</td>
<td>4 (12.5)</td>
</tr>
<tr>
<td>Poor</td>
<td>2 (6.25)</td>
</tr>
<tr>
<td>Total</td>
<td>32 (100)</td>
</tr>
</tbody>
</table>

Table 4: Radiological assessment by modified Rasmussen criteria

<table>
<thead>
<tr>
<th>Clinical result</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>3 (9.37)</td>
</tr>
<tr>
<td>Good</td>
<td>24 (75)</td>
</tr>
<tr>
<td>Fair</td>
<td>3 (9.37)</td>
</tr>
<tr>
<td>Poor</td>
<td>2 (6.25)</td>
</tr>
<tr>
<td>Total</td>
<td>32 (100)</td>
</tr>
</tbody>
</table>

This mechanical concept of fixation by absolute stability is being replaced by the new biological concept of indirect reduction and relative stability using minimally invasive approach. MIPO technique maintains a biological favorable environment for healing by reducing soft tissue trauma caused by surgical exposure. However, MIPO technique does not allow reduction by direct vision so intraoperative fluoroscopy is necessary for achieving good reduction and alignment. In this study, the average time for union was 18 weeks which is comparable to other studies on MIPO plating. Excellent to good outcome seen in 24 (81.25%) patients, which is comparable to similar other studies conducted by Rambold (93%), Seppo (86%), and Joseph Schatzker (86%).

CONCLUSION

Fractures of the proximal tibia are the result of high-energy trauma. They involve a lot of soft tissue injury. This compromised soft tissue condition should be considered while treating them. Treatment by MIPO technique after improvement of the soft tissue condition gives good results from radiological as well as functional point of view. The use of long plates spanning the length of the fracture also gives adequate stability to allowing for fractures union and soft tissue healing.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Study of Lab Parameters Predicting Post-discharge Mortality after Admission for Community-acquired Pneumonia: A Prospective Tertiary Hospital Care Based Study

Fayaz Ahmad Sofi¹, Aamir Rashid², Jan Mohammad², Ghulam Nabi Dhobi³

¹Additional Professor, Department of Rheumatology, Sher-i-Kashmir Institute of Medical Sciences, Srinagar, Jammu and Kashmir, India,
²Senior Resident, Department of Cardiology, Sher-i-Kashmir Institute of Medical Sciences, Srinagar, Jammu and Kashmir, India,
³Professor, Department of Infectious Diseases, Sher-i-Kashmir Institute of Medical Sciences, Srinagar, Jammu and Kashmir, India

INTRODUCTION

Considering the importance of community-acquired pneumonia (CAP) it is remarkable how little is known about what happen to patients after they are discharged from the hospital. Patients who survive an episode of CAP in intensive care units (ICUs) have greater mortality after discharge from hospital than age-matched control subjects.1-18 Observations by few investigators indicate that only independent predictors of mortality after discharge were mental obtundation, comorbid illnesses and decreased hematocrit. Thus, a possibility that CAP may present a sentinel event for many life-limiting diseases and hence should alert a treating physician for a close and careful follow-up. It appears that increased risk of death persists for several years after an episode of pneumonia; specific features of pneumonia episode may alert clinicians to focus particular attention on the longer term prognosis of certain patients. Although the cause of the decreased long-term survival is not yet clear, it may be that the systemic inflammatory response produced by CAP accelerates the natural course of medical

Abstract

Introduction: There are considerable morbidity and mortality following discharge of patients admitted as community-acquired pneumonia (CAP). There is very scarce data about follow-up of these patients after they are discharged from the hospital.

Aims and Objectives: To study the lab parameters predicting post-discharge mortality following admission for CAP on follow-up.

Materials and Methods: A prospective cohort of patients presenting as CAP admitted in our institute (Sher-i-Kashmir Institute of Medical Sciences) was recruited from October 2008 to April 2010.

Results: Our study comprised 153 patients of CAP with median follow-up of 397 days. Mean age of patients was 61.31 ± 16.49 years. 99 (62.8%) were male and 54 patients were females. From total of 153 patients 34 (22.22%) patients died at median follow-up of 397 days. Hypoalbuminemia (P = 0.03), increased blood urea nitrogen (BUN) (P = 0.00), serum creatinine >1.5 mg/dl, hyperglycemia (>250 mg/dl) (P = 0.02), pH <7.35 (P = 0.01), bilateral involvement on chest X-ray (P = 0.01), and higher pneumonia severity index (PSI) class (P = 0.0001) were found to be significantly associated with mortality on follow-up. We could not ascertain any relation between particular microbial etiology and mortality on follow-up.

Conclusion: There is considerable mortality following discharge of patients admitted with CAP. Hypoalbuminemia, increased BUN, creatinine, blood sugar, low pH and higher PSI class can be used as factors in predicting which patients will have a poor outcome after discharge from the hospital.

Key words: Lab parameters, Pneumonia, Mortality
comorbidities such as atherosclerosis. This hypothesis is bolstered by a recent study that showed reduced long-term survival in CAP+ patients who were clinically cured but had increased interleukin 6 and interleukin 10 levels at the time of hospital discharge. In apparently healthy older individuals, low-grade inflammation occurs is associated with increased risk of CAP.\textsuperscript{17} Once pneumonia, inflammatory marker concentrations are several times higher.\textsuperscript{18} Very little is known about factors predicting long-term mortality following an episode of CAP. Our study was designed to analyze what lab parameters lead to decrease in long-term survival, so as to identify patients at high risk of mortality on follow-up and to formulate better follow-up of these patients which in turn will reduce long-term mortality.

**Aims and Objectives**

To study the lab predictors of mortality after hospitalization in patients with CAP

**MATERIALS AND METHODS**

**Study Design**

A prospective cohort of patients admitted in our institute (Sher-i-Kashmir Institute of Medical Sciences) was recruited from October 2008 to April 2010. The subjects were enrolled only after written informed consent. Patients were followed for mortality and morbidity closely by noting their home addresses, cell/telephone numbers.

**Inclusion Criteria**

All patients presenting with CAP were included in the study. CAP was defined as an acute illness (fewer than 14 days of symptoms), the presence of new chest infiltrates as confirmed by a radiologist or pulmonary critical care physician, and clinical features suggestive of acute pneumonia. The clinical features required were one of Group A (fever >37.8°C, hypothermia <36°C, cough and sputum production) or two of B (dyspnea, pleuritic pain physical findings suggestive of lung consolidation, and leukocyte count >12,000 or <4000). These criteria are consistent with the published guidelines of CAP.\textsuperscript{19}

**Exclusion Criteria**

1. Patients with severe immunodeficiency as defined by the Centers for Disease Control Criteria for patients with acquired immune deficiency syndrome;\textsuperscript{20}
2. Patients receiving chemotherapy in the past 60 days;
3. Patients receiving treatment with corticosteroids equivalent to prednisolone at more than 20 mg/day for more than 14 days;
4. Patients receiving immunosuppression after organ transplantation;
5. Patients receiving cyclosporine, cyclophosphamide, or azathioprine;
6. Non-ambulatory patients and;
7. Patients hospitalized within the past 30 days.

All patients who died within 30 days of hospital discharge were excluded from the study. Mortalities after 30 days of hospital discharge were taken into account.

**Data Collection**

The variables of interest which were results of tests as ordered by a treating physician such as blood glucose levels, blood urea, serum creatinine, complete blood count, liver function tests, electrocardiogram, X-ray chest, ultrasound abdomen, and cultures as ordered by the treating physician were recorded. Pneumonia severity index (PSI) score was calculated as described by Fine et al.\textsuperscript{17}

**Statistical Calculations**

Statistical calculations were performed with SPSS. Univariate analysis using Chi-square tests or Fisher exact tests were used when the variable of interest was categorical. Cox regression modeling was used for multivariate analysis with models using all significant interactions. All \( P \) values were taken as two-tailed with a value below 0.05 taken as significant. In addition, Pearson’s correlation was used to determine the correlation between various lab variables and also to find an association by bivariate analysis. Kaplan–Meier analysis was used to get survival curves. All patients who died within 30 days of hospital discharge were excluded from the study. Mortalities after 30 days of hospital discharge were taken into account.

**RESULTS**

Our study comprised 153 patients of CAP who were followed for median follow-up of 397 days (range 90-720 days). The mean age of patients was 61.31 ± 16.49 years. 99 (62.8%) were males with mean age of 59.53 ± 18.21 years, and 54 patients were females with mean age of 64.59 ± 12.24 years. From a total of 153 patients, 34 (22.22%) patients died at median follow-up of 397 days. We could ascertain the etiology of only 29.1% of patients and in 69.9% etiology was unknown. *Staphylococcus aureus* was the most common organism isolated from survivors (14.1%) as well as nonsurvivors (20.6%). There was no association between particular etiology and survival status as shown in Table 1 and Figure 1. Hypoalbuminemia (\( P = 0.03 \)), increased blood urea nitrogen (BUN) (\( P = 0.00 \)), serum creatinine >1.5 mg/dl, hyperglycemia (>250 mg/dl) (\( P = 0.02 \)), pH <7.35 (\( P = 0.01 \)) were found to be significantly associated with post-discharge mortality as shown in Table 2. Receiver operating characteristic (ROC)
curve of creatinine against death the area under the curve is 0.798 with standard error 0.47, using cut-off value of 1.2 mg/dl we got a sensitivity of 85% and specificity of 77% as shown in Figure 2. As the PSI class of patients increased, the survival decreased with the lowest survival in PSI Class 5 as shown in Figure 3. The ROC curve of PSI class with death as outcome is shown in Figure 4. The area under ROC curve plotted with PSI class against death is 0.734 with a standard error of 0.044 ($P = 0.0001$). Kaplan–Meier curves plotted for PSI class against time; reveal decreasing survival as the PSI class increases. For PSI Classes 3, 4, and 5, we found 24.24%, 27.4%, and 47.8% mortality, respectively, against 0% and 3% mortality in PSI Class 1 and 2, respectively.

**DISCUSSION**

There is very little data on post hospital survival of patients admitted as CAP from our local population although there are a number of international studies, there is hardly any data available at regional or national level. Little is known what happens to patients admitted as CAP after discharge. We found an appreciable mortality (22.22%) at median follow-up of 397 days post-discharge which highlights the need of close follow-up after

### Table 1: Percentage and distribution of microbial etiology

<table>
<thead>
<tr>
<th>Etiology</th>
<th>Total (N=153)</th>
<th>Survivors (N=119)</th>
<th>Nonsurvivors (N=34)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streptococcus pneumoniae</td>
<td>14 (9.1)</td>
<td>11 (11.11)</td>
<td>3 (8.8)</td>
<td>0.63</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>21 (13.7)</td>
<td>14 (14.1)</td>
<td>7 (20.6)</td>
<td>0.41</td>
</tr>
<tr>
<td>Klebseilla pneumoniae</td>
<td>3 (1.9)</td>
<td>2 (2.02)</td>
<td>1 (2.9)</td>
<td>0.79</td>
</tr>
<tr>
<td>Enterococci</td>
<td>3 (1.9)</td>
<td>3 (3.03)</td>
<td>0 (0)</td>
<td>0.45</td>
</tr>
<tr>
<td>Pseudomonas</td>
<td>5 (3.26)</td>
<td>3 (3.03)</td>
<td>2 (5.8)</td>
<td>0.81</td>
</tr>
<tr>
<td>Etiology not known</td>
<td>107 (69.9)</td>
<td>86 (72.2)</td>
<td>21 (61.7)</td>
<td>0.76</td>
</tr>
</tbody>
</table>

### Table 2: Descriptive values of various laboratory values in survivor and nonsurvivor groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Survivor group</th>
<th>Nonsurvivor group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCO₃</td>
<td>21.7±5.02</td>
<td>21.4±6.2</td>
<td>0.964</td>
</tr>
<tr>
<td>pH</td>
<td>7.4±0.07</td>
<td>7.36±0.10</td>
<td>0.012</td>
</tr>
<tr>
<td>Blood glucose</td>
<td>119.4±45.1</td>
<td>146.1±73.2</td>
<td>0.153</td>
</tr>
<tr>
<td>BUN mg/dl</td>
<td>32.45±23.5</td>
<td>70.5±39.01</td>
<td>0.00</td>
</tr>
<tr>
<td>Creatinine mg/dl</td>
<td>1.26±0.83</td>
<td>2.77±1.8</td>
<td>0.00</td>
</tr>
<tr>
<td>Hemoglobin g/dl</td>
<td>11.39±2.2</td>
<td>11.04±3.08</td>
<td>0.615</td>
</tr>
<tr>
<td>TLC/μl</td>
<td>7900±284</td>
<td>10.36±4.94</td>
<td>0.192</td>
</tr>
<tr>
<td>HCT</td>
<td>35.6±6.01</td>
<td>34.4±9.21</td>
<td>0.418</td>
</tr>
<tr>
<td>Total protein g/dl</td>
<td>6.6±3±6.16</td>
<td>6.25±0.69</td>
<td>0.845</td>
</tr>
<tr>
<td>Albumin g/dl</td>
<td>3.06±0.533</td>
<td>2.7±0.85</td>
<td>0.00</td>
</tr>
</tbody>
</table>

BUN: Blood urea nitrogen, HCT: Hematocrit, TLC: Thin layer chromatography, SD: Standard deviation

Figure 1: Percentage of different bacteriae in patients with community acquired pneumonia (1) *Streptococcus pneumoniae*, (2) *Staphylococcus aureus*, (3) *Klebsiella pneumoniae*, (4) Enterococci, (5) *Pseudomonas*, and (6) etiology not known

![Figure 1: Percentage of different bacteriae in patients with community acquired pneumonia](image1)

![Figure 2: Receiver operating characteristic curve for creatinine with death as outcome](image2)

![Figure 2: Receiver operating characteristic curve for creatinine with death as outcome](image3)
Discharge. There are some studies showing substantial mortality post-discharge (25% at 1 year and 21% at 2.5 years, respectively).

Factors which we found to be significantly associated with mortality on follow-up included. Hypoalbuminemia ($P = 0.03$), increased BUN ($P = 0.00$), serum creatinine >1.5 mg/dl, hyperglycemia (>250 mg/dl) ($P = 0.02$), pH <7.35 ($P = 0.01$), bilateral involvement on chest X-ray ($P = 0.01$), and higher PSI class.

**Hypoalbuminemia**

Low serum albumin was found to be strongly associated with post-discharge mortality using multivariate analysis ($P = 0.03$ relative risk [RR] 0.467 and 95% confidence interval [CI] of 0.228-0.957). Bivariate analysis also shows an increase in mortality ($P = 0.003$) and ICU admission ($P = 0.028$). Hedlund et al. also found an association between serum albumin and post-hospital mortality. Similar finding was confirmed by Woodhead et al., it is said that low albumin in CAP is more because of inflammatory state and less because of nutritional depletion.

**BUN**

BUN has been found to be a grave sign in CAP, we also found that higher BUN was significantly associated with death even after discharge in CAP, we have found it by univariate analysis ($P = 0.000$), bivariate analysis ($P = 0.00$), and also by multivariate analysis ($P = 0.000$, RR = 1.006, and 95% CI of 1.009-1.030). Patients with high BUN are not only more likely to die on follow-up, but they need ICU admissions than those having low BUN ($P = 0.01$), but there is no relation between high BUN and rehospitalization. We used the same cut off as that used by Fine et al. but our finding is different in the sense that increased BUN is not only associated with increased hospital mortality but also with post-discharge mortality.

**Serum Creatinine**

Although on multivariate analysis, we could not find significant association between high serum creatinine and mortality, but when used creatinine as a categorical variable with a cut-off value of 1.5 g/dl we have found that patients who were having more than 1.5 g/dl of creatinine on admission were having high mortality ($P = 0.00$). Also raised serum creatinine associated with ICU admissions ($P = 0.01$) and death (0.000) by bivariate analysis, when we plot ROC curve of creatinine against death the area under curve is 0.798 with standard error 0.47, using cut-off value of 1.2 mg/dl we got sensitivity of 85% and specificity of 77%. As found by Zalacain et al. for post-discharge mortality, we have found that patients increased creatinine level at admission have increased post-discharge mortality.

**Hyperglycemia**

In our study, we found that there was significant post-discharge mortality in patients who were having blood glucose more than 250 mg/dl on hospital admission ($P = 0.02$). The risk of increased mortality was also seen by McAlister et al. We could not establish a relationship between lower degrees of hyperglycemia (>125 mg/dl) and mortality, since we followed our patients for a maximum of 2 years, the confirmation needs further follow-up.

**Arterial Blood Gas (ABG) Analysis**

In ABG, we found low pH a predictor of post-discharge mortality. By doing univariate analysis, patients having pH <7.35 we have a remarkable mortality after discharge from the hospital ($P = 0.01$), bivariate analysis shows
association of low pH with post-hospital mortality ($P = 0.012$) and rehospitalization ($P = 0.002$). Association of pH with mortality was first of all confirmed by Fine et al., cut off used by us is same as used by them.

Chest X-ray
We found that patients with bilateral lung involvement are more likely to die during follow-up (univariate analysis $P = 0.03$ by Fisher’s exact test). Our findings are in consistence with Leroy et al.

PSI Class
We found a positive correlation between high PSI class and subsequent mortality even after hospital discharge, area under ROC curve plotted with PSI class against death is 0.734 with a standard error of 0.044 ($P = 0.0001$). Kaplan–Meier curves plotted for PSI class against time; reveal decreasing survival as the PSI class increases. For PSI Classes 3, 4, and 5, we found 24.24%, 27.4%, and 47.8% mortality, respectively, against 0% and 3% mortality in PSI class 1 and 2, respectively, so we can say that increasing PSI class is not only a predictor of in-hospital mortality but also it can predict post-hospital mortality. Similar findings have been confirmed recently by Johnstone et al.\textsuperscript{22}

CONCLUSION
There is considerable mortality following discharge of patients admitted with CAP. Hypoalbuminemia, increased BUN, creatinine, blood sugar, low pH and higher PSI class can be used as factors in predicting which patients will have poor outcome after discharge from hospital and hence need a closer follow-up.

REFERENCES

How to cite this article: Sofi FA, Rashid A, Mohammad J, Dhobi GN. Study of Lab Parameters Predicting Post-discharge Mortality after Admission for Community-acquired Pneumonia: A Prospective Tertiary Hospital Care Based Study. Int J Sci Stud 2017;5(4):103-107.

Source of Support: Nil, Conflict of Interest: None declared.
A Radiology-pathological Correlation of Spinal Meningioma in a Tertiary Care Hospital - A Retrospective Study

A G Krishnaveni1, P Kannan2, Heber Anandan3

1Associate Professor, Department of Pathology, Thoothukudi Medical College, Thoothukudi, Tamil Nadu, India, 2Professor and Head, Department of Pathology, Thoothukudi Medical College, Thoothukudi, Tamil Nadu, India, 3Senior Clinical Scientist, Department of Clinical Research, Dr. Agarwal’s Healthcare Limited, Tirunelveli, Tamil Nadu, India

Abstract

Introduction: The study was conducted to understand the clinical algorithm of spinal meningioma. Correlation was done by clinical presentation with radiological features and histopathology. The stress on to understand the necessity for a team-approach between clinician, radiologist and pathologist and vice versa is emphasized.

Aim: The aim of the study is to correlate histopathology of spinal meningioma with the radiological features.

Materials and Methods: This is a retrospective study of spinal tumors, diagnosed by histopathology as various types of meningioma. All the relevant clinical data of the patients were searched from the ward records. The various radiological features were collected.

Results: The total number of spinal tumors studied during the 8 years period was 86 cases among which 25 cases were diagnosed by histopathology as various types of meningioma conclusively. Spectroscopy provides molecular information with regard to meningiomas and potentially aid in biopsy planning. Surgical resections were done as follows: 20 cases resected as Simpson Grade 1, 5 cases resected as Simpson Grade 2. Venous thromboembolism was seen in 1 patient. Four cases underwent follow-up adjuvant external beam radiotherapy.

Conclusion: The Simpson grading of resection of meningioma correlated the degree of surgical resection completeness with symptomatic recurrence. Four cases underwent follow-up adjuvant external beam radiotherapy with good results. Spinal meningioma needs correlation between radiologist, pathologist and clinician.

Key words: Adjuvant external beam radiotherapy, Computed tomography, Hematoxylin-eosin stain, Magnetic resonance imaging, Radiograph, Simpson grading of resection

INTRODUCTION

Meningiomas, which arise from arachnoid cap (meningothelial) cells, are one of the most frequent primary intraspinal neoplasms is approximately five per million for females and three per million for males. Spinal meningiomas most often affect middle-aged women. The second most common intradural extramedullary spinal tumor representing 25% of all such tumors. Meningiomas are often located posterolaterally in the thoracic region and anteriorly in the cervical region. We found that spinal meningiomas were located lateral to the spinal cord or had a component that extended laterally. A posterior location was more frequent than an anterior one. Typically, back or radicular pain preceded the weakness and sensory changes; the sphincter dysfunction was always a late finding. The incidence of meningioma is due to exposure to environmental risk factors or sensitive diagnostic modalities; there is a relationship between age, sex, pathological subtype, and location of meningioma. An estimated 0.5% of the population has an incidental asymptomatic spinal meningioma in autopsy studies. With the wider
use of computed tomography and magnetic resonance imaging (MRI), many meningiomas are discovered as incidental findings during investigation for unrelated symptoms. Sex, age, initial tumor size, and calcification were reported to be related to the tumor growth judging from follow-up scans. Gingko leaf sign is seen on axial post contrast T1 imaging, with the leaf representing the distorted spinal cord, pushed to one side of the theca by the meningioma, and the stem, seen as a non-enhancing “streak,” probably representing the stretched dura mater. The prevalence of tumor invasion of the dural tail has been reported (0-100%), with generally higher prevalence in the World Health Organization (WHO) II (atypical) meningiomas. This is further complicated by the presence of tumor cells in apparently normal dura adjacent to tumors. Whether or not the dural tail should be resected and if so how much surrounding dura should be included in the resection continues to be debated. A broad division of meningiomas is into primary intradural (which may or may not have secondary extradural extension) and primary extradural pregnancy is associated with high incidence of spinal meningioma. Intradural extramedullary neoplasms are located outside the spinal cord but within the dural sheath. Extradural spinal meningioma arises outside the dural covering of the spinal cord. Meningiomas are categorized into three WHO grades with 16 histological subtypes. Meningiomas are closely associated with the tumor suppressor syndrome NF2, with 50-75% of individuals with NF2 developing a meningioma during their lifetime, associated with obesity. Meningiomas are the most common extraaxial primary spinal tumor. Although a majority of these tumors are low grade, a significant proportion will recur after initial treatment. Literature published since the WHO 2000 classification report higher recurrence rates at 5 years following surgical excision for WHO Grade 2 (41%), and 70-91% for Grade 3 (than for WHO Grade 1 lesions (3%). Primary intrasosseous meningioma is a term used to describe a subset of these extradural meningiomas that arise in bone. The second most common intradural extramedullary spinal tumor representing 25% of all such tumors. The aim of the study is to correlate histopathology of spinal meningiomas with the radiological features.

**MATERIALS AND METHODS**

This retrospective study was conducted in the Department of Pathology, Thoothukudi Medical College Hospital. We reported 86 cases of primary spinal tumors among which 25 cases were various types of spinal meningioma by histopathology conclusively. All the relevant clinical data of the patients were searched from the ward records. Parameters used to assess were age, sex, tumor location, pathological subtype, Simpson grade of surgical excision, tumor recurrence or progression during follow-up, venous thromboembolism (VTE) in the follow-up period survival time. A detailed health profile on general condition was taken and recorded.

**RESULTS**

Meningioma commonly involved thoracic region and cervical regions in the study. Meningothelial meningioma and psammomatous meningioma were the common subtypes observed (Table 1).

T1 weighted MRI scan shows meningioma as an isointense lesion; contrast enhanced T1 weighted scan shows enhancement of the lesion and T2 weighted scan shows meningioma as a high signal intensity lesion. The histopathological finding varies with the grades (Table 2).

**Meningioma**

Meningiomas occur most commonly after the fifth decade of life. Females are affected far more commonly than males in ratio of 4:1. The gross appearance of the typical meningioma is a solid, lobulated, or globose mass broadly attached to the dura mater. On sectioning, most meningiomas are grayish-tan and soft, but collagenized, have a rubbery texture and a whorled or trabeculated cut surface, whereas variants rich in stromal mucopolysaccharides acquire a somewhat gelatinous consistency. Calcification is often readily apparent and infiltration by foamy macrophages reflects the accumulation of lipids within tumor cells. Factors that may influence the etiology of peritumoral edema include tumor size, histological subtypes, vascularity, venous stasis, and dural invasion. Loss of chromosome 22 occurs in recurrent and atypical meningiomas. Approximately, half of meningiomas exhibit allelic loss that involves band q12 on chromosome 22.

The NF2 gene that resides in this region on chromosome 22q is a tumor suppressor gene involved in sporadic and

**Table 1: Distribution of tumor locations and histopathological subtypes of spinal meningioma**

<table>
<thead>
<tr>
<th>Types</th>
<th>Cervical</th>
<th>Thoracic</th>
<th>Lumbar</th>
<th>Sacral</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meningothelial</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Fibrous</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Transitional</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Angiomatous</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Psammomatous</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Anaplastic</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>25</td>
</tr>
</tbody>
</table>
MRI scan shows an extramedullary, oval lesion at T9/10 level. It is isointense to cord tissue on both T1 and T2 weighted images, and demonstrates vivid contrast enhancement. The lesion measures 13 mm x 8 mm.

Fibroblastic meningioma
MRI scan shows a vividly-enhancing T2 hyperintense lobulated intradural extramedullary tumor centered in the left side of the spinal canal at the C5/6 vertebral level, with enhancement extending along the exiting left C6 nerve root. The tumor severely compresses and displaces the spinal cord into the right side of the spinal canal at this level.

Transitional meningioma
MRI scan shows a dural-based mass, located posterior to the thoracic cord, markedly compressing it. It is isointense to cord tissue on both T1 and T2 weighted images, and demonstrates vivid contrast enhancement. Dural tails are seen extending above and below the lesion.

Angiomatous meningioma
MRI scan shows an extramedullary, oval lesion at T10/11 level. It is isointense on T1 and there is moderate enhancement. The lesion is displaced anteriorly. The coronal view shows the lesion displacing the cord to left. The lesion measures 13 mm x 8 mm.

Atypical meningioma
MRI scan shows a lesion within the spinal canal at T9 is a slightly hyperintense on T1, isointense on T2 intensely enhancing extramedullary intradural mass. The lesion displaces the spinal cord toward the right with complete effacement of the CSF signal at this level and significant cord compression.

Anaplastic meningioma
MRI scan shows a well-defined enhancing intradural, extramedullary mass at the T2/T3 level causing severe compression. High signal foci in the cord in keeping with compression related edema.

NF2-associated meningioma tumorgenesis. Mutations in NF2 gene are associated with sporadic meningioma, fibrous meningioma, transitional meningioma, meningothelial meningioma, atypical and anaplastic meningiomas.

Behavior is coded/0 for benign tumors, /1 for low or uncertain malignant potential or borderline malignancy, /2 for in situ lesions, and /3 for malignant tumors (Table 3).

**Treatment for Intracranial Meningioma**
**Surgery for spinal meningioma**
The prone position for all spinal tumors, including those in the cervical region. It is important to localize the correct level by X-ray. In cases in which meningiomas were located anteriorly, the laminectomy was extended laterally toward the articular process to provide sufficient exposure and cause minimal displacement underwent classic posterior of the spinal cord. The key considerations in the operation include the following. Adequate exposure above and below the tumor and on the ipsilateral side is needed. Careful removal of laminae is important particularly when there is an indication that the tumor is calcified. This may be facilitated by drilling a groove at the lateral edge of the lamina on each side and then lifting the lamina up while the yellow ligament attachments are divided. The dura is opened laterally over the tumor. Internal and/or lateral decompression of the tumor is performed before trying to dissect the tumor away from the spinal cord. Division of the dentate ligament attachments and/or a posterior nerve root in the thoracic region may facilitate removal. When the tumor is posterior lateral, the dural attachment is excised and the defect is repaired with a piece of fascia. In the more common anterior lateral tumors, resection of dura may be difficult without risk of injury to the ventral nerve roots or spinal cord. Calcified meningiomas were also difficult to resect because of adhesions to the spinal cord. Excellent results have been reported by several neurosurgeons using microsurgical techniques. Laminectomy is replaced by osteoplastic laminotomy with reconstruction of the posterior spinal column. The dural attachment was completely resected if the spinal meningioma was located dorsally or dorsolaterally. In these cases, duraplasty was performed with autologous fascia obtained during the operative approach. In ventrally located tumors, the dural attachment was not excised but extensively bipolar cauterized. Somatosensory evoked potentials were routinely facilitated by drilling a groove at the lateral edge of the lamina on each side and then lifting the lamina up while the yellow ligament attachments are divided. The dura is opened laterally over the tumor. Internal and/or lateral decompression of the tumor is performed before trying to dissect the tumor away from the spinal cord. Division of the dentate ligament attachments and/or a posterior nerve root in the thoracic region may facilitate removal. When the tumor is posterior lateral, the dural attachment is excised and the defect is repaired with a piece of fascia. In the more common anterior lateral tumors, resection of dura may be difficult without risk of injury to the ventral nerve roots or spinal cord. Calcified meningiomas were also difficult to resect because of adhesions to the spinal cord. Excellent results have been reported by several neurosurgeons using microsurgical techniques. Laminectomy is replaced by osteoplastic laminotomy with reconstruction of the posterior spinal column. The dural attachment was completely resected if the spinal meningioma was located dorsally or dorsolaterally. In these cases, duraplasty was performed with autologous fascia obtained during the operative approach. In ventrally located tumors, the dural attachment was not excised but extensively bipolar cauterized. Somatosensory evoked potentials were routinely...
monitored in each of the patients. Patients with malignant meningiomas underwent external-beam radiation therapy alone or in combination with chemotherapy after surgery. Cerebrospinal fluid (CSF) leakage, wound complications, and transient deterioration of neurological status were the most common post-operative complications. The most frequent cause of death during the post-operative period was pulmonary embolism.

The Simpson grade of meningioma resection was described in 1957 and correlated the degree of surgical resection completeness with symptomatic recurrence. The type of resection still plays a part in the likelihood of symptomatic recurrence, other factors (such as the MIB-1 index) are also important, particularly in Grades 1-3 (Table 4).

Adjuvant Radiotherapy

Conventional external beam radiotherapy lacks the precision to allow delivery of large doses of radiation near radiosensitive structures such as the spinal cord. Tumor dose was maintained at 12-20 Gy. The CyberKnife system was found to be feasible, safe, and effective. The major potential benefits of radiosurgical ablation of spinal lesions are short treatment time in an outpatient setting with rapid recovery and symptomatic response. This technique offers a successful therapeutic modality for the treatment of a variety of spinal lesions as a primary treatment or for lesions not amenable to open surgical techniques, in medically inoperable patients, in lesions located in previously irradiated sites, or as an adjunct to surgery.

Chemotherapy for Meningioma

- Hydroxyurea - Hydroxyurea is an oral ribonucleotide inhibitor that arrests the cell cycle in the S phase and induces apoptosis. Investigators are currently looking at the role of hydroxyurea as an adjunct to other therapies, such as radiation or calcium channel blockers. Pilot studies with radiation have shown some promise
- Trabectedin - This chemotherapeutic agent is believed to work by binding to the minor groove of the DNA helix and inhibiting transcription factor binding. Trabectedin was investigated in a preclinical study published by Preusser et al., which revealed a statistically significant response to treatment of various meningioma cell lines. The group subsequently treated a single, heavily pretreated patient with this chemotherapeutic agent was reported to have initial relief of his neurological symptoms and aphasia, and MRI revealed reduction of perifocal edema; however, treatment had to be terminated after five cycles due to side effects of generalized edema and mucositis. Additional, combinations of Adriamycin and decarbazine or isosfamide and mensa showed efficacy in some cases.

### Table 3: Morphology code of the ICD-O of intracranial meningioma

<table>
<thead>
<tr>
<th>Disease</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meningotheliomatous meningioma</td>
<td>9531/0</td>
</tr>
<tr>
<td>Fibrous (fibroblastc) meningioma</td>
<td>9532/0</td>
</tr>
<tr>
<td>Transitional (mixed) meningioma</td>
<td>9537/0</td>
</tr>
<tr>
<td>Psammomatous meningioma</td>
<td>9533/0</td>
</tr>
<tr>
<td>Angiomatos meningioma</td>
<td>9534/0</td>
</tr>
<tr>
<td>Microcystic meningioma</td>
<td>9530/0</td>
</tr>
<tr>
<td>Secretory meningioma</td>
<td>9530/0</td>
</tr>
<tr>
<td>Lymphoplasmacytic-rich meningioma</td>
<td>9530/0</td>
</tr>
<tr>
<td>Metaplastic meningioma</td>
<td>9530/0</td>
</tr>
<tr>
<td>Clear cell meningioma</td>
<td>9538/1</td>
</tr>
<tr>
<td>Chordoid meningioma</td>
<td>9538/1</td>
</tr>
<tr>
<td>Atypical meningioma</td>
<td>9539/1</td>
</tr>
<tr>
<td>Papillary meningioma</td>
<td>9538/3</td>
</tr>
<tr>
<td>Rhabdoid meningioma</td>
<td>9538/3</td>
</tr>
<tr>
<td>Anaplastic meningioma</td>
<td>9530/3</td>
</tr>
</tbody>
</table>

ICD-O: International Classification of Diseases for Oncology

### Table 4: The Simpson grade of meningioma resection

<table>
<thead>
<tr>
<th>Simpson grade</th>
<th>Definition</th>
<th>10-year recurrence rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Macroscopic gross-total resection with excision of dura, sinus, and bone</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Macroscopic gross-total resection with coagulation of dural attachment</td>
<td>19</td>
</tr>
<tr>
<td>3</td>
<td>Macroscopic resection without resection or coagulation of dural attachment</td>
<td>29</td>
</tr>
<tr>
<td>4</td>
<td>Biopsy</td>
<td>Not available</td>
</tr>
<tr>
<td>5</td>
<td>Subtotal resection</td>
<td>40</td>
</tr>
</tbody>
</table>

Meningotheliomatous Meningioma

Seven cases of meningotheiimatos meningioma were reported. Six cases involving females and one case involving males. The age group involved in females range from 56 to 74 years of age old and the age involved in male was 59 years of age old. Six cases involved thoracic region, one involved thoracic region and one case involved thoracic region. Six cases underwent Simpson Grade 1 resection and one case underwent Simpson Grade 2 resection one case underwent Adjuvant external beam radiotherapy microscopically meningotheiimatos meningioma variants are the classic and common variant characterized by a lobular microarchitecture and are populated by cells having delicate round or oval nuclei. Common to these are tumor cells concentrically wrapped in tight whorls, pale nuclear “pseudoinclusions,” and nuclear “washing out” consisting of invaginated cytoplasm, and the lamellated calcospherules known as psammoma bodies.

Extradural mass with dural tail extending above and below it results in marked compression of the upper thoracic cord.
Sections studied show meningothelial meningioma displaying a more relaxed fascicular and syncytial arrangements. Psammomatous calcifications can be appreciated in the center of the image. Fine collagenous septae appear intertwined with meningothelial cells. MRI scan shows an extradural mass with dural tail extending above and below it results in marked compression of the upper thoracic cord. The histopathology and radiology correlation was perfect in all the seven cases (Figures 1 and 2).

**Fibroblastic Meningioma**

Three cases of fibroblastic meningioma were reported, two cases involving females and one involving males. The age group involved in females range from 52 to 67 years of age old and the age group involved in males 72 years of age old. Two cases involved thoracic region, one involved thoracic region. All three cases underwent Simpson Grade 1 resection. Fibroblastic meningioma is a common variant adopt a mesenchymal profile, being variably collagenized and consisting of spindle-shaped tumor cells in interfascicular pattern. In fibroblastic meningioma, the tumor cells form wide fascicles, with intercellular collagen and reticulin. The collagenous bands may be quite broad and may undergo dense calcification.

A vividly-enhancing T2 hyperintense lobulated intradural extramedullary tumor centered in the left side of the spinal canal at the C5/6 vertebral level, with enhancement extending along the exiting left C6 nerve root. The tumor severely compresses and displaces the spinal cord into the right side of the spinal canal at this level, with no overt cord signal abnormality demonstrated.

Section studied shows fibrous meningioma containing ropey collagen. The collagen fibers look brighter and thickened intertwined with meningothelial cells bundles. MRI scan shows a vividly-enhancing T2 hyperintense lobulated intradural extramedullary tumor centered in the left side of the spinal canal at the C5/6 vertebral level, with enhancement extending along the exiting left C6 nerve root. The tumor severely compresses and displaces the spinal cord into the right side of the spinal canal at this level. The histopathology and radiology correlation was perfect in all the three cases (Figures 3 and 4).

**Transitional Meningioma**

Three cases of fibroblastic meningioma were reported. Three cases involving females and one involving male. The age group involved in females range from 56 to 68 years of age old and the age group male is 67 years of age old. Two cases involved thoracic region, one involved cervical region. All three cases underwent Simpson Grade 1 resection. Microscopically these tumors have transition between meningothelial and fibrous meningioma. They maintain a lobular and fascicular arrangement. Whorls are striking and are tightly wound. These are often particularly rich in compact cellular whorls and endowed with psammoma bodies in significant numbers. Some tumors have large, distinct areas of meningothelial, fibrous and transitional regions mingle locally.

A dural-based mass is located posterior to the thoracic cord, markedly compressing it. It is isointense to cord tissue on both T1 and T2 weighted images, and demonstrates vivid contrast enhancement. Dural tails are seen extending above and below the lesion.

Section studied shows features of both meningothelial and fibrous types. The meningothelial cells arranged in fascicles of variable length and also exhibit some lobularity. MRI
scan shows a dural-based mass, located posterior to the thoracic cord, markedly compressing it. It is isointense to cord tissue on both T1 and T2 weighted images, and demonstrates vivid contrast enhancement. Dural tails are seen extending above and below the lesion. The histopathology and radiology correlation was perfect in all the three cases (Figures 5 and 6).

**Angiomatous Meningioma**

Two cases of angiomatous meningioma were reported. One case involving female and one involving male. The age group involved in female is 62 years of age old and the age group involved in male 56 years of age old. One case involved cervical region, one involved thoracic region angle. All two cases underwent Simpson Grade 1 resection. One case underwent follow-up stereotactic radiosurgery (SRS). Microscopically these tumors have numerous, conspicuous blood vessels with regions of classical meningothelial meningioma. The vascular channels may be small, medium sized and may be thin walled or have hyalinized thickened walls.

There is an extramedullary, oval lesion at T10/11 level. It is isointense on T1 and there is moderate enhancement. The spinal cord is displaced anteriorly. The coronal view shows the lesion displacing the cord to the left. The lesion measures 13 mm × 8 mm.

Section studied shows numerous vascular spaces can be identified in the background of an meningothelial cells. MRI scan shows an extramedullary, oval lesion at T10/11 level. It is isointense on T1, and there is moderate enhancement. The spinal cord is displaced anteriorly. The coronal view shows the lesion displacing the cord to the left. The lesion measures 13 mm × 8 mm. The histopathology and radiology correlation was perfect in all the two cases (Figures 7 and 8).

**Psammomatous Meningioma**

Seven cases of meningotheliomatous meningioma were reported. Six cases involving females and one case involving male. The age group involved in females range from 56 to 74 years of age old and the age involved in male was 59 years of age old. Six cases involved cervical region, one involved thoracic region and one case involved thoracic region. Six cases underwent Simpson Grade 1 resection and one case underwent Simpson Grade 2 resection one case underwent adjuvant external beam radiotherapy psammomatous meningioma is a histologic subtype of meningioma usually presented as a heavily calcified intracranial or spinal mass lesion. Microscopically these meningiomas have abundant psammoma bodies; the neoplastic cells have a transitional appearance with whorls. As psammoma bodies become large, they may lose circular

---

**Figure 3**: Fibrous meningiomas usually contain ropey collagen that may mimic the appearance of solitary fibrous tumor. In this image, the collagen fibers look brighter and thickened intertwined with meningothelial cells bundles.

**Figure 4**: Section studied shows fibrous meningioma containing ropey collagen.

**Figure 5**: Transitional meningioma sections show features of both meningothelial and fibrous types. The meningothelial cells arranged in fascicles of variable length and also exhibit some lobularity.
shape and assume less regular shapes. They occur in the thoracic spinal region particularly in middle-aged women.

Within the spinal canal at T9 is a slightly hyperintense on T1, isointense on T2 intensely enhancing extramedullary intradural mass measuring 10 mm × 13 mm × 16 mm in orthogonal planes. The lesion displaces the spinal cord toward the right with complete effacement of the CSF signal at this level and significant cord compression.

Psammomatous meningioma demonstrating the classic concentric calcifications. Psammomatous meningiomas need to have over half of the tumor mass composed of psammoma bodies. They probably start out as transitional meningioma that over time undergoes calcification obscuring the underlying meningothelial cells.

Section studied shows the classic concentric calcifications with underlying meningothelial cells. MRI scan shows a lesion within the spinal canal at T9 is a slightly hyperintense on T1, isointense on T2 intensely enhancing extramedullary intradural mass. The lesion displaces the spinal cord toward the right with complete effacement of the CSF signal at this level and significant cord compression. The histopathology and radiology correlation was perfect in all the seven cases (Figures 9 and 10).

Atypical Meningioma

An atypical meningioma is more common in women of middle age or above 50 years of age. Microscopically atypical meningioma is characterized by multifocal, centrilobular forms of necrosis creating a low power microscopic impression similar to the pseudo palisading of tumor cells around necrosis. The absence of architectural pattern is referred to as “sheeting.” Regions of hypercellularity and high nuclear: Cytoplasmic ratio is seen in atypical meningioma. One finds irregular, small islands of dense cellularity with hyperchromatic nuclei and relatively inconspicuous cytoplasm otherwise called “small cell formation.” The estimated recurrence rate for totally resected atypical meningiomas is about 40% at 5 years. Any of the following three criteria microscopically should be demonstrated for a diagnosis.

1. High mitotic index (e.g., ≥4 mitoses per 10 high-power fields or ≥2.5/mm²)
2. Presence of at least three of the following four features:
   i. Sheeting architecture
   ii. Hypercellularity
   iii. Macro nucleoli
   iv. Small cell formation.
3. Brain invasion

Two cases of atypical meningioma were reported, one case involving female and one involving male. The age group involved in female is 67 years of age old and the age group involved in male 56 years of age old. One cases
involved cervical region, one involved thoracic region. All two cases underwent Simpson Grade 2 resection. Two cases underwent follow-up adjuvant external beam radiotherapy.

Well defined enhancing intradural, extramedullary mass at the T2/T3 level causing severe compression. High signal foci in the cord in keeping with compression related edema.

Section studied shows atypical meningioma, with hypercellularity, increased mitotic activity and macro nucleoli. MRI scan shows a well-defined enhancing intradural, extramedullary mass at the T2/T3 level causing severe compression. High signal foci in the cord in keeping with compression related edema. The histopathology and radiology correlation was perfect in all the two cases (Figures 11 and 12).

Anaplastic Meningioma
Anaplastic malignant meningioma microscopically shows pattern less sheet such as growth, a large number of mitoses, increased cellularity, focal necrosis, brain infiltration, pleomorphism, and anaplasia. Anaplastic meningiomas are associated with recurrence rates of up to 50-80% after surgical resection and median survival is <2 years. One case of anaplastic meningioma was reported. The age group involved in female case is 68 years of age old. One case involved thoracic region. One case underwent Simpson Grade 2 resection. One case died due to VTE in the post-operative period. MRI showed that the lesion had a slightly short T1 signal and a long T2 signal in addition to a conspicuous heterogeneous enhancement with contrast administration on T1-weighted images. A dural-based mass lesion in the upper thoracic spine with same signal intensity as that of spinal cord with displacement of cord to the right. Homogeneous enhancement with contrast.

Section studied shows the tumor displays hypercellularity, prominent nucleoli, nuclear pleomorphism, and sarcoma-like morphology. MRI scan shows a dural-based mass lesion in the upper thoracic spine with same signal intensity as that of spinal cord with displacement of cord to the right. Homogeneous enhancement with contrast. The histopathology and radiology correlation was perfect in all the one case (Figures 13 and 14).

MRI scans were obtained at pre-defined intervals, every 6 months for the 1st year and then yearly thereafter.

The Grade 1 tumors meningothelial meningioma, psammomatous meningioma, fibroblastic meningioma, transitional meningioma, angioblastic meningioma responded well to treatment. The atypical...
DISCUSSION

Our study has similar findings with the literature including female predominance and age distribution.\textsuperscript{15-19} One patient experienced VTE and died because of pulmonary embolism. Meningothelial and psammomatous meningiomas were the most common pathological subtypes of meningiomas. Based on the hypothesis, that the diffusion of water to and from the cells is highly dependent on the ratio of intracellular and extracellular space, DWI MRI Scan is used to differentiate the tumour grades.\textsuperscript{20-22} Pathological examination revealed irreversible changes, including attening of the anterior horn, disappearance and necrosis of anterior horn cells in the grey matter, and demyelination and axonal degeneration in the white matter.\textsuperscript{23} High-grade meningiomas are characterized by restriction of the water diffusion; depicting as hyperintensity on DWI. Spectroscopy MRI Scan provides molecular information with regard to meningiomas and potentially aid in biopsy planning. In males, they are more likely to experience recurrence. The presence of a dural tail should be carefully analyzed in predicting recurrence. Patients exhibiting a dural tail on imaging need undergo long-duration follow-up, as late recurrence is a known phenomenon in large tumors with ventral attachment causing spinal cord compression. As suggested by some authors\textsuperscript{24} arachnoid scarring can also cause secondary progressive neurological deterioration after spinal intradural surgery. As early as 1938, spinal meningioma surgery was described by Cushing and Eisenhardt\textsuperscript{25} as being “one of the most gratifying of all operative procedures.” When analyzed all pathological subtypes, the poor prognosis was found in anaplastic meningiomas, followed by atypical meningiomas. Stereotactic radiosurgery is a safe and effective treatment for spinal meningiomas with or without surgical resection. The following factors were prognostically positive: Early diagnosis before the appearance of severe neurological symptoms, young age of the patients, total removal of the tumor, mild spinal cord compression, no intraoperative spinal cord retraction because of adequate surgical access, and the use of microsurgical techniques.

CONCLUSION

Group I meningioma demonstrated benign radiological, histopathological and clinical behavior; Group III demonstrated aggressive radiological, histopathological, and clinical behavior. Group II meningioma might be considered intermediate. Pre-operative radiological classification can be used as a supplement to the histopathological grading. Adjuvant therapies like SRS can be beneficial for spinal meningiomas with severe meningioma and anaplastic meningioma did not respond to treatment (Table 5).
spinal cord compression as total resection of those meningiomas may cause functional loss and they tend to be more benign. The planned combination of microsurgery and adjuvant gamma knife radiosurgery extends the therapeutic spectrum in the treatment of spinal meningiomas. Through our experience with patients suffering from severe preoperative neurological deficits, we can conclude that a good functional outcome should be expected in the vast majority of cases and that more than half of patients recovered totally after surgery. The study provides the importance of other medical faculty the surgeon, radiologist and oncologist to work as a team for a successful outcome. We correlated the histopathological findings with radiological findings. This resulted in perfect correlation between the histopathology study and radiology study.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Predictors of Intestinal Ischemia in Small Bowel Obstruction - A Prospective Study

Ritesh Bazaz¹, Sadhana Tiwari², Bikramjit Singh Sodhi³, Jasmine Kokiloo⁴

¹Senior Resident, Department of Surgery, Fortis Hospital, Shalimar Bagh, Delhi, India, ²Assistant Professor, General Surgery, GS Medical College and Hospital, Pilkhua, Hapur, Uttar Pradesh, India, ³Senior Resident, Department of Surgery, GS Medical College, Pilkhua, Hapur, Uttar Pradesh, India, ⁴Intern, Government Medical College, Jammu, Jammu and Kashmir, India

Abstract

Background: The purpose of this prospective study is to assess the predictors of intestinal ischemia in small bowel obstruction.

Materials and Methods: This study comprises of 92 cases of acute small bowel obstruction managed in the surgery department in Government Medical College, Jammu, over 12 months from 1st November to 31st October. The diagnosis of acute intestinal obstruction was made in these cases by detail history, clinical examination, and radiological investigation. A detail history and a thorough clinical examination were recorded as per pro forma attached.

Aims and Objectives: The aims of this study are (1) to define various clinical, laboratory, and radiological predictors of intestinal ischemia in acute bowel obstruction, (2) to correlate the predictive factors with operative findings of intestinal ischemia in acute bowel obstruction, and (3) to formulate the protocol for the management of bowel obstruction with suspected intestinal ischemia.

Results: Intestinal obstruction affects patients of all age groups from <1 year to more than 80 years. The highest incidence was in the age group of <20 years. However, there was no association found between age group and presence or absence of ischemia. Most common etiology of obstruction found was adhesion, followed by hernia. Males were more commonly affected than females, but again no association was found between gender and ischemia.

Conclusion: To summarize, patients with bowel obstruction should initially be managed conservatively. The presence of predictors which have a positive correlation with ischemia should raise an alarm of underlying bowel ischemia and prompt the surgeon for need of surgical intervention.

Key words: Bowel, Intestinal, Ischemia, Obstruction

INTRODUCTION

Mechanical bowel obstruction term is used to define intestinal obstruction caused by a physical blockage of the intestinal lumen. Partial obstruction occurs when the intestinal lumen is narrowed but still allows the transit of some intestinal content aborally. On the other hand, complete obstruction implies that the lumen is totally obstructed, and none of the intestinal contents can move distally. Complete obstruction carries a markedly increased risk of strangulation (vascular compromise). Complete intestinal obstruction can be categorized as simple obstruction, closed-loop obstruction, or strangulation obstruction. Strangulation occurs when the blood supply to the affected segment is compromised.¹⁻¹⁰ The strangulation is either reversible (i.e., the viability of the bowel is maintained with relief of the obstruction) or irreversible when the vascular obstruction has caused irreversible ischemia of the bowel that will progress to transmural necrosis whether or not the strangulation is relieved. The causes of bowel obstruction can be divided into three categories: Obstruction arising from extraluminal causes (e.g., adhesions, hernias, carcinoma, and abscess), obstruction intrinsic to bowel wall (e.g., malrotation, tuberculosis, Crohn’s disease, and neoplasms), and intraluminal obturator obstruction (e.g., gallstones, enteroliths, foreign bodies, and bezoars). Laboratory data, although non-diagnostic, may be helpful in determining
the condition of the patient and guide the resuscitation. A complete blood cell count and differential, electrolyte panel, blood urea nitrogen, creatinine, and urinalysis should be obtained to evaluate fluid and electrolyte imbalance and to rule out sepsis.\cite{11,11-18}

Computed tomography (CT) findings diagnostic of bowel obstruction include intestinal loops >25 mm in diameter and a transition zone between dilated and collapsed bowel loops. In addition, because CT can demonstrate changes in the intestinal wall and associated mesentery, as well as showing enhancement or lack thereof by the intravenously administered contrast, some evidence about the severity of the local vascular changes and the presence or absence of strangulation may also be available.

CT angiography using multidetector CT is frequently used technique in patients suspected to have bowel ischemia. The most valuable advantage of using CT angiography includes not only obtaining information about presence or absence of thromboembolism and/or vascular narrowing in mesenteric vessels but also demonstrating the hemodynamic changes in the involved bowel segments.

Contraindications to non-operative management include suspected ischemia, large bowel obstruction, closed-loop obstruction, strangulated hernia, and perforation. A relative contraindication to non-operative management is a complete small bowel obstruction.

If a patient being treated non-operatively develops evidence of a complicated obstruction, operative intervention is indicated.

The timing of conversion to operative management in a patient with a small bowel obstruction who is not improving with non-operative management is more controversial. Some surgeons advocate surgical intervention in any patient who fails to show improvement within 48 h of initiating therapy. Others advocate a more liberal use of non-operative therapy, citing a mean time to successful resolution of up to 4.6 days. It is important for the surgeon to remember that non-operative management always carries a calculated risk of overlooking an underlying complicated obstruction.\cite{15,19-31}

**MATERIALS AND METHODS**

This study comprises of 92 cases of acute small bowel obstruction managed in the surgery department in Government Medical College, Jammu, over 12 months from 1st November 2014 to 31st October 2015. The diagnosis of acute intestinal obstruction was made in these cases by detail history, clinical examination, and radiological investigation. A detail history and a thorough clinical examination were recorded as per pro forma attached.

Different investigations were undertaken in all cases of acute intestinal obstruction, which included routine hemogram, urine analysis, blood urea, creatinine, serum electrolytes, electrocardiography, blood grouping, cross matching, and radiological examination (usually X-ray abdomen and abdomen ultrasonography). Contrast studies including contrast-enhanced CT abdomen were done in selected patients. After resuscitating these patients by conventional methods of intravenous fluids, nasogastric suction, broad spectrum antibiotics were started. Keeping in view the urine output and other hemodynamic parameters, prompt resuscitation and early surgery were undertaken in patients of suspected strangulation.

**Inclusion Criteria**

All the patients with intestinal obstruction were included in the study.

**Exclusion Criteria**

All the patients with intestinal obstruction will be included except:
1. Patients with suspected perforation,
2. Patients with gross comorbid conditions such as ischemic heart disease and uncontrolled diabetes mellitus.

**RESULT**

The following clinical observations were made from clinical data.

**Incidence of Ischemia**

Out of 92 patients included in the study, ischemia was present in 16 of them with the incidence of 17.39%.

**Age and Gender Incidence**

Intestinal obstruction although common in all age groups, the age spectrum in our clinical study ranged from 3 months to 85 years. The study showed peak incidence of cases in the age group of <20 years of age. Maximum cases of ischemia were seen in the same age group, but distribution of age showed no statistical correlation with ischemia in the present study (Table 1).

The study included 11 male patients and 5 female patients who showed intraoperative findings of ischemia. Yet again, no correlation was found between ischemia and gender.

**Presentation**

The type of pain sometimes gives a clue to diagnosis of intestinal ischemia.
In the present study, 11 out of 16 patients had continuous pain as compared to 5 patients who had colicky pain. Although strongly associated, this predictor had a low sensitivity and specificity for ischemia (Table 2).

Fever as a symptom was reported by only 2 out of 16 patients with ischemia and showed no association with it ($P = 0.1704$) (Table 3).

On examination, tachycardia was found in 18 patients in our study. Out of these, 12 were found to have ischemia on intraoperative findings. Tachycardia thus showed strong association with ischemia and specificity (Table 4).

The findings of guarding and rebound tenderness indirectly suggested peritonism and were found in 13 patients in our study. Out of these, 12 had ischemia showing strong association and high specificity (Table 5).

In the present study, sluggish bowel sounds were found in 24 patients, out of which 10 had ischemia. This showed a high association of ischemia and sluggish bowel sounds (Table 6).

### Investigations

Apart from routine investigations, total leucocyte count (TLC), acidosis, and amylase were studied as a predictor of ischemia. TLC was found in 14 patients, out of which 13 had ischemia. TLC thus showed high correlation with ischemia (Table 7).

Arterial blood gas (ABG) samples were sent to look for acidosis which was reported in 14 patients. When followed with laparotomy, ischemia was present in 13 of them, showing highly significant association (Table 8).

Amylase, although non-specific for ischemia, is usually found raised in cases of small bowel obstruction with

---

**Table 1: Distribution of small bowel obstruction based on gender**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Ischemia present</th>
<th>Ischemia absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>11</td>
<td>39</td>
<td>50</td>
</tr>
<tr>
<td>Female</td>
<td>5</td>
<td>37</td>
<td>42</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>76</td>
<td>92</td>
</tr>
</tbody>
</table>

Chi-square value $= 1.16$ (not significant)

**Table 2: Association of ischemia with type of pain**

<table>
<thead>
<tr>
<th>Type of pain</th>
<th>Ischemia present</th>
<th>Ischemia absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colicky</td>
<td>5</td>
<td>68</td>
<td>73</td>
</tr>
<tr>
<td>Continuous</td>
<td>11</td>
<td>78</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>76</td>
<td>92</td>
</tr>
</tbody>
</table>

Chi-square value $= 23.91$ (yate’s correction)

Fisher’s exact $P<0.001$ (highly significant)

Sensitivity 33.25%

Specificity 10.53%

PPV 6.85%

NPV 42.11%

**Table 3: Association of ischemia with fever**

<table>
<thead>
<tr>
<th>Fever</th>
<th>Ischemia present</th>
<th>Ischemia absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Absent</td>
<td>14</td>
<td>73</td>
<td>87</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>76</td>
<td>92</td>
</tr>
</tbody>
</table>

Chi-square value $= 0.585$ (yate’s correction)

Fisher’s exact $P>0.001$ (not significant)

Sensitivity 12.50%

Specificity 96.05%

PPV 40.00%

NPV 83.91%

**Table 4: Association of tachycardia with ischemia**

<table>
<thead>
<tr>
<th>Tachycardia</th>
<th>Ischemia present</th>
<th>Ischemia absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>12</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>Absent</td>
<td>4</td>
<td>70</td>
<td>74</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>76</td>
<td>92</td>
</tr>
</tbody>
</table>

Chi-square value $= 0.3368$ (yate’s correction)

Fisher’s exact $P<0.001$ (highly significant)

Sensitivity 75.00%

Specificity 92.11%

PPV 66.67%

NPV 94.59%

**Table 5: Association of peritonism with ischemia**

<table>
<thead>
<tr>
<th>Peritonism</th>
<th>Ischemia present</th>
<th>Ischemia absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>12</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Absent</td>
<td>4</td>
<td>75</td>
<td>79</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>76</td>
<td>92</td>
</tr>
</tbody>
</table>

Chi-square value $= 53.23$ (yate’s correction)

Fisher’s exact $P<0.001$ (highly significant)

Sensitivity 75.00%

Specificity 98.68%

PPV 92.31%

NPV 94.94%

**Table 6: Bowel sounds as a predictor of ischemia**

<table>
<thead>
<tr>
<th>Type of bowel sounds</th>
<th>Ischemia present</th>
<th>Ischemia absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sluggish</td>
<td>10</td>
<td>14</td>
<td>24</td>
</tr>
<tr>
<td>Exaggerated</td>
<td>6</td>
<td>62</td>
<td>68</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>76</td>
<td>92</td>
</tr>
</tbody>
</table>

Chi-square value $= 11.13$ (yate’s correction)

Fisher’s exact $P<0.001$ (highly significant)

Sensitivity 62.65%

Specificity 81.58%

PPV 40.00%

NPV 91.18%
ischemia. In our study too, all the 8 patients with raised amylase (>150) had ischemia as an intraoperative finding. Apart from being significantly associated with ischemia, raised amylase also had 100% specificity for ischemia in our study (Table 9).

**Ultrasonographic (USG) Findings**

All the patients included in our study were taken for USG. Apart from other findings of dilated bowel loops and type of peristalsis, the correlation between the presence of ascites and intraoperative findings of ischemia was studied. Ascites was present in 37 patients and ischemic seen in 13 of them. Ascites thus had a strong association with ischemia but with a low sensitivity and specificity (Table 10).

Thus, almost all the predictors, included in the study, were associated with ischemia with variable sensitivity and specificity, but gender and fever were not found to be associated with ischemia in a case of bowel obstruction.

**DISCUSSION**

Despite striking advances in the various disciplines of medicine, intestinal obstruction continues to remain a problem of utmost complexity. The determination of level and cause of obstruction often elude the surgeon, who is many times ignorant about the presence or absence of ischemia. Age-wise distribution of patients with obstruction showed no association of age with presence or absence of ischemia. This was contrary to Bizer et al. and Tsumura et al. who reported that the presence of bowel strangulation shows a positive correlation with age. Similar correlation was advocated by studies done by Aldemir et al. and Komatsu et al. where the latter took the age limit as more than or equal to 65 years.

No association was found between ischemia and gender in the present study contrary to the result of Tsumura et al., in which association was found between female gender and ischemia. Continuous abdominal pain was present in 11 out of 16 patients with ischemia and was strongly associated with it as was also seen by Otamiri et al. and Aldemir et al. The result contradicted the study of Bizer et al., which reported no correlation between continuous pain and bowel ischemia.

2 out of 16 patients with ischemia had fever as presenting complaint, and thus, fever showed no statistical association with ischemia as was observed by Bizer et al.

Although the study done by Bizer et al. showed no correlation, in the present study, tachycardia had a strong association with ischemia and was highly specific, with specificity of around 92%. Feza et al. also showed similar association as did Aldemir et al.
The specificity of peritonism for predicting ischemia was around 98%, with around 12 patients with ischemia having peritonism, suggesting strong association. Similar association was reported by Feza et al., Tsumura et al., Takeuchi et al., Zielinski et al., and Aldemir et al., and Jancelewicz et al. also reported that guarding was moderately predictive for bowel strangulation.

Bowel sounds were found to be sluggish in 10 out of 16 patients with ischemia suggesting strong association as observed by Aldemir et al.

Laboratory investigations showed a raised TLC in 13 out of 16 patients of ischemia. This predictor was strongly associated with ischemia similar to various previous studies done by Bizer et al., Otamiri et al., Feza et al., Takeuchi et al., Aldemir et al., Tsumura et al., Jancelewicz et al., and Schwenter et al.

As observed by Takeuchi et al., acidosis had a strong association with ischemia in the present study as ABG analysis showed acidosis in 13 out of 16 patients with ischemia.

Raised serum amylase levels were found in 8 out of 16 patients with ischemia showing a strong association. This test showed high specificity of 100% but a low sensitivity of 50%.

13 out of 16 patients had USG findings of ischemia thereby proving a strong association between them. Similar association was also observed by Komatsu et al. and Kenji et al.

Lit©rature concerning various aspects of predictors of bowel obstruction has been reviewed. Observation of 92 cases of bowel obstruction, admitted over 12 months from 1st November 2014 to 31st October 2015, have been made. The present study is summarized as under: Intestinal ischemia; however, these predictors have low sensitivity and specificity. The most specific predictor of ischemia was raised amylase. USG findings of ascites were also found to be significantly associated with ischemia but with low sensitivity and specificity.

Continuous abdominal pain was significantly associated with ischemia but with a low sensitivity and specificity. Fever was absent in most cases of obstruction and showed no correlation with ischemia.

Clinically, the presence of tachycardia and peritonism was significantly associated with ischemia with high specificity. Sluggish bowel sounds, though significantly associated with ischemia, have a low sensitivity and specificity for the same.

On investigating the patients in our study, raised TLC and presence of acidosis were associated with presence of ischemia; however, these predictors have low sensitivity and specificity. The most specific predictor of ischemia was raised amylase.

CONCLUSION

Patients with bowel obstruction should initially be managed conservatively. The presence of predictors which have a positive correlation with ischemia should raise an alarm of underlying bowel ischemia and prompt the surgeon for the need of surgical intervention.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Prevalence of Lung Parenchymal Involvement in Cases of Tubercular Pleural Effusion - Comparative Study between Chest X-ray and Computed Tomography Thorax

Rahul Ranjan¹, M K Meghwani², Supriya Katiyar³, Alok Kumar⁴, C M Bhalla⁴

¹Associate Professor, Department of Radiodiagnosis, Rama Medical College and Hospital, Mandhana, Kanpur, Uttar Pradesh, India, ²Professor, Department of TB and Chest, Rama Medical College and Hospital, Mandhana, Kanpur, Uttar Pradesh, India, ³Assistant Professor, Department of Pathology, Rama Medical College and Hospital, Mandhana, Kanpur, Uttar Pradesh, India, ⁴Assistant Professor, Department of Radiodiagnosis, Rama Medical College and Hospital, Mandhana, Kanpur, Uttar Pradesh, India

Abstract

Introduction: Pleural effusion is one of the common manifestations of tuberculosis (TB). It can present alone or may be associated with tubercular involvement of lung parenchyma.

Purpose: The purpose of the study is to know the prevalence of lung parenchymal involvement of TB as seen in computed tomography (CT) thorax in cases of tubercular pleural effusion (TPE). The second aim of the study is to know the prevalence of active changes of tubercular lung involvement on CT of thorax that is not picked up on chest X-ray.

Material and Methods: This is prospective study in which 50 cases of pleural effusion seen on X-ray chest which on diagnostic ultrasound aspiration were found to be tubercular were analyzed on CT thorax.

Result: Lung parenchymal involvement was seen in 21 cases (42%) on chest X-ray and 29 cases (58%) on CT thorax. Images compatible with active pulmonary disease was seen in 11 cases (22%) on chest X-ray and 17 cases (34%) on CT thorax.

Conclusion: This study reveals lung parenchymal involvement is common in cases of TPE which are better and clearly depicted on CT thorax compared to chest X-ray. This is important in identifying the active form of disease which is better identified on CT thorax as these cases are important source of disease dissemination.

Key words: Chest, Computed tomography, Lung, Pleural effusion, Tuberculosis, X-ray

INTRODUCTION

Tuberculosis (TB) continues to be a major public health problem in India. Pleural TB is one of the common extrapulmonary forms of TB in adults, particularly in places where the prevalence of disease is high.¹,² Although pulmonary TB can manifest as primary infection, however it is more commonly associated with the reactivation of pre-existing foci.¹,²,⁴ It is accepted that pleural TB results from a late hypersensitive reaction to the antigens of mycobacterium tuberculosis subsequent to rupture of a subpleural caseous focus.¹,²,⁴ The release of even a small number of bacilli from the lungs to the pleural cavity triggers a series of immune reactions that are mediated by T-lymphocytes, which produce cytokines and stimulate macrophages to form a granuloma.⁴,⁷ These events trigger an inflammatory process in the pleural space, vascular permeability increases, and leukocytes enter the pleural space causing accumulation of fluid and cells which are characteristic of exudative pleural effusion seen in cases of TB.¹,²,⁶

Traditionally, pleural TB is classified as primary when it develops after initial exposure to mycobacterium tuberculosis. This form is more common in young adult
living in region of high prevalence of TB. The post-primary form, which is associated with reactivation of preexisting focus develops after long period of primary infection and is more common in elderly population living in areas of low prevalence of disease. However, this classification is controversial. There is also evidence of simultaneous pleuropulmonary involvement.

This has an epidemiological importance as these cases of pleural effusion with concomitant pulmonary involvement can be important source of disease dissemination.

Chest X-ray is most widely and primary radiological investigation in suspected cases of pleuroparenchymal TB of thorax. However, computed tomography (CT) of thorax is much more superior in identifying lung lesions.

In this context, the objective of the study is to know the prevalence of lung parenchymal involvement in cases of tubercular pleural effusion (TPE) and to know the active changes of tubercular lung involvement on CT thorax that is not seen on chest X-ray (Table 1).

**MATERIAL AND METHODS**

This prospective study was conducted in Rama Medical College, Kanpur, between August 2016 and May 2017. This was study of 50 adult patients who were diagnosed with pleural effusion on chest X-ray and evaluation of diagnostic pleural fluid aspiration were found to be tubercular based on following criteria:

1. Positive modified light’s criteria with lymphocytic predominance of exudative fluid with fluid adenosine deaminase level more than 40 IU/L or
2. Culture of pleural fluid positive for mycobacterium tuberculosis or pleural fluid positive ziehl-neelsen stain (Figure 1c) or
3. Pleural biopsy or fine-needle aspiration cytology showing tubercular granuloma (Figure 1a and b).

These patients underwent CT thorax (with/without contrast) on 16 slice General Electric (GE) CT Scan machine. The findings were divided into following 3 groups.

1. Active disease - Presence of consolidation, thick walled cavitary lesion, centrilobular nodules, confluent nodules (Peribronchiolar infiltrates), tree in bud nodules.
2. Residual scarring - Parenchymal fibrotic bands, traction bronchiectasis, calcified nodules.
3. Indeterminate - Solitary nodule, mediastinal lymphadenopathy, bronchial/bronchiolar wall thickening.

**RESULTS**

Out of 50 patients, 35 patients were male and 15 were female. The mean age of patients in study was 45 years. Pleural effusion was bilateral in 12 patients, right sided in 35 patients, and left sided in 27 patients. Mild pleural effusion was observed in 41 patients, moderate in 9 patients and gross in none of the patients. Associated with pleural effusion 21 patients showed lung parenchymal changes on chest X-ray and 29 patients showed lung parenchymal involvement on CT thorax.

Consolidation was seen in 9 patients on chest X-ray and 13 patients on CT thorax (Figure 2). Thick walled cavitary lesions were seen in 2 patients on chest X-ray and 5 patients on CT thorax (Figure 3).

The presence of centrilobular nodules (05 cases), confluent nodules (06 cases), and tree in bud nodules (03 cases) were seen only on CT thorax (Figure 4) and not seen on chest X-ray.

Among the findings of residual scarring, fibrotic bands were seen in 10 patients on chest X-ray and 12 patients on CT thorax, calcified nodules were seen in 2 patients on chest X-ray and 4 patients on CT thorax (Figures 5 and 6). Traction bronchiectasis was seen in 6 patients on CT thorax (Figure 7).

<table>
<thead>
<tr>
<th>Findings</th>
<th>X-ray</th>
<th>CT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consolidation</td>
<td>09</td>
<td>13</td>
</tr>
<tr>
<td>Thick walled cavity</td>
<td>02</td>
<td>05</td>
</tr>
<tr>
<td>Centrilobular nodules</td>
<td>05</td>
<td></td>
</tr>
<tr>
<td>Confluent nodules</td>
<td>06</td>
<td></td>
</tr>
<tr>
<td>Tree in bud nodules</td>
<td>03</td>
<td></td>
</tr>
<tr>
<td>Fibrotic band</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Traction bronchiectasis</td>
<td>02</td>
<td>06</td>
</tr>
<tr>
<td>Calcified nodules</td>
<td>02</td>
<td>04</td>
</tr>
<tr>
<td>Solitary nodules</td>
<td>01</td>
<td></td>
</tr>
<tr>
<td>Mediastinal lymphadenopathy</td>
<td>03</td>
<td></td>
</tr>
<tr>
<td>Bronchial wall thickening</td>
<td>02</td>
<td></td>
</tr>
</tbody>
</table>

CT: Computed tomography

**Table 1: Lung parenchymal changes seen in cases of tubercular pleural effusion on chest X-ray and computed tomography**

**Figure 1:** (a) Fine-needle aspiration cytology (FNAC) from pleural thickening showing Langhans giant cell and tubercular granuloma (Leishman stain x100). (b) FNAC from pleural thickening showing Langhans giant cell and epithelioid cells (Leishman stain x100). (c) Ziehl neelsen staining (x1000) showing tubercular bacilli
Among indeterminate findings, mediastinal lymphadenopathy (3 cases) and bronchial wall thickening (2 cases) were seen only on CT thorax and not on chest X-ray.
DISCUSSION

The study was conducted in high prevalence TB region in India. It revealed that there is high prevalence of lung parenchymal involvement in cases of TPE which are more clearly seen on CT thorax (58% cases) compared to chest X-ray (42% cases).

Chest X-ray is the initial investigation of choice in suspected cases of TPE due to easy availability, easy to perform, low cost, and low radiation. However, it is less sensitive in demonstrating lung parenchymal or mediastinal involvement. This fact is important when considering that lung parenchymal or mediastinal involvement is seen in 17-36% of patients with TPE.12-15 Similar results were obtained in our study showing active and residual lung parenchymal involvement in 30% of TPE on chest X-ray.

However, high-resolution computed tomography (HRCT) thorax is much superior in demonstrating lung parenchymal or mediastinal involvement in TPE.12-16 Our study also shows similar results with lung parenchymal involvement seen in 21 cases (42%) of TPE on chest X-ray.

The most frequent findings of active disease that was seen on both chest X-ray and CT thorax was consolidation (homogeneous opacity reflecting granulomatous inflammation of parenchyma with or without air bronchogram-Figure 2).10,11,17,18

Only CT thorax demonstrated identification of centriflobular nodules, confluent nodules and tree in bud nodules (Figure 4) that were seen in 8 cases. The tree in bud nodules reflect endobronchial dissemination of caseous necrosis and granulomatous inflammation that fills and surrounds alveolar duct and respiratory bronchiol.10,11,17,18

In our case study, mediastinal lymphadenopathy was observed in only 3 cases and is considered nonspecific because they can be seen in both active phase and persist after specific treatment.19

Overall, chest X-ray demonstrated 11 patients with changes of active disease, 10 patients with changes of residual scarring and none of the patients with indeterminate disease.

While CT thorax showed 17 patients with changes of active disease, 11 patients with changes of residual scarring, and 3 patients with indeterminate disease. There were 6 patients (12% of total cases) that showed changes of active lung disease on CT that was not picked on X-ray.

Similar results were also seen in case series done by Seiscento et al. in 88 HIV negative patients with pleural TB (unilateral pleural effusion) in Brazil.20

CONCLUSION

In conclusion, this study supports the recommendation of a more vigorous diagnosis of patients with pleural TB especially those living in high prevalence area as lung parenchymal involvement is common in such cases. This is important in identifying the active form of lung parenchymal disease which is much better appreciated on CT chest compared to X-ray as these cases are important source of disease dissemination.

ACKNOWLEDGMENT

The authors are thankful to Mr. Mohan Chandra, Medical Transcriptionist, Department of Radiodiagnosis, Rama Medical College, for helping in preparing the manuscript and in data collection.

REFERENCES

Ranjan, et al.: Prevalence of Pulmonary Involvement in Tubercular Pleural Effusion


Source of Support: Nil, Conflict of Interest: None declared.
Evaluation of Gastrointestinal Cause in Cases of Unexplained Anemia in Adults - A Study from Tertiary Care Center

Chitta Ranjan Panda¹, Kali Prasanna Swain², Sambit Kumar Behera³, Rabindra Kumar Jena⁴, Tapan Kumar Sahoo⁵

¹Associate Professor, Department of Gastroenterology, Shrirama Chandra Bhanj Medical College, Cuttack, Odisha, India, ²Assistant Professor, Department of Neurology, Shrirama Chandra Bhanj Medical College, Cuttack, Odisha, India, ³Resident, Department of Gastroenterology, Shrirama Chandra Bhanj Medical College, Cuttack, Odisha, India, ⁴Professor and Head, Department of Haematology, Shrirama Chandra Bhanj Medical College, Cuttack, Odisha, India, ⁵Junior Consultant, Department of Radiation Oncology, HCG Panda Cancer Hospital, Cuttack, Odisha, India

Abstract

Background: Anemia is the most common illness, the human being is suffering even on today. About 50% of Indian population suffer from this disease. Evaluation of anemia is the most important step in the management. Blood loss from gastrointestinal (GI) tract is one of the common causes of anemia in adults, but its evaluation is expensive and multistep procedures. On the contrary, if there is delay in evaluation, it may be too late to offer the optimal therapy.

Aims and Objective: The aim of this study is to evaluate the profile of GI disorders in unexplained anemia in adult patients and need of its evaluation.

Materials and Methods: A total of 146 patients with the unexplained anemia attaining Clinical Haematology Department of SCB Medical College, Cuttack, from January 2014 to January 2017 were taken in the study. A detailed GI evaluation was done in all cases. All the analyses were done in SPSS 17 software.

Results: A total of 46 cases responded to treatment after addressing to known primary etiology. A total of 100 cases did not respond to treatment and underwent further evaluation in the present study. The mean age was 50 years (range 15-72 years). Male-to-female ratio was 1.086. The mean duration of the illness was 8 months, and the mean hemoglobin was 7.2 g/dl (range 4.5-9 g/dl). Among 100 patients not responding to treatment, GI causes for anemia found in 50 (50%) patients, 10 (10%) patients had a disease outside GI tract, and in 40 (40%) patients no cause for anemia established. GI malignancy was the most common finding (26%) followed by chronic duodenal ulcer and ileocecal tuberculosis.

Conclusions: GI disorders are the leading cause of unexplained anemia in adults (50%). Malignancy was identifying as the most common cause with colon and stomach being the frequent sites of involvement, followed by benign etiology with chronic duodenal ulcer and ileocecal tuberculosis. We strongly recommend a thorough GI evaluation in this subset of unexplained anemia of adult patients.

Key words: Adults, Etiology, Gastrointestinal, Unexplained anemia

INTRODUCTION

Anemia is the most common disease in the world including India affecting 50% of general population. The evaluation of anemia is a complex time-consuming and expensive process.¹ Thus, a scientific, multistep, and rational evaluation is important by considering the relevance of clinical settings and cost-effective ratio. Evaluation of entire gastrointestinal (GI) tract is itself a multistep process and expensive which includes gastroscopy, colonoscopy, and capsule endoscopy; computed tomography (CT) scans of abdomen and CT angiography, among other things. Most of the clinicians do not recommend that these procedures routinely and a significant proportion of patients are also reluctant to undergo such procedures. On the contrary,
if diagnosis is delayed, it may be too late to catch these lesions at early stage to offer the optimal curative options. There is no recommendation or guideline for indication of such procedures in anemic patients, leaving it entirely to the clinical judgment. Moreover, there is paucity of studies involving large series in this context. Thus, the present study was taken up to evaluate GI causes in these types of cases and the need for such evaluation routinely in such subset of adult patients of unexplained anemia.

MATERIAL AND METHODS

All patients in between 15 and 75 years of age presenting with anemia who were admitted in the Department of Clinical Haematology, SCB Medical College, Cuttack from January 2014 to January 2017 were enrolled for this prospective study. All the patients had undergone some investigations earlier by local physicians but failed to find a definitive cause for their anemia.

Unexplained anemia is defined in the present study as persistent anemia (Hemoglobin <11 g%) with no evidence of hemoglobinopathy, immunodeficiency, vitamin B12 and folic acid deficiency, autoimmune hemolytic anemia, bone marrow failure syndromes, leukemia, multiple myeloma, lymphoma, etc.

Patients were excluded from the study if they had a known cause of blood loss or had been taking nonsteroidal anti-inflammatory drugs regularly or had an established reason for anemia such as nutritional deficiency (iron, folic acid, and cobalamin), hemoglobinopathies, autoimmune hemolytic anemia, bone marrow failure syndromes, thyroid disorders, drugs causing bone marrow suppression, etc. Patients with liver, renal, pulmonary, and cardiac dysfunctions were excluded from the study. Pregnant ladies and lactating mothers were not included in this study.

GI symptoms were grouped into upper and lower GI symptoms. Upper GI symptoms which consisted of anorexia, nausea and vomiting, and upper abdominal pain that was related to food or relieved by antacid or H2 blocker. Lower GI symptoms comprised changed bowel habit, lower abdominal pain diarrhea, and constipation that was colicky or associated with altered bowel habit or relieved by the passage of stool or flatus. The finding of an epigastric mass or hepatosplenomegaly suggested that they were related to upper GI disease while a mass in the right iliac fossa pointed to lower GI disease as the cause. As GI symptoms or signs may be nonspecific, two or more features related to either the upper or lower tract were considered necessary to suggest the site of possible disease.

Anemia was assessed by estimating hemoglobin concentration and other parameters by 5-part automated cell counter (sysmex pocH-100i). Serum ferritin concentration, serum iron concentration, total iron binding capacity, transferrin saturation, bone marrow aspiration, hemoglobin electrophoresis, reticulocyte count, osmotic fragility test, Coombs test, liver function tests, kidney function tests, thyroid function tests, tuberculin test, and X-ray chest were performed in all the cases to exclude any known cause for anemia. Serum electrophoresis for M band, biopsy of lymph nodes was done whenever needed.

The GI investigations comprised endoscopy of upper GI tract, duodenal (D2) biopsy, barium follow through X-ray examination of the small gut, capsule endoscopy, sigmoidoscopy, colonoscopy; ultrasound examination of the abdomen, CT of the abdomen with CT angiography, and fecal occult blood test were performed when considered appropriate. Diagnostic laparoscopy or laparotomy was done when clinically indicated.

All the analyses were done in SPSS 17 software.

Ethical clearance was obtained from the institutional ethical review board. Informed consent was filled in respective cases.

RESULTS

A total of 146 patients were included in this study, 46 cases responded to treatment after addressing to known primary etiology. A total of 100 cases did not respond to treatment and underwent further evaluation in the present study. The mean age of the study group was 48.2 years (range 15-72 years). A total of 76 patients were male; remaining 70 were female. The mean duration of the illness was 8 months and the mean hemoglobin was 7.2 g/dl (range 4.5-9 g/dl). Among 100 patients, GI causes for anemia were found in 50 patients. A total of 10 patients had a disease outside GI tract; in 40 patients, no cause for anemia could be established.

Table 1a shows the number of identifiable malignant GI cases of unexplained anemia. The most common cause of malignancy was colon in 13 patients followed by gastric malignancy in 9 patients. Totally, 3 patients were found to be small intestinal malignancy while 1 case found to have ampullary growth.

Table 1b shows GI diseases other than malignancy associated with anemia in 24 patients. Among them, 11 patients presented with chronic duodenal ulcer. A total of 6 patients presented with tuberculosis involving GI tract.
Five of the 6 patients with GI tuberculosis had involvement of the terminal ileum and cecum, and 1 had colonic tuberculosis. Colonoscopy with biopsy allowed a definitive diagnosis of GI tuberculosis in 5 patients; in one patient, biopsy was not conclusive, but presumptive diagnosis of GI tuberculosis was made on the colonoscopic appearance of cecal ulceration and response to antitubercular therapy. A total of 4 patients had celiac sprue on duodenal biopsy which had raised anti-tissue transglutaminase antibody titer after revaluation. Despite the absence of symptoms lesions were found in 1 case of Crohn’s disease. 2 patients had angiodysplasia of colon diagnosed after CT angiography. Totally, 10 patients had a disease outside GI tract accounting for anemia (Table 2). Among them, 8 cases had gynecological cause. A total of 2 patients had malignancy outside GI tract, i.e., malignancy of unknown primary site which was diagnosed by laparoscopy and biopsy of peritoneal seeding.

**DISCUSSION**

This study was conducted in 100 patients of unexplained anemia with or without GI symptoms who did not respond to treatment and were evaluated to find out a GI cause. GI malignancy was the most common finding. Colorectal cancer and Carcinoma of stomach accounted for 13 cases (13%) and 9 cases (9%), respectively; in this series. Different series have estimated that carcinoma of colon accounts for 11-14% and carcinoma of stomach accounts for 1-5% of iron deficiency anemia in Western countries. Anemia was the only presenting manifestation in patients of duodenal adenocarcinoma, ampullary carcinoma, and ileal adenocarcinoma. Few literatures have demonstrated the extreme latency of these tumors and the necessity for detailed GI investigations in patients presenting with isolated iron deficiency anemia by performing endoscopic examination of upper GI tract, duodenoscopy, and endoscopic retrograde cholangiopancreatography.

Next to malignancy, chronic duodenal ulcers were the most frequent cause of anemia in the present study. It reflects higher prevalence of Helicobacter pylori infection in our population. GI tuberculosis was the next frequent cause of anemia in our study. Anemia in GI tuberculosis may result from occult GI bleeding from ulceration or malabsorption of dietary iron or as a part of anemia of chronic disease. Tuberculosis is common in our country. Sign and symptoms of GI tuberculosis are nonspecific; a high index of suspicion should be maintained to ensure a timely diagnosis. In the present study, 4 patients had celiac sprue that had only presented with anemia but without any GI complaints, and 10 (10%) patients had a disease outside GI tract as the cause for anemia. One previous study reported 2% patients had a systemic disease without coexisting GI disease during evaluation of patients with iron deficiency anemia. This finding suggests that some patients presenting with anemia and GI symptoms may have disease outside the GI tract. Gynecological evaluation should be considered during evaluation of female patients with anemia.

There were 40 (40%) patients in whom no cause for the anemia could be ascertained in the present study. Some earlier studies have shown similar finding in patients with iron deficiency anemia. Follow-up data were not available in these patients. Most of these patients were asymptomatic. Conditions such as unreported menstrual losses or insufficient dietary intake of iron in the context of the prevalent poor socioeconomic status in our country may have been responsible for occult iron deficiency. Alternatively, ulcerations or benign lesions might have caused blood loss in the past but then healed and thus were not detected. Moreover, abnormalities such as polyps or vascular ectasia might have been missed during the endoscopic examination or their anemia was associated with undiagnosed chronic disease such as rheumatoid arthritis. Up to 5% of patients with anemia result from recurrent GI bleed who remain undiagnosed in spite of upper GI endoscopy and colonoscopy, with the presumed source of...
bleeding being the small bowel.\textsuperscript{11} Recently, various methods, including push enteroscopy, two-way enteroscopy, and capsule endoscopy, have been employed to detect and manage small bowel lesions.\textsuperscript{12} Several studies showed that capsule endoscopy is highly effective in detecting small-bowel lesions, with an overall diagnostic yield superior to that of push enteroscopy or radiologic imaging.\textsuperscript{13-16} Capsule endoscopy is being recommended as the primary initial investigation in occult GI bleeding by two international guidelines, with double balloon enteroscopy at present reserved for therapeutic action.\textsuperscript{17-19} Capsule endoscopy, double balloon enteroscopy, mesenteric angiography are now available in our set up which resulted in diagnosis of one case of Angiodysplasia.

This study also reflects that age is an important factor determining the cause of anemia. Malignancy particularly of GI tract origin contributing to anemia was found in middle aged people 46 years and above, whereas hematological causes or other systemic illness or no identified cause was found in younger people between 15 and 45 years. Some earlier studies have found evidence of such differences.\textsuperscript{8} Investigations for anemia should be tailored to the patient’s age and the clinical setting.

\textbf{CONCLUSION}

This study was conducted on a selected group of patients presenting to a specialized unit of a tertiary care hospital. The sample size was also not big. Despite these limitations, findings of this study suggest the need of routine evaluation of GI tract in adult patients of unexplained anemia to identify the GI lesions and offer optimal treatment.

\textbf{REFERENCES}

Study of Hearing Outcome in Secretory Otitis Media in Children 3 to 12 Years of Age

Bency Benjamin¹, K B Rajamma²

¹Resident, Department of ENT, Sree Gokulam Medical College and Research Foundation, Trivandrum, Kerala, India, ²Professor, Department of ENT, Sree Gokulam Medical College and Research Foundation, Trivandrum, Kerala, India

Abstract
Background and Objective: The objective of this study is to assess the hearing outcome in cases of secretory otitis media before and after treatment different treatment modalities.

Materials and Methods: A prospective observational study consisting of 174 children in the age group 3-12 years of age diagnosed with secretory otitis media. They underwent medical and different modalities of surgical treatments. All patients subjected to audiometry and tympanometry for assessment of hearing before and after treatments.

Result: Study results showed that there was no significant change in hearing in patients who underwent medical treatment. But in those patients who underwent surgical modalities of treatment, there was a significant hearing improvement. Moreover, out of these, the maximum benefit was seen in patients who underwent adenoidectomy with grommet insertion.

Conclusion: In this study, the hearing outcome in secretory otitis media was assessed following different modalities of treatment. Patients who underwent medical management did not show much improvement in the conductive hearing loss assessed before treatment. While those who underwent surgical management had improvement of hearing when compared with that before treatment.

Key words: Decibel, Hearing loss, Otitis media with effusion, Pure tone audiometry

INTRODUCTION

Otitis media with effusion (OME) is a pathologic condition of the middle ear in which effusion occurs in the middle ear space behind an intact tympanic membrane without any signs of acute inflammation. It results from alterations of the mucociliary system within the middle ear cleft, and it’s frequently caused by malfunctioning eustachian tube.¹

OME is one of the most common causes of hearing loss of acute onset in children. Parents complain of inattentiveness of child in school, mouth breathing, and snoring due to associated adenoid hypertrophy.

Symptoms may involve hearing loss and aural block but typically lacks pain and fever. Furthermore, parents often complain of mouth breathing and snoring. In children, the hearing loss is mild to moderate and detected in audiogram.²

OME accounts for medical and surgical treatments in a large population of children. It may cause loss of school days and poor academic performance.³

OME occurs as a result of many causes out of which one of the most common causes is a complication of the upper respiratory infection or episode of acute otitis media. OME results in decreased cognitive, auditory and communicative skills of the child.⁴

Objective
To study the hearing outcome in children of age group 3-12 years with secretory otitis media before and after treatment (medical/surgical).

MATERIALS AND METHODS

A prospective observational study of 170 patients who presented to the ENT Department at Sree Gokulam Medical College and Research Foundation with complaints...
of deafness, heaviness of ears, earache, blockage in ears, mouth breathing, nasal blockage was subjected to detailed ear, nose, and throat examination. Those suspected of OME were further posted for pure tone audiometry (PTA) and impedance audiometry.

Hearing assessment can be done using tuning fork tests in and can be confirmed with PTA in older children. While in younger children (3-5 years) conditioned play audiometry can be used for hearing assessment. Audiometry will give a quantitative and qualitative assessment of hearing.

Based on patient preference and examiner's choice, patients were subjected to different treatment modalities like:

a. Medical management
b. Surgical management.
   1. Adenoidectomy alone
   2. Adenoidectomy with myringotomy
   3. Myringotomy with grommet insertion.

Medical management (a):
1. Antibiotics if there is any sign of the upper respiratory tract infection.
2. Nasal decongestants such as xylometazoline and oxymetazoline
3. Topical nasal steroids are given in resistant cases.
4. Autoinflation of Eustachian tube by valsalva maneuver.

Surgical management (b):
1. Myringotomy alone (B)
2. Myringotomy with grommet insertion (C)
3. Adenoidectomy alone (D)
4. Adenoidectomy with myringotomy (E)
5. Adenoidectomy with grommet insertion (F).

Patients were asked to review on the 14th day and 2nd month follow-up after treatments.

During the follow-up, all will be asked for any relevant ear, nose and throat symptoms. Detailed ear, nose and throat examinations will be done. PTA and tympanometry also will be repeated serially.

RESULTS AND ANALYSIS

Patients who underwent medical management (A) had a pretreatment mean conductive hearing loss of 20.4 dB before treatment which as recorded to be 20.3 dB after treatment. \( P = 0.068 \).

Patients who underwent myringotomy alone (B) had a pretreatment mean conductive hearing loss of 21.8 dB before treatment which as recorded to be 20.8 dB after treatment. \( P = 0.015 \).

Patients who underwent myringotomy with grommet insertion (C) had a pretreatment mean conductive hearing loss of 22.3 dB before treatment which as recorded to be 21.2 dB after treatment \( P = 0.005 \).

Patients who underwent adenoidectomy alone (D) had a pretreatment mean conductive hearing loss of 20.7 dB before treatment which as recorded to be 19.7 dB after treatment. \( P \) value was found to be 0.010.

Patients who underwent adenoidectomy with myringotomy (E) had a pretreatment mean conductive hearing loss of 21.3 dB before treatment which as recorded to be 20.0 dB after treatment. \( P \) value was found to be 0.006.

Patients who underwent adenoidectomy with grommet insertion (F) had a pretreatment mean conductive hearing loss of 23.1 dB before treatment which as recorded to be 20.8 dB after treatment. \( P \) value was found to be < 0.001 (Table 1).

<table>
<thead>
<tr>
<th>Management modality</th>
<th>n</th>
<th>PTA Mean±SD</th>
<th>Paired t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Pre</td>
<td>26</td>
<td>20.4±4.5</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>26</td>
<td>19.3±3.5</td>
</tr>
<tr>
<td>B</td>
<td>Pre</td>
<td>24</td>
<td>21.8±5.5</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>24</td>
<td>20.8±4.2</td>
</tr>
<tr>
<td>C</td>
<td>Pre</td>
<td>24</td>
<td>22.3±5.7</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>24</td>
<td>21.2±5.1</td>
</tr>
<tr>
<td>D</td>
<td>Pre</td>
<td>15</td>
<td>20.7±4.9</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>15</td>
<td>19.7±4.1</td>
</tr>
<tr>
<td>E</td>
<td>Pre</td>
<td>50</td>
<td>21.3±6.2</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>50</td>
<td>20.8±4.8</td>
</tr>
<tr>
<td>F</td>
<td>Pre</td>
<td>35</td>
<td>23.1±5.5</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>35</td>
<td>20.8±4.1</td>
</tr>
</tbody>
</table>

PTA: Pure tone audiometry, SD: Standard deviation

DISCUSSION

Hearing assessment can be done using tuning fork tests in and can be confirmed with PTA in older children. While in younger children (3-5 years) conditioned play audiometry can be used for hearing assessment. Audiometry will give a quantitative and qualitative assessment of hearing.

A case series of 100 cases were studied in detail in General Hospital, New Guinea, by Aithal and Colleagues (1992-1994), the study was conducted to assess the type of hearing loss in OME. It was detected that a characteristic
audiogram is showing improved air conduction and decreased bone conduction hearing at 2 KHz and air conduction loss at both high and low frequencies. This hearing loss improved following myringotomy and grommet insertion.

**Tympanogram**

A tympanogram showing B curve is suggestive of fluid in the middle ear and is diagnostic of OME. Tympanogram showing C type curve is suggestive of negative pressure within the middle ear.

In a similar study conducted by Dr. H S Satish, Dr. Sarojamma, Dr. Anjan kumar on role of adenoidectomy in OME, which was published in journal of dental and medical sciences, in this study, it was found that there was a significant improvement in hearing following adenoidectomy in cases of OME. There was a difference of 5.3-4.09 dB hearing improvement following treatment. It was also found that patients who had B type curve before treatment had changed to A type curve posttreatment (Figure 1).

**CONCLUSION**

This study was conducted to assess hearing in patients with secretory otitis media in children 3-12 years. Assessment of hearing loss was done by PTA, patients who underwent medical management (A) had a pretreatment mean conductive hearing loss of 20.4 dB before treatment which as recorded to be 20.3 dB after treatment. \( P = 0.068 \), hence not significant statistically.

Patients who underwent myringotomy alone (B) had a pretreatment mean conductive hearing loss of 21.8 dB before treatment which as recorded to be 20.8 dB after treatment. \( P \) value was found to be 0.015, hence statistically significant.

Patients who underwent myringotomy with grommet insertion (C) had a pretreatment mean conductive hearing loss of 22.3 dB before treatment which as recorded to be 21.2 dB after treatment. \( P = 0.005 \), hence statistically significant.

Patients who underwent adenoidectomy alone (D) had a pretreatment mean conductive hearing loss of 20.7 dB before treatment which as recorded to be 19.7 dB after treatment. \( P \) value was found to be 0.010, hence statistically significant.

Patients who underwent adenoidectomy with myringotomy (E) had a pretreatment mean conductive hearing loss of 21.3 dB before treatment which as recorded to be 20.0 dB after treatment. \( P \) value was found to be 0.006, hence statistically significant.

Patients who underwent adenoidectomy with grommet insertion (F) had a pretreatment mean conductive hearing loss of 23.1 dB before treatment which as recorded to be 20.8 dB after treatment. \( P \) value was found to be < 0.001, hence very significant statistically.

Out of all the treatment modalities, the most statistically significant management modality was found to be group that underwent treatment F, i.e., adenoidectomy with grommet insertion.

**REFERENCES**

Effects of Ultraviolet Rays on the Eyes in a Tertiary Referral Hospital in Tamil Nadu

N Sharmila, B Pramila
Associate Professor, Department of Ophthalmology, Government Vellore Medical College, Vellore, Tamil Nadu, India

Abstract

Introduction: Ultraviolet (UV) radiation from the sun can trigger the onset of various ophthalmic problems.

Aim: To assess the pattern of eye diseases caused by UV rays at Government Vellore Medical College and Hospital.

Materials and Methods: Retrospective study was conducted from February 2017 to May 2017 around 673 patients who came with ocular defects due to sunlight were considered for study. We recorded the data based on the type of presentation of disease. The data were analyzed statistically by simple proportion.

Results: Of the 673 patients examined most common age group is 40-50 years, more predominant in males. The most common disease being cataract. The patients were managed appropriately.

Conclusion: Our study shows a male preponderance and the most common age group being 40-50 years. The most common disease found is cataract. Hence, there is an urgent need for reinforcement of the protective wear during exposure to sunlight thereby preventing the ill effects.

Key words: Cataract, Conjunctivitis, Sunlight, Ultraviolet Radiation

INTRODUCTION

Hot weather, strong sun, sun bath, swimming pools, air conditioning, and dry atmosphere are all factors that can adversely affect the eye and cause vision problems. Summer is the time when we look forward to either for a holiday or a weekend getaway. Ultraviolet (UV) radiation from the sun can trigger the onset of a range of eye diseases.

Summer is the time of optimism where the days are longer, and flowers are at their best. Most of the time is spent outdoors. This is the time of the year where we recharge our batteries and our bodies get prepared for the colder months.

UV radiation sits adjacent to the blue end of the visible portion of the electromagnetic spectrum constituting 400-100 nm wavelengths. The sun is the natural source of UV energy.

It is hypothesized that UV rays from the sun can invite formation of free radicals which cause protein modification and peroxidation. As far as the eye is concerned the cornea and the lens are the most important tissues absorbing UV radiation. Below 300 nm (UV-B) it is the cornea that absorbs most radiation, the lens absorbs UV-A of <370 nm. “UV-A light-excited kynurenines oxidize ascorbate and modify lens proteins through the formation of advanced glycation end products: Implications for human lens aging and cataract formation.”

MATERIALS AND METHODS

Our study was done in an ophthalmology Outpatient Department (OPD) of a tertiary hospital in South India. Of the 5,559 patients who attended ophthalmic OPD at Government Vellore Medical College from February 2017 to May 2017, 673 patients were affected due to sunlight. The patients who already had eye diseases such as glaucoma and operated eyes were excluded from the
study. A thorough ophthalmic examination was done which included visual acuity measurement by Snellen chart, slit-lamp examination to evaluate anterior segment problems and fundus examination by indirect ophthalmoscopy and slit lamp by microscope. Intraocular pressure was measured in all patients except with cornea involvement. The data collected included age, sex, and type of ocular disease. The data were finally analyzed statistically by simple proportion.

RESULT AND DISCUSSION

In our study, of 673 patients, 60% of the patient belonged to the age group of 40-50 years. 71% of them were males and 29% were females. UV radiation from the sun can trigger the onset of cataracts. It is a common misconception that the cataracts are solely age related. This is not so. Sunlight acts as an additional factor in hastening the process of cataract formation.

In our study, most of the patients in 40-50 years were affected (Table 1).

In our study, mostly males were affected. This may be attributed to their work outdoor and exposure to sunlight henceforth (Table 2).

In our study, cataract formed the major bulk of the causes. The conjunctiva was affected next either due to allergy or a degenerative disease because of the UV exposure. This was followed by corneal involvement like keratitis. The lids were affected due to lack of hygiene resulting in chalazion or sty. Dry eye was commonly noticed in some of the patients, more so in patients with exposure to air conditioner vents (Table 3).

Sunlight reflected from the surface of water, or other reflective medium can cause conjunctivitis and keratitis. Conjunctivitis as otherwise called “Red eye” is associated with redness, watery discharge, and running nose.

Keratitis may involve a wide variety of infections and inflammation. It should be treated at the earliest to prevent corneal scarring thereby resulting in permanent blindness.

The conjunctiva is easily damaged by UV, which activates a complex series of oxidative reactions and distinct pathways of cell death. There is strong epidemiological evidence to support an association between chronic UV exposure and the formation of a pterygium. This wing-shaped thickening of the conjunctiva and cornea is particularly seen in people who live in sunny climates and those who work outdoors. The prevalence of pterygia occurring on the nasal conjunctiva has been explained by peripheral light focusing onto the medial anterior chamber beneath the limbal corneal stem cells.

Actively dividing stem cells are likely to have a lower damage threshold than non-mitotic corneal epithelial cells.

The aggravating factor for infections of the conjunctiva and cornea is lack of hygiene. In hot summer, bugs of all sorts multiply fast so it is essential to instruct the patients to maintain cleanliness and particularly washed hands frequently.

Looking directly at the sun, the solar rays can cause permanent loss of sight at any age. Patient must be advised to wear proper quality sunglasses. The better lens colors are brown, gray, or green and preferably avoid very dark and very light lens.

Continuous exposure air conditioning vents will cause drying out of the surface of the eye. To keep the eyes clear, sparkling and healthy it is essential to keep the surface naturally irrigated. Blinking of the eye consciously rapidly a few times helps in regulating the natural moisturizing effect.

Even in chlorinated swimming pools, blinking is better as chlorine is an irritant that affects the eyes, and excessive exposure can cause conjunctivitis or keratitis. The use of swimming goggles is another measure of avoiding exposure to chlorinated water.
Dust particles and pollen are a hazard in summer months and can provoke or accelerate an allergy which has detrimental effect on the eyes. Close-fitting wraparound sunglasses keep out the dust and pollen thereby providing a physical protection to the eyes. Prompt treatment with qualified ophthalmologists and controlling the dryness with medications and avoiding exposure to dust will go a long way in the management of allergic conjunctivitis.

**CONCLUSION**

Based on our study, the most common age group affected was 40-50 years and males because of their greater exposure to sunlight. A few useful tips to prevent eye diseases due to sunlight:
1. Cold compress to the closed eyes.
2. Frequent use of lubricating eye drops prescribed by ophthalmologists.
3. Use of sunglasses outdoors.
4. Avoid direct splashing of water into open eyes.
5. Avoid contact lens and eye makeup if eyes are feeling sore.

According to a national sun safety survey conducted by the American Academy of Ophthalmology, only about half of people who wear sunglasses say they check the UV rating before buying. The good news is that you can easily protect yourself. To be eye smart in the sun, the American Academy of Ophthalmology recommends the following:

Wear sunglasses labeled “100% UV protection”: The use only glasses that block both UV-A and UV-B rays and that are labeled either UV 400 or 100% UV protection.

- Choose wraparound styles so that the sun’s rays cannot enter from the side.

- If you wear UV-blocking contact lenses, you will still need sunglasses.

Wear a hat along with your sunglasses; broad-brimmed hats are best.

Remember the kids: It’s best to keep children out of direct sunlight during the middle of the day. Make sure they wear sunglasses and hats whenever they are in the sun.

Know that clouds do not block UV light: The sun’s rays can pass through haze and clouds. Sun damage to the eyes can occur any time of year, not just in summer.

Be extra careful in UV-intense conditions: Sunlight is strongest mid-day to early afternoon, at higher altitudes, and when reflected off of water, ice, or snow. Be extra careful in UV-intense conditions: Sunlight is strongest mid-day to early afternoon, at higher altitudes, and when reflected off of water, ice, or snow.

By embracing these simple tips you and your family can enjoy the summer sun safely while protecting your vision.

**REFERENCES**


**How to cite this article:** Sharmila N, Pramila B. Effects of Ultraviolet Rays on the Eyes in a Tertiary Referral Hospital in Tamil Nadu. Int J Sci Stud 2017;5(4):137-139.

**Source of Support:** Nil, **Conflict of Interest:** None declared.
Pericardiectomy for Constrictive Pericarditis - A Comprehensive Study Between Total and Subtotal Pericardiectomy by Left Aterolateral Thoracotomy

G Josephraj¹, P Rani², M Muthukumar², S Naveen³, P Manivannan³, M Mohamed Yaser³, Heber Anandan⁴

¹Professor and Chief, Department of Cardiothoracic Surgery, Madurai Medical College, Madurai, Tamil Nadu, India, ²Senior Assistant Professor, Department of Cardiothoracic Surgery, Madurai Medical College, Madurai, Tamil Nadu, India, ³Junior Resident, Department of Cardiothoracic Surgery, Madurai Medical College, Madurai, Tamil Nadu, India, ⁴Senior Clinical Scientist, Department of Clinical Research, Dr. Agarwal's Healthcare Limited, Tamil Nadu, India

Abstract

Introduction: Constrictive pericarditis is a chronic inflammatory process that leads to progressive pericardial fibrosis encasing the heart in a thickened and fibrotic pericardiectomy this leads to impaired diastolic filling of the cardiac chambers, with the elevation of right atrial mean pressure and end diastolic pressure in both ventricles with the end result of reduced cardiac output.

Aim: To analyze the perspectives of clinical outcomes and surgical results of pericardiectomy (total or subtotal) done by left anterolateral thoracotomy and to analyze the histopathology of all pericardiectomy specimen to find out the etiology.

Methods: The patient population consisted of patients with constrictive pericarditis who had pericardiectomy and confirmed pathologically. Patients were assigned into two groups one with sub-total pericardiectomy (Group I) and lie other with total pericardiectomy (Group II).

Results: The mortality rate was similar in the two Groups with two deaths. All the deaths were cardiac related and occur in the perioperative period as a result of low cardiac syndrome. Both the groups of the patients had similar and significant improvement in the New York Heart Association (NYHA) status. The degree of improvement was not significant improvement between the two groups. The mean hospital stay and inotropic support requirements was similar between the two groups. It is of interest to note that 40% of cases are caused by tuberculosis and no obvious cause of pericarditis was identified in the rest of the patients in both the groups.

Conclusion: The results of pericardiectomy in terms of improvement in NYHA status and mortality are similar in both types of resection. The combination of chemotherapy and surgery yields good results in the treatment of tuberculous pericarditis.

Key words: Pericardiectomy, Tuberculosis, Thoracotomy

INTRODUCTION

Constrictive pericarditis is a chronic inflammatory process that leads to progressive pericardial fibrosis encasing the heart in a thickened and fibrotic pericardiectomy.¹,² This leads to impaired diastolic filling of the cardiac chambers, with the elevation of right atrial mean pressure and end diastolic pressure in both ventricles with the end result of reduced cardiac output.³ It is an uncommon condition with the largest series reported 363 patients extending over 60 years. Medical mortality in centers with experience is well below 5%. Overall 5 years survival rate as high as 70-80% has been reported after resection with curative intent. As a result, an increase in number of patients are now surviving on a long-term basis.³⁴ Their quality of life may be very much treatment of these patients has observational studies and case constrictive pericarditis without symptoms and early death. Today pericardiectomy is the treatment of choice for many chronic constrictive
pericarditis. Improvement of perioperative management and surgical techniques has resulted in a steady decrease in post-operative mortality. Today, post-operative hospital mortality in centers with experience is well below 5%. Overall 5 years survival rates as high as 70-80% has been reported after resection are now curative intent. As a result, an increase in number of patients are now surviving on long term basis.8-10

Their quality of life may be very much influenced by the adequacy of pericardial resections. Surgical management remains only effective treatment available for this potentially curable disorder.

Various approaches and techniques have been suggested. The approaches described for pericardiectomy include left anterolateral thoracotomy, median sternotomy, a U incision with the basis of U lying at the left sterna border (Harrington approach) and bilateral thoracotomy. Pericardiectomy has also been performed with or without the use of cardiopulmonary bypass with each having its proponents. Regardless of the surgical approach, resection of diseased pericardium is essential for minimizing early morbidity and mortality and improving long-term functional results and quality of life. This study was designed to compare two types of surgical technique of pericardiectomy, total and subtotal pericardiectomy by left anterolateral thoracotomy.11,12

Aim
To analyze the perspectives of clinical outcomes and surgical results of pericardiectomy (total or subtotal) done by left anterolateral thoracotomy and to analyze the histopathology of all pericardiectomy specimen to find out the etiology.

MATERIALS AND METHODS

This study was conducted in Department of Cardiothoracic surgery at Government Rajaji Hospital. The patient population consisted of patients with constrictive pericarditis who had pericardiectomy and confirmed pathologically. The research proposal was approved by the institutional review board of ethical committee for clinical research. These patients all prospectively underwent detailed clinical evaluation, biochemical investigation, chest radiography, computed tomography scan of chest and Echocardiography. The patients subsequently underwent pericardiectomy and confirmed histopathologically. At operation, all had confirmed constrictive pericarditis by surgical intervention assessed by intra-operative central venous pressure (CVP) measurement which shows the adequacy of release of constriction and pathological confirmation by subjecting to histopathological examination. Post-operative echo and CT scan were taken to assess the outcome. Inclusion Criteria: All patients with the clinical signs and symptoms, chest X-ray, CT chest and Echocardiographic features consistent with the diagnosis of constrictive pericarditis. Exclusion Criteria: Patients with preexisting severe comorbid conditions which may preclude invasive evaluation and surgical treatment. Patients with the Echocardiographic features of thickened pericardium but without clinical features of constrictive pericarditis. Patients with associated rheumatic heart disease.

Clinical profile of the patients were recorded with specific emphasis to signs and symptoms such as dyspnea and New York Heart Association (NYHA) functional class, fever, weight loss, cough, chest, pain, palpitation, Ascites, Pedal edema, Jugular Venous Pulse, Painful Hepatomegaly, H/o tuberculosis (TB) and antituberculosis therapy treatment.

All patients underwent pericardiectomy. Patients were assigned into two groups one with sub-total pericardiectomy (Group I) and lie other with total pericardiectomy (Group II). Right semi lateral position. Left anterolateral thoracotomy was approached through 5th intercostals space. Adhesion released. Pericardial fluids sucked and sent for analysis. Resection of the diseased pericardium starts by first resecting the parietal pericardium and creating a cleavage plane in between, The pericardium is free in the following order: First from the left ventricle (LV) and right ventricle (RV) and the left pulmonary vein orifices from the aorta and pulmonary artery, including the left pulmonary vein orifices from the aorta and pulmonary artery, including the left ventricular outflow tract; and finally from the superior and inferior vena cava. To avoid damage to the phrenic nerves, entire the anterior pericardium was resected within 3 or 4 cm of the phrenic nerves, and then completed the dissection of the pericardium from the diaphragm. Resection is continued till epicardial vessels are visualized and contraction is satisfactory. Thoracotomy is closed after securing complete hemostasis. All patients had left inter costal drainage (ICD), All resected specimen were sent for histopathological confirmations. In total pericardiectomy the pericardium is removed from all the surfaces of the heart Parietum over anterolateral wall, Posterior wall and diaphragmatic surface of LV removed. Pericardium over right atrium, superior vena cava (SVC), inferior vena cava (IVC) and pulmonary veins were removed. In Subtotal Pericardiectomy resection is not extended beyond the left phrenic nerve. Resection over the right atrium and pulmonary vein were not done.

Intra-operative Pressure Study
All patients had CVP line for CVP monitoring and were recorded before and after resection.
HPE Confirmation
All resected specimen was sent for histopathological examination to confirm the etiology by macroscopic and microscopic examination.

Follow Up
All patients were followed one week after discharge and at monthly intervals for the first 6 months and subsequently at 3-month interval for 2 years; Patients symptoms were analyzed and treated accordingly.

Pre-operative and post-operative clinical outcomes were analyzed. Pre-operative, intra-operative and post-operative pressure studies were analyzed. Surgical outcomes in terms of functional recovery analyzed. Intra-operative and post-operative complications studied. Duration of hospital stay after surgery and operative mortality was studied. Operative mortality included in all patients who will die within 30 days of the procedure or during the same hospital admission. At surgery, the operative procedures, time taken for resection and total operating time were recorded.

RESULTS
The study consists of 30 patients with clinical, surgical techniques and pathological diagnosis of constrictive pericarditis. Males and females are in equal in the ratio of 1:1. The mean duration of symptoms was 7.4 months (range: 1-24 months, median - 5 months). The most common presenting feature was dyspnea and abdominal distension which were present invariably in all patients. Pedal edema was present in 11 patients in first Group I and 6 patients in Group II. Ascites praecox was the next most common (90%) feature, also abdominal distension and loss of appetite was present in the patients. Most patients presented with history of TB. Patients gave history of anti TB treatment for pericardial effusion at the onset of illness. None of the patients of the study group had prior cardiac surgery, mediastinal irradiation, uremia or malignancy as a cause for constrictive pericarditis. On physical examination 30 patients (100%) had elevated jugular venous pressure 18 cm of water. Hepatomegaly was invariable but spleen was one third of the patients (Table 1).

Age group of the patients ranged from 14 to 60 years, with a mean age of 28.15 years in Group I and ranged from 16 to 50 years with the mean age of 30.8 in Group II. The youngest age of the patient was 14 years. P = 0.05799 statistically not significant (Table 2).

Low voltage complexes were seen in Group I and II. Heart size was normal in one third of the patients cardio thoracic ratio (CTR ≤ 0.50). In remaining two third of the patients mild to moderate cardiomegaly was present (CTR range: 0.55-0.60). Pericardial calcification was present in 6 patients, (30%) in Group I and one patient in Group II (10%). Calcification was best seen in lateral view. Pleural effusion was present in 12 patients (60%) in Group I and 6 patients in Group II (70%) (Tables 3 and 4).

CT scan of the chest was obtained in all patients with and without intravenous contrast agents, pericardial effusion was present in cases(45%) in Group I and 5 cases in Group II. Effusion was mild in 3 patients (25%) and minimal in 2 patients (20%). Two patients had moderate pericardium effusion with thick strands in the pericardial cavity. Pericardium was thickened more than 10mm in 14 patients (70%) in Group I and in 7 patients (70%) in Group II. The thickness ranged from 4 mm to 35 mm. the median pericardial thickness was 15 mm (Table 5).

### Table 1: Clinical data analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group I (%)</th>
<th>Group II (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (%)</td>
<td>Mean - 28.15</td>
<td>Mean - 30.8</td>
</tr>
<tr>
<td>Sex (%)</td>
<td>Male 11 (55)</td>
<td>Male 5 (50)</td>
</tr>
<tr>
<td>NYHA Class I</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>NYHA Class II</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>NYHA Class III (%)</td>
<td>9 (45)</td>
<td>5 (50)</td>
</tr>
<tr>
<td>NYHA Class IV (%)</td>
<td>11 (55)</td>
<td>5 (50)</td>
</tr>
<tr>
<td>Ascites praecox</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Pedal edema</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Chest pain</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>JVP</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>Liver</td>
<td>16</td>
<td>8</td>
</tr>
</tbody>
</table>

NYHA: New York Heart Association, JVP: Jugular Venous Pressure

### Table 2: Age distribution

<table>
<thead>
<tr>
<th>Age group</th>
<th>Group I (%)</th>
<th>Group II (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15 years</td>
<td>5 (25)</td>
<td>3 (30)</td>
</tr>
<tr>
<td>16-25</td>
<td>9 (45)</td>
<td>4 (40)</td>
</tr>
<tr>
<td>26-45</td>
<td>6 (30)</td>
<td>2 (20)</td>
</tr>
<tr>
<td>&gt;45</td>
<td>0 (0)</td>
<td>1 (10)</td>
</tr>
</tbody>
</table>

### Table 3: Analysis of electrocardiography

<table>
<thead>
<tr>
<th>ECG findings</th>
<th>Group I (%)</th>
<th>Group II (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atrial fibrillation</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Low voltage complexes</td>
<td>13 (65)</td>
<td>3 (30)</td>
</tr>
</tbody>
</table>

### Table 4: Analysis of CXR

<table>
<thead>
<tr>
<th>Chest radiography</th>
<th>Group I (%)</th>
<th>Group II (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTR ≤0.50-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTR ≥0.50-12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTR ≥0.50-9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcification</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>12</td>
<td>6</td>
</tr>
</tbody>
</table>

CTR: Cardio thoracic ratio, CXR: Chest X-ray
All patients had significant reduction in CVP both intraoperatively and post operatively as seen from the results (Table 6).

Analysis of Operative Technique
In all patients, the approach was via left anterolateral thoracotomy. We freed the pericardium in this order. First from the LV and RV. Next the aorta and pulmonary artery, including the left ventricular outflow tract. Then from the LV and RV and left pulmonary vein orifices and finally from the superior and inferior vena cava. During these steps, we set the amplitude of the cautery under 60 mv to avoid causing diathermal dysfunction of the RV during electro cauterization must be taken not to damage the phrenic nerves. Then completed the dissection of the pericardium from the diaphragm. There was no major bleeding from the pericardial edges, nor was there was evidence of phrenic acne injury either perioperatively or post operatively. One patient had RV tear which was sutured immediately. One patient had left pulmonary vein tear which was identified and sutured. None of the 25 patients experienced ventricular fibrillation, so there was no need for cardioversion (Table 7).

The mortality rate was similar in the two groups with two deaths. All the deaths were cardiac related and occur in the perioperative period as a result of low cardiac syndrome. Both the groups of the patients had similar arid significant improvement in the NYHA status (Table 8).

DISCUSSION

Interest in the diagnosis and treatment of constrictive pericarditis was greatly stimulated in the United States by Churchill's report on pericardiectomy in 1929.13 Since then this disease has come to be recognized in its early phases. Surgical treatment has been rendered more effective and less hazardous by improvements in methods of management and by technical advances providing for a more adequate correction of the cardiac construction. The condition is not a common one, and its etiology remains obscure. Increasing experience with surgical procedures employed for conditions of the heart should contribute to a better understanding of the genesis of constrictive pericarditis. Until the etiological factors are sufficiently known to enable the employment of preventive measures, the direct surgical attack remains the most satisfactory method of relieving symptoms and prolonging life.14

Patients with constrictive pericarditis have reduced diastolic filling. They present with congestive cardiac failure. They are diagnosed by CT scan magnetic resonance imaging with pericardium thickness 73 mm in size.

<table>
<thead>
<tr>
<th>Table 5: Analysis of CT scan</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT scan</td>
</tr>
<tr>
<td>Pericardial effusion</td>
</tr>
<tr>
<td>Pericardial thickening</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Calcification</td>
</tr>
<tr>
<td>CT: Computed tomography</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 6: Analysis of pre-operative, intra-operative, post-operative CVP pressure study</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVP pressure</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>Group I</td>
</tr>
<tr>
<td>Group II</td>
</tr>
<tr>
<td>CVP: Central venous pressure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 7: Analysis of post-operative, intra-operative requirement, complications and functional status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complications and functional status</td>
</tr>
<tr>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Post-operative inotrope</td>
</tr>
<tr>
<td>Post-operative ventilation</td>
</tr>
<tr>
<td>Wound infection</td>
</tr>
<tr>
<td>Post-operative hospital stay</td>
</tr>
<tr>
<td>NYHA functional Class 1</td>
</tr>
<tr>
<td>ii</td>
</tr>
<tr>
<td>iii</td>
</tr>
<tr>
<td>iv</td>
</tr>
<tr>
<td>30 days mortality</td>
</tr>
<tr>
<td>NYHA: New York Heart Association</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 8: Analysis of post-operative NYHA classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>NYHA classification</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Class 1</td>
</tr>
<tr>
<td>Class 2</td>
</tr>
<tr>
<td>NYHA: New York Heart Association</td>
</tr>
</tbody>
</table>

Tb pericarditis is treated by CAT 1-6 months with intense treatment 2 months and 4 months - 2 drug regimes. Patients with pericardial effective need corticosteroid slowly for 3 months.

Patients anterolateral thoracotomy with compete removal of pericardium offer the best treatment for contraction and effective pericarditis. By median sternotomy pericardium attached over the SVC, IVC, right atrium can be removed.15

The mortality rate were similar in the two groups with two deaths. All the deaths were cardiac related and occur in the perioperative period as a result of low cardiac syndrome. Both the groups of the patients had similar arid significant improvement in the NYHA status. The degree of improvement was not significant improvement between the two groups. The
Mean hospital stay and inotropic support requirements was similar between the two groups. It is of interest to note that 40% of cases are caused by TB and no obvious cause of pericarditis was identified in the rest of the patients in both groups. None of the patients were operated on during the acute infectious phase and no other causative agents apart from TB were identified. However, although not significant, wound infections were present in three patients in Group I (23%) versus one patient (6.6%) in the Group II. These were treated with antibiotics and drainage of wound infection. Here was lesser degree of complications in both the groups patients requiring antibiotic therapy and two patients required bronchoscopy for retained secretions and two patients had a pleural effusion, which required drainage.

CONCLUSION

The results of pericardiectomy in terms of improvement in NYHA status and mortality are similar in both types of resection. The combination of chemotherapy and surgery yields good results in the treatment of tuberculous pericarditis. TB is the most common etiology while the others non-specific.

REFERENCES

Utility of 128-slice Multi-detector Spiral Computed Tomography in Detecting Spectrum of Involvement in Acute Pancreatitis

Bharatkumar Mudalgi¹, Manohar Kachare², Akshay Kulkarni³

¹Associate Professor, Department of Radiology, Miraj-Pandharpur Road, Government Medical College, Miraj, Maharashtra, India, ²Professor, Department of Radiology, Miraj-Pandharpur Road, Government Medical College, Miraj, Maharashtra, India, ³Senior Resident, Department of Radiology, Miraj-Pandharpur Road, Government Medical College, Miraj, Maharashtra, India

Abstract

Introduction: Computed tomography (CT) has proved to be invaluable, noninvasive, technique for detailed assessment of pancreas during its acute inflammatory stage. Detailed evaluation, proper staging on scoring basis and prediction of morbidity and mortality are possible with the help of advanced high-resolution multi-detector multislice CT scanner. The purpose of this study is to determine the role and efficacy of CT scan in evaluating spectrum of extent of involvement of pancreas in acute phase irrespective of the etiology. This was a cross-sectional retrospective study of 3 years duration.

Aims and Objectives: To evaluate the extent of involvement of pancreatic parenchymal inflammation and to diagnose common early and late complications with the prediction of morbidity and mortality.

Material and Methods: This was a cross-sectional retrospective study conducted at Government Medical College, Miraj, from June 2014 to May 2017. A total of 150 patients of different age groups presenting with signs and symptoms of acute pancreatitis and with those with altered pancreatic function test were included in this study. Diagnosis was confirmed on clinical, biochemical marker (raised serum amylase and lipase levels), imaging findings and response to the treatment.

Results: In our study, acute pancreatitis was more common in males (68%) compared to female population (32%). Most common age group affected by this pathology was 40-60 years age group (58%), and least common age group was more than 80 years (<7%). Most common etiology in males was alcohol abuse (39%) and in females were gall stones (39%). 20-40 age group population was most commonly affected by alcohol induced pancreatitis while 40-60 age group was most commonly affected by gall stones disease. Other causes were seen in <40 age group.

The most common finding of acute pancreatitis on CT scan was acute early interstitial edematous pancreatitis (31.4%). Ductal disruption was the least common finding (2%). CT severity index was mild in 38% cases and moderate to severe in 31% each.

Conclusion: Early diagnosis and assessment of extent of parenchymal involvement with an assessment of complication and prediction of morbidity and mortality clearly remains a challenge in acute pancreatitis. CT proves itself as a gold standard in such emergency situation and a true winner above all other modalities thus helping the physicians in quality result oriented care of these patients.

Key words: Complication, Computed tomography, Computed tomography severity index, Pancreas, Prognosis, Radiological diagnosis

INTRODUCTION

Continuous radiological innovations have led to availability of high end, state of art, multi-detector, multislice, and spiral computed tomography (CT) scanners for regular use in clinical practice to evaluate each organ in detail with the highest spatial and temporal resolution with minimal
Possible dose and time for the investigation. These non-invasive techniques are extremely helpful not only to image organ with small possible slice thickness (up to 0.6 mm) but also has helped us to detect most of these complications of inflammation of pancreas. Of course, the credit goes to a number of scientists for their contribution from advent of remarkable technology to till date modification and innovations resulting in making these user-friendly Softwares. At this background, it’s also necessary to remember and salute Godfrey Hounsfield of UK who introduced this technology in 1972 on the basis of different of number mathematical equations and algorithms and made an important historic development which further evolved till date into high end scanners in terms of slices, source (single or dual source), detector dynamics and fast iterative reconstruction reducing remarkably the scan times and increasing the resolution as well as the patient throughput in the department of radiology. These technical advantages have help the radiologist and physician to evaluate the pancreatic parenchyma which was the most difficult retroperitoneal organ to image with conventional imaging.

Acute pancreatitis is a common problem with varied etiology and extent of involvement. Acute pancreatitis refers to an acute inflammation of pancreatic parenchyma due to the injury of pancreatic acinar cells with multifactorial etiology. CT imaging is extremely useful for confirming diagnosis and to see for the degree of parenchymal injury with prediction of morbidity and mortality on the basis of modified CT severity index (CTSI). New Atlanta classification can also be used for proper nomenclature of the pathological involvement on CT scan and properly classify pancreatitis as well as a decrease in inter radiologist variations. US and magnetic resonance imaging (MRI) have limited abilities for detailed evaluation of this retroperitoneal organ. The aims and objectives of this study are to determine the efficiency of CT scan in evaluating the spectrum of involvement of pancreas, properly classifying them and predicting the severity of the disease for prognostication of this life-threatening disease.

MATERIAL AND METHODS

This was a cross-sectional retrospective study conducted at Government Medical College, Miraj, from June 2015 to May 2017. A total of 150 patients of different age groups presenting with signs and symptoms of acute pancreatitis and with those with altered pancreatic function test were included in this study. Diagnosis was confirmed on clinical, biochemical marker (raised serum amylase and lipase levels), imaging findings and response to the treatment.

Study Area

The study area includes Miraj city and districts in vicinity including peripheral small town and villages.

Study Population

A total of 150 patients of varied age groups presenting with clinical signs and symptoms of acute pancreatitis with raised serum amylase and lipase levels were included in the study.

Inclusion Criteria

- Patients referred for CT of pancreas, who were highly suspected to have acute inflammation.
- Patient who were already diagnosed pancreatitis and were scanned to assess the extent of complications.

Exclusion Criteria

- Patient who were known the case of chronic pancreatitis.
- Patients presenting with altered renal functions in whom only plain scan was performed.
- Patient with contrast allergy.
- Scans with poor image qualities showing artifacts due to poor breath hold hampering optimal evaluation.

Equipment Used

Multi-detector (128-slice) spiral CT, siemens somatom definition AS+, siemens medical systems, Forchheim, Germany.

Protocol Used

Triphasic contrast study of abdomen and pelvis was performed after acquiring a topogram. Axial images were obtained, and the acquired data were reconstructed into isotropic coronal and sagittal planes. The slice thickness used was 0.6 mm. All these images were interpreted in arterial, venous and delayed phases. The contrast was injected using Dual Injector (Stellant, Medrad Dual Head Injector, USA). About 100 ml of non-ionic contrast (Iohexol 300 ml I/ml) was injected through antecubital vein at a flow rate of 4 ml/s followed by saline injection of 40 ml at 3.5 ml/s. Arterial phase images were acquired with a delay of 25-30 s using care bolus technique venous phase and delayed phase images were acquired at delay of 45-60 s and 120-140 s, respectively, after intravenous. Injection of contrast revised Atlanta classification 2012 was used for labeling correctly the pathologies of pancreas. Staging of disease was performed using modified CTSI which helped in predicting morbidity and mortality of the disease.

OBSERVATION

Axial CT scans with reconstruction in coronal and sagittal planes in arterial, venous and delayed phases
were performed in 150 patients who had a high index of suspicious of acute pancreatitis on the basis of clinical signs, symptoms and altered pancreatic function tests. The results are enumerated in Tables 1-5.

RESULTS

A total of 150 patients with a clinical and radiological diagnosis of pancreatitis were included in this study. There was clear sex predilection toward males with M:F ratio of 2:1. Of the total number, 102 (68%) were males and 48 (32%) were females as shown in Table 1. 40-60 age groups were more labile to pancreatitis than other age groups (Table 2). Alcohol abuse and gall stones were the most common etiological factors (39% each). However, alcohol abuse was most common causative agent in males (53 out of 59) and gall stones in females (34 out of 59). <4% had other rare causes of pancreatitis while no causative agent could be found in 14.7% case (Table 3). Alcohol induced pancreatitis was commonly seen at age group of 20-40 years irrespective of sex while gall stone pancreatitis was seen commonly at age group of 40-60 years (Table 4). Degree of involvement was tabulated using modified CTSI. About 38% patients had a mild degree of involvement while moderate to severe involvement was seen in 38% age. The prediction of morbidity and mortality is shown in Figure 1 as per CTSI. Most common CT imaging findings were acute interstitial edema of pancreas (31%). Various complications were enlisted (Table 5) in accordance with New Atlanta classification 2012 (Figure 2). Acute peripancreatic fluid collections (APFCs) were the most common complication (12.7%).

In most of the patient irrespective of age, sex who had a mild degree of pancreatitis according to modified CTSI the predicted morbidity and mortality was 3% and 8%, respectively (Table 6).

DISCUSSION

Acute pancreatitis is one of the most common causes of the upper abdominal pain, wherein the clinical signs and symptoms are insensitive to assess the degree of organ involvement and to predict morbidity and mortality. The involvement of adjacent and remote tissue and organs also

---

**Table 1: Gender distribution**

<table>
<thead>
<tr>
<th>Gender</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>48 (32)</td>
</tr>
<tr>
<td>Male</td>
<td>102 (68)</td>
</tr>
<tr>
<td>Grand total</td>
<td>150 (100)</td>
</tr>
</tbody>
</table>

**Table 2: Age and gender distribution**

<table>
<thead>
<tr>
<th>Age distribution</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-20</td>
<td>11</td>
<td>31</td>
<td>42</td>
</tr>
<tr>
<td>20-40</td>
<td>9</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>40-60</td>
<td>22</td>
<td>36</td>
<td>58</td>
</tr>
<tr>
<td>60-80</td>
<td>5</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>80-above</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Grand total</td>
<td>48</td>
<td>102</td>
<td>150</td>
</tr>
</tbody>
</table>

**Table 3: Distribution by etiopathology**

<table>
<thead>
<tr>
<th>Etiology</th>
<th>Female</th>
<th>Male</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>6</td>
<td>53</td>
<td>59 (39)</td>
</tr>
<tr>
<td>Gallstones</td>
<td>34</td>
<td>25</td>
<td>59 (39)</td>
</tr>
<tr>
<td>Hypertriglyceridemia</td>
<td>2</td>
<td>3</td>
<td>5 (3.3)</td>
</tr>
<tr>
<td>Congenital anomalies</td>
<td>1</td>
<td>2</td>
<td>3 (2)</td>
</tr>
<tr>
<td>Trauma</td>
<td>0</td>
<td>3</td>
<td>3 (2)</td>
</tr>
<tr>
<td>Idiopathic</td>
<td>5</td>
<td>16</td>
<td>21 (14.7)</td>
</tr>
</tbody>
</table>

**Table 4: Age distribution of etiologies**

<table>
<thead>
<tr>
<th>Age range</th>
<th>Alcohol</th>
<th>Gallstones</th>
<th>Hypertriglyceridemia</th>
<th>Congenital anomalies</th>
<th>Trauma</th>
<th>Idiopathic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-20</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>20-40</td>
<td>30</td>
<td>12</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>40-60</td>
<td>14</td>
<td>38</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>60-80</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>80-above</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Grand total</td>
<td>59</td>
<td>59</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>21</td>
</tr>
</tbody>
</table>

**Figure 1: Revised Atlanta classification of fluid collections in acute pancreatitis. ANC: Acute necrotic collection, APFC: Acute peripancreatic fluid collection, WON: Walled-off necrosis**

---
has an alarming concern which needs to be addressed by robust and reliable imaging technique. The incidence of acute pancreatitis is 5-17 case per 100,000 per year. Biliary calculi are the most common cause in women and alcohol abuse is most common cause in men for acute as well as recurrent pancreatitis. Newer advanced CT imaging has emerged to be a gold standard in imaging of pancreas. To add on this CT technique has also proved a clear winner in predicting the causes of acute pancreatitis. Clinical signs and symptoms along with three-fold rise in serum amylase and lipase and CT findings form a Tripod in confirming diagnosis of pancreatitis and its sequelae. Furthermore, biochemical markers are raised in other pathologies as well proving them to be very insensitive. Many systems to classify pancreatitis have been developed clinically such as Acute Physiology and Chronic Health Evaluation II (APACHE II), and Ranson’s Criteria which predicts the severity of pancreatitis with a score of more than three indicating acute severe pancreatitis. However, their utility is debatable and less sensitive. CTSI is commonly used to evaluate and estimate pancreatic injury and to predict morbidity and mortality (Figure 1). Algorithmic approach to the care of patients with necrotizing pancreatitis can be built up.

The revised Atlanta classification (Figure 3) can be used precisely to describe findings in acute pancreatitis, standardize terminology across specialties and help in the treatment planning, defines acute pancreatitis as interstitial edematous pancreatitis or necrotizing pancreatitis. It also categories the various pancreatic and peripancreatic collections and helps us to plan treatment depending on the stage of the disease.

Proper Triphasic imaging protocols are extremely useful to study a variety of details regarding degree of involvement of pancreatic parenchyma, peripancreatic tissues and organs and surrounding arteriovenous luminal involvement. Noncontrast scans are often not useful especially to predict necrosis and hence can prevent additional radiation exposure. Scanning using care bolus technique with injection delay of 25-30, 45-60 s, and 120 s help us in acquiring raw data in arterial, venous, and delayed phases. This data are effectively reconstructed using 0.6 mm slice thickness in axial, coronal, and sagittal isotropic images. Although under debate, intravenous contrast usage clearly outweighs the potential risk of its injection.

**Imaging Pearls**

In interstitial edematous pancreatitis (Figure 4), this organ shows a diffuse enlargement with slight heterogeneous enhancement. These findings are more commonly seen

---

**Table 5: CT features of acute pancreatitis**

<table>
<thead>
<tr>
<th>Features</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interstitial edema</td>
<td>47 (31.4)</td>
</tr>
<tr>
<td>Necrosis</td>
<td>19 (12.6)</td>
</tr>
<tr>
<td>Pancreatic abscess</td>
<td>7 (4.6)</td>
</tr>
<tr>
<td>Ductal disruption</td>
<td>3 (2)</td>
</tr>
<tr>
<td>Vascular thrombosis</td>
<td>17 (11.4)</td>
</tr>
<tr>
<td>Extrapancreatic fat necrosis</td>
<td>17 (11.4)</td>
</tr>
<tr>
<td>APFC</td>
<td>19 (12.7)</td>
</tr>
<tr>
<td>Pseudo cyst</td>
<td>16 (10.6)</td>
</tr>
<tr>
<td>WON</td>
<td>5 (3.3)</td>
</tr>
</tbody>
</table>

CT: Computed tomography, WON: Walled-off necrosis, APFC: Acute peripancreatic fluid collection

**Table 6: Distribution of cases according to CT severity index with prediction of morbidity and mortality**

<table>
<thead>
<tr>
<th>Score</th>
<th>n (%)</th>
<th>Morbidity (%)</th>
<th>Mortality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2 (mild)</td>
<td>57 (38)</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>4-6 (moderate)</td>
<td>46 (31)</td>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>8-10 (severe)</td>
<td>47 (31)</td>
<td>17</td>
<td>92</td>
</tr>
</tbody>
</table>

CT: Computed tomography

---

**Table 7: Distribution of cases according to CT severity index with prediction of morbidity and mortality**

<table>
<thead>
<tr>
<th>Score</th>
<th>n (%)</th>
<th>Morbidity (%)</th>
<th>Mortality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2 (mild)</td>
<td>57 (38)</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>4-6 (moderate)</td>
<td>46 (31)</td>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>8-10 (severe)</td>
<td>47 (31)</td>
<td>17</td>
<td>92</td>
</tr>
</tbody>
</table>

CT: Computed tomography

---

**Figure 2: Contrast-enhanced computed tomography (CECT) in 46-year-old woman with epigastric pain. (a and b), Axial and coronal CECT venous phase image shows extrapancreatic fat necrosis/saponification noted in the lesser sac (long arrows, a and b)**

**Figure 3: Computed tomography severity index**

---

**Table 8: Inflammatory process – Balthazar’s morphological index for acute pancreatitis**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Tomographic finding</th>
<th>Scoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Normal pancreas.</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>Focal or diffuse pancreatic enlargement.</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>Pancreatic alterations associated with peripancreatic inflammation.</td>
<td>2</td>
</tr>
<tr>
<td>D</td>
<td>Single fluid collection.</td>
<td>3</td>
</tr>
<tr>
<td>E</td>
<td>Two or more fluid collections and/or presence of gas within the pancreas or within peripancreatic inflammation.</td>
<td>4</td>
</tr>
</tbody>
</table>

**Pancreatic necrosis**

<table>
<thead>
<tr>
<th>Tomographic finding</th>
<th>Scoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absence of necrosis.</td>
<td>0</td>
</tr>
<tr>
<td>&lt; 30% necrosis.</td>
<td>2</td>
</tr>
<tr>
<td>30% to 50% necrosis.</td>
<td>4</td>
</tr>
<tr>
<td>&gt; 50% necrosis.</td>
<td>6</td>
</tr>
</tbody>
</table>
Figure 4: Contrast-enhanced computed tomography (CECT) in 45-year-old man with abdominal pain and raised amylase lipase. (a and b) Axial CECT venous phase image shows enlarged and edematous pancreas with loss of normal fatty lobulation and peripancreatic fat stranding, edema and free fluid (arrow, a). Coronal CECT venous phase image shows changes of acute edematous interstitial pancreatitis with extension of fluid noted in the lesser sac (long arrow, b) and along transverse mesocolon (short arrow, b).

Figure 5: Contrast-enhanced computed tomography (CECT) in 34-year-old man with epigastric pain radiating to back. (a and b) Axial CECT venous phase image shows severely hypo/nonenhancing area suggestive of necrosis (long arrow, a) with >60% involvement with significant peripancreatic inflammation (short arrow, a). Coronal CECT venous phase image shows better delineation of extension of necrotic fluid throughout the body and tail of pancreas (long arrow, b).

Figure 6: Contrast-enhanced computed tomography (CECT) in 28-year-old man with severe upper abdominal pain. (a and b) Axial CECT, venous phase image shows partially obstructing filling defect suggestive of thrombosis in the distal part of the splenic vein just before its confluence with superior mesenteric vein (long arrow, a). Changes of acute edematous interstitial pancreatitis are also seen. Coronal curved reconstruction image shows extent of the thrombus in entire splenic vein (long arrow, b).

Figure 7: Contrast-enhanced computed tomography (CECT) in 32-year-old man with alcohol abuse, severe nausea, vomiting, and abdominal pain. (a, b and c) Axial CECT venous phase image shows a hypoattenuating collection suggestive of pseudo cyst formation anterior to the pancreas (long arrow, a). Coronal CECT venous phase image shows partially obstructing nonenhancing filling defect suggestive of acute thrombus is noted in the extrahepatic main portal vein (long arrow, b). Sagittal CECT venous phase image shows focal area of ductal disruption directly connecting with the pseudo cyst of pancreas (long arrow, c).

Figure 8: Contrast-enhanced computed tomography (CECT) in 41-year-old women with epigastric pain and altered pancreatic function test. a and b, oblique axial CECT venous phase image shows well encapsulated hypoattenuating lesion suggestive of walled-off pancreatic necrosis in the head and uncinate process of pancreas (long arrow, a). Coronal CECT venous phase image shows better delineation of the walled-off necrosis of pancreas 4 weeks after necrotizing pancreatitis.

if scans are performed 5-7 days after onset of symptoms. In necrotizing pancreatitis Revised Atlanta Classification identified three forms. In first one, there would be variable degree of necrosis which is seen as heterogeneous nonenhancing area (Figure 5) with or without minimal peripancreatic involvement. In the second form, there would be predominant extrapancreatic necrosis (Figure 6) with minimal parenchymal necrosis. The third form is the most common and shows variable degree and severity of pancreatic and extrapancreatic necrosis. Interstitial edematous pancreatitis is often associated with APFC which develop into pseudo cysts overtime (Figure 7). On the other hand, necrotizing pancreatitis is associated with pancreatic and extrapancreatic acute necrotic collection (ANC) which overtime develop into walled-off pancreatic necrosis (Figure 8). The ANC can get infected (abscess formation) (Figure 2). Air specks in the collection are most sensitive maker for abscess formations as is an enhancement of the walls of delayed phase image. Vascular thrombosis (Figure 6 and 7) and
pseudoaneurysms can further complicate the course and natural prognosis of disease. Portal vein, splenic vein are more commonly involved than other vascular channels around (Figure 9).

In a study conducted by Cappell et al., acute pancreatitis was most common in 40-60 age groups. They also predicted the male to female predilection of 2:1. In our present study, similar findings could be reported. Similarly, Bank et al. reported alcohol abuse in males and gallstones in females to be the most common etiopathological factor for this dreadful disease. Zhao et al. published a reference to new Revised Atlanta Classification to bring down the inter observer reporting variations to describe and categorized disease with huge spectrum of involvement. Balthazar et al. in formulated CTSI criteria to prognosticate the disease. Many authors including Ju et al. have emphasized that USG and MRI have limited advantages over CT imaging. We have successfully re-emphasized the findings coated by Balthazar et al. on the extreme utility of CT imaging in acute pancreatitis. CTSI is clearly superior to Ranson criteria and APACHE scoring system in predicting outcome in acute pancreatitis. There are limitations to our study as we have not included cases of acute on chronic pancreatitis which might altered the results of spectrum of involvement. We also do not have follow-up of patients clinical course, extent of morbidity and mortality after the scan was performed.

CONCLUSION

There is considerable utility of Triphasic contrast enhanced CT scan for evaluation of pancreas during its acute inflammation and follow-up to rule out complications of the same. Easy availability, multiplanar capabilities fast scanning techniques, have surely played major role in understanding changes in inflammation of pancreas during acute inflammation and to follow-up to know the extent of complication and thus predicting the morbidity and mortality of the disease thus helping the clinicians for proper counseling of the patient and their families. In view of wide spectrum of findings. CT scans have helped us to accurately stage the disease with high accuracy. CT remains a gold standard and sensitive modality for detection, accurate diagnosis and determine for exact extent of complication of acute pancreatitis. Predicting morbidity and mortality have proved to be more sensitive than the clinical criteria on the bases of CTSI. Thus, CT has an extreme utility without any doubt in evaluating disease of acutely inflamed pancreas with its early and remote noninvasively.

REFERENCES

Prevalence of Depression in Diabetes Mellitus and Its Determinants

Amit Kumar Mishra, Sudhir Kumar, Arshad Ahmad, Govind Kumar, Krishna Kumar Singh, Kalyan Kumar Saha, Amrendu Kumar, Rajesh Kumar

1Assistant Professor, Department of General Medicine, IGIMS, Sheikhpura, Patna, Bihar, India, 2Associate Professor, Department of General Medicine, IGIMS, Sheikhpura, Patna, Bihar, India, 3Assistant Professor, Department of Psychiatry, IGIMS, Sheikhpura, Patna, Bihar, India, 4Senior Resident, Department of General Medicine, IGIMS, Sheikhpura, Patna, Bihar, India, 5Professor, Department of Psychiatry, IGIMS, Sheikhpura, Patna, Bihar, India

Abstract

Introduction: The prevalence of diabetes mellitus is increasing worldwide. Diabetes mellitus is a chronic disease which affects many organ systems leading to reduced life expectancy. The association of diabetes mellitus and depression has been observed since long.

Purpose: To find out the prevalence of depression in diabetes mellitus.

Method: Total 300 diabetic patients included in this study and they were screened for depression by patient health questionnaire-9

Results: The result from the study showed the prevalence rate of depression in diabetic is 43.33%. Among these depressed group 30.76% were mildly depressed, 40.76% were moderately depressed and 28.46% had severe depression.

Conclusion: High prevalence of depression was found in diabetic patients. Hence psychiatrist assessment should be part of diabetic patients evaluation.

Key words: Depression, Diabetes mellitus, Glycemic control, Psychiatric assessment, PHQ-9

INTRODUCTION

Diabetes mellitus and depression both are common disease. The World Health Organization projected that 300 million people will suffer from diabetes mellitus by 2025. India has the largest number of diabetic population in the world and it is expected that there will be 69.9 million diabetic populations in India by 2025.

Diabetes mellitus is chronic disease which virtually affects every organ of human system leading reduced life expectancy and quality of life as a result of complication.

Depression is the most common psychiatric disorder in the general practice. It is estimated that 340 million people are affected globally, and it is associated with significant morbidity and health-care cost.

Depression is common among people with diabetes. The frequent association of diabetes and depression has been observed since long. More than 300 years ago Dr. Thomas Willis, a British physician, made the observation that there was a relationship between diabetes and depression when he suggested that diabetes was the result of sadness or long sorrow. Latter on many studies showed high prevalence of depression in diabetic as compared to general population and confirmed the link between diabetes and depression.

Compared with patients with diabetes alone, diabetic patients with depression have been shown to have poorer self-management and poor drug compliance and associated with worst diabetic outcome. Patients with depression and diabetes are more likely to have...
higher micro-vascular and macro-vascular complication and higher mortality rate. They are more likely to have higher cardiovascular risk factors such as smoking, obesity, sedentary lifestyle, and uncontrolled hyperglycemia.

Depression is associated with physiological abnormalities, including activation of the hypothalamic–pituitary–adrenal axis, sympathoadrenal system, and proinflammatory cytokines, which can induce insulin resistance.

While depression may contribute to poor diabetic-related outcome, diabetes and its complication may also contribute to poor depression outcome. Hence, one disease fuelling the other.

**Aim and Objective of the Study**
To find out the prevalence rate of depression in diabetic patients, its major determinants and its severity grading.

**MATERIALS AND METHODS**

This study was an observational prospective study conducted after approval from Institutional Ethic Committee at the department of General Medicine, IGIMS, Patna, Bihar from June 2016 to May 2017. Number of participants included was 300.

**Inclusion Criteria**
1. All patients suffering from diabetes mellitus above the age of 15 years
2. Willing to participate in study.

**Exclusion Criteria**
1. Not willing to participate in study
2. Diabetic patients of age <15 years.

The study included all diabetic patients from OPD and IPD of general medicine department IGIMS. Both newly diagnosed diabetic patients and patient having history of diabetes were included in the study. The study included all type of diabetes, i.e., Type 1, Type 2, and other specific type. The diagnosis of diabetes was made according to criteria proposed by American Diabetes Association. Clinical history including age, sex, and religion was taken, HbA1c was done.

Then, all diabetic patients was screened for depression by patient health questionnaire (PHQ-9).

By this scoring system following questions was asked over the past 2 weeks, how often have you been bothered by any of the following problems?

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Not at all</th>
<th>Several days</th>
<th>More than half days</th>
<th>Nearly every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Little interest or pleasure in doing things</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. Feeling down, depressed, or hopeless</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. Trouble falling or staying asleep, or sleeping too much</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. Feeling tired or having little energy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. Poor appetite or overeating</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. Feeling bad about yourself or that you are a failure or have let yourself or your family down</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. Trouble concentrating on things, such as reading the newspaper or watching television</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. Moving or speaking so slowly that other people could have noticed or the opposite being so figety or restless that you have been moving around a lot more than usual</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. Thoughts that you would be better off dead or of hurting yourself</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Total score</td>
<td>0</td>
<td>9</td>
<td>18</td>
<td>27</td>
</tr>
</tbody>
</table>

After collection of data prevalence of depression in diabetic patient was derived, and statistical analysis has been done regarding its correlation with demographical, social and clinical variables such as age, sex, religion, and glycemic control (HbA1c).

**RESULTS**

Among 300 diabetic patients, 130 patients had depression whereas 170 patients did not have depression. Of these 130 diabetic patients with depression 55 were male and 75 were female. The mean age of depressed diabetic patient was 50.19 years. Among depressed group 110 patients were Hindu and 20 were Muslim (Table 1).

According to PHQ-9 score, among these depressed group 40 (30.76%) were mildly depressed (PHQ score 5-9), 53 (40.76%) were moderately depressed (PHQ score 10-14), and 37 (28.46%) patients had severe depression (PHQ score - 15-27) (Table 2).

The mean HbA1c level of depressed patients with diabetes were 8.5.
The aim of the study was to assess the prevalence of major depression among diabetic population. The result from the present study showed the prevalence rate of depression in diabetic patients is 43.33%. This study indicates that the prevalence of depression in diabetes is high as compared to non-diabetic population. World mental health surveys indicate that major depression is experienced by 10-15% people in their lifetime. This study also showed that the prevalence of depression in diabetics is higher compared to that reported in most of the previous similar study.

Asghar et al., found that depressive was present in 29% of males and 30.5% of females with newly diagnosed diabetes in rural Bangladesh. Similarly, Sotiropoulos et al., found depression in 33.4% of a cohort of Greek adults with Type 2 diabetes. In another study, Zahid et al. found a lower depression prevalence (14.7%) among patients with diabetes in a rural area in Pakistan.

However, there are many studies which indicated higher prevalence rate as compared to our study. Das et al., found that rate depression in Type 2 diabetes mellitus was 46.15%. In another study, Khamseh et al., found major depression in 71.8% of a sample of 206 Iranian patients with Type 1 and Type 2 diabetes. Result of this study is much higher than our study. Our findings are comparable with that of Mier et al., who found that the rate of depression among Hispanic patients was 40.5% in northeastern Mexico. Taken together, these studies and our finding provide evidence that depression is associated with diabetes mellitus.

Diabetic female showed increased prevalence of depressive symptoms compared with male participants; in our study 57.69% of depressive patient was female. The predominance of depression among females is consistent with other studies. Anderson et al. found that diabetes doubles the risk of depression and it is especially more among females 28.2% compared to 18% among males.

In our study, mild and moderate depression was more common 71.52% than severe depression which was only 28.46%.

Independent risk factors of depressive symptoms were glycemic control. In our study, Mean level of HbA1c was 8.5, which indicates that most of the depressed patients with diabetes are poorly controlled.

### DISCUSSION

### REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Functional and Radiological Outcome Analysis of Anterior Cervical Discectomy and Fusion in Cervical Spondylotic Myeloradiculopathy

A Saravanan¹, N Deen Muhammed Ismail², S Mohan Kumar³, E Rajarajan³, Heber Anandan⁴

¹Senior Assistant Professor, Department of Orthopaedics, Institute of Orthopaedics and Traumatology, Madras Medical College, Chennai, Tamil Nadu, India, ²Director and Professor, Department of Orthopaedics, Institute of Orthopaedics and Traumatology, Madras Medical College, Chennai, Tamil Nadu, India, ³Junior Resident, Department of Orthopaedics, Institute of Orthopaedics and Traumatology, Madras Medical College, Chennai, Tamil Nadu, India, ⁴Senior Clinical Scientist, Department of Clinical Research, Dr. Agarwal’s Healthcare Limited, Chennai, Tamil Nadu, India

Abstract

Introduction: Anterior cervical fusion is commonly performed for cervical compression myeloradiculopathy.

Aim: To analyze the functional and radiological outcome analysis of anterior cervical discectomy and fusion in cervical spondylotic myeloradiculopathy.

Methods: Retrospective analysis of 30 patients who underwent single/double level discectomy and anterior cervical fusion by auto graft and stabilization by plate and screws were included. Functional outcome was analyzed by Modified Odom’s Criteria.

Results: Outcome was satisfactory in 29 patients with one patient with fair result in the series who had signal changes in pre-operative magnetic resonance imaging and no patients required further surgery in the same level. Average period of fusion was 4 months except for one patient who got delayed fusion due to superficial infection. Commonly fused levels fused levels were at C5-C6 7 patients at C6-C7 4 patients remove. There were no major complications.

Conclusion: We conclude that discectomy and anterior cervical fusion by bone graft and stabilization by H plate and screws is an excellent procedure in case of cervical degenerative spondylotic myeloradiculopathy.

Key words: Cervical spondylotic myeloradiculopathy, Spine, Spondylosis

INTRODUCTION

Cervical spondylotic myeloradiculopathy is a spinal cord dysfunction accompanying typical age related degeneration of the cervical spine.¹ Spondylosis degenerative process that leads to decreased disc height, annular bulge/tear of disc material producing pressure effect over cord and nerve root.² Clinical features vary from neck pain, radiating pain in the upper limb to numbness and weakness of the upper limb.³ The majority of patients with symptoms respond well to conservative treatment in the form of analgesics and physiotherapy. Patients with deterioration of symptoms presence of sensory deficit, motor weakness and not responding to conservative management for more than 3 months, are taken up for surgical treatment using anterior cervical discectomy with removal of posterior osteophytic complex with autologous iliac crest bone graft ensuring spinal stabilization by fusion and addition of locking H plate fixation to prevent graft migration and collapse.⁴

Aim

To analyze the functional and radiological outcome analysis of anterior cervical discectomy and fusion in cervical spondylotic myeloradiculopathy.

MATERIALS AND METHODS

This retrospective study was conducted in Institute of Orthopaedics and Traumatology, Madras Medical College.
30 patients who underwent single/double level discectomy and anterior cervical fusion by auto graft and stabilization by plate and screws were included.

Inclusion Criteria
Symptoms and signs of Cervical Compressive myelopathy, Persistent radicular pain not responding to conservative management for 3 months, and Compressive Cervical radiculopathy with progressive neurological symptoms.

Exclusion Criteria
Cervical spine Trauma, listhesis, and tumor infectious etiology. Data collected: Visual Analog Scale scoring for neck pain and radiculopathy pre- and post-operative, Clinical and neurological charting, Plain X-ray cervical spine anteroposterior and lateral with follow-up X-rays, computed tomography cervical spine if ossification of the posterior longitudinal ligament is suspected, and cervical spine magnetic resonance imaging (MRI). Follow-up: Radiographic determination of union and osseous incorporation based on the continuation of trabeculae and complete osseous union of the graft/bone interface.

The presence of bridging bone between the adjacent vertebra.

Post-operative Protocol
Immediate post-operative patient was given soft cervical collar and sutures removed on the 12th post-operative day. Patients discharged with soft cervical collar for 1 month. Depending on the level of job activity patient was instructed to resume to work 3-4 weeks for minimal labor and 6-8 weeks for moderate labor and 12 weeks for heavy labor. Post-operative evaluation included clinical examination and cervical spine radiograph at 3, 6, 12 weeks and 6 months then annually to assess fusion and progression of bony incorporation at the graft vertebral interface.

RESULTS
About 26 males and 4 females’ patients were included in our study, and the average age was 50.2 years (32-73 years of age). In our study, among 30 patients 86.7% males are affected by cervical disease. Only 13.3% females are affected by cervical disease. The average duration of symptom was 8 months. The most of our cases were single level disc with posterior osteophyte complex disease with most common level was C5-C6 level, and 2 patients had two level disc decompression (Table 1 and Figure 1). The average period of fusion was 4 months except for one patient who got delayed fusion probably due to superficial infection. The clinical outcome (sensory, motor, and reflex) by the clinical tests and overall functional outcome with Modified Odom’s criteria (Table 2). Outcome was excellent in 23 patients, good in 5 patients, and fair in 2 patients (Table 3). One patient did not show good neurological improvement in the series who had signal changes in pre-operative MRI and no patients required further surgery in the same level. There are no complications such as donor site morbidity, dysphonia, pseudoarthrosis, and neurological deterioration (Table 4). There were no graft related complications like graft dislodgement. There was no plate breakage, screw migration or cerebrospinal fluid leakage.

<table>
<thead>
<tr>
<th>Table 1: Distribution of level of fusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fusion</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>C3-C4</td>
</tr>
<tr>
<td>C3-C4-C5</td>
</tr>
<tr>
<td>C3-C4-C5-C6</td>
</tr>
<tr>
<td>C4-C5</td>
</tr>
<tr>
<td>C4-C5-C6</td>
</tr>
<tr>
<td>C5-C6</td>
</tr>
<tr>
<td>C5-C6-C7</td>
</tr>
<tr>
<td>C6-C7</td>
</tr>
</tbody>
</table>
DISCUSSION

The natural history of Cervical Spondylotic Myeloradiculopathy has not been thoroughly defined and documented. Almost all patients worsen if left untreated and most studies report significant numbers (over 50%) of patients progressing to severe disability.\(^5\) Indications for instrumentation in these patients are less clear,\(^6\) but the excellent outcome of rigid internal fixation and theoretical advantages of decreasing graft migration have made plating an attractive (Figure 2).\(^7\)

The demographic variables of this series were comparable to Ali et al.,\(^8\) where male patients were predominant and C5/6 level was the most common involved site. The significant clinical improvement (neck pain, arm pain, motor, sensory, and reflex) improvement was comparable to Wang et al.\(^9\) Connolly et al.\(^{10}\) reported fusion rates with auto graft ranging from 87% to 97%, and Emery et al.\(^{11}\) reported 20-27% of pseudoarthrosis. The risk of pseudoarthrosis increases with each additional level of surgery.\(^{10}\) Although we had 100% fusion and no pseudoarthrosis, the results might have varied with longer follow-up and larger study population.

CONCLUSION

One or two level anterior cervical discectomy and fusion with or without anterior plating for cervical spondylotic radiculopathy and myelopathy is a safe and effective procedure which provides excellent early return to activity with minimal complication rate.

REFERENCES


<table>
<thead>
<tr>
<th>Symptoms and sign</th>
<th>Methods</th>
<th>Pre-operative</th>
<th>Post-operative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>6 months</td>
<td>1 year</td>
</tr>
<tr>
<td>Neck pain</td>
<td>VAS</td>
<td>7.5±1</td>
<td>1±0.5</td>
</tr>
<tr>
<td>Arm pain</td>
<td>VAS</td>
<td>8±0.5</td>
<td>1.5±0.5</td>
</tr>
<tr>
<td>Sensory</td>
<td>Clinical</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Motor</td>
<td></td>
<td>06</td>
<td>1</td>
</tr>
<tr>
<td>Reflex</td>
<td></td>
<td>20</td>
<td>1</td>
</tr>
</tbody>
</table>

VAS: Visual Analog Scale

### Table 2: Distribution of clinical outcome

<table>
<thead>
<tr>
<th>Symptoms and sign</th>
<th>Methods</th>
<th>Pre-operative</th>
<th>Post-operative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>6 months</td>
<td>1 year</td>
</tr>
<tr>
<td>Neck pain</td>
<td>VAS</td>
<td>7.5±1</td>
<td>1±0.5</td>
</tr>
<tr>
<td>Arm pain</td>
<td>VAS</td>
<td>8±0.5</td>
<td>1.5±0.5</td>
</tr>
<tr>
<td>Sensory</td>
<td>Clinical</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Motor</td>
<td></td>
<td>06</td>
<td>1</td>
</tr>
<tr>
<td>Reflex</td>
<td></td>
<td>20</td>
<td>1</td>
</tr>
</tbody>
</table>

VAS: Visual Analog Scale

### Table 3: Distribution of functional outcome

<table>
<thead>
<tr>
<th>Functional outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified Odom’s Criteria</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

### Table 4: Distribution of complications

<table>
<thead>
<tr>
<th>Complications</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wound infection</td>
<td>1 (3)</td>
</tr>
<tr>
<td>Donor site morbidity</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Transient dysphagia</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Dysphonia</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Graft related</td>
<td>0 (0)</td>
</tr>
<tr>
<td>CSF leakage</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Neurological deterioration</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

CSF: Cerebrospinal fluid
Accuracy of Diagnostic Peritoneal Paracentesis in Acute Abdomen Requiring Emergency Surgical Intervention

J Rakesh Fernando¹, S Sendhurpandian², A Mohan Kumar², Heber Anandan³

¹Assistant Professor, Department of General Surgery, Tirunelveli Medical College, Tirunelveli, Tamil Nadu, India, ²Junior Resident, Department of General Surgery, Tirunelveli Medical College, Tirunelveli, Tamil Nadu, India, ³Senior Clinical Scientist, Department of Clinical Research, Dr. Agarwal’s Healthcare Limited, Tirunelveli, Tamil Nadu, India

Abstract

Introduction: Abdominal paracentesis is a simple bedside or clinic procedure in which a needle is inserted into the peritoneal cavity, and ascitic fluid is removed. Diagnostic paracentesis refers to the removal of a small quantity of fluid for testing.

Aim: To evaluate the efficacy of abdominal paracentesis as a simple, bedside diagnostic tool in diagnosing the acute abdominal conditions requiring emergency surgical interventions.

Materials and Methods: All patients with acute abdominal pain, both traumatic and nontraumatic, ages between 12 and 70 years and patients with shock and suspicion of acute abdomen were included in the study.

Results: Overall diagnostic accuracy of positive peritoneal paracentesis in our study was 93.75%. The study showed that the procedure was 100% accurate in blunt trauma abdomen and gastroduodenal perforation. There was a complete absence of complications in our study.

Conclusion: In conclusion, our study reestablishes the simplicity, safety and accuracy of peritoneal tapping as a diagnostic aid in acute abdomen. It is particularly useful in centers where radiological facilities do not exist.

Key words: Diagnostic tool, Emergency, Peritoneal paracentesis

INTRODUCTION

The term “acute abdomen” designates symptoms and signs of intra-abdominal disease usually treated best by surgical operation. Many diseases of which, some do not require surgical treatment produce abdominal pain, thus the evaluation of patient with acute abdominal pain must be methodical and careful.¹ Prognosis of acute surgical conditions of the abdomen depends on accurate diagnosis and early surgical intervention. However, the diagnosis of acute surgical conditions of abdomen is in many instances challenging and complex. The problem becomes more baffling when 24 h services of radiology and laboratory are not available. In these circumstances, abdominal paracentesis becomes useful and carries immense value. Most of the cases of the acute abdomen can be diagnosed clinically by the presence or absence of abdominal pain; abdominal tenderness, guarding, and rigidity.² There should be a certain diagnostic modality which confirms the diagnosis and the surgeon should feel safe and accurate in deciding which patients require surgical intervention. Although imaging modalities such as X-rays, ultrasonography (USG), computed tomography (CT), and magnetic resonance imaging are available and can diagnose accurately, these investigations are not available everywhere or not available for 24 h, in developing countries like India. For these reasons, there should be a diagnostic modality which is simple, accurate and available by the bedside. Peritoneal paracentesis is a simple, accurate and bedside procedure. This requires an appropriate size needle attached to a disposable syringe which is available everywhere.³ The basic principle is that in many cases of acute abdomen,
there is a collection of fluid in the peritoneal cavity. Aspirating the fluid and analyzing it both grossly and microscopically will aid in arriving at the diagnosis. The objections to the technique, most often raised had been on the grounds of safety. As the procedure is blind, there are chances of puncturing the bowel. However, many clinical and experimental studies have proved beyond doubt that even if bowels are punctured by the needles, subsequent leakage is a very small hazard. In spite of numerous articles advocating the acceptance of this extremely useful diagnostic tool, some continue to deplore it, and others have not had sufficient experience in performing this procedure or do not understand the merits and limitations. The present study was undertaken to know the merits and demerits of peritoneal tapping in surgical acute abdomen.

Aim
To evaluate the efficacy of abdominal paracentesis as a simple, bedside diagnostic tool in diagnosing the acute abdominal conditions requiring emergency surgical interventions.

MATERIALS AND METHODS
All acute abdominal cases admitted to the emergency surgical wards in Tirunelveli Medical College Hospital were included in the study. A total of 50 cases were studied during this period. All patients with acute abdominal pain, both traumatic and nontraumatic, ages between 12 and 70 years and patients with shock and suspicion of acute abdomen were included in the study. Vital signs of the patient were recorded. Thorough clinical examination was done for the evidence of abdominal tenderness, guarding, rigidity, obliteration of liver dullness, and peristaltic sounds. Based on the history and clinical examination, provisional clinical diagnosis was made, and routine investigations such as complete blood count, blood sugar, urea, creatinine, and liver function tests were done in all patients. Specific investigations such as erect X-rays abdomen, USG abdomen, and pelvis, and CT was done depending on provisional diagnosis and their requirement. Before the patient was subjected to the four quadrant peritoneal tap, erect X-ray abdomen was done, reasons being, the theoretical chances of air being either introduced into the peritoneal or sucked from the peritoneal cavity while performing the procedure. The fluid aspirated from the peritoneal cavity was analyzed macroscopically and microscopically.

RESULTS
A total of 50 cases of acute abdominal emergencies admitted to the emergency surgical ward of Tirunelveli Government Medical College Hospital were studied. Details regarding the age, sex, occupation, address, presenting symptoms physical signs, and the characteristics of the aspirated fluid were studied and analyzed. Vital signs were examined, and a complete systemic examination of the patients was done. The patients were put on nasogastric aspiration, intravenous fluids, antibiotics, analgesics, and antacids. Patients were catheterized depending on the need for the same. Patients presenting in shock were resuscitated. Routine investigations were sent including blood grouping. In suspected perforative peritonitis erect X-ray abdomen was done before the tap. Once peritoneal tapping with fluid cytology was done and diagnosis made, patients were also subjected to other radiological investigations (USG and CT) depending on their need and our diagnosis confirmed, patients were taken up for surgery, and definite surgical procedures were done. For patients with inconclusive diagnosis after tapping, other investigations such as USG abdomen and CT abdomen were taken and depending on clinical circumstances, patients were subjected to operative/nonoperative management.

Out of 50 cases, 17 were from 21 to 30 age group. Next common age group was between 31 and 40 years, which constituted 10 cases followed by 41-50 age group which constituted 9 cases. Out of 50 cases studied, there were 34 male patients and 16 female patients. In this study, males were affected more than the females.

The most common symptom in our study was abdominal pain, present in 50 cases (100%) followed by vomiting in 27 cases (54%), abdominal distension in 26 cases (52%), and least being constipation in 21 Table 1.

Abdominal tenderness was the most common sign present in all cases (50), guarding was present in 25 cases, rigidity was noted in 27 cases, and liver dullness was obliterated in 12 cases. Absent bowel sounds in 29 cases. Tachycardia was noted in 43 cases. Diagnosis of shock was made in 13 cases. Out of 50 cases, 36 were due to nontraumatic abdominal pathology, and 14 cases were caused by traumatic Table 2.

Initially, the procedure was carried out in the right lower quadrant in all 50 patients, of which 40 were positive, and tap was not repeated. For 6 cases, tap was positive in the left lower quadrant and in 04 cases, tap was positive in the left upper quadrant and in 2 cases, tap was positive in the right upper Table 3.

A lot of information can be gathered by gross examination of the aspirated fluid. Most of the times, the physical characters of the aspirated fluid will give a probable clue to the pathology. In the present study of 50 cases, we could aspirate the characteristic fluid in 46 cases. The most
common type of fluid, we aspirated was bilious in 15 cases. Purulent fluid was seen in 11 cases. Feculent in 2 cases, turbid fluid was noted in 2 cases. Clear fluid in 1 case. Serosanguinous fluid was positive in 3 cases. Hemorrhagic fluid was positive in 10 cases blood stained fluid in 2 cases and bile stained in 2 cases.

In cases of positive taps, we noticed odorless fluid in 37 cases, purulent foul smell in 6 cases, feculent odor in 2 cases, and uriniferous in 1 Table 4.

Out of 46 positive study group 45 patients were subjected to laparotomy. In every case, pathological fluid in the peritoneal cavity at operation was correlated with the finding of pre-operative paracentesis. In one patient with diffuse peritonitis with suspected intra-abdominal pathology, paracentesis revealed a turbid fluid in the right hypochondrium; further radiological investigations confirmed the diagnosis as acute cholecystitis and patient managed conservatively. Out of 4 negative study groups laparotomy was done in 3 cases based on the clinical and radiological investigations, and the surgery revealed a true intra-abdominal pathology. Remaining 1 case, patient managed conservatively without Table 5.

Out of 50 cases, 46 cases only we get a fluid aspiration from the peritoneal cavity, for the remaining cases, we did not get any fluid on aspiration. While subjecting this fluid for cytology, we able to get a cell count of red blood cell >1 lakh cells/cu.mm for 9 cases in traumatic group and 1 case in nontraumatic group, all are subjected to laparotomy, and hemoperitoneum confirmed.

For remaining 36 cases, we get a cell count of white blood cell >500 cells/cu.mm with cell count ratio >1; of these only 35 cases underwent laparotomy and obviously, pathological fluid was confirmed in laparotomy. In remaining one case though we get a peritoneal fluid with turbid and odorless in nature with cytology shows increased polymorphs count, further radiological investigations revealed it as an acute cholecystitis, hence patient managed conservatively.

In this study, there were 46 positive taps, among them 33 cases were nontraumatic, and 13 cases were traumatic. Out of 33 cases in nontraumatic group, 6 cases were gastric perforation, 9 cases were duodenal perforation, 5 cases were ileal perforation, 5 cases were appendicular perforation, 1 case is ruptured ectopic pregnancy, 1 case is diffuse peritonitis with post anastomotic leak, 2 cases were intra-abdominal abscess due to ruptured liver and splenic abscess, 1 case due to gall bladder perforation, and 2 cases were small bowel strangulation due to mesenteric ischemia and ileo-ileal knotting. In one patient there was a positive tap, but further investigations revealed as acute cholecystitis and managed conservatively. Of the 13 cases in traumatic group 4 were due to liver injury, 3 cases due to splenic laceration, 2 cases due to mesenteric tear, and 2 cases due to jejunal perforation, 1 case due to sigmoid perforation, and 1 case due to bladder Table 6.

In this study, we encountered negative taps in 4 cases. Among these, 1 case was due to retroperitoneal hematoma, which one is managed conservatively. The remaining 3 cases were subjected to laparotomy based on clinical and radiological backgrounds which were diagnosed as Meckel’s diverticulitis, ileal perforation, and intussusception in each one Table 7.

In our study 50 cases were subjected to peritoneal paracentesis, tap was positive in 46 cases and negative/dry tap in 4 cases. In nontraumatic group, there were 36 cases of these 33 cases had a positive tap. In 1 case, a 48-year-old male patient with feature of diffuse peritonitis, where history and examination are equivocal, tapping revealed a turbid fluid containing polymorphs in the right hypochondrium but subsequent radiological investigations confirmed the diagnosis as acute cholecystitis and patient recovered on conservative treatment without emergency surgical intervention. In other 32 cases, we had positive tap both macroscopically and microscopically which was confirmed by emergency laparotomy. In remaining 3 cases, we had false negative result. In these case no fluid was aspirated in spite of the presence of fluid in the peritoneal cavity. The diagnostic accuracy (sensitivity) in nontraumatic group was found to be 91.42% with the high percentage of true positive result was found in gastroduodenal perforations. In traumatic group, paracentesis was positive in 13 cases. All of them underwent laparotomy with positive pathology. In 1 case, we had negative tap and further investigations diagnosed as retroperitoneal hematoma without intra-abdominal organ injury, and patient responded well to conservative line of management. Most common intra-abdominal organ injury in our study was liver laceration. The diagnostic accuracy of paracentesis in traumatic group was found to be 100%. The overall diagnostic accuracy of abdominal paracentesis in both nontraumatic and traumatic group was Table 8.

**DISCUSSION**

In our present series, acute abdominal disease was more common in the male sex. 39 out of 50 cases were male accounting for 78.00% and 11 were females accounting for 22.00%. Males dominated in the blunt trauma abdomen. This is probably because of active involvement of males in daily life and high incidence of trauma under the influence of alcohol. Positive tap reported in literature ranges from
In the present series, we got the positive tap in 46 out of 50 cases with an accuracy of 93.75%. This positive rate is in close confirmation with the observation made by other workers. Rao et al. performed a study in 100 cases and their positive tap rate was 81.00%. Trivedi et al., in their series of 70 cases had positive taps in 57 cases amounting to 81.00%. Khan et al., in their series of 56 cases had 46 positive tap amounting to 82.14%. Baker et al. in an unselected series of 101 patients, found positive results in 83%. Lamke and Varenhorst did a study on 114 patients with a positive rate of 90%. Sloop reported 94% positive rates in his study of 65 cases. McPartlin and McCarthy in his study of 100 cases had positive rate of 67%. Giacobine and Sile performed diagnostic paracentesis in 130 patients with a positive rate of 82%. Prout (1968) had 72% positive rate in his study. Majority of cases in our series was in nontraumatic acute abdomen. 36 out of 50 cases were in this group, accounting for 72%. Peritoneal paracentesis was positive in 33 cases with true positive in 32 cases, accounting for 88.88%. Approximately, similar reports have been published in literature. Baker et al. reported accuracy of diagnostic tap in 80% of cases with perforated duodenal ulcer or gastric ulcer. Similar reports have been reported by Singh et al. and Thate et al. Rao (1993) obtained 100% positive results in gastrointestinal perforation. Mahanta et al. showed 76.47% positive tap in nontraumatic acute abdomen. In our series, we obtained 33 positive taps in nontraumatic acute abdomen. Of which 32 had true positive, i.e., the characteristic fluid aspirated correlated with the intraoperative finding. Only one case with false positive result, i.e., though we aspirated turbid fluid from the peritoneal cavity, further investigations revealed it as an acute cholecystitis and that patient treated conservatively without emergency laparotomy. Except this case we did not encountered false positive cases, this is possibly due to exclusion of patients with acute intestinal obstruction and multiple abdominal scars from our study. Although the clinical and radiological picture in majority of visceral perforation is characteristic, there are some instances, where, the diagnosis is uncertain and in such circumstances abdominal paracentesis proves very helpful. We encountered four such instances in our clinical study. In one case, we were in diagnostic dilemma between perforative peritonitis and acute pancreatitis. This was because of both patients presented with shock and per abdomen examination revealed tenderness, guarding and rigidity. Erect X-ray abdomen showed only ground glass appearance. Diagnostic aspiration of peritoneal fluid revealed bilious. Diagnosis of perforative peritonitis was made and laparotomy done which revealed gall bladder perforation. Peritoneal paracentesis proved to be valuable in these circumstances, as opening, the patient with acute pancreatitis would have been disastrous. In another case, a female patient presented with shock and localized lower abdominal tenderness and guarding. X-ray abdomen erect showed localized ileus, USG abdomen detects free fluid in pelvis, and diagnostic aspiration of peritoneal cavity revealed frank blood. Patient immediately taken up for laparotomy and found to be ruptured ectopic pregnancy. In other two cases of suspected peritonitis, where radiological findings inconclusive. But diagnostic aspiration revealed bilious. Patient taken up for laparotomy and found to be ileal perforations. Abdominal paracentesis proved its usefulness in a post-operative case where diagnosis was difficult. We encountered such a case during our study. A 45-year-old male was admitted to surgical ward with a diagnosis of perforation. He underwent emergency laparotomy with ileal anastomosis. Post-operative period was uneventful till 5th day. Patient started with soft diet and drain was removed on 6th post-operative day. On 8th post-operative day, patient developed breathlessness with wheeze. On 9th post-operative day patient’s condition deteriorated with pulse rate of 116/min and with blood pressure was 90/60 mmHg. Per abdominal examination revealed slight distention with tenderness but no guarding or rigidity. USG abdomen and pelvis showed moderate degree ascites with right sided pleural effusion. Bilious fluid was aspirated on peritoneal paracentesis. Laparotomy revealed anastomotic breakdown. Proximal diversion loop ileostomy colostomy and abdomen closed. Peritoneal paracentesis proved very useful in deciding the need for surgical intervention. Similar reports were published in literature. Singh et al. encountered three post-operative cases, where peritoneal paracentesis was very useful in arriving at the diagnosis. Baker et al. in his article published two post-operative cases where abdominal paracentesis undoubtedly helped the surgeon. In our series, we encountered 36 cases of nontraumatic acute abdomen. 27 out of 36 cases were due visceral perforation. Out of 27 visceral perforations 26 cases were positive for abdominal tap, resulting in 96.29% accuracy. Thus, the present study revealed that the utility of abdominal paracentesis is considerably effective in visceral perforations. In our series, we had 15 cases of gastroduodenal perforations. Peritoneal paracentesis was positive in all of them. This high accuracy (100.00%) was possibly due to the late presentation of patients to the hospital. Average time of onset to the presentation to the hospital in our study was 2-3 days. The late presentation allows accumulation of fluid in the peritoneal cavity, resulting high chances of positive peritoneal tap. Thus, peritoneal tap is particularly useful in developing country like India, where patients usually present late to the hospital. This high accuracy in gastroduodenal perforations of our study was comparable with the observations of other workers Bhatnagar and Asopa. 90.00%, Mahanta et al. 92.00%. In our series, we had 6 cases of ileal perforations out of which 5 cases were positive and 1 case was negative for tap. All positive cases
were confirmed during the laparotomy. In the negative tap, on laparotomy there was minimal fluid in the peritoneal cavity. Negative tap in our study was possibly due to needle tip not reaching up to the fluid level or due to the collection of fluid in the most dependent portion of the peritoneal cavity, that is, in the pouch of Douglas. Analysis of characteristic fluid aspirated helped in locating the nature and to some extent the site of lesion in perforation. In cases of peptic perforations, we could able to tap a bilious, purulent or turbid fluid with flakes. Of the 15 gastroduodenal perforations, 11 were bilious and 4 were purulent fluid with flakes. We noticed that, in perforations distal to the duodenum time aspirate was foul smelling and feculent. In our series, we encountered 2 cases of gangrenous small intestine. Peritoneal tap revealed a characteristic blood stained dark fluid with foul smell. Laparotomy confirmed the same fluid with gangrenous jejunal and proximal ileum in one case due to mesenteric ischemia and in other case with gangrenous ileum due to knotting of the ileum. This shows that peritoneal paracentesis is also useful in strangulated bowel. This was also an observation by Moretz and Erickson, Bhatnagar and Asopa, McPartlin and McCarthy in 1971, Singh et al., Kosloske and Goldthorn in 1982. In our present series, we encountered 14 patients who presented with blunt abdominal trauma and paracentesis was performed in all patients. Positive tap was obtained in 13 cases. All of them underwent laparotomy and had hemoperitoneum with visceral organ injury. 4 out 13 had liver laceration, 3 had splenic laceration. In four cases, bile mixed with blood was aspirated, laparotomy done and found that two were due to mesenteric tear and two had jejunal perforation. In one case, feculent fluid was aspirated and laparotomy revealed sigmoid colon perforation. In one case clear fluid was aspirated with urine smell due to intraperitoneal rupture of bladder. The most common finding in our study was liver laceration. The diagnostic accuracy in our study, with positive paracentesis rates was 100%. We encountered 1 negative tap, radiological investigations revealed retroperitoneal hematoma, which we managed conservatively and the patients responded well to it. Thus, abdominal paracentesis has a high rate of sensitivity and specificity in detecting intraperitoneal hemorrhage preoperatively and can be a useful guide. This was also an observation of many other workers. Mansoor et al. performed a study on 50 cases and 12 out of 13 positive were true positive with diagnostic accuracy of 91.2%. Mahanta et al. reported diagnostic accuracy of 84.3% in blunt abdominal trauma. Lamke and Varenhorst detected intra-abdominal bleeding in 90% of cases. Overall, 4 taps were negative in our study. Out of which 1 case was true negative. Further clinical and radiological investigations revealed as a retroperitoneal hematoma without intra-abdominal organ injury and we managed conservatively. Thus, negative tap helped us to avoid an unnecessary

<table>
<thead>
<tr>
<th>Table 1: Distribution of symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
</tr>
<tr>
<td>Pain</td>
</tr>
<tr>
<td>Vomiting</td>
</tr>
<tr>
<td>Abdominal distension</td>
</tr>
<tr>
<td>Constipation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Distribution of signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs</td>
</tr>
<tr>
<td>Tenderness</td>
</tr>
<tr>
<td>Guarding</td>
</tr>
<tr>
<td>Rigidity</td>
</tr>
<tr>
<td>Liver dullness obliteration</td>
</tr>
<tr>
<td>Absent bowel sounds</td>
</tr>
<tr>
<td>Tachycardia (&gt;100/m)</td>
</tr>
<tr>
<td>Shock (&lt;90/80 mmHg)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3: Site of the positive tap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site of the tap</td>
</tr>
<tr>
<td>Right lower quadrant</td>
</tr>
<tr>
<td>Right upper quadrant</td>
</tr>
<tr>
<td>Left lower quadrant</td>
</tr>
<tr>
<td>Left upper quadrant</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4: Nature of the aspirated fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of the aspirated fluid</td>
</tr>
<tr>
<td>Bilious</td>
</tr>
<tr>
<td>Hemorrhagic</td>
</tr>
<tr>
<td>Bile stained fluid</td>
</tr>
<tr>
<td>Blood stained fluid</td>
</tr>
<tr>
<td>Purulent</td>
</tr>
<tr>
<td>Feculent</td>
</tr>
<tr>
<td>Serosanguinous</td>
</tr>
<tr>
<td>Turbid</td>
</tr>
<tr>
<td>Clear</td>
</tr>
<tr>
<td>Dry tap/negative tap</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5: Relationship between peritoneal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peritoneal fluid cytology</td>
</tr>
<tr>
<td>Positive microscopic findings RBC &gt;1 lakh cells/cu.mm and WBC &gt;500 cells/cu.mm; cell count &gt;1</td>
</tr>
<tr>
<td>Negative microscopic findings RBC &lt;50,000 cells/cu.mm WBC &lt;100 cells/cu.mm; cell count &lt;1</td>
</tr>
</tbody>
</table>

RBC: Red blood cell, WBC: White blood cells
laparotomy. The remaining 3 cases were false negative; the clinical picture in all these cases was quite obvious of intra-abdominal pathology. Clinical and radiological investigations found to be suspicious of intra-abdominal pathology. In these cases negative tap was not taken into consideration and decision for laparotomy was made. Findings of laparotomy were coincident with the clinical and radiological investigations. These cases were associated with minimal collection of fluid in the peritoneal cavity. In these cases fluid was collected in the pouch of the Douglas. Negative tap may because of minimal fluid in the peritoneal cavity particularly collected in the pouch of Douglas. The only drawback of the abdominal paracentesis encountered in our study was a negative tap. Hence, the negative tap should be dealt cautiously. The decision for further management should be based on clinical and radiological investigation. This was also a point highlighted by many workers. Baker et al. opined that, a negative paracentesis has no positive significance. If operation is indicated on clinical grounds, then, whatever may be, the fact that no fluid has been obtained from the peritoneal cavity must be completely disregarded. Stephens concluded that a negative tap does not prove that there is no significant intra-abdominal lesion and it must only be considered along with the patients overall clinical consideration.

In our series, we got the positive taps very often in the right lower quadrant. In a case of splenic laceration, we got positive tap on the left flank. In another case of ileal perforation, tap was positive in the left lower quadrant. This suggests that paracentesis does not necessary indicate the probable site of the lesion. This has also been observation of Baker et al. and Giacobine and Siler. During our study, we encountered two hemorrhagic taps that were immediately recognized as false positive. This is due to the fact that intraperitoneal fluid will not clot on standing, whereas accidental puncture of the blood vessel will clot on standing. Nonclotting of the

### Table 6: Positive tap and associated pathology

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastric perforation</td>
<td>06</td>
</tr>
<tr>
<td>Duodenal perforation</td>
<td>09</td>
</tr>
<tr>
<td>Ileal perforation</td>
<td>05</td>
</tr>
<tr>
<td>Appendicular perforation</td>
<td>05</td>
</tr>
<tr>
<td>Gall bladder perforation</td>
<td>01</td>
</tr>
<tr>
<td>Post anastomotic leak</td>
<td>01</td>
</tr>
<tr>
<td>Diffuse peritonitis with suspected intra-abdominal pathology</td>
<td></td>
</tr>
<tr>
<td>Intra-abdominal abscess</td>
<td>02</td>
</tr>
<tr>
<td>Post anastomotic leak</td>
<td>01</td>
</tr>
<tr>
<td>Meckel's diverticulitis</td>
<td>01</td>
</tr>
<tr>
<td>Intussusception</td>
<td>01</td>
</tr>
<tr>
<td>Retro peritoneal hematoma</td>
<td>01</td>
</tr>
</tbody>
</table>

### Table 7: Negative taps and associated pathology

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meckel's diverticulitis</td>
<td>01</td>
</tr>
<tr>
<td>Ileal perforation</td>
<td>01</td>
</tr>
<tr>
<td>Intussusception</td>
<td>01</td>
</tr>
<tr>
<td>Retro peritoneal hematoma</td>
<td>01</td>
</tr>
</tbody>
</table>

### Table 8: Diagnostic accuracy of abdominal paracentesis

<table>
<thead>
<tr>
<th>Abdominal emergencies</th>
<th>Number of cases</th>
<th>Positive tap</th>
<th>Negative tap</th>
<th>Diagnostic accuracy sensitivity</th>
<th>Diagnostic falseness of the test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>True</td>
<td>False</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>Nontrauma group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visceral perforation</td>
<td></td>
<td>6</td>
<td>6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stomach</td>
<td></td>
<td>6</td>
<td>6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Duodenum</td>
<td></td>
<td>9</td>
<td>9</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Small bowel</td>
<td></td>
<td>6</td>
<td>5</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Appendix</td>
<td></td>
<td>5</td>
<td>5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gall bladder</td>
<td></td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Diffuse peritonitis</td>
<td></td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Intra-abdominal abscess</td>
<td></td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Post anastomotic leak</td>
<td></td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Meckel's diverticulitis</td>
<td></td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Acute intussusception</td>
<td></td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Acute cholecystitis</td>
<td></td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mesentric ischemia</td>
<td></td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ieo-ileo knotting</td>
<td></td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Intraperitoneal hemorrhage</td>
<td></td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Trauma group</td>
<td></td>
<td>4</td>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Liver laceration</td>
<td></td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Splenic laceration</td>
<td></td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mesenteric tear</td>
<td></td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Jejunal perforation</td>
<td></td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sigmoid colon</td>
<td></td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Post anastomotic leak</td>
<td></td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Bladder rupture</td>
<td></td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
peritoneal fluid can be explained by the fact that, peritoneum is lined by the mesothelial cell which are rich in plasminogen activators. The body’s principal controlling mechanism of the clotting system is the plasma protein plasminogen. Plasminogen activators convert plasminogen to plasmin. This plasmin catalyzes the breakdown of fibrin to fibrin split products, inducing clot lysis. The diagnostic accuracy of paracentesis in nontraumatic acute abdomen in the present study was 91.42% and traumatic group it was 100%. The overall diagnostic accuracy of paracentesis in the present study of 50 cases was 93.75% percent. This high index of reliability of paracentesis in cases of acute abdomen has also been emphasized by majority of workers. The various rate of diagnostic accuracy attained by various workers have been depleted Mahanta et al. 80%,18 Byrne 83%,21 Giacobine and Siler 83%,13 Prout 86%,16 McPartlin and McCarthy 86%,12 Rao et al. 89%,6 Lamke and Varenhorst 90%,10 Stephens 98%,23 Bhatnagar and Asopa 100%.19

CONCLUSION

Our study reestablishes the simplicity, safety and accuracy of peritoneal tapping as a diagnostic aid in acute abdomen. It is particularly useful in centers where, radiological facilities do not exist, or where radiologists do not available at all time and in serious cases of acute abdomen who cannot be transported for radiography. It is also extremely useful for early diagnosis of complications following abdominal surgery. It is concluded that diagnostic abdominal tap is extremely reasonable diagnostic aid and can lead to improve surgical care of the patient with atypical acute abdominal pain.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Knowledge, Attitude and Practice toward Diabetic Retinopathy and Retinal Examination among Diabetic Population in Al-Hasa Region, Saudi Arabia: A Cross-sectional Study

Abdullah Hisham Al-Mulla¹, Abdulaziz Khalid Al-Thafar¹, Marwan Abdulrahman Al-Shaikh Hussain¹, Sayed Ibrahim Ali², Saif Khuzaim Al-Dossary³

¹Medical Student, Department of Ophthalmology, College of Medicine, King Faisal University, Al-Hasa Region, Saudi Arabia, ²Assistant Professor, Department of Family and Community Medicine, College of Medicine, King Faisal University, Al-Hasa Region, Saudi Arabia, ³Assistant Professor, Department of Surgery, College of Medicine, King Faisal University, Al-Hasa Region, Saudi Arabia

Abstract

Introduction: Diabetic retinopathy (DR) is a major health concern in diabetic patients. It is considered as a silent developing disease that eventually can lead to blindness. Therefore, it is important for diabetic population to be aware of the importance of early detection and timely intervention to avoid visual loss.

Purpose: To assess the knowledge, attitude and practice (KAP) toward DR and retinal examination among diabetic population in Al-Hasa region.

Materials and Methods: A cross-sectional questionnaire based study was conducted from August 2016 to April 2017. A questionnaire which was prepared based on KAP was distributed among Saudi diabetic patients in Al-Hasa region of Saudi Arabia. The researchers have done the questionnaire on 479 individuals of diabetic patients. Data analysis was performed using SPSS program version 24.

Results: The minimum age of the participants was 21 and the maximum age was 65. The number of male participants is 276 (57.6%) and females 203 (42.4%). The mean KAP score was 7.86 ± 3.8. 224 (46.8%) of the participants in the study were found to have inadequate knowledge about eye complications of diabetes and DR. In addition to that, 101 (21.1%) are not restricting to the guidelines of screening. The assessment of attitude and practice also showed poor results. More than half of the participants, 263 (54.9%), are not following the screening guidelines of DR. Only 232 (48.4%) know the recommended duration interval of eye screening.

Conclusion: DR is a common but unrecognized problem among diabetic population in Al-Hasa region. There is a lack of awareness among Saudi diabetic population about this problem. There is a need for educational intervention programs to increase the knowledge level about this disease as well as the necessity of screening and periodic follow-ups.

Key words: Attitude, Diabetic retinopathy, Knowledge, Practice, Retinal examination

INTRODUCTION

Diabetes mellitus (DM) is becoming the main health problem worldwide.¹ In 2014, it is estimated globally that 387 million suffer from diabetes. This prevalence is expected to increase and reach to 592 million in 2035.² In Saudi Arabia, DM is considered as a major health problem in the country. The prevalence in 2015 was 17.6% of the population, and this percentage was the highest in the Middle East.³

DM is a chronic disease that can lead to many early and late complications in different body organs such as cardiovascular, neural, renal, and ocular complications.⁴

Diabetic retinopathy (DR) is a well-known complication of diabetes and it is the leading cause of blindness in diabetic
patients. Studies have shown that among patients with diabetes after 15 years, a proximately 2% of them will be blind.

In Saudi Arabia, many studies in different regions were conducted to show the exact prevalence of DR. The prevalence of DR in Riyadh (Capital of Saudi Arabia) was found to be 31%, in Al-Madinah Al-Munawarah was 36%, and in Al-Hasa (that is the region of our study) was estimated to be 33% of all diabetic patients. DR is considered as a silent developing disease. To avoid blindness in these patients, early detection and timely intervention is an important part in the management. Therefore, it is important for diabetic population to be aware of the annual eye screening from the time of diagnosis in type 2 and after 5 years of diagnosis in type 1.

Previous knowledge, attitude and practice (KAP) studies had been conducted before. Which showed the presence of adequate awareness about regular eye screening in most of the general practitioners and diabetic patients, but less than half of them had been screened.

Unfortunately, there are no data on awareness of eye screening for DR among diabetic population in our region, making it important to do these kinds of studies.

**Aim and Objectives of Study**

This study aims to evaluate the level of KAP toward DR and retinal examination among diabetic population in Al-Hasa region. This study was conducted because of two main reasons. First, the higher level of awareness of the disease and regular periodic eye screening can prevent many eye complications in diabetic patients. Second reason, to the best of our knowledge, no study was done before in Al-Hasa region about this specific kind of study.

**MATERIALS AND METHODS**

A retrospective cross-sectional questionnaire based study was conducted from August 2016 to April 2017. The authors got the approval from Research Ethical Committee in the college of medicine of King Faisal University. The questionnaire which was prepared based on KAP had been revised by the Ophthalmology Department in the college and then distributed among diabetic patients in Al-Hasa Region. The researchers have done the questionnaire on 479 individuals of diabetic patients. The researchers have collected the demographic characteristics, and 12 questions about DR to evaluate the knowledge and attitude. In addition to that, number and duration of screening intervals and laser treatments were included to evaluate the practice of the patients toward the disease. This study includes patients who were diagnosed with diabetes either type 1 or type 2. Both genders were included with age range from 21 to 65. The data collection comprised the demographic characteristics of age, gender, marital status, educational level, and the lifestyle of having a healthy diet and regular exercises. Furthermore, the researchers asked the participants whether they have pre-existing eye diseases or present with eye symptoms at the time of collecting the data. Data analysis was performed using SPSS program version 24. Descriptive statistics of all variables were obtained to evaluate the data (by Chi-square test). The value of $P < 0.05$ was considered a statistically significant. This method of analysis was similar to the other KAP studies in the purpose of comparison.

**RESULTS**

A total of 479 individuals with diabetes in Al-Hasa Region were included in our study. The minimum age of the participants was 21 and the maximum age was 65. More than half of them are in the age group (35-60).

The number of male participants is 276 (57.6%) and females 203 (42.4%). Primary educational level was found in 46 (9.6%), 158 (33%) had secondary, and 275 (57.4%) had the academic educational level. The demographic characteristics are shown in Table 1.

Regarding the type of diabetes, 154 (32.1%) of the participants have type 1,225 (47%) have type 2 diabetes, and 100 (20.9%) of them are not sure about their type. The duration of treatment was ≤5 years in 225 (47%), 6-10 years in 118 (24.6%), and ≥11 years in 136 (28.4%) individuals. 241 (50.3%) out of 479 participants are following a healthy lifestyle of regular exercises and healthy diet. In addition to that, 32 (6.7%) of them did not receive any pharmacological treatment.

**Table 1: Biographical data**

<table>
<thead>
<tr>
<th>Demographic characteristics (N=479)</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;35</td>
<td>116 (24.2)</td>
</tr>
<tr>
<td>35-60</td>
<td>300 (62.6)</td>
</tr>
<tr>
<td>&gt;60</td>
<td>63 (13.2)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>276 (57.6)</td>
</tr>
<tr>
<td>Female</td>
<td>203 (42.4)</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>96 (20.1)</td>
</tr>
<tr>
<td>Married</td>
<td>368 (76.8)</td>
</tr>
<tr>
<td>Divorced</td>
<td>15 (3.1)</td>
</tr>
<tr>
<td><strong>Educational level</strong></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>46 (9.6)</td>
</tr>
<tr>
<td>Secondary</td>
<td>158 (33)</td>
</tr>
<tr>
<td>Academic</td>
<td>275 (57.4)</td>
</tr>
</tbody>
</table>
Regarding pre-existing eye disease, 51 (10.6%) of the patients were diagnosed with DR (34 of them received laser treatment), 38 (8%) have cataract, 11 (2.3%) have glaucoma, and the remaining 379 (79.1%) are free of eye diseases.

The mean KAP score was 7.86 ± 3.8. The level of knowledge is shown in Table 2. 68 (14.2%) of the participants did not hear about DR before. Furthermore, 191 (39.9%) do not know why this condition occurs in diabetes, and less than one-third of the participants, only 129 (26.9%), know how DR is treated.

224 (46.8%) of the diabetic patients who are included in this study were found to have inadequate knowledge about eye complications of diabetes and DR. In addition to that, 101 (21.1%) out these 224 who have inadequate knowledge are also not restricting to the guidelines of screening. The results of attitude and practice toward the eye screening are shown in Table 3. More than half of the participants, 263 (54.9%), are not following the screening guidelines of DR. Only 232 (48.4%) know the recommended duration interval of eye screening.

The responses of all the participants related to the KAP are shown in Table 4.

### DISCUSSION

Diabetes is well-known to be the most common metabolic disease among Saudi population according to the last epidemiological studies. DR is the most common ocular complication of diabetes which can be prevented by controlling the blood sugar levels and regular eye screening.

Our study found that among diabetic patients in Al-Hasa Region, there is no significant difference between males and females in the level of knowledge, attitude or practice.

Regarding the age variable, the study showed that the age group (35-50) has a better attitude and practice toward DR ($P = 0.001$). We attribute that this age group starts...
to have more eye complications than the younger age, so they will receive more eye care. However, no significant difference was found between the age groups in the level of knowledge.

Another major finding of our study was the impact of the educational intervention on the level of knowledge and awareness about the disease, as the study results showed that the participants who have the university and secondary educational levels had the highest scores in the questionnaire.

Furthermore, we concluded from this study that more prolonged course of the disease will increase the level of awareness, as the Chi-square ($P = 0.000$) showed that patients who had a more prolonged duration of the disease ($\geq 11$ years) have a higher KAP score than the others.

A significant association was found between the higher knowledge and positive attitude toward the disease, which shows the importance of increasing the level of awareness among the diabetic population. This finding is shown clearly in Table 5.

To the best of our knowledge, this is the first KAP study of DR among diabetic patients in the eastern province of Saudi Arabia. Previously, a KAP study was conducted in our region, but it was among medical students. In 2015 a similar KAP study conducted in Al-Jouf and Hail Province of Saudi Arabia showed 75.62% were aware of DR. In our study, the Knowledge score result was 53.2% which is lower compared to Al-Jouf and Hail Province study. In addition, studies conducted in different countries including Japan (98%), Australia (96%), and Oman (72%) showed higher results. However, our results (53.2%) still is better than that found in India (50%), and USA (52%).

In regard to the attitude, Al-Zarea in his study noted that 38.49% of patients believed that if the diabetes is under control, there is no need to visit the ophthalmologist, while in our study this percentage was lower than the after mentioned study with only 14.2%.

The practices toward the disease also showed some variations between the results. 45.1% of patients in this study undergone eye screening annually. This result was slightly lower than Al-Zarea’s study (48.9%).

We conclude from these findings that our patients had poor attitude and practice compared to the others, which emphasize the needs for educational intervention.

**CONCLUSION**

DR is a common but unrecognized problem among diabetic population in Al-Hasa region. There is a lack of awareness among Saudi diabetic population about this problem. There is a need for educational intervention programs to increase the knowledge level about this disease as well as the necessity of screening and periodic follow-ups.

**ACKNOWLEDGMENTS**

The authors are thankful to Dr. Fahad Al wadaani (ophthalmologist) for his guidance and support toward the study.

**REFERENCES**


Source of Support: Nil, Conflict of Interest: None declared.
A Study on Changing Clinical Profile of Chronic Pancreatitis from a Tertiary Care Centre

Chitta Ranjan Panda¹, Bijay Misra², Sambit Kumar Behera³, Haribhakti Seba Das⁴, Shivaram Prasad Singh⁵

¹Associate Professor, Department of Gastroenterology, Shrirama Chandra Bhanj Medical College, Cuttack, Odisha, India, ²Consultant, Department of Gastroenterology, Gastro and Kidney Care Hospital, Bhubaneswar, Odisha, India, ³DM Resident, Department of Gastroenterology, Shrirama Chandra Bhanj Medical College, Cuttack, Odisha, India, ⁴Assistant Professor, Department of Gastroenterology, Shrirama Chandra Bhanj Medical College, Cuttack, Odisha, India, ⁵Professor, Department of Gastroenterology, Shrirama Chandra Bhanj Medical College, Cuttack, Odisha, India

INTRODUCTION

Chronic pancreatitis (CP) is defined as an inflammatory disease of the pancreas characterized by persistent and often progressive lesions, leading to pain and/or exocrine and endocrine insufficiency. Pain is usually the most frequent complaint with which most of these patients present. The loss of endocrine and exocrine function which gradually develops leads to symptoms such as weight loss, anorexia, steatorrhea, and symptoms of diabetes. It is a major health problem worldwide and is associated with considerable morbidity. Alcohol is the most common cause of CP worldwide whereas idiopathic chronic pancreatitis (ICP) is the most common etiology of CP in most of the studies in India.²,³ Recently, there is an increase in alcohol intake in our population, and number of alcoholic liver diseases is also increasing. In this study, we intended to highlight the clinical profile of recently admitted cases of CP during last 1 year and to compare them with cases during previous 5 years.

PATIENTS AND METHODS

The present study was conducted in the Department of Gastroenterology, Shrirama Chandra Bhanj Medical
College, Cuttack, Odisha. Retrospective analysis of the clinical profile of 150 cases of CP admitted during past 5 years (Group A) was compared with 31 cases of CP seen during last 1 year (Group B). Detailed history, physical examination, fasting blood glucose, serum amylase, lipase level, and CA 19-9 were studied. Ultrasound (USG) abdomen and pelvis, CT scan reports were reviewed and analyzed.

Statistical analysis was performed with SPSS 16.0 software; \( P < 0.05 \) was considered statistically significant. The significance of the difference between two independent proportions was calculated by Z ratio.

RESULTS

Total number of patients in Group A was 150 and in Group B was 31. Male patients predominate in both the groups. The mean age of presentation in Group A was 35.70 ± 13.08 years and in Group B was 39.16 ± 13.12 years. Majority of patients in both groups were in age group of 30-40 years. The mean duration of disease in Group A was high, i.e., 3.09 years as compared to 1.12 years in Group B (Table 1).

Pain was the most common presentation in both groups (86% vs. 96.77%, \( P = 0.09 \)), followed by vomiting (41% vs. 39%, \( P = 0.83 \)). Oily leak was significantly higher in Group A (37.33% vs. 6.45%, \( P = 0.0002 \)) than patients in Group B. Other symptoms such as diarrhea (18% vs. 6.45%, \( P = 0.11 \)), vomiting (41% vs. 39%, \( P = 0.83 \)), and duodenal obstruction (6.66% vs. 6.45%, \( P = 0.47 \)) were comparable between the two groups. 22% of patients in Group A and 13% of patients in Group B were diabetic at presentation (Table 2). Of calcific pancreatitis 20% in Group A and 25% in Group B were diabetic.

The most common etiology in Group B was alcohol (55%) which was the cause in 21% in Group A (\( P < 0.0002 \)), whereas idiopathic CP in Group B is significantly lower compared to Group A (48.39% vs. 76.67%, \( P < 0.0002 \)), only one patient in Group A had familial pancreatitis, as depicted in Table 3.

As shown in Table 4, complications such as pseudocyst (6.67% vs. 20%, \( P = 0.023 \)) ascites (8% vs. 29.23%, \( P = 0.0009 \)), and pleural effusion (0.6% vs. 19.35%, \( P < 0.0002 \)), were significantly more common in Group B. Two patients (1.33%) in Group A and 1 (3.22%) in Group B developed malignancy in due course of the disease.

Pancreatic parenchyma was either normal (35% vs. 10%, \( P = 0.0004 \)) or compressed (24% vs. 6.45%, \( P = 0.029 \)) in significantly more proportion of cases in Group A than Group B on USG of abdomen. Parenchymal enlargement (13% vs. 45%, \( P < 0.0002 \)) and atrophy (6.67% vs. 22.58%, \( P = 0.005 \)) were observed significantly more proportion of cases in Group B. Calcification was noted more in Group A as compared to Group B (86.66% vs. 38.70%, \( P < 0.0002 \)) as shown in Table 5a. Dilated main pancreatic duct was observed significantly more number of cases in

### Table 1: Comparison of parameters between the two groups

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group A n=150 (%)</th>
<th>Group B n=31 (%)</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>100 (67.33)</td>
<td>25 (80.65)</td>
<td>0.12</td>
</tr>
<tr>
<td>Female</td>
<td>50 (32.67)</td>
<td>6 (19.35)</td>
<td>0.12</td>
</tr>
<tr>
<td>Mean</td>
<td>35.70±13.08</td>
<td>39.16±13.12</td>
<td>0.53</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20</td>
<td>16 (10.67)</td>
<td>3 (9.08)</td>
<td>0.86</td>
</tr>
<tr>
<td>20-39</td>
<td>35 (23.33)</td>
<td>3 (9.08)</td>
<td>0.08</td>
</tr>
<tr>
<td>30-39</td>
<td>40 (26.67)</td>
<td>9 (29.03)</td>
<td>0.78</td>
</tr>
<tr>
<td>40-49</td>
<td>35 (23.33)</td>
<td>9 (29.03)</td>
<td>0.378</td>
</tr>
<tr>
<td>50-59</td>
<td>15 (10)</td>
<td>5 (16.13)</td>
<td>0.321</td>
</tr>
<tr>
<td>&gt;60</td>
<td>9 (6)</td>
<td>2 (6.45)</td>
<td>0.92</td>
</tr>
<tr>
<td>Mean duration of disease in years</td>
<td>3.09</td>
<td>1.12</td>
<td>0.33</td>
</tr>
</tbody>
</table>

### Table 2: Comparison of clinical features between both the groups

<table>
<thead>
<tr>
<th>Clinical features</th>
<th>Group A n=150 (%)</th>
<th>Group B n=31 (%)</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>129 (86)</td>
<td>30 (96.77)</td>
<td>0.09</td>
</tr>
<tr>
<td>Oily leak</td>
<td>56 (37.33)</td>
<td>3 (9.68)</td>
<td>0.0002</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>27 (18)</td>
<td>2 (6.45)</td>
<td>0.11</td>
</tr>
<tr>
<td>Duodenal obstruction</td>
<td>16 (6.66)</td>
<td>2 (6.45)</td>
<td>0.47</td>
</tr>
<tr>
<td>Vomiting</td>
<td>61 (40.66)</td>
<td>12 (38.70)</td>
<td>0.83</td>
</tr>
<tr>
<td>Diabetic</td>
<td>33 (22)</td>
<td>4 (12.94)</td>
<td>0.253</td>
</tr>
</tbody>
</table>

### Table 3: Comparison of etiology between two groups

<table>
<thead>
<tr>
<th>Etiology</th>
<th>Group A n=150 (%)</th>
<th>Group B n=31 (%)</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcoholic</td>
<td>32 (21.33)</td>
<td>17 (54.84)</td>
<td>&lt;0.0002</td>
</tr>
<tr>
<td>Idiopathic</td>
<td>117 (76.67)</td>
<td>15 (48.39)</td>
<td>&lt;0.0002</td>
</tr>
<tr>
<td>Familial</td>
<td>1 (6.7)</td>
<td>0</td>
<td>0.64</td>
</tr>
</tbody>
</table>

### Table 4: Comparison of complications between the two groups

<table>
<thead>
<tr>
<th>Complications</th>
<th>Group A n=150 (%)</th>
<th>Group B n=31 (%)</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudocyst</td>
<td>10 (6.67)</td>
<td>6 (19.35)</td>
<td>0.023</td>
</tr>
<tr>
<td>Ascites</td>
<td>12 (8)</td>
<td>9 (29.23)</td>
<td>0.0009</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>1 (0.6)</td>
<td>6 (19.35)</td>
<td>&lt;0.0002</td>
</tr>
<tr>
<td>Malignancy</td>
<td>2 (1.33)</td>
<td>1 (3.23)</td>
<td>0.45</td>
</tr>
</tbody>
</table>
Group A (77.33% vs. 48.39%, \(P = 0.001\)) as compared to Group B on contrary more patients in Group B had normal pancreatic duct than Group A (15.33% vs. 48.39%, \(P < 0.0002\)) (Table 5b).

On comparing alcoholic pancreatitis patients in both groups, age at presentation was 3rd to 4th decade, duration of disease was more in Group B (4.58 vs. 9.48 years, \(P = 0.002\)). Pain abdomen was the most common presentation followed by vomiting. Complications such as pseudocyst (6.25% vs. 35.29%, \(P = 0.0008\)), ascites (6.25% vs. 35.25%, \(P = 0.0008\)), and pleural effusion (3.13% vs. 17.655, \(P = 0.007\)) were significantly higher in Group B as compared to Group A patients as depicted in Table 6.

Majority of our patients were managed conservatively (85.33% vs. 93.55%, \(P = 0.214\)), only 14.66% (22/150) in Group A and 6.45% (2/31) in Group B were managed by surgery, i.e., lateral pancreaticojunostomy for intractable pain, and in one patient pain recurrence even after surgery. Diabetes was well controlled in our patients most were managed with an oral hypoglycemic agent (OHA), only (15.15%) in Group A and none in Group B needed insulin for blood sugar control.

**DISCUSSION**

CP is not uncommon in our part. The mean age of presentation in our population was 3rd to 4th decade, and male outnumbered female in both the groups which were also reported in studies from the north and south India.\(^3\) Pain was the most common presentation in both the groups, which was similar to studies by Garg\( et al.\)\(^2\) 22% of patients in Group A and 13% of patients in Group B were diabetic at presentation and nearly one-fourth patients in each group having intraductal and parenchyma calcification on USG were diabetic which is lower as compared to reports published by Balakrishnan\( et al.\) (40%).\(^3\) All the acute complications were more common in Group B as compared to Group A and exocrine (steatorrhea) and endocrine deficiency (diabetes) were more commonly found in Group B. This may be due to long duration disease in Group A (3.09 vs. 1.02 years). In this study, 1-3% of the subjects in both groups had pancreatic malignancy. This is lower than the previously described rate of adenocarcinoma complicating tropical pancreatitis (25%).\(^7\)\(^8\) Prospective studies are required to detect the true incidence and prevalence of adenocarcinoma complicating CP in India. Idiopathic was the most common etiology in Group A, but there is an upsurge of alcohol as an etiology of CP at present date in our state this is due to change in lifestyle, economic growth in our population.\(^3\) All the previous studies including our study in Group A (during past 5 years) done across the country reported idiopathic pancreatitis as most common form of CP.\(^4\)\(^5\) Pancreatic parenchymal and ductal calcification and ductal dilatation were observed more in Group A, whereas enlarged pancreas noted more commonly in Group B this may again be due to long duration of disease in Group A and more alcoholic pancreatitis in Group B. Comparing alcoholic pancreatitis in both groups clinical profile was same, but the local complication was more in Group B. About 85% of patients in Group A and 93% of our population managed conservatively with enzyme supplementation and analgesics for pain, OHA for blood glucose control. Only 15% in Group A and 6% patients in Group B needed surgery for intractable pain.

There is a small number of patients in Group B as compared to Group A, however, this is an ongoing study...
better comparison will be expected in future. The duration of disease in group A was more as compared to Group B.

CONCLUSIONS

There seems a recent trend of increase in alcoholic CP in our set up during last 1 year. However, further studies are necessary for a firm conclusion.

REFERENCES

Clinical Study of Lipid Profile Pattern in Acute Coronary Syndromes

V Suresh Kumar, Madavaram Sreelatha
Assistant Professor, Department of General Medicine, Mahatma Gandhi Memorial Hospital, Warangal, Telangana, India

Abstract

Introduction: Acute coronary syndrome is one of the leading cause of morbidity and mortality in the world today. There has been constant effort on the part of medical researchers to analyze this problem and search for factors that may aid in its prevention.

Materials and Methods: The present study was undertaken in the Department of Cardiology/General Medicine in the MGM Hospital, Warangal. A total of 50 cases were studied, which were admitted consecutively (not picked up at random) during the month of June 2013-April 2015. The patients were in the age group of 25-70 years and had the complaints of chest pain/chest discomfort, breathlessness, vomiting, sweating, and near syncope/syncope variably.

Results: This study shows that in patients with acute coronary artery syndromes, a maximum number of patients (90%) presented with chest pain as a symptom. Majority were in the age group of 51-60 years (40%) followed by 61-70 years (36%) age group. Majority of them (42%) had anterior wall (ST elevation myocardial infarction) transmural infarct. Majority of them were in lower socioeconomic status group. Vegetarian diet rich in carbohydrates is the staple diet. It might be one of the factors for increased triglyceride levels in this group of patients.

Conclusion: Sedentary lifestyle, low socioeconomic status, smoking, diabetes, and hypertension are risk factors for acute coronary syndromes.

Key words: Acute coronary syndrome, Lipid profile, Low-density lipoprotein

INTRODUCTION

Acute coronary syndrome is one of the leading cause of morbidity and mortality in the world today. There has been constant effort on the part of medical researchers to analyze this problem and search for factors that may aid in its prevention.

Elevated blood cholesterol level is a main risk factor of atherosclerosis process, which underlies the development of coronary heart disease (CHD), including acute coronary syndrome. Total blood cholesterol consists of low-density lipoprotein cholesterol (LDL-C), which is the largest component of total cholesterol (TC), i.e., 60-70% of TC. LDL-C is very atherogenic (a very atherogenic lipoprotein) and it should be decreased and represents the major cause of CHD. The correlation between elevated LDL-C level and CHD development should be observed as a multistep process, which starts from the young age. Plaque rupture or erosion usually leads to acute coronary syndrome (acute myocardial infarction [MI], unstable angina (UA) pectoris, and sudden death caused by CHD).

The second cholesterol component is high-density lipoprotein cholesterol (HDL-C). Normally, it is 20-30% of TC. HDL-C is one of important lipoproteins and is very potential to prevent atherosclerosis by changing the “biology” of arterial wall lesion, without being affected by LDL-C level.

Correlation between blood triglyceride (TG) level and CHD may be derived from various mechanisms such as TGs cause more atherogenic LDL-C and cause higher clearance rate of HDL-C, which finally causes low HDL-C level. TGs may cause endothelial dysfunction and may stimulate macrophages migration into endothelium. It may also stimulate vascular endothelium to promote thrombogenic mediator synthesis, for example, plasminogen activator...
Kumar and Sreelatha: Lipid Profile Pattern in Acute Coronary Syndromes

inhibitor (PAI-1). In this study, which component of the triad lipid that has more important role and frequently found in patients with acute coronary syndrome, focusing on HDL-C.

Aims and Objectives
1. The aim of the present study is a clinical study of lipid profile patterns in patients admitted with acute coronary syndrome (UA/non-ST elevation myocardial infarction [NSTEMI]/ST elevation myocardial infarction [STEMI]).
2. It is a prospective study of 50 cases over 2 years in the MGM Hospital, Warangal. The age groups of patients from 25 to 70 years are included in the present study.
3. The study emphasizes on lipid profile pattern.
4. To study the risk factors that effect lipid profile pattern in acute coronary syndromes.

MATERIALS AND METHODS

The present study was undertaken in the Department of Cardiology/General Medicine in the MGM Hospital, Warangal district. A total of 50 cases were studied, which were admitted consecutively (not picked up at random) during the month of June 2013-April 2015.

The patients were in the age group of 25-70 years and had the complaints of chest pain/chest discomfort, breathlessness, vomiting, sweating, and near syncope/syncope variably. The symptoms suggestive of acute coronary syndrome.

Inclusion Criteria
1. Cases are studied, which are admitted consecutively (not picked up at random).
2. The patients are taken in the age group of 25-70 years and had the complaints of chest pain/chest discomfort, breathlessness, vomiting, sweating, and near syncope/syncope variably.
3. Lipid profile samples are taken within 24 h of onset of symptoms.

Exclusion Criteria
1. The patients <25 years and more than 70 years are excluded.
2. The patients with previous history of MI are excluded.
3. Acute coronary syndrome that occur secondary to other reasons such as anemia, trauma or noncardiac surgery is excluded.

After recording the complaints and history of the patients, they were subjected to computerized electrocardiogram. ST elevation, convex in nature (or) ST elevation with “T” wave inversion (or) ST elevation with “T” wave inversion along with a forming “q” wave, considered as diagnostic of acute coronary syndrome.

These patients were subjected to 2D echocardiography and regional wall motion abnormalities are recorded. For these patients, creatinine phosphokinase (CPK-MB) levels and troponin levels are estimated. The serum sample for lipid profile was collected 14 h after the patient’s last oral intake of solids/liquids (excluding water to take aspirin tablet at the time of admission) but within 24 h of onset of symptoms (to eliminate the lipid profile changes due to autonomic system activity if serum is collected after 24 h).

Methods of Estimation of Lipid Profile Patterns in this Study
The lipids are estimated using the semi autoanalyzer of Chem – 7 using the Transosi.

Procedures
The slide is a multilayered film in a plastic support, containing all reagents necessary to determine lipid levels in serum/plasma. A 10 µL drop of specimen is deposited on the slide. The sample spreads evenly and undergoes a series of reactions in the slide to produce a colored compound. Intensity of color is proportional to the amount of lipid in a sample. The reagents vary with the fraction of lipid to estimated.

Reaction Sequence

Lipoprotein \( \rightarrow \) Surfactant Chol + Chol ester + Protein
Chol ester + water \( \rightarrow \) Chol ester hydrolase chol + fatty acid
Chol + oxygen \( \rightarrow \) CholocidaseChol – 4 – en – 3 one + \( \rightarrow \) H2O2 + leuco dye \( \rightarrow \) Peroxidase dye

Before the collection of serum sample for lipid profile 100 ml of normal saline with streptokinase/heparin was given intravenously for transmural infarcts, no IV fluids was given for non-transmural infarcts.

RESULTS

• Admitted 50 inpatients in MGM Hospital, Warangal with acute coronary syndromes, the results are as follows:
• The present study consisted of:
  • Anterior wall MI - 21 (42%)
  • Inferior wall MI - 11 (22%)
  • Antero-lateral wall MI - 4 (8%)
  • Anterior wall NSTEMI - 3 (6%)
Kumar and Sreelatha: Lipid Profile Pattern in Acute Coronary Syndromes

- Inferior wall NSTEMI - 2 (4%)
- UA - 9 (18%)

Majority of the patients (42%) had anterior wall MI, then followed by inferior wall MI (22%) and unstable angina (18%).

1. TC average - 185.68 mg%
2. LDL-C average -116.75 mg%
3. TGs average - 179.62 mg%
4. HDL-C average - 32.38 mg% (Table 1).

1. The TC levels are found to be more in the males and TGs are to be more in the females.
2. HDL-C levels not much change between males and females.
3. LDL-C levels more in males than females (Table 2).

DISCUSSION

In the present study, 50 cases were admitted with acute coronary syndrome were studied. For their mode of presentation, risk factors for atherosclerosis with special emphasizes on their lipid profile patterns (Tables 3-8).

The age group of the patients from 25 to 70 years. Out of 50 cases, there were 19 female patients and 31 male patients. All of them were from North Telangana districts (Adilabad, Karimnagar, and Warangal).

Table 1: Average lipid profile fractions in patients

<table>
<thead>
<tr>
<th>Lipid fraction</th>
<th>TC Mean in mg%</th>
<th>LDL Mean in mg%</th>
<th>HDL Mean in mg%</th>
<th>TG Mean in mg%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cholesterol</td>
<td>185.68</td>
<td>116.75</td>
<td>32.38</td>
<td>179.62</td>
</tr>
</tbody>
</table>

| TC: Total cholesterol, LDL: Low-density lipoprotein, HDL: High-density lipoprotein, TG: Triglycerides |

Table 2: Average lipid profile fractions in males and females

<table>
<thead>
<tr>
<th>Lipid fraction</th>
<th>Male (mean mg%)</th>
<th>Female (mean mg%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td>187.88</td>
<td>182.11</td>
</tr>
<tr>
<td>LDL</td>
<td>121.46</td>
<td>109.07</td>
</tr>
<tr>
<td>HDL</td>
<td>31.58</td>
<td>33.68</td>
</tr>
<tr>
<td>TG</td>
<td>153.10</td>
<td>222.89</td>
</tr>
</tbody>
</table>

| TC: Total cholesterol, LDL: Low-density lipoprotein, HDL: High-density lipoprotein, TG: Triglycerides |

1. Majority of the patients (90%) presented with chest pain as the symptom.
2. Majority of the patients are in the age group of 51-60 years (40%), then followed by the age group of 61-70 years (36%) (Table 3).
3. Majority of the patients (42%) had anterior wall MI, then followed by inferior wall MI (22%) and unstable angina (18%) (Table 4).

Table 4: Distribution of patients into various types of acute coronary syndromes

<table>
<thead>
<tr>
<th>Type of acute coronary syndrome</th>
<th>No. of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antero lateral wall MI</td>
<td>4 (8)</td>
</tr>
<tr>
<td>Anterior wall NSTEMI</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Anterior wall MI</td>
<td>21 (42)</td>
</tr>
<tr>
<td>Inferior wall NSTEMI</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Inferior wall MI</td>
<td>11 (22)</td>
</tr>
<tr>
<td>Unstable angina</td>
<td>9 (18)</td>
</tr>
</tbody>
</table>

| MI: Myocardial infarction, NSTEMI: Non-ST elevation myocardial infarction |

Table 5: Distribution of total cholesterol in patients

<table>
<thead>
<tr>
<th>Total cholesterol</th>
<th>No. of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;200</td>
<td>18 (36)</td>
</tr>
<tr>
<td>160-200</td>
<td>15 (30)</td>
</tr>
<tr>
<td>&lt;160</td>
<td>17 (34)</td>
</tr>
</tbody>
</table>

Table 6: Distribution of LDL-C in patients

<table>
<thead>
<tr>
<th>LDL-C</th>
<th>No. of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;160</td>
<td>6 (12)</td>
</tr>
<tr>
<td>130-160</td>
<td>11 (22)</td>
</tr>
<tr>
<td>100-130</td>
<td>20 (40)</td>
</tr>
<tr>
<td>&lt;100</td>
<td>13 (26)</td>
</tr>
</tbody>
</table>

| LDL-C: Low-density lipoprotein cholesterol |

Table 7: Distribution of HDL-C in patients

<table>
<thead>
<tr>
<th>HDL-C</th>
<th>No. of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;60</td>
<td>0 (0)</td>
</tr>
<tr>
<td>35-60</td>
<td>27 (54)</td>
</tr>
<tr>
<td>&lt;35</td>
<td>23 (46)</td>
</tr>
</tbody>
</table>

| HDL-C: High-density lipoprotein cholesterol |

Table 8: Distribution of triglyceride cholesterol in patients

<table>
<thead>
<tr>
<th>Triglycerides</th>
<th>No. of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;400</td>
<td>2 (4)</td>
</tr>
<tr>
<td>200-400</td>
<td>10 (20)</td>
</tr>
<tr>
<td>160-200</td>
<td>9 (18)</td>
</tr>
<tr>
<td>&lt;160</td>
<td>29 (58)</td>
</tr>
</tbody>
</table>

| Triglycerides |

International Journal of Scientific Study | July 2017 | Vol 5 | Issue 4

176
4. About 36% of patients had TC >200 mg%, 30% had between 160 and 200 mg%, and 34% had <160% (Table 5).

5. About 4% of patients had TG levels >400 mg%, 20% of patients had TG levels 200-400 mg%, 18% of patients had TG levels 160-200 mg%, and 58% of patients had TG levels >160 mg% (Table 8).

6. About 82% of the patients had LDL/HDL-C >2.5, 72% of the patients had TC/HDL-C >4.5, 50% of the patients had triglyceride-rich lipoproteins (TRL)/HDL-C >5.75 (Tables 6 and 7).

7. Most of the patients having more mean lipid profile fractions and acute coronary syndromes in sedentary lifestyle (62%), low socioeconomic status (52%), smokers (58%), hypertensive (72%), and diabetes (72%).

A study done at MGM, New Bombay Hospital, Department of Cardiology using carotid intima/media thickness of >0.8 as a marker for atherosclerosis. About 27% of patients with LDL/HDL-C >2.5 had atherosclerosis while only 10% of patients with ratio <2.5 had atherosclerosis. TC/HDL-C >4.5 and TG/HDL-C >5.75 were associated with intimal thickening.

In the present study:
- 82% of the patients had LDL/HDL-C >2.5
- 72% of the patients had TC/HDL-C >4.5
- 50% of the patients had TRL/HDL-C >5.75.

In a study in Chennai, 75% of patients with myocardial infarct had TC <200 mg%. In another study, a still lower level of <150% was reported. In South Africa, 62% of Indian coronary artery disease (CAD) patients had high TC while their HDL-C was lower than native Africans. In UK, Indians with CAD had TC lower than the Whites.

In the present study, 36% of patients had TC >200 mg%, 30% had between 160 and 200 mg%, and 34% had <160%.

**TGs**

The role of it in CAD is controversial, but Framingham study, Paris prospective study, and Edinburgh and Stockholm study suggested hypertriglyceridemia to be a risk factor. Data from UK and USA also revealed that 50% of Indian CAD patients had high TGs levels than native Whites.

In the present study:
- 4% of patients had TG levels >400 mg%
- 20% of patients had TG levels 200-400 mg%
- 18% of patients had TG levels 160-200 mg%
- 58% of patients had TG levels >160 mg% (Table 9).

**CONCLUSIONS**

This study shows that in patients with acute coronary artery syndromes, maximum number of patients (90%) presented with chest pain as a symptom. Majority were in the age group of 51-60 years (40%) followed by 61-70 years (36%) age group. Majority of them (42%) had anterior wall (STEMI) transmural infarct. Majority of them were in lower socioeconomic status group. Vegetarian diet rich in carbohydrates is the staple diet. It might be one of the factors for increased TG levels in this group of patients.

TC levels crossed 200 mg% in only 36% of the patients, showing that estimating the TC level is not sufficient to assess the risk factor for atherosclerosis. Total LDL-C levels crossed 160 mg% in 12% of patients. HDL-C levels are <35 mg% in 46% of patients, and levels are between 35 and 60 mg% in 54% of patients. TGs crossed 160 mg% (studies in India showed that TGs above this level is considered a risk factor for Indians compared with the Westerners) in 42% of the patients. Hence, TC and LDL-C levels are within normal limits in majority of the patients, but HDL-C levels are below the required levels and TGs are above the normal levels in majority of the patients.

Female patients were found to have more TG and HDL-C levels than male patients. TC and LDL-C levels are more in the male patients.

TG, LDL-C, and TG levels are found to be more in smokers than non-smokers. HDL-C levels are found to be slightly higher in smokers than nonsmokers, which probably might be due to their concomitant occasional alcohol intake.

TG/HDLC was >4.5 in 72% of patients.

LDL/HDL-C was >2.5 in 82% of patients.

TG/HDLC was >5.75 in 50% of patients.
This once again emphasizes that low levels of HDL-C are the major risk factor in the lipid abnormality.

Sedentary lifestyle, low socioeconomic status, smoking, diabetes, and hypertension are also risk factors for acute coronary syndromes.

These patients are presumed to have other causative risk factors such as increased homocysteine levels, increased lipoprotein (a) levels, increased fibrinogen levels, increased PAI levels, and decreased plasminogen levels which are not measured as a risk factor in this study.

REFERENCES


Prevalence of Refractive Errors among the School going Children at a Tertiary Center of West Bengal

Mita Saha (Dutta Chowdhury) 1, Alok Ranjan2, Md. Nazarul Islam1, Sushmita Mukherji3

1Assistant Professor, Department of Ophthalmology, R. G. Kar Medical College and Hospital, Kolkata, India, 2Senior Resident, Department of Ophthalmology, All India Institute of Medical Sciences, Patna, Bihar, India, 3Postgraduate, Department of Ophthalmology, R. G. Kar Medical College and Hospital, Kolkata, India

Abstract

Background: Refractive error is an avoidable cause of visual impairment. Diagnosis and treatment of refractive errors are not only simple but also the most effective forms of eye care.

Aims and Objectives: To study the prevalence of refractive errors, among school children in the age group of 5-15 years.

Material and Methods: The study was a cross-sectional study comprising 1840 government school children in the age group of 5-15 years in the Outpatients Department of R. G. Kar Medical College, after screening during the period of October 2014 to September 2015. Students were screened for defective vision with the help of Snellen’s chart. Students with refractive errors underwent retinoscopy under cycloplegia followed by post mydriatic test. Corrective glasses were prescribed and provided free of cost.

Results: A total of 1840 children were examined. Of which 53.6% of the study population were boys and 46.4% were girls. The mean age of the study group was 12.4 years. 48.5% of the children were in the age group of 13-15 years. 44.4% of the refractive error was detected in children studying in class 8, 9, and 10. The prevalence of refractive error in our study population was 13.86%. Urban and rural children were 7.03%. Myopia was noted to be the most common refractive error followed by hypermetropia and astigmatism. It was also noted in our study that the prevalence of refractive error was more common in the female children. It was also noted that there was a relationship between family history of parents or siblings having refractive errors.

Conclusion: The prevalence of uncorrected refractive error, especially myopia, was higher in older children. Causes of higher prevalence and barriers to refractive error correction services should be identified and addressed. Eye screening of school children is recommended and is a must.

Key words: Hypermetropia, Prevalence, Myopia, Refractive error, School Children

INTRODUCTION

Refractive error is the second largest cause of treatable blindness after cataract. A person becoming blind due to an uncorrected refractive error at a young age would suffer many more years of blindness than a person becoming blind due to cataract in old age and would place a greater socioeconomic burden on society.

Refractive error as a cause of blindness has not received much attention because many definitions of blindness have been based on best-corrected distance visual acuity, including the definition used in the International Statistical Classification of Diseases and Related Health Problems. Because of the increasing realization of the enormous need for correction of refractive error worldwide, this condition has been considered one of the priorities of the recently launched global initiative for the elimination of avoidable blindness: Vision 2020 - The Right to Sight. In India, the overall incidence of refractive errors has been found to vary between 21% and 25% of the patients attending eye outpatient department. The various studies conducted in different part of India had reported the prevalence of refractive
errors between 20% and 25% among school going children. There is no available data from West Bengal depicting the prevalence of refractive error among the school going children. This necessitated to conduct the study to find out the prevalence of refractive error in a tertiary center of West Bengal to assess the magnitude of the problem, so that effective rehabilitative measures can be instituted up to the optimal level to achieve the goal of the World Health Organization and International Agency for the prevention of blindness concerning to refractive error.

MATERIALS AND METHODS

The study was conducted in tertiary care eye center of Kolkata from a period of October 2014 to September 2015. There was a random selection of 1840 children from eight schools of North Kolkata aged 5-15 years studying in Class 1 to Class 10. All subjects were brought to the Outpatient Department of Ophthalmology at R. G. Kar Medical College, Kolkata. It was a prospective study, cross-sectional in design.

The parameters studied were:
- Visual acuity measurement with Snellen’s chart.
- Gross examination of the anterior segment with a torch light.
- Streak retinoscopy and refraction.
- Cycloplegic refraction.
- Examination of media and fundus by direct ophthalmoscopy.

Study Technique

We randomly selected eight schools of North Kolkata where screening of school children for refractive error was conducted after taking written permission to do the study from the headmaster/headmistress and informed consent from the parents. Ophthalmic examinations were carried out in the respective schools by a single ophthalmologist with the help of a departmental optometrist. Children whose visual acuity was <6/9 underwent subjective refraction till the achievement of best corrected visual acuity. Those not achieving best corrected visual acuity following subjective refraction was underwent cycloplegic refraction.

Inclusion Criteria

School children of age 5-15 years of the randomly selected eight schools in North Kolkata.

Exclusion Criteria

Students having corneal opacity and cataract were excluded.

RESULTS AND DISCUSSION

Out of 1840 children in the study group 182 (9.9%) were in the age group of 5-6 years, 307 (16.7%) were in the age group of 7-9 years, 458 (24.9%) were in the age group of 10-12 years, and 893 (48.5%) were in the age group 13-15 years (Table 1 and Figure 1).

In the present study of school children, 986 (53.6%) were male and 854 (46.4%) were female children (Table 2 and Figure 2).

In this study population, 810 (44%) children were in 8th-10th standard, 289 (15.7%) were in 6th-7th standard, and 341 (18.5%) were in 5th-6th standard.

![Figure 1: Distribution of the study population according to the age](image1)

![Figure 2: Distribution of the study population according to the gender](image2)

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Number of children (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-6</td>
<td>182 (9.9)</td>
</tr>
<tr>
<td>7-9</td>
<td>307 (16.7)</td>
</tr>
<tr>
<td>10-12</td>
<td>458 (24.9)</td>
</tr>
<tr>
<td>13-15</td>
<td>893 (48.5)</td>
</tr>
<tr>
<td>Total</td>
<td>1840 (100.0)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number of children (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>986 (53.6)</td>
</tr>
<tr>
<td>Girls</td>
<td>854 (46.4)</td>
</tr>
<tr>
<td>Total</td>
<td>1840 (100.0)</td>
</tr>
</tbody>
</table>

Table 1: Distribution of the study population according to the age

Table 2: Gender wise distribution of the study population
558 (30.3%) were from 3rd to 5th standard, and 183 (9.9%) were from 1st to 2nd standard (Table 3 and Figure 3).

The visual acuity noted by investigator was found to be 6/6 in 1554 (84.45%) cases, 6/9 in 184 (10.0%), 6/12 in

74 (4.0%), 6/18 in 15 (0.8%), 6/24 in 8 (0.4%), and ≤6/36 in 5 (0.3%) cases, respectively (Table 4).

Number of students examined = 1840.
Number of cases detected by the investigator = 286.
Number of cases confirmed by the refractionist = 255.
The prevalence of refractive errors in the study population = 13.86%.

In this study, out of 255 children confirmed by the refractionist with refractive errors, 215 new cases of refractive errors were found, and 40 children were already wearing spectacles (Table 5).

The age wise distribution of the prevalence of refractive error was calculated. There was 24 (13.2%) in 5-7 years, 43 (14.0%) in 7-9 years, 62 (13.5%) in 10-12 years, and 126 (14.1%) in 13-15 years, respectively (Table 6).

In this study, refractive error was more prevalent in the female children 148 (17.3% of total female children) compared to male children 107 (10.9% of total male children) (Table 7).

Among 286 children with visual acuity <6/6, 255 (13.86%) children were confirmed to have a refractive error after proper check up at the hospital, and the rest 31 children were excluded from the study.

Table 3: Distribution of the study population according to the educational standard

<table>
<thead>
<tr>
<th>Standard</th>
<th>Number of Children (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st-2nd</td>
<td>183 (9.9)</td>
</tr>
<tr>
<td>3rd-5th</td>
<td>558 (30.3)</td>
</tr>
<tr>
<td>6th-7th</td>
<td>289 (15.7)</td>
</tr>
<tr>
<td>8th-10th</td>
<td>810 (44.4)</td>
</tr>
<tr>
<td>Total</td>
<td>1840 (100.0)</td>
</tr>
</tbody>
</table>

Table 4: Uncorrected visual acuity of children during screening using Snellen's chart

<table>
<thead>
<tr>
<th>Vision by investigator</th>
<th>Number of children (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/6</td>
<td>1544 (84.45)</td>
</tr>
<tr>
<td>6/9</td>
<td>184 (10.0)</td>
</tr>
<tr>
<td>6/12</td>
<td>74 (4.0)</td>
</tr>
<tr>
<td>6/18</td>
<td>15 (0.8)</td>
</tr>
<tr>
<td>6/24</td>
<td>8 (0.4)</td>
</tr>
<tr>
<td>≤6/36</td>
<td>5 (0.3)</td>
</tr>
<tr>
<td>Total</td>
<td>1840 (100.0)</td>
</tr>
</tbody>
</table>

Table 5: Newly detected cases and old cases of refractive errors in the study group (n=255; Figure 4)

<table>
<thead>
<tr>
<th>Cases</th>
<th>Number of children (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old case</td>
<td>40 (15.7)</td>
</tr>
<tr>
<td>Newly detected</td>
<td>215 (84.3)</td>
</tr>
<tr>
<td>Total</td>
<td>255 (100.0)</td>
</tr>
</tbody>
</table>

Table 6: Age wise distribution of students with and without refractive errors

<table>
<thead>
<tr>
<th>Age in group</th>
<th>Refractive error present</th>
<th>Refractive error absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-7</td>
<td>24 (13.2)</td>
<td>158 (86.8)</td>
<td>182</td>
</tr>
<tr>
<td>7-9</td>
<td>43 (14.0)</td>
<td>264 (86.0)</td>
<td>307</td>
</tr>
<tr>
<td>10-12</td>
<td>629 (13.5)</td>
<td>396 (86.5)</td>
<td>458</td>
</tr>
<tr>
<td>13-15</td>
<td>126 (14.1)</td>
<td>767 (85.9)</td>
<td>893</td>
</tr>
<tr>
<td>Total</td>
<td>255 (13.86)</td>
<td>1585 (86.14)</td>
<td>1840</td>
</tr>
</tbody>
</table>

Table 7: Gender wise distribution of refractive errors

<table>
<thead>
<tr>
<th>Sex</th>
<th>Refractive error present</th>
<th>Refractive error absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>107 (10.9)</td>
<td>879 (89.1)</td>
<td>986</td>
</tr>
<tr>
<td>Female</td>
<td>148.73</td>
<td>706 (82.7)</td>
<td>854</td>
</tr>
<tr>
<td>Total</td>
<td>255 (13.86)</td>
<td>15.85 (86.14)</td>
<td>1840</td>
</tr>
</tbody>
</table>

Table 8: Distribution of refractive errors as per educational standard

<table>
<thead>
<tr>
<th>Standard</th>
<th>Refractive error present</th>
<th>Refractive error absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st-2nd</td>
<td>20 (10.9)</td>
<td>163 (89.1)</td>
<td>183</td>
</tr>
<tr>
<td>3rd-5th</td>
<td>45 (8.1)</td>
<td>513 (91.9)</td>
<td>558</td>
</tr>
<tr>
<td>6th-7th</td>
<td>58 (20.1)</td>
<td>231 (79.9)</td>
<td>289</td>
</tr>
<tr>
<td>8th-10th</td>
<td>132 (16.3)</td>
<td>678 (83.7)</td>
<td>810</td>
</tr>
</tbody>
</table>

Figure 3: Distribution of students according to classes

Figure 4: Distribution of newly detected and old cases of refractive errors in the study group

Figure 4: Distribution of newly detected and old cases of refractive errors in the study group
This study shows that highest prevalence (20.1% of total children in Class 6th and 7th standard) of refractive errors in children of 6th and 7th standard. The prevalence in children of Class 8th-10th standard is 16.3% of total children in Class 8th-10th standard, in 1st-2nd is 10.9% of total children in Class 1st-2nd standard, and 3rd-5th is 8.1% of total children in Class 3rd-5th standard (Table 8).

There was an association between family history of parents or siblings wearing spectacles and refractive errors. The difference in the proportion of student with a refractive error with and without family history (Table 9).

The present study shows the power of right and left eyes in diopters. Majority of the children (55.6% and 27.1%) had power of −0.5 or −0.75 days in the right and left eye. Very few children (6.7% and 10.6%) had power of +0.5 or +0.75 days in the right and left eye, respectively. The percentage of children with power less than −1.0 and above +1.0 is 27.1% and 10.6%, respectively (Table 10 and Figure 5).

In this study, myopia was more commonly seen which constitutes for 59.4% of the refractive errors. Astigmatism was seen in 25.8% of the cases which includes myopic and hyperopic astigmatism, and hypermetropia is seen in 14.4% of myopic and hyperopic astigmatism, and hypermetropia is seen in 14.8% of the cases (Table 11 and Figure 6).

REFERENCES

Profile of Testicular Germ Cell Tumors in Kashmir: A Retrospective Analysis

Syed Arshad Mustafa1, Vinod Mitla2, Saqib Zaffar Banday3, Sanaullah Kuchay4

1Assistant Professor, Department of Radiotherapy, Government Medical College, Srinagar, Jammu and Kashmir, India, 2Lecturer, Department of Internal Medicine, Government Medical College, Jammu, Jammu and Kashmir, India, 3Registrar, Department of Radiotherapy, Government Medical College, Srinagar, Jammu and Kashmir, India, 4Professor, Department of Radiotherapy, Government Medical College, Srinagar, Jammu and Kashmir, India

Abstract

Background: Testicular tumors are the most common solid neoplasm in young men. Germ cell tumors (GCT) constitute over 90% of all the malignant testicular neoplasms. The incidence of testicular tumors shows a significant geographic variation with the highest number of cases being reported in Scandinavia, Germany and Switzerland and lowest in Asian and African nations. Presently, there are only a few well-established risk factors for this disease, notably cryptorchidism and age. However, for the most part, the etiology of testicular cancer remains unknown.

Aim and Objective: To analyze the profile of testicular GCT at a tertiary cancer center in Kashmir.

Materials and Methods: This retrospective analysis of testicular germ cell tumor cases was performed in the year 2017 on 40 patients enrolled in the Department of Radiation Oncology, Government Medical College, Srinagar, from 2012 to 2017.

Results: Of the 40 patients analyzed, majority had seminomatous histology. Most of them presented with unilateral disease with laterality toward the right side. Bilateral tumors presented at an earlier age than unilateral disease. Most of the patients enrolled belonged to rural areas. Tumor markers such as lactate dehydrogenase and beta-human chorionic gonadotropin had statistically significant association with the overall stage of disease.

Key words: Germ cell, Kashmir, Testicular tumor

INTRODUCTION

Testicular cancer is a rare neoplasm, accounting for only 1% of all male cancers. It is, however, the most common solid malignancy in young men.1 Globally, there has been an increase in the incidence of testicular cancer, with studies reporting almost doubling of its incidence in the past 40 years,2 with western nations reporting a decrease in the mortality over the years.1 Age-standardized incidence rates are highest in New Zealand (7.8), UK (6.3), Australia (6.1), Sweden (5.6), USA (5.2), Poland (4.9), and Spain (3.8) per 100,000 men. India, China, and Colombia have the lowest incidence (0.5, 1.3, and 2.2, respectively) per 100,000 men. India has the lowest overall testicular cancer incidence −1.7% (−2.5; −0.8).1 Cryptorchidism or maldescended testis (MDT) is the most established factor associated with testicular cancer, with a 2-4 fold increase in the risk of testicular cancer.3 Several studies undertaken to correlate any association between testicular cancer and various possible risk factors have shown mixed results, with current literature on the causes of testicular cancer being limited only to a few established risk factors including age, race, and MDT.4 Seminoma and nonseminoma do not seem to have substantial difference in etiological risk factors because of similar incidence trends and nearly half of all tumors being composed of both “seminoma” and “nonseminoma” elements.5 While as western nations report early stage at diagnosis,6 Indian literature reports a locally advanced stage at presentation.7 Kashmir valley is ethnically, topographically and climatically distinct from rest of India, hence this study was undertaken to analyze the profile of testicular cancer patients in Kashmir Valley.
with regard to various parameters and their corroboration with world literature.

MATERIAL AND METHODS

This study was conducted in the Department of Radiation Oncology, Government Medical College, Srinagar, from 2012 to 2017. It was a retrospective analysis conducted on 40 patients with histological documentation of germ cell tumor. Patients with histologies other than germ cell tumor were not included in the analysis. Data were analyzed with respect to demographic and clinical profile of patients such as age, residence, socioeconomic status, birth order, presenting sign and symptom, history of smoking, and history of trauma. Patients who were operated were staged radiologically, surgically, and with tumor markers, while as patients not subjected to surgery were staged radiologically and with tumor markers.

RESULTS

In our study, a total of 40 cases of testicular germ cell tumors were enrolled, of which 65% were seminomatous tumors and the rest nonseminomatous. The patients presented at a mean age of 37.0 years with a standard error of 2.00 years; the minimum and maximum age of presentation was 16 and 65, respectively.

Testicular swelling was the most common presenting symptom in 65% of the patients with tender testicular mass being the most common sign. 60% of the patients did not have any identifiable risk factor, while in the rest cryptorchidism was the major risk factor identified. Over 67% of the patients were subjected to high inguinal orchietomy, which was the most common surgical procedure undertaken (Figure 1).

Patients with bilateral disease presented earlier with a mean age at of presentation of 24.2 years in contrast to 38.9 years for unilateral disease ($d = -14.7$ 95% confidence interval $-3.23$ to $-26.14$, $t = 2.595$, $P = 0.013$), although unilateral disease was more common representing 87.5% of all the cases ($\chi^2 = 22.5$, $P = 0.00001$). In unilateral testicular tumors right sided tumors were more common (55% of total) but the difference as compared to left was not statistically significant ($\chi^2 = 2.314$, $P = 0.175$).

Coming to the sociodemographic profile of the patients, 82.5% of patients belonged to the rural areas and rest from urban areas, the difference being statistically significant ($\chi^2 = 16.9$, $P = 0.00004$). 72% patients were employed ($\chi^2 = 8.1$, $P = 0.006$).

The median overall stage of disease at presentation for the cases was “II-C” (35% of all cases and maximum among all stages). Various variables, like risk factors, age at presentation, prognostic group, socioeconomic profile, smoking habits, history of trauma, biochemical markers, among others, were tested for association with the overall stage of disease using the “Kruskal-Wallis” test. Only lactate dehydrogenase (LDH), beta-human chorionic gonadotropin ($\beta$-HCG) and prognostic group had statistically significant association with the overall stage of disease. Higher levels of LDH > S1 ($\chi^2 = 9.806$, $P = 0.003$, $\eta^2 = 0.2514$), $\beta$-HCG > S2 ($\chi^2 = 8.415$, $P = 0.019$, $\eta^2 = 0.2158$) and poorer prognostic group ($\chi^2 = 8.111$, $P = 0.005$, $\eta^2 = 0.2078$) predicted a higher overall stage of the disease.

Statistical analysis for the data was performed using the SPSS software (v20, IBM Corporation).

DISCUSSION

Over 95% of all primary testicular tumors are of germ cell origin. Less frequent tumors include Leydig cell, Sertoli cell, and other rare or poorly defined histological types. Approximately, half of the testicular GCT (TGCT) is classical seminomas and the rest nonseminomatous, including subtypes like embryonal carcinoma, yolk cell tumor, teratoma, choriocarcinoma, and spermatocytic seminoma.5 Our study revealed 65% of the tumors to be seminomatous and rest nonseminomatous. Intra tubular germ cell neoplasia also known as carcinoma in situ, reported to be precursor for all TGCT in adolescents and young adults6 was not seen in any of our cases.

More than 80% of TGCT in men are seen in second to fourth decade of life whereas 15-20% is seen in men aged 45 years or older.4

Figure 1: Clinico-demographic parameters of testicular tumor
Our study revealed mean age at disease presentation to be 37 years with the patients having bilateral disease presenting at an earlier age. Our findings are corroborated by other studies reporting bilateral TGCT’s to present at an earlier age.9

Retrospective studies have shown the prevalence of bilateral TGCT tumors to be around 1-2%,10 with majority (80-85%) occurring metachronously.11 Whereas the association of bilateral disease with earlier presentation was significant in our study, we could not elicit any association between bilateral disease with undescended testis, as reported in various studies.9

Studies as early as the beginning of the 19th century has shown MDT to be strongly associated with testicular neoplasia12 with some reports showing the relative risk of association to be 5-10 fold.13 Our analysis showed 30% of the patients having MDT.

Rural preponderance of testicular neoplasms was reported as early as in 1974, where agricultural based rural areas were shown to have a higher incidence than urban populations.14 No big analysis has been carried in India comparing rural versus urban demography of testicular cancer. Of late many studies have shown mixed results with some analyses showing no association with rural/urban dwelling,15 while some studies showing urban habitation to be at higher risk than general population.2 Overall, if at all any association, its reported to be nonsignificant.16 Our study showed over 80% of the patients to be from rural areas, possibly due to more agricultural activities like use of carcinogenic pesticides in rural areas.14 Differences in the incidence of testicular tumors with regard to different ethnicity as reported in studies17 could not be elicited in our analysis.

Association with smoking was nonsignificant in our study. Retrospective studies too have not shown any significant association of testicular tumors with maternal smoking.18

Testicular trauma though proposed by some authors as a risk factor for testicular tumors, was not a significant finding in our analysis.19

Data on testicular GCT have shown Stage I to be the most common stage at presentation,20 however, our study revealed most common stage at presentation to be Stage II C, the cause of which could not be verified.

Three relatively specific and sensitive serum biomarkers are used in the diagnosis, prognosis, and surveillance of testicular cancer and include alpha-fetoprotein (α-FP), beta subunit of β-HCG, and LDH.21 These tumor markers, along with other prognostic factors, help in stratifying patients into good, intermediate, and poor prognosis categories.22 Increased levels of α-FP are typically found in nonseminomatous tumors23 α-FP levels are typically not elevated in seminomas; however, if increased levels of α-FP are found in pure seminoma, it must be considered and treated as a nonseminomatous germ cell tumor. Elevated serum β-HCG levels are typically present in both seminomas and nonseminomas. Increased levels of serum β-HCG following orchiectomy is an indication of persistent disease, whereas rising levels of β-HCG after treatment completion and disease remission indicates disease relapse.21 Increased levels of serum LDH have been seen to be associated with advanced testicular tumors in approximately 80% seminomas and 60% of nonseminomas.23 Our analysis revealed a significant association of LDH and β-HCG with overall disease stage, where by higher levels of these markers were seen in higher stage disease. These markers coupled with other poor prognostic factors such as positive family history and infertility are indirect predictors of survival.

High inguinal orchiectomy has been the standard surgical procedure for a suspected testicular cancer. Procedural deviations such as trans-scrotal orchiectomy, open testicular biopsy, and fine needle aspiration have been historically negated in view of prognostic implications.24

Whereas some studies have revealed statistically significant differences in the local recurrence rate among patients undergoing scrotal violation versus the inguinal approach,25 some authors report that the effect of higher local recurrence in trans-scrotal approach was not statistically significant to impact the survival rates or distant recurrence in all groups analyzed.24

In our analysis, apart from the 70% patients who were subjected to orchietomy and orchietomy plus retroperitoneal lymph node dissection, rest were subjected to either laparotomy (17.5%) or trans-scrotal orchietomy (7.5%). Laparotomy was performed in patients who presented with abdominal disease whereas trans-scrotal surgery was inadvertently carried out at peripheral health service hospitals.

**CONCLUSION**

Testicular germ cell tumor continues to be a disease of young adults with a slight predominance of seminomatous histology. Testicular swelling is the most common symptom for which consultation is sought, with bilateral testicular tumor patients presenting at a significantly earlier age. Over
one-third patient had associated cryptorchidism while the majority did not have an identifiable risk factor. Majority of the patients came from rural areas the cause of which needs to be ascertained with further studies. Although majority of patients had undergone high inguinal orchiectomy over 7% patients had undergone nonstandard surgical procedures which underscores the importance of timely referral and intervention at a dedicated oncological center.

As against earlier disease presentation in rest of the world, patients in our analysis reported at a locally advanced stage. LDH and β-HCG had a significant implication with overall disease stage.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Antibiotic Cement Impregnated Nailing in Management of Infected Non-union of Femur and Tibia

A Saravanan¹, R Raj Ganesh¹, N Deen Muhammed Ismail², Heber Anandan³

¹Senior Assistant Professor, Department of Orthopaedics, Institute of Orthopaedics and Traumatology, Madras Medical College, Chennai, Tamil Nadu, India, ²Director and Professor, Department of Orthopaedics, Institute of Orthopaedics and Traumatology, Madras Medical College, Chennai, Tamil Nadu, India, ³Senior Clinical Scientist, Department of Clinical Research, Dr. Agarwal’s Healthcare Limited, Tirunelveli, Tamil Nadu, India

Abstract

Introduction: Infected non-union of long bones presents a complex problem to the treating surgeon. The treatment of non-union traditionally followed a two-staged procedure. Single-stage procedure such as debridement and use of antibiotic cement impregnated intramedullary nails has been described in the literature currently.

Aim: To evaluate the clinical outcome of compound fractures of femur and tibia managed by antibiotic cement impregnated Küntscher nail.

Materials and Methods: This prospective study was done on 25 cases of infected non-union of femur and tibia. Functional results were evaluated with regard to control of infection, bony union, and complications.

Results: After an average follow-up of 8 months, infection was controlled in 24 of 25 (96%) patients; bone union was achieved in 23 of 25 patients (92%), rate of bony union average of 26 weeks for tibia, and 24 weeks for femur.

Conclusion: Antibiotic cement impregnated nailing is a simple, economical, and very effective procedure than traditional methods in management of infected non-unions of long bones.

Key words: Antibiotic cement impregnated nail, Infected non-union, Long bones

INTRODUCTION

Despite advances in antibiotics and operative treatment, infected non-union remains difficult to treat, with considerable morbidity, and health-care costs. Infected non-union has been defined as a state of failure of union for 6-8 months with persistent infection at the fracture site. The incidence seems to be increasing, especially in view of increasing high-velocity trauma, which is more frequently treated with internal fixation.¹ ³ The presence of poorly vascularized tissues, adherence of bacteria to bone, and implants along with slow bacterial replication rate contribute to persisting infection.⁴ ⁵

Infected non-union presents with dual problems of controlling infection and providing stability. We present our single-stage procedure of treatment, Küntscher nail coated with antibiotic cement, which combines local antibiotic delivery with good alignment and intramedullary fixation. The use of an antibiotic impregnated cement coated IM nailing for infected nonunion of tibia and femur fractures has been well-documented in the literature.⁶ ¹³ Antibiotic nail provides osseous stability which is important in the management of an infected nonunion. Second, antibiotic cement allows higher concentration of antibiotic at the local site than is achievable with systemic antibiotics and is associated with fewer side effects. Antibiotic cement has been shown to elute antibiotic at the local sites for up to 36 weeks thus having a therapeutic effect on refractory infection. Unlike traditional methods of management of infected non-union antibiotic cement-coated nailing acts as a single-stage procedure by providing stability and treating infection at the same time along with other advantages such as early mobilization, avoidance of pin site infections, ease of performance, and being cost-effective.
Aim
The aim of the study is to evaluate the clinical outcome of compound fractures of femur and tibia managed by antibiotic cement impregnated Küntscher nail.

MATERIALS AND METHODS
This is a prospective study of 25 cases of infected nonunion. One female and 24 male patients (age range, 21-65 years) were included in the study. 12 of the patients were Gustillo's classification Grade III B compound, two were Grade II Compound, two were Gr I compound and nine were closed fractures at the time of injury. All 25 patients had infected non-union at presentation, and 14 patients had bone defect ranging from 1 to 2.5 cms after initial debridement. Average follow-up was 8 months (range, 8-36 months). All patients were evaluated pre-operative with X-rays, hemoglobin, total count, differential count, sedimentation rate, C-reactive protein, pus C/S, comorbid medical issues, and allergy to vancomycin.

Preliminary thorough wound debridement was done. Vancomycin 4 g was mixed with 40 g standard viscosity gentamycin bone cement and was coated over Küntscher nail of appropriate length prepared. In case of the tibia, after selecting the Küntscher nail of appropriate length the Herzog’s bend of 8ºis created with bench-press 5 cm from the proximal end of Figure 1. Nail diameter is determined by the per-operative reaming diameter. The medullary canal is reamed up to the maximum diameter possible. Küntscher nail of 8 mm or 9 mm diameter is chosen and cement coated up to 1 mm less than diameter of the last reamer. When the cement reaches doughy consistency Küntscher nail is coated and manually rolled up to uniform diameter. Proximal eye of nail left open while distal nail tip cement is molded to smooth bullet-nose shape. Nail inspected for spotty coverage and smoothened. The diameter required is checked with Küntscher diameter measuring gauge and excess cement is shaved off and nail rerolled before the cement sets and diameter is rechecked. Bone cement is allowed to set for 15 min before insertion for the monomer to evaporate and to prevent cement nail debonding. After setting of cement, nail placed intramedullary. Primary wound closure is attempted alternatively staged plastic surgery procedures planned.

RESULTS
After an average follow-up of 8 months, infection was controlled in 24 of 25 (96%) patients (Table 1). Bone union was achieved in 23 of 25 patients (92%) (Table 2). Rate of bony union average of 26 weeks for Figure 2-4 and 24 weeks for Figure 5-7 (Table 3). Complications encountered were non-union persisting in 2 cases, broken and bending nail in 2 cases, and nail cement debonding in 2 cases. Recurrence of infection was observed in 1 patient (Table 4). According to Paley’s bony criteria, there were 20 excellent results, 2 good results, 1 fair, and 2 poor result, respectively. According to Paley’s functional criteria 18 excellent results, 5 good results and 2 poor results were recorded (Graphs 1 and 2).

DISCUSSION
The treatment of infected nonunion requires procedures to control the infection and to provide stability to achieve union. There is no single universally accepted modality of treatment presently available for the management of infected nonunion. Conventionally, infected non-union has been managed using two-step procedure to control the infection first and subsequently to treat the nonunion.

Delivery of antibiotics to the infection site systemically or locally is essential to control infection. Long-term

---

**Table 1: Control of infection**

<table>
<thead>
<tr>
<th>Bone treated</th>
<th>Number of cases</th>
<th>Infection controlled</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tibia</td>
<td>19</td>
<td>18</td>
<td>95</td>
</tr>
<tr>
<td>Femur</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 2: Bony union**

<table>
<thead>
<tr>
<th>Bone treated</th>
<th>Number of cases</th>
<th>Union</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tibia</td>
<td>19</td>
<td>18</td>
<td>95</td>
</tr>
<tr>
<td>Femur</td>
<td>6</td>
<td>5</td>
<td>95</td>
</tr>
</tbody>
</table>

**Table 3: Rate of union**

<table>
<thead>
<tr>
<th>Bone treated</th>
<th>Minimum duration (weeks)</th>
<th>Maximum duration (weeks)</th>
<th>Mean (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tibia</td>
<td>16</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>Femur</td>
<td>14</td>
<td>26</td>
<td>16</td>
</tr>
</tbody>
</table>

**Table 4: Complications**

<table>
<thead>
<tr>
<th>Complications</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-union persisting</td>
<td>2</td>
</tr>
<tr>
<td>Infection not controlled</td>
<td>1</td>
</tr>
<tr>
<td>Nail bending</td>
<td>1</td>
</tr>
<tr>
<td>Nail breakage</td>
<td>1</td>
</tr>
<tr>
<td>Proximal nail impingement</td>
<td>2</td>
</tr>
<tr>
<td>Distal nail migration</td>
<td>1</td>
</tr>
<tr>
<td>Nail cement debonding</td>
<td>2</td>
</tr>
</tbody>
</table>
infection and repeated debridement create excessive fibrosis around the non-union site and hinder antibiotic permeability.\textsuperscript{14} Hence, delivery of antibiotics to the local site is far more beneficial than systemic administration of antibiotics. The use of antibiotic-impregnated poly methyl methacrylate cement beads for local delivery of antibiotics without any systemic toxicity has been well documented for the management of osteomyelitis and open fractures.\textsuperscript{15,16} However, these antibiotic cement beads do not provide any stability across fracture site and cannot be placed in the intramedullary canal as it entails difficult removal due to fibrous ingrowths. Gentamycin and vancomycin are common choices for local delivery of antibiotics because of their broad spectrum of activity, heat stability, and low allergenicity. Vancomycin up to 4 g and gentamycin up to 2% per 40 g do not alter the mechanical property of bone cement. Elution of antibiotics follows a biphasic pattern, with an initial rapid phase and a secondary slow phase.\textsuperscript{9,17} Elution is at its maximum during the 1\textsuperscript{st} day, greatly declines on the 2\textsuperscript{nd} day, and then, gradually decreases over time and stabilize between days 5 and 10. Animal and clinical studies consistently have shown high local concentrations and undetectable or very low serum levels of the locally delivered antibiotics with no systemic toxicity. The systemic absorption of the locally delivered antimicrobial agent is limited and results in extremely low serum levels, which have ranged from 0.3 to 0.5 µg/mL in the case of gentamycin. Clinical and experimental studies show them to have good elution properties from bone cement, and no deleterious effects on bone healing. The process of surface adhesion and biofilm development is a survival
strategy employed by bacteria. This process is designed to anchor microorganisms in a nutritionally advantageous environment with adhesion to implant surface avoided in this technique. Control of infection in 24 out of 25 cases in our study is comparable to results of infection control in all cases by Ashok et al. Indian journal of orthopedics 2009. All cases were further managed with exchange nailing by Shyam et al., but exchange nailing was done for only 3 cases in our study to achieve bony union in 23 out 25 cases in our study. Qiang et al. have shown bony union in only 11 out of 19 cases. Thonse et al. have shown bony union in 17 out of 20 cases. Rate of bony union average of 26 weeks for tibia and 24 weeks for femur is comparable with results shown by Han et al. of 26.4 weeks for tibia and 31.5 weeks for femur.

CONCLUSION

Antibiotic cement impregnated nailing provides effective infection control and good stability to promote union. It is advantageous over external fixators and has good patient compliance. Thus, antibiotic cement impregnated nailing is a simple, economical, and very effective procedure when compared to the traditional methods in management of infected non-unions of long bones.
REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Spectrum of Reactive and Metastatic Pathologies in Evaluation of Peripheral Lymph Node in Tertiary Health Center

Momota Naiding¹, Shipra Singh², Sikha Agarwal², R N Choubey³

¹Associate Professor, Department of Pathology, Silchar Medical College and Hospital, Silchar, Assam, India, ²Post Graduate Trainee, Department of Pathology, Silchar Medical College and Hospital, Silchar, Assam, India, ³Professor, Department of Pathology, Silchar Medical College and Hospital, Silchar, Assam, India

Abstract

Introduction: Lymphadenopathy is commonly encountered clinical entity. Appropriate diagnosis and thus treatment modality of cause is important in approach to such cases. Fine-needle aspiration cytology being less discomforting to patients is preferred before going for open biopsy of such swellings.

Purpose of Study: The aim of this study was to evaluate the spectrum from reactive pathologies to metastases to peripheral lymph nodes in various malignancies in tertiary health center.

Materials and Methods: The data pertaining to the details of the patients who underwent fine-needle aspiration (FNA) evaluation of superficial and deep lymph nodes from the period May 2016 to May 2017 at Silchar Medical College and Hospital, Silchar was analyzed to determine the age- and sex-distribution of the patients and the distribution of pathologies diagnosed on FNA evaluation of the lymph nodes.

Results: In this study, a total of 128 patients underwent evaluation of peripheral lymphadenopathies. 58 were male patients (74.24%) outnumbering females (25.76%). The majority of patients were in age group of 21-60 years. Non-specific reactive lymphadenitis is most common cause for reactive hyperplasia of lymph nodes followed by granulomatous lymphadenitis. Among various metastatic malignancies squamous cell carcinoma metastasis are most common.

Conclusion: FNA evaluation is a quick, easy, relatively non-traumatic, and, in expert hands, a reliable method of diagnosing the pathology underlying enlarged peripheral lymph nodes.

Key words: Peripheral lymphadenopathy, Reactive hyperplasia of lymph nodes, Squamous cell carcinoma metastasis

INTRODUCTION

Among patients attending the outdoor department one of the most common clinical presentations is lymphadenopathy. Spectrum of etiology varies from inflammatory causes to malignant ones.¹ Fine-needle aspiration cytology (FNAC) is a clinical technique to obtain cells, tissues and/or fluid through a thin needle attached with disposable syringe for the purpose of diagnosis of enlarged swellings.² De may has summarized the FNAC with the acronym of SAFE: Simple, accurate, fast, and economical.³ It can differentiate between non-neoplastic and neoplastic lesions.⁴,⁵ Because of early availability of results, simplicity, minimal trauma, and absence of complications, the aspiration cytology is now considered a valuable diagnostic aid. The cytomorphological features collaborates with histopathology and has qualities of a micro-biopsy.⁶ The outcome of FNAC can be improved by proper clinical assessment of lesion, careful procedure, and adequate smear preparation.

This study was undertaken to identify the causes of lymphadenopathy among patients referred for FNAC evaluation of their enlarged lymph nodes to the department of our tertiary care hospital located in Silchar, India.
MATERIALS AND METHODS

In this study, retrospective, systematic data were retrieved from existing records in Department of Pathology, Silchar Medical College and Hospital.

During the study period of 1 year (May 2016 to May 2017), a total of 128 patients were referred to cytopathology Department in Silchar Medical College and Hospital for FNAC of single or multiple enlargements of lymph nodes. Patients with either superficial or deep lymph node enlargements were included in the study.

These patients underwent FNAC evaluation of enlarged lymph nodes using 22 to 23 G needles with 10 cc syringe attached. Consent was taken before aspiration procedure. Consequent to the study clinical profile of each patient pursuing relevant investigation results were collected.

Smears were prepared on clean glass slides as per standard techniques, and the smears either wet fixed by immersing the slides in 95% methanol or air-dried. Where aspirate was scanty, all slides were wet-fixed only. Wet-fixed smears were stained by hematoxylin and eosin and Papanicolaou’s (Pap) stains. Air-dried smears were stained by Giemsa stain. Special stains like Ziehl–Neelsen stains were also used wherever required.

All slides after staining were mounted using standard cover slips, and then, analyzed by standard microscopy. Diagnosis was made by either a single cytopathologist or, where mandated, by two or more cytopathologists. In cases where malignant deposits or lymphoproliferative disorders were diagnosed on FNAC, it was recommended that the patients be referred to biopsy and histopathologic examination of the lesions.

At the end of the study period, the results of the FNAC analyses were retrieved from the cytopathology archives and analyzed to establish the spectrum of pathologies reported on FNAC during the period under study. The age and gender profile of the patients was also studied. Data were analyzed using MS Excel sheet and calculations of incidence made from the same.

No correlation with biopsy reports was undertaken during this study as in the majority of cases excised lymph nodes were not received for histopathological evaluation.

RESULTS

A total of 128 patients reported for FNAC evaluation of enlarged peripheral lymph nodes during the period May 2016 to May 2017. The distribution of lesions diagnosed is given in Figure 1. During the entire study period, a diagnosis of non-specific reactive lymphadenitis was given in 54 aspirates, out of 128 (42.25% of cases) and was the most common diagnosis offered. Granulomatous lymphadenitis, caseating or non-caseating, was diagnosed in 42 aspirates (33.15%) and was the second most common diagnosis offered.

The age and gender distribution of all the cases, year wise, is given in Table 1. Male patients constituted 74.24% of the cases overall (95 out of 128 aspirates). Most of the patients were in the age group 21-60 years. No age or gender specific predilection was seen for any of the pathologies reported.

Granulomatous lymphadenitis was diagnosed by the presence of epithelioid cell granulomas, with or without central caseating necrosis. We routinely do AFB stain on such smears in our laboratory.

In our spectrum, non-specific reactive lymphadenitis is most common pathology. Key features to assign the diagnosis of the same are the presence of polymorphous lymphoid population and tingible body macrophage.

Among small round cell tumor (which total count for 9 cases out of 128; 7.03%), in six cases poorly differentiated carcinoma were suspected while in three cases provisionally, diagnosis of non-Hodgkins lymphoma was given.

Non-Hodgkin’s lymphoma was diagnosed by the presence of a monotonously uniform population of lymphocytic cells scattered singly in a highly cellular smear and the absence of Reed Sternberg cells.

Diagnosis of metastatic deposits was seen in 16 cases. Possible types of metastatic deposits are given in Table 2. The majority of cases are above 50 years of age. Metastatic...
squamous cell carcinoma is the most common etiology seen. However, for the rest, distribution is fairly equal among all morphologies.

Metastatic deposits were diagnosed based upon morphological patterns and cellular details. Squamous cell carcinoma and adenocarcinoma metastases are shown in Figures 2-9.

No opinion was possible in 2 out of 128 cases (1.56%) due to inadequate aspirated material on the smears. This was due to the extremely small size of the lymph nodes accessed.

**DISCUSSION**

FNAC is a valuable diagnostic tool for establishing a diagnosis in cases of superficial lymphadenopathy. This technique has limited the need for excision of enlarged lymph nodes, especially in cases of reactive and tubercular lymphadenitis. However, gray areas still exist in the establishment of an exact diagnosis, especially in the case of one of the small round cell tumors, where distinguishing low-grade non-Hodgkin's lymphoma from a reactive hyperplasia may pose a diagnostic dilemma even in experienced hands.

In this series of cases, non-specific reactive lymphadenitis was the most common diagnosis. Similar findings were noted by Shrivastav et al., Mohanty and Wilkinson and Pandey et al. This is in contrast to the series of Shah et al. where tubercular lymphadenitis was the most common diagnosis. In this...
series, granulomatous lymphadenitis was the second most common diagnosis offered.

In the series of Kumar et al. and Shilpa and Nataraju, reactive lymph node hyperplasia was the second most common diagnosis.\textsuperscript{11,12} The relative frequency of pathologies varies with the type of hospital and the demographics of the dependent population.\textsuperscript{13,14}

In this study, there was a preponderance of male patients with a total of 95 (74.24\%) in concordance to other studies.\textsuperscript{1,15-17} No reason for this difference can be ascribed.

Metastatic deposits in the enlarged lymph nodes were diagnosed in 16 cases (12.5\%). Among the metastatic lesions diagnosed, metastatic squamous cell carcinoma was the most common microscopic variant seen.

Other series showed a higher incidence of squamous cell carcinoma.\textsuperscript{13,14} There was no significantly higher incidence of any particular microscopic variant among the metastatic deposits reported in our study.

Small round cell tumors were diagnosed in 9 out of 128 cases (7.03\%) and formed a very small percentage of the total pathologies reported.

Dowerah et al., however, reported an incidence of 10.6\% cases of lymphomas in their series.\textsuperscript{15}

Excision biopsy of the affected lymph node was done in one case of non-Hodgkin's lymphoma, and histopathological evaluation of the excised node confirmed the diagnosis.

Other pathologies in our series were acute suppurative lymphadenitis and granulomatous lymphadenitis which was found in 5 (3.91\%) and 42 (32.81\%) aspirates, respectively. Shah et al. reported 30 cases of acute lymphadenitis in their series of 555 aspirates analyzed (5.4\%) which is similar to our findings.

**CONCLUSION**

Being a convenient, non-traumatic, and quick invasive procedure, FNAC continues to be an important tool in
diagnosing lymph nodes pathologies. We found that the majority of patients had non-specific reactive lymphadenitis in our series; granulomatous lymphadenitis was the second most common pathology. Metastatic deposits constituted 12.5% of the pathologies. It is better to perform FNAC for possible cytological diagnosis than to plan for invasive procedure of open biopsy.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Various Prognostic Parameters in Carcinoma Breast Patients: A Prospective Study

Vijay Kumar¹, Sunil Bhat², Atul Agarwal¹, Bikramjit Singh Sodhi¹

¹Assistant Professor, Department of Surgery, G S Medical College and Hospital, Pilkhuwa, Hapur, Uttar Pradesh, India, ²Senior Resident, Department of Surgery, Government Medical College, Jammu, Jammu and Kashmir, India

Incidence of breast carcinoma is increasing in most countries at a mean rate of 1-2% annually. And soon nearly one million of women will develop this disease every year throughout the world.4-7

Mortality rate for breast carcinoma in the Western world is of the order of 15-25 per 1 lakh women. This mortality rate is also increasing in Indian women, but at a much slower pace (Peckham, 1995). Breast cancer is responsible for 19% of all cancer-related death of women in the world.

Breast cancer incidence in female by the site in India is 20%. The cumulative incidence up to the age of 64 years is 1-2%; thus one out of every 43-58 Indian women would develop breast cancer during her life (NCRP, 88-89).

In the last two decades, the treatment of breast cancer has undergone dramatic changes, and a much wider range of both local and systemic therapeutic options are now available. Early diagnosis, especially by the advent of mammographic breast screening, is detecting tumors which...
are likely to have a favorable outcome and it has become extremely important to assess prognosis for each patient before a therapeutic plan is agreed.\textsuperscript{7-15}

Modified radical mastectomy has been considered the optimal treatment for locoregional breast cancer. Despite this, the reported incidence of locoregional failure after mastectomy varies from \(<5\%\) to \(>30\%\). Once a local recurrence is detected, treatment recommendations vary widely and frequently include different combinations of surgical resection, external radiation therapy, hormone therapy, and/or chemotherapy.

The factors concerned with the prognosis of breast carcinoma are complex. The prognosis of carcinoma of breast correlates with age at occurrence, menopausal status, tumor size, presence and number of involved axillary lymph nodes, family history, histological type of tumor, presence of tumor necrosis, lymphovascular embolization, extranodal extension, grade of tumor, treatment modality, skin involvement, etc.\textsuperscript{16-20}

**Aims and Objectives**

1. To analyze the efficacy of various prognostic factors in carcinoma breast.
2. To identify the most important prognostic factor in carcinoma breast.

**MATERIALS AND METHODS**

The present study has been conducted retrospectively and prospectively on all patients of histologically proved carcinoma of the breast, who were admitted in the surgical wards of S V B P Hospital, Meerut, since January 1993 to October 2004.

Retrospective study has been conducted from January 1993 to July 2003 and prospective study from June 2003 to October 2004.

All the patients included in the prospective study have been thoroughly interrogated and clinically examined.

The patients included in the retrospective study have been studied from old records of central record section of S.V.B.P hospital; Meerut and these cases have been followed up by contacts and letters.

**Inclusion Criteria**

All female patients with histologically proven breast carcinoma.

**Exclusion Criteria**

Patients with significant comorbidities and Stage IV breast carcinoma.

**RESULTS**

This study comprises 525 patients of carcinoma breast who were admitted in surgical wards of S.V.B.P Hospital Meerut, since January 1993 to October 2004. Patients with Stage I, II, and III disease at the time of presentation were included in the study but patients with Stage IV disease at the time of presentation were excluded due to lack of records.

These patients were investigated as per protocol. Follow-up was done by records and contacts and it was recorded on a pro forma.

Out of 738 patients, 82 presented with Stage IV disease so, were excluded from the study. The present study includes remaining 656 patients followed up for 5 years and within 5 years; follow-up could be evaluated in 525 patients (Tables 1-11).

**DISCUSSION**

Out of these 525 patients, youngest patient was of 22 years of age and oldest was 80 years of age. Our most of the patients were in the age group of 41-50 years (28.19\%), i.e., around menopause. It was found that the prognosis was best in the age group 41 to 50 years (5-year disease free survival [DFS] 60.81\%). Furthermore, the survival was found to be 43.47\% in age group 21-30 years and 46.42\% in age group 31-40 years.

**Table 1: DFS according to age**

<table>
<thead>
<tr>
<th>Age</th>
<th>No. of patients</th>
<th>1 year DFS</th>
<th>2 year DFS</th>
<th>3 year DFS</th>
<th>4 year DFS</th>
<th>5 year DFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-30</td>
<td>23</td>
<td>19 (82.60)</td>
<td>15 (65.21)</td>
<td>14 (60.86)</td>
<td>13 (56.62)</td>
<td>10 (43.47)</td>
</tr>
<tr>
<td>31-40</td>
<td>127</td>
<td>110 (86.61)</td>
<td>88 (69.29)</td>
<td>80 (62.99)</td>
<td>74 (58.26)</td>
<td>64 (50.39)</td>
</tr>
<tr>
<td>41-50</td>
<td>148</td>
<td>133 (89.86)</td>
<td>114 (77.02)</td>
<td>108 (72.97)</td>
<td>100 (67.56)</td>
<td>90 (60.81)</td>
</tr>
<tr>
<td>51-60</td>
<td>107</td>
<td>91 (85.04)</td>
<td>74 (69.15)</td>
<td>69 (64.48)</td>
<td>63 (58.87)</td>
<td>54 (50.46)</td>
</tr>
<tr>
<td>61-70</td>
<td>92</td>
<td>79 (85.86)</td>
<td>62 (67.39)</td>
<td>57 (61.95)</td>
<td>53 (57.60)</td>
<td>44 (47.82)</td>
</tr>
<tr>
<td>71-80</td>
<td>28</td>
<td>23 (82.14)</td>
<td>18 (64.28)</td>
<td>18 (64.28)</td>
<td>16 (57.14)</td>
<td>13 (46.42)</td>
</tr>
<tr>
<td>Total</td>
<td>525</td>
<td>455 (86.66)</td>
<td>371 (70.66)</td>
<td>346 (65.90)</td>
<td>319 (60.76)</td>
<td>275 (52.38)</td>
</tr>
</tbody>
</table>

DFS: Disease free survival
Kumar, et al.: Importance of Prognostic Factors in Breast Carcinoma

in patients of 71-80 years of age. Similar observation was made by Host and Lund in (1986), in this study, the maximum number of patients were in Stage III and they showed least 5-year DFS (47.40% for Stage III A and 35.18% for Stage III B) as compared with patients in Stage I and II disease having 5-year DFS of 66.97% and 57.80%, respectively. Fisher et al. in (1984) and William et al. in (1992) reported a similar observation.21-23

In this study, it was found that patients with positive family history had a 5-year DFS of 47.16% as compared to patients with negative family history (5 year DFS

<table>
<thead>
<tr>
<th>Table 2: Disease free survival according to clinical stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical stage</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>I</td>
</tr>
<tr>
<td>II</td>
</tr>
<tr>
<td>II A</td>
</tr>
<tr>
<td>II B</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

DFS: Disease free survival

<table>
<thead>
<tr>
<th>Table 3: DFS according to family history</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family history</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Negative</td>
</tr>
<tr>
<td>Positive</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

DFS: Disease free survival

<table>
<thead>
<tr>
<th>Table 4: Disease free survival according to menopausal status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>Premenopausal</td>
</tr>
<tr>
<td>Postmenopausal</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

DFS: Disease free survival

<table>
<thead>
<tr>
<th>Table 5: DFS according to tumor size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumor size</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>T1</td>
</tr>
<tr>
<td>T2</td>
</tr>
<tr>
<td>T3</td>
</tr>
<tr>
<td>T4</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

DFS: Disease free survival

<table>
<thead>
<tr>
<th>Table 6: DFS according to axillary lymph node status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node status</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>Negative</td>
</tr>
<tr>
<td>1-3 nodes</td>
</tr>
<tr>
<td>4-6 nodes</td>
</tr>
<tr>
<td>6-10 nodes</td>
</tr>
<tr>
<td>&gt;10 nodes</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

DFS: Disease free survival
In our study, 232 patients were premenopausal and 279 patients were postmenopausal and the analysis revealed that prognosis was better in postmenopausal patients (5-year DFS was found to be 48.70% in premenopausal patients and 60.93% in postmenopausal patients).

Tumor size is an important prognostic parameter. In our study it was found that patients with T1 disease had 5-year DFS 72.63% and patients with T4 disease, 5-year DFS of 40.20%, this indicates better prognosis in patients with small tumor size, this has already been emphasized by Carter et al. (1989), Valagussa et al. (1978), and William et al. (1992).

Hormone receptors status played an important role in the prognosis of carcinoma breast. It is an important determinant of response to endocrine therapy. The present study of 129 patients who had records about their hormone receptor status, clearly showed that patients with ER/PR positive tumors have better survival than patients without them.
In the present study, it was found that patients with positive and negative ER/PR status had a 5-year DFS rate of 58.62% and 39.60%, respectively. While patients with ER/PR status unknown had a 5-year DFS of only 39.60%. Similar observations have been made by Crowe et al. (1986), Anderson et al. (1990), Battifora et al. (1993), Aaltoma et al. (1993), and Allred et al. (1990). While Fisher et al. (1990) found that the difference in 5-year DFS between 1426 patients with ER and 372 without it was negligible. Similarly, Donegan (1992) stated that estrogen and progesterone receptors provide prognostic information that is independent of axillary stage, but the influence is weak.

Axillary lymph node status is an important predictor of prognosis in carcinoma of breast patients. The number of involved nodes is directly related to the period of disease free interval. In the present series the 5-year DFS rate in lymph node negative patients was 73.75% and in those with 1-3 positive nodes was 50.92% while in the patients with more than 10 involved nodes, the 5-year DFS was found to be only 08.82%. This has already been by proved by Voogd (2001), Wilner (1993), Williams (1992), and Crowe (1991).

Histological grade is an important determinant of prognosis. In our study of 450 patients, the 5-year DFS in Grades I, II and III tumors was found to be 63.44%, 54.61%, and 33.33%, respectively. The negative impact of poor histological grade on survival was also reported by Le Doussal et al. (1989).

Lymphovascular embolization is an important prognostic parameter. In the present series of 354 patients, it was found that patients, in whom lymphovascular embolization was present, showed a 5-year DFS of 28.69% and in those patients not having lymphovascular embolization, 58.80. The poor prognosis in tumors with lymphovascular embolization has been shown by Davis et al. (1986), MacMillan et al. (1996). Pinder et al. (1994), and Clemente et al. (1992).

Tumor necrosis carries a worse prognosis. In our study of 418 patients, it was found that patients in whom tumor necrosis was present, showed a 5-year DFS of 30.76% and patients without tumor necrosis showed a 5-year DFS of 59.80%. Similar observations have been made by Gilchrist et al. (1988).

Perinodal extension is an important prognostic parameter. In our study of 347 patients, it was found that patients having perinodal extension were found to have 5-year disease tree survival of 20.20% as compared to patients without it with 5-year DFS of 60.86%. This has also been shown by Mambo et al. (1977). Dongan et al. (1993) and Fisher et al. (1976) while Hartevit et al. (1984) found that extra nodal extension had no intrinsic prognostic significance and concluded that the presence of tumor cells in efferent vessels was the only indicator of poorer prognosis in patients with involved nodes.

Radiotherapy as a treatment modality improves the chances of survival. In our study 187 patients, treated by surgery and chemotherapy, showed 5-year DFS rate of 69.51%. Survival was improved to 72.85% when in 70 patients of the other group, radiotherapy was added surgery alone without any adjuvant therapy offered least chances of DFS (26.66%). The 5-year DFS improved to 69.51% with the introduction of chemotherapy and it further improved by adding radiotherapy (72.85%). Davis et al., (1986) in their study also found better survival with the addition of adjuvant chemo or endocrine therapy in patients of breast cancer.

Neoadjuvant chemotherapy was given in locally advanced breast cancers to allow conservative surgery. However, it offered no survival benefit. In our study, it was found that 5-year DFS rate was 49.64% in patients who were given neoadjuvant chemotherapy as compared to 69.51% in whom chemotherapy was given after surgery.

Summary
The present study comprise 525 patients who were admitted in the indoor, Department of Surgery S.V.B.P Hospital Meerut, during January 1993 to October 2004.

Most of the patients were in the age group of 41-50 years (28.19%), i.e., around menopause.

Prognosis was best in the age group 41-50 years (5-year DFS 60.81%).

There was no significant difference in survival was between age group 2-30 years and 71-80 years of age. 5-year DFS was found to be 43.47% and 46.42% in the, respective, age groups.

Higher tumor grade was associated with poor prognosis. The 5-year DFS was found to be 47.40% for Stage III A and 35.18% for Stage III B as compared with 66.97% and 57.80% in patients with Stage I and II disease, respectively.

Positive family history was found to be associated with poor prognosis. 5-year DFS in patients with positive family history was found to be 47.16% as compared to patients with negative family history with 5-year DFS of 62.93.

Prognosis was found better in postmenopausal patients. 5-year DFS was found to be 48.70% in premenopausal patients and 60.93% in postmenopausal patients.
Tumor size is an important prognostic parameter and better prognosis was found in patients with small tumor size. Patients with T1 disease had 5-year DFS 72.63% and patients with T4 disease 5-year DFS of 40.20%.

Hormone receptors status is a powerful prognostic parameter. In the present study of 129 patients who had records about their hormone receptor status, patients with positive ER/PR status had better survival than patients with negative ER/PR status, with a 5-year DFS rate of 58.62% and 39.60%, respectively.

Axillary lymph node status is an important predictor of prognosis. The 5-year DFS rates were found to be reduced with the increase in the number of involved lymph nodes. The 5-year DFS rate in lymph node negative patients was 73.75% and in those with 1-3 positive nodes was 50.92% while in the patients with more than 10 involved nodes, showed a 5-year DFS rate of only 08.82%.

Histological grade is an important determinant of prognosis. The poor histological grade was associated with reduced survival. The 5-year DFS in Grade I, II, and III tumors was found to be 63.44%, 54.61%, and 33.33%, respectively.

Lymphovascular embolization carried a poor prognosis. The patients with lymphovascular embolization showed a 5-year DFS of 28.69% compared with 58.80% 5-year DFS rate in patients not having lymphovascular embolization.

Tumor necrosis was associated with poor prognosis. Patients in whom tumor necrosis was present showed a 5-year DFS of 30.76% compared with patients without tumor necrosis with a 5-year DFS of 59.80%.

Perinodal extension is an important prognostic parameter. Patients having perinodal extension were found to have 5-year DFS of 20.20% as compared to patients without it with 5-year DFS of 60.86%.

Radiotherapy improves the chances of survival. Patients treated by surgery and chemotherapy showed 5-year DFS rate of 69.51%. Survival was improved to 72.85% when radiotherapy was added.

Surgery alone without any adjuvant therapy carried a poor prognosis with 5-year DFS (26.66%). The 5-year DFS improved to 69.51% with the introduction of chemotherapy and it further improved by adding radiotherapy (72.85%).

Neoadjuvant chemotherapy offered no survival benefit. In our study, it was found that 5-year DFS rate was 49.64% in patients who were given neoadjuvant chemotherapy as compared to 69.51% in whom chemotherapy was given after surgery.

CONCLUSIONS

The conclusion derived from the present study is as follows:
1. Prognosis was best in age group 41-50.
2. There was no significant difference in survival was between age group 21-30 years and 71-80 years of age.
3. Higher tumor grade was associated with poor prognosis.
4. Positive family history was found to be associated with poor prognosis.
5. Prognosis was found better in postmenopausal patients.
6. Tumor size is an important prognostic parameter, and better prognosis was found in patients with small tumor size.
7. Hormone receptors status is a powerful prognostic parameter. Patients with positive ER/PR status had better survival than patients negative ER/PR status.
8. Axillary lymph node status is an important predictor of prognosis. The 5-year DFS rates were found to be reduced with the increase in the number of involved lymph nodes.
9. Histological grade is an important determinant of prognosis. The poor histological grade was associated with reduced survival.
10. Lymphovascular embolization carried a poor prognosis. The patients with lymphovascular embolization showed a worse 5-year DFS compared with patients not having lymphovascular embolization.
11. Tumor necrosis was associated with poor prognosis.
12. Perinodal extension is an important prognostic parameter patients having perinodal extension were found to have worse 5-year DFS as compared to patients without it.
13. 5-year DFS was improved when radiotherapy was added to the surgery. Thus, radiotherapy improves the chances of survival.
14. Surgery alone without any adjuvant therapy carried a poor prognosis. The 5-year DFS improved with the introduction of chemotherapy and it further improved by adding radiotherapy to the surgery.
15. Neoadjuvant chemotherapy offered no survival benefit.

REFERENCES

Kumar, et al.: Importance of Prognostic Factors in Breast Carcinoma


Source of Support: Nil, Conflict of Interest: None declared.
Study of Intraurethral Instillation of Tacrolimus for Urethral Involvement Following Lichen Sclerosus

Ranjan K Dey¹, Imran Khan², Dawood Khan²
¹Associate Professor, Department of Urology, R. G. Kar Medical College and Hospital, Kolkata, West Bengal, India, ²Post Doctoral Student, Department of Urology, R. G. Kar Medical College and Hospital, Kolkata, West Bengal, India

Abstract
Introductiön: Lichen sclerosus (LS) is a lymphocyte-mediated inflammatory process that in men affects the genital skin and also the urethra, causing urethral stricture. Formerly known as balanitis xerotica obliterans, LS is the most common cause of long panurethral stricture in males. Medical management of LS in the form of topical steroids, immunomodulators like tacrolimus, and systemic retinoid acitretin have been described for diseases involving the prepuce and glans. Urethral involvement usually requires surgical intervention. This study was done to assess the efficacy of intraurethral instillation of tacrolimus as a nonsurgical modality.

Materials and Methods: Type of study: This is a prospective nonrandomized observational study. The study included 20 men with histology proven genital LS with variable length of anterior urethral involvement proximal to fossa navicularis. Pretreatment uroflowmetry and ultrasonography were done for flow and post-void residual urine status. All the patients underwent suprapubic cystostomy before therapy, for longer intraurethral dwell time of tacrolimus. Patients also underwent meatotomy for associated meatal stenosis. 1 g of 0.03% tacrolimus was instilled intraurethrally twice a day for 6 weeks. Reassessment was done at 6 weeks and 12 weeks.

Results: A total of 15 patients (75%) responded favorably to the treatment with significant improvement at 6 weeks sustained at 3 months. Four patients did not respond to the treatment. One patient showed objective and subjective improvement but found the process cumbersome and opted for Urethroplasty. The most common patient’s complaint was of urethral discomfort and perineal heaviness for the initial few days, which subsided on its own.

Discussion: Intraurethral instillation of tacrolimus provides a minimally invasive tool for management of one of the difficult urethral strictures to treat. The treatment modality fulfills the three basic goals of urethral stricture management - unobstructed voiding, painless intercourse, and good cosmesis.

Key words: Intraurethral instillation, Lichen sclerosus, Tacrolimus

INTRODUCTION

Lichen sclerosus (LS) is an inflammatory disease that can affect both men and women and shows a predilection for the anogenital region. It is a lymphocyte-mediated process that in men affects the genital skin and also the urethra, causing urethral stricture. Formerly known as balanitis xerotica obliterans (BXO), LS was first described in the late 19th century and the male form specifically by Stuhmer in 1928.¹ The term BXO had been used interchangeably with LS; however, LS is currently used exclusively since the formal adoption of the term by the international society for the study of vulvar disease.² LS is the most common cause of long panurethral stricture in males.³,⁴

The exact etiology of LS is yet to be established, with multiple theories regarding infection, trauma, genetic, and autoimmune disorders. Of these, autoimmune etiology is the most prevalent theory.⁵,⁷ Multiple infectious agents have been investigated for a link to LS including borrelia burgdorferi⁸ and human papilloma virus;⁹,¹¹ however, there is no conclusive evidence which can show a causative relationship.
BXO is a rare disease that affects only 6 of 1000 males (0.06%). The condition can effect male of any age, but condition rises steadily through the 3rd decade with maximum incidence in the 6th decade of life. LS is most commonly found in the genital region with a 5:1 ratio of genital compared with extragenital involvement. LS almost always involve the foreskin/glans and in severe cases involve the meatus and urethra up to variable length.

Medical management of LS in the form of topical steroids, immunomodulators like tacrolimus, and systemic retinoid acitretin has been described. However, these have been restricted for diseases involving the prepuce and glans. Disease involving the urethra usually requires some form of surgical intervention, with a variable rate of recurrences depending on the surgical procedure and the type of tissue used for substitution.

We performed this study to assess the efficacy of intraurethral instillation of tacrolimus as a nonsurgical modality of treatment for anterior urethral stricture due to LS extending proximal to the fossa navicularis up to variable length.

**MATERIALS AND METHODS**

**Type of Study**
This was a prospective, nonrandomized study.

**Inclusion Criteria**
The study included 20 men with histology proven genital LS with variable length of anterior urethral involvement proximal to fossa navicularis.

**Exclusion Criteria**
Patients with upper tract changes and altered renal function (serum creatinine > 1.5) were excluded from the study.

A detailed history and clinical examination was done. Blood investigations for renal function (serum creatinine), complete blood count, glycated hemoglobin (HbA1C), and liver function test were done. Patients had uroflowmetry on two consecutive days and higher of the two values for $Q_{\text{max}}$ was taken. In the same way, ultrasonography was done on two separate occasions, 24 h apart; lower of the two residual urine value was taken. Retrograde urethrogram (RGU) was done to assess the involvement of the urethra, and whenever possible, the patients underwent ureteroscopy with a 6Fr ureteroscope to confirm the findings of the RGU, look for the proximal extent of the disease and baseline documentation of the condition of the urethra before starting the therapy.

Any urinary tract infection if present was treated. All the patients underwent suprapubic cystostomy (SPC) before therapy, which allowed for longer intraurethral dwell time of tacrolimus and rest to the urethra. Patients also underwent meatomomy for associated meatal stenosis. 1 g of 0.03% tacrolimus was instilled intraurethrally twice a day for 6 weeks.

At 6 weeks, SPC was clamped and patients were asked to void per urethra. Patients were assessed for subjective and objective (in the form of $Q_{\text{max}}$ and post-void residual [PVRV]) improvement of voiding. Repeat RGU were done at 6 weeks. Blood investigations were done at 6 weeks to look for any systemic effects of tacrolimus.

If the patient showed subjective and objective improvement at 6 weeks, the frequency of intraurethral instillation was reduced to once in the night time. Patients continued to void per urethra and were assessed again at 3 months, and if there was persistent improvement, SPC was removed.

**RESULTS**

Majority of our patients were in the 4th and 5th decade of life with the youngest being 28 years and the oldest being 65 years of age. All the patients were histologically proven LS cases having significant obstructive lower urinary tract symptoms. A total of 15 patients (75%) had pan anterior urethral stricture, whereas rest 5 (25%) had involvement up to variable length into the penile urethra.

A total of 15 patients (75%) responded favorably to the treatment (Figure 1). There was significant improvement at 6 weeks in PVRV (mean of differences 126.3, 95% confidence interval [CI]=100.4-152.2, $P < 0.05$) and $Q_{\text{max}}$ (mean of differences 6.440, 95% CI=5.126-7.754, $P < 0.05$)
and the changes in $Q_{\text{max}}$ were sustained at 3 months. None of the patients showed deterioration of the renal function or upper tract changes at 3 months. One of the patients who were an amputee showed excellent results at the end of 6 weeks, with a $Q_{\text{max}}$ of 36.4 ml/s (Figure 2).

Four patients did not respond to the treatment at the end of 6 weeks of therapy, including two patients having diabetes mellitus (Figure 3). One patient had recurrent attacks of urinary tract infection and was taken up for urethroplasty. Total five breaks through urinary tract infections which were there over the course of study and controlled with oral antibiotics. One patient showed objective and subjective improvement but found the process twice daily intraurethral instillation cumbersome and opted for urethroplasty. A motivated patient and involvement of the spouse can come a long way in improving compliance of patients.

The Most common patient’s complaint was of urethral discomfort and perineal heaviness for the initial few days, which subsided on its own. None of the patients had any adverse changes in blood count, HbA1C (even patients with diabetes mellitus), liver function test which might rule out systemic absorption of tacrolimus when instilled intraurethrally.

All of the patients were sexually active and satisfied during the study period. None of the female partners complained of vaginal irritation or discomfort after intercourse.

**DISCUSSION**

Genital LS is a chronic, debilitating, and inflammatory condition that impairs urinary flow, affects sexual function and in turn affecting the psychosocial status of patient. It can affect any age group but is more prevalent in the third to fifth decade of life.

The clinical presentation and severity of genital LS can vary markedly. The onset may be insidious, pursuing a chronic course over many years with few early symptoms, or it may behave aggressively with florid disease evident within weeks of onset. Urethral involvement starts at the meatus and in long-standing disease mucosal involvement, and spongiform fibrosis can spread proximally in a confluent manner as far back as the prostate. However, it has not been found in bladder mucosa. The proximal extent is usually well demarcated when in the penile urethra, although with more extensive bulb extension of the disease, the mucosal changes may fade indistinguishably, and sometimes, there are minor mucosal “skip” lesions beyond the apparent posterior limit.

Differential diagnosis might include lichen planus, localized scleroderma, leukoplaikia, vitiligo, and the cutaneous rash of Lyme disease.

There are three goals for maintenance in male patients with genital LS: Unobstructed voiding, painless intercourse, and adequate cosmesis. If we achieve Goals 1 and 2, most patients rarely wish to move forward with more invasive therapies to achieve Goal number 3.

LS has been managed both medically and surgically. Medical management has been undertaken for mainly for early disease confined to the cutaneous surface. Topical corticosteroids have been the mainstay of medical management of LS. In a double-blind, placebo-controlled study of 40 boys with LS, 41% showed clinical improvement with steroid administration. Steroid preparations used include clobetasol propionate (0.05%), betamethasone (0.05%), mometasone (0.1%), and hydrocortisone (2.5-10%). Potential side effects of corticosteroids include cutaneous atrophy, adrenal suppression, and contact sensitivity.

LS of glans has been successfully treated with the tacrolimus which is a calcineurin inhibitor that blocks the production of interleukin-2 and T-cell activation. There have been encouraging studies with respect to the efficacy of tacrolimus for both primary and maintenance treatment of BXO, which was the basis of our study.

For urethral involvement of varying degree, usually surgery is preferred, especially long segment urethral stricture.
There is no doubt that surgery provides the best results in management strictures arising out of BXO, but surgery in itself is associated with its own set of complications.

Repeated urethral dilatation is usually associated with very high recurrence rates, and the second and third dilatations for early recurrence (within 3 months) are of very little, if any value.  

Recurrences after surgical therapy are not uncommon in BXO, with rates as low as 9-12% with buccal mucosal grafts, to as high as 50-100% when local flaps are used. Initial response to intraurethral tacrolimus instillation was quite acceptable (75%) and longer term follow-up is required, especially to assess response on the tacrolimus is stopped.

Urethroplasty is a major surgical undertaking with its own set of complications. Patients may be subjected to staged procedures, especially in BXO associated strictures, where patients land up with a temporary proximal ureterostomy and in some cases permanent ones. Potential buccal harvest site complications include hemorrhage, pain, facial swelling, damage to Stensen’s duct, lip paresthesia, and restriction in mouth opening.

Many a time, age-associated comorbidities and health status become limiting factor for a major surgical undertaking. At times, we come across patients who cannot tolerate even the reasonable mild stressors of a perineal ureterostomy and intraurethral instillation of tacrolimus can be used in these patients.

Urethroplasties are associated with erectile dysfunction in varying proportion, i.e., from 1% to 50%, and from erectile dysfunction, surgery for anterior urethral stricture may be associated with change in the erect penile length and chordee of varying degree. Men with longer anterior urethral stricture and in those patients in whom penile skin flaps are used are at greater risk for erectile dysfunction. None of our patients complained of sexual dysfunction post-tacrolimus usage.

The carbon dioxide laser has been used as an alternative to incisional surgery to ablate BXO on the glans and for the dilatation of proximal strictures, with a variable success rate.

Intraurethral instillation of tacrolimus provides a minimally invasive tool for management of one of the difficult urethral strictures to treat. The study is of short duration and underpowered, but the initial results are encouraging with good response. It fulfills the 3 basic goals of urethral stricture management - unobstructed voiding, painless intercourse, and good cosmesis. Larger studies with intraurethral instillation of tacrolimus and of longer duration, in different group of patients (primary cases, recurrent stricture disease), are required to confirm the initial encouraging results and better define the role of this modality of treatment.

REFERENCES

Dey, et al.: Intraurethral Tacrolimus for Lichen Sclerosus


How to cite this article: Dey RK, Khan I, Khan D. Study of Intraurethral Instillation of Tacrolimus for Urethral Involvement Following Lichen Sclerosus. Int J Sci Stud 2017;5(4):204-208.

Source of Support: Nil, Conflict of Interest: None declared.
INTRODUCTION

The prevalence of coronary heart disease (CHD) is rapidly increasing in India. Cardiovascular disease, especially, CHD is a major contributor to mortality and morbidity in India. Epidemiological transition, with an increase in life expectancy and demographic shifts of population, age-profile, combined with lifestyle-related changes increases in levels of cardiovascular risk factors accelerates the CHD epidemic in India.

The most important risk factor for CAD in women is the misconception that CAD is not a woman's disease. This misconception is gradually being corrected but still has important influences on all aspects of prevention, diagnosis, and treatment. This also leads to the neglect of formal risk assessment and failure to aggressively treat CAD once it has been detected. In addition, a woman's presentation style alters physicians' estimates of the likelihood of CAD. Women are on average 5-10 years older at the time of presentation. Perhaps, even more than in men, the prevalence of angiographic coronary disease varies dramatically according to the nature of the chest pain, the patient's age, and the presence and type of coronary risk factors. This underlines the importance of good history taking and careful cardiovascular risk factor assessment in the evaluation of women with chest pain. A variety of factors influence the evaluation of chest pain in women, including patient and physician perception of disease risk. Compared with men, women with chronic stable angina are older and more likely to have hypertension (HTN), diabetes, and congestive heart failure, but less likely to have had a prior myocardial infarction or revascularization. Although equally likely to have effort angina, such women are more likely to experience pain at rest, during sleep, or with...
mental stress and to have nausea and jaw, back, neck pain or palpitations. They are less likely to report diaphoresis than men. These differences make the evaluation of new symptom or disability more complex and make essential gender-based approach to education of both lay and health personnel in the presentation of acute ischemic syndromes. Hence, a complete study on the presenting features, clinical manifestations, and treatment modalities offered and outcome in acute myocardial infarction (AMI) in women is an important challenge that involves recognition by both patients and physicians.

Aim
Risk stratification of AMI in rural women on admission and assess the role of modifiable and non-modifiable risk factors in women.

MATERIALS AND METHODS
This study was conducted at Rajah Muthiah Medical College and Hospital, 1200 bedded tertiary care teaching hospital in Chidambaram, Tamil Nadu, India. The study period was 1 year.

Inclusion Criteria
All female patients between age 30 and 90 years admitted in intensive care unit (ICU) with a history of chest pain lasting for more than 30 min, not relieved by nitrates at rest with typical electrocardiogram changes of AMI and raised cardiac enzymes were included in the study.

A detailed history taking was done through questionnaire which includes complete obstetric history, family history, personal history, and clinical findings. Investigations, treatment, complication, outcome, and observation are also noted for every patient. The results were tabulated and analyzed.

RESULTS
In our study, 60 female patients in age from 30 to 90 years admitted in ICU were admitted. 38% of patients were from 60 to 69 years followed by 50-59 years (Table 1). Diabetes mellitus (DM), HTN, and hypercholesterolemia were seen highly in this study group. 68% of women were used tobacco, 60% had family history of disease (Table 2). Isolated systolic HTN, obesity, and tobacco chewing shown high-mortality rate in the study group (Table 3).

DISCUSSION
In this study that included 60 patients, during 1 year, maximum incidence of AMI was observed in women in the age group of 60-70 years, 23 cases (38.3%). Age appears to be the strongest cardiovascular risk factor that remains non-modifiable. 12 patients (20%) were below 50 years of age, and 48 patients (80%) were above 50 years of age. The incidence of AMI is 0% below 40 years of age and 7% above 80 years of age. This age predominance in females is due to the loss of the protective effect of estrogen after menopause.

In this study, 36 patients (60%) gave a positive family history of coronary artery disease (CAD). The total incidence of HTN in AMI is 47 patients (78.3%). This is more than western population, where the fraction of CHD attributable to HTN is approximately 20%. The increased awareness of HTN and the advent of various drugs to control blood pressure attributes to the reduced incidence in western countries. 10 patients (21.7%) expired while under treatment.

DM is a strong risk factor for CAD in women than in men. Mortality rates for CAD are 3-7 times higher
among diabetic women than among non-diabetic women. Diabetes exacerbates the effect of known coronary risk factors and may impair the estrogen binding, negating the protection against CAD. In this study, 49 patients (81.6%) had diabetes. The incidence of diabetes is high in our study population when compared to 20% incidence in the western population. This may be due to poor control of hyperglycemia and due to the association of DM combined with other cardiovascular risk factors. The incidence of AMI is more in female diabetics when compared to males. This is due to the fact that female diabetics have lower high-density lipoprotein and higher very low-density lipoprotein than their male counterparts. The presence of diabetes is one of the strongest risk factor in women and our study confirms the same. The mortality in diabetic female patients is 16% in this study. 47 patients (78.5%) had both diabetes and HTN in this study, and the mortality was 7 patients. None of the patients in this study had given the history of smoking or alcohol, but 41 patients (68%) were habitual tobacco chewers. Use of tobacco is also a strong risk factor for CAD. The mortality rate among tobacco chewers was 75%. The effect of tobacco with an elevated risk of CAD in women is understudied. The World Health Organization data suggests that absolute risk of MI in women who smoke is greatly elevated by the use of combined oral contraceptives and indicates 10 times higher risk. However, in our study, we did not encounter any smokers or oral contraceptive users.

46% of the patients had hypercholesterolemia, and 47% of the patients were obese with body mass index > 30. The mortality among obese patients was 20%. In our study, all the study patients were multiparous, of which 14 patients (23.33%) had six or more pregnancies. Five multiparous patients (8.33%) expired during the study.

CONCLUSION

The study concludes that women suffering from AMI are likely to be older than 60 years and more likely to have a history of HTN, diabetes, hypercholesterolemia, and obesity. The maximum incidence of AMI occurred in the post-menopausal age group. All women were multiparous, and women with six or more pregnancies had a high-mortality rate. Women are more likely to experience neck and shoulder pain, abdominal pain, nausea, vomiting, fatigue, and dyspnea in addition to classical chest pain.

REFERENCES


How to cite this article: Selvamuthukumaran S. Risk Stratification of Acute Myocardial Infarction in Rural Women. Int J Sci Stud 2017;5(4):209-211.

Source of Support: Nil, Conflict of Interest: None declared.
Comparative Study of Ropivacaine and Levobupivacaine given Paravertebrally in Breast Cancer Surgeries

Raghvendra Upadhyay¹, Rajan B Godwin², Mayura Setiya³  
¹Resident, Department of Anaesthesiology, N.S.C.B. Medical College, Jabalpur, Madhya Pradesh, India, ²Assistant Professor, Department of Anaesthesiology, N.S.C.B. Medical College, Jabalpur, Madhya Pradesh, India, ³Demonstrator, Department of Anatomy, N.S.C.B. Medical College, Jabalpur, Madhya Pradesh, India

Abstract

Background: “Pain” an unpleasant sensory and emotional experience associated with any surgery. In modern medicine, pain control is the standard of care and right of a patient. Providing post-operative analgesia to the patient gives subjective comfort which helps in restoring the altered physiology and immunological response.

Aim: To assess the efficacy of injection ropivacaine with fentanyl and injection levobupivacaine with fentanyl given paravertebrally for providing intraoperative and post-operative analgesia in elective surgeries for breast cancer patients.

Study Design: Prospective randomized double blind study.

Materials and Methods: Our study included 90 patients aged between 18 and 60 years of ASA Grade I and II scheduled for elective breast cancer surgeries. Group A received general anesthesia (GA) along with injection ropivacaine 0.25% (0.3 ml/kg) with injection fentanyl 25 mcg in thoracic paravertebral space. Group B received GA along with injection levobupivacaine 0.25% (0.3 ml/kg) with injection fentanyl 25 mcg in thoracic paravertebral space. Group C received GA alone. For assessing the intraoperative hemodynamic stability and post-operative analgesia, various parameters were recorded.

Results: The result of our study demonstrated that thoracic paravertebral block (PVB) led to superior intraoperative hemodynamic stability and post-operative analgesia of higher degree when compared with GA alone in a patient undergoing breast cancer surgeries. Thoracic PVB with both A and B Groups produced comparable analgesia.

Conclusion: It was concluded that injection ropivacaine and injection levobupivacaine with fentanyl as an additive given paravertebrally during breast cancer surgeries under GA provides equal and effective hemodynamic stability and satisfactory post-operative analgesia of the same duration and substantially less incidence of any post-operative complication such as nausea and vomiting with reduced post-operative stay.

Key words: General anesthesia, Intraoperative hemodynamic stability, Post-operative analgesia, Thoracic paravertebral block

INTRODUCTION

Pain is a distressing feeling or an unpleasant sensory, and emotional experience often associated with intense or damaging stimuli like surgery.¹ Breast cancer is perhaps the most common cancer in women often requiring surgical intervention.² Breast cancer patients usually experience post-operative pain in about 40% cases reflecting the inadequacy of conventional pain management.³ Post-operative pain is considered a form of acute pain which is a combined constellation of severe unpleasant sensory, emotional and mental experience precipitated by surgical trauma leading to a cascade of autonomic, endocrine, metabolic physiologic and behavioral responses ultimately contributing to organ dysfunction, morbidity, increased hospital stay, and mortality.⁴,⁵
General anesthesia (GA) is currently the standard technique used for surgical treatment of breast cancer and has failed to achieve adequate post-operative pain control. With the advent of regional anesthesia using paravertebral block (PVB) in the last two decades as a part of “multimodal” approach to post-operative analgesia in breast surgeries has overall reduced the severity of chronic pain after mastectomy and reduction in post-operative nausea and vomiting and has also improved the potential for early discharge.

Paravertebral analgesia (PVA)-based anesthetic approach reduced pain scores and opioid requirements along with reduced doses of inhalational anesthetics.

A PVB for breast surgeries has gained popularity and considered a technique of choice for anesthesia and post-operative analgesia during breast surgeries. PVB reduces intraoperative drug requirement, and by reducing the post-operative pain and nausea and vomiting, it improves the post-operative recovery. The increasing popularity of PVA as an effective method of intra- and post-operative pain relief for breast surgery warrants more research on combinations of local anesthetics and adjunctive analgesics. The addition of adjunctive analgesics, such as Fentanyl and clonidine to local anesthetics has been shown to enhance the quality and duration of sensory neural blockade, and decrease the dose of local anesthetic and supplemental analgesia. Consequently, smaller doses of local anesthetic may be used and non-toxic plasma levels achieved.

There is little systematic research on the efficacy and tolerability of the addition of adjunctive analgesic agents in PVA.

This study assessed the efficacy of PVB used in conjunction with general anesthesia for better intraoperative hemodynamic stability and post-operative analgesia as compared to general anesthesia alone. We compared injection levobupivacaine and injection ropivacaine with adjuvant fentanyl using peripheral nerve stimulator in a single level thoracic PVB instead of multiple levels. Single level thoracic PVB would prevent overdose toxicity of local anesthetic agent and is safer than multiple levels.

**Materials and Methods**

In this clinical prospective study 90 patients, ASA physical Status I and II, 18-60 years scheduled for unilateral breast surgery were enrolled randomly in three groups after obtaining institutional ethics committee approval. Patients with pre-existing respiratory diseases such as obstructive pulmonary disease, coexisting cardiovascular diseases, infection at the site of thoracic PVB, pregnant and breast feeding females, psychiatric disorders, severe obesity (body mass index >35 kg/m²), H/o allergy, and bleeding diathesis were excluded from the study.

Patients undergoing breast surgeries with PVB followed by GA and GA alone were randomly divided into three groups, each group containing 30 patients.

**Group A**
Patients in Group A received GA along with ropivacaine 0.3 ml/kg of 0.25% with fentanyl 25 mcg in thoracic PVB.

**Group B**
Patients in Group B received GA along with levobupivacaine 0.3 ml/kg of 0.25% with fentanyl 25 mcg in thoracic PVB.

**Group C**
Patients in Group C received GA alone.

During the pre-operative day patients were thoroughly explained about the procedures to be undertaken and were made well conversant with the visual analog scale (VAS) for post-operative pain assessment and their consent was taken. Patients were premedicated with alprazolam 0.25 mg on the night before the surgery. In the operation theatre, I/V access was established, and standard monitors were attached. Baseline vital parameters such as pulse rate, noninvasive blood pressure, respiratory rate, peripheral arterial oxygen saturation,
and electrocardiogram were recorded. Now, in the sitting position anatomical landmarks were marked. The spinous process of T4 vertebra was identified and local infiltration of 2% lignocaine given at 2-2.5 cm lateral to mid-point of T4 spinous process. Peripheral nerve stimulator with 5 cm needle was inserted perpendicular to the skin, and at around 4-4.5 cm distance the transverse process of the thoracic vertebra was contacted. The needle was withdrawn and redirected caudally below the transverse process not more than 1-1.5 cm deeper than the initial insertion, and motor stimulation of intercostal muscles was noted. Best motor stimulation was achieved with minimum current strength. Although peripheral nerve was initially set at 2.5 mA and was repositioned till the best stimulation was achieved with minimum current strength, i.e., 0.5-0.8 mA. After careful aspiration, the drug was injected in the paravertebral space, and after few minutes the sensation was tested by pin prick method at the surgical site. After confirming sensory anesthesia following PVB the patient was induced with injection propofol at the rate of 2 ml/kg with injection succinylcholine at the rate of 1.5 ml/kg to facilitate tracheal intubation and the patient was maintained with isoflurane and nitrous oxide plus oxygen (60:40). Neuromuscular blockade was achieved using vecuronium 0.04 mg/kg. The patients underwent intraoperative hemodynamic monitoring at an interval of 30 min and then postoperatively every 3 h for 24 h.

Rescue analgesia with injection diclofenac 75 mg was given postoperatively when VAS score reached >3 in each group.

**Statistical Analysis**

Descriptive statistics were used to describe the baseline characteristics. Numerical data were expressed as a mean and standard deviation. Qualitative data were expressed as frequency and percentage. Chi-square test was used to examine the relation between qualitative variables. For quantitative data, comparison between the groups was done using independent sample t-test. For descriptive purposes, P value differences <0.05 were noted in the tables. All analysis was conducted using SPSS version.

**OBSERVATION AND RESULTS**

Pre-operative vital parameters were similar when the groups were compared. There were no statistically significant differences between the three groups in terms of pre-operative parameter (Table 1 and Graph 1).

In terms of hemodynamic stability, Group A and B were hemodynamically stable than Group C (Table 2 and Graph 2).

When time of rescue analgesia was compared in three groups, it showed that mean duration of analgesia in Group A and Group B was 42.53 ± 13.27 h and 46.4 ± 13.27 h, respectively, which is statistically insignificant whereas in Group C it was 4 h (Table 3 and Graph 3).

When doses of I/V diclofenac were compared it showed that maximum cumulative dose of it was required in Group C, i.e., 635 mg as compared to Group A and Group B which were 185 mg and 160 mg, respectively.
The incidence of post-operative nausea and vomiting (PONV) in Group A and B was 10% and 6.9%, respectively, whereas Group C it was 48.3% (Table 4 and Graph 4).

Both the Group A and B provided acceptable analgesia as shown by the pain scores by Mann–Whitney test. Data for assessment of pain in Group A and B were statistically not significant at VAS 4, 8, 12, 24, 36, 48, and 72 h (Table 5). There were no complications attributable to post-operative pain.

**DISCUSSION**

Several surveys have demonstrated that post-operative pain management is still inadequate. Approximately, 40% of women after breast surgery complain about acute pain with pain scores above 5 reflecting inadequacy of conventional pain management. Insufficiently, controlled post-operative pain may delay the recovery further leading to persistent chronic pain with prolonged hospital stay and also extended medical costs. With the advent of regional anesthesia using PVB in the last two decades as a part of “multimodal” approach for better post-operative recovery and pain control in breast surgeries has overall reduced the severity of chronic pain after mastectomy and reduction in post-operative nausea and vomiting.

Several studies investigated the feasibility of PVB to improve post-operative pain relief after breast surgery. By analyzing these studies, it was observed that PVB in addition to GA or alone provides better post-operative analgesia, indicating that a perioperative PVB is a feasible and effective method for an improved post-operative pain treatment after breast surgery. Two recent meta-analyses reported that a PVB provided same pain relief compared with thoracic epidural analgesia after thoracotomy.

Another important issue for a successful PVB may be the appropriate drug choice, dose and administration technique. By analyzing the included data of the present meta-analysis, there was variability in drug concentration, combination with different additives, and type of local anesthetics administered into the paravertebral space. Bupivacaine and ropivacaine 0.5% were most commonly administered for MPVB or SPVB, while levobupivacaine or ropivacaine 0.25% was administered as a bolus and continuous infusion via a paravertebral catheter. Hura et al. recently randomized 70 patients scheduled for mastectomy

---

**Table 1: Comparison of pre-operative base line hemodynamic parameter**

<table>
<thead>
<tr>
<th>Pre-operative parameter</th>
<th>Mean±SD</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basal SBP (mm Hg)</td>
<td>117.26±4.13</td>
<td>116.43±6.55</td>
<td>120±9.84</td>
<td></td>
</tr>
<tr>
<td>Basal DBP (mmHg)</td>
<td>78.86±2.44</td>
<td>79.2±3.38</td>
<td>80.03±3.5</td>
<td></td>
</tr>
<tr>
<td>Pulse rate (r/min)</td>
<td>79.5±3.15</td>
<td>78.4±4.06</td>
<td>83.3±6.49</td>
<td></td>
</tr>
<tr>
<td>Respiratory rate (r/min)</td>
<td>14.1±1.423</td>
<td>13.93±0.365</td>
<td>14.83±1.31</td>
<td></td>
</tr>
<tr>
<td>SPO₂ (%)</td>
<td>97.63±1.245</td>
<td>98.3±0.466</td>
<td>97.77±1.524</td>
<td></td>
</tr>
</tbody>
</table>

SBP: Systolic blood pressure, DBP: Diastolic blood pressure, SPO₂: Peripheral arterial oxygen saturation, SD: Standard deviation

**Table 2: Comparison of intraoperative hemodynamic parameters**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mean±SD</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP at 30 min</td>
<td>119.83±8.437</td>
<td>117±7.54</td>
<td>128.73±8.851</td>
<td></td>
</tr>
<tr>
<td>DBP at 30 min</td>
<td>74.66±4.67</td>
<td>74.83±4.91</td>
<td>83.53±5.981</td>
<td></td>
</tr>
<tr>
<td>Heart rate at 30 min</td>
<td>70.63±6.594</td>
<td>73.26±5.91</td>
<td>86.9±7.567</td>
<td></td>
</tr>
<tr>
<td>SBP at 60 min</td>
<td>111.23±8.629</td>
<td>111.5±8.71</td>
<td>132.17±9.89</td>
<td></td>
</tr>
<tr>
<td>DBP at 60 min</td>
<td>73.3±5.51</td>
<td>65.1±10.97</td>
<td>85.87±5.329</td>
<td></td>
</tr>
<tr>
<td>Heart rate at 60 min</td>
<td>69.13±5.989</td>
<td>69.1±3.98</td>
<td>87.4±7.379</td>
<td></td>
</tr>
<tr>
<td>SBP at 90 min</td>
<td>108.3±8.54</td>
<td>111.36±7.03</td>
<td>131.3±5.22</td>
<td></td>
</tr>
<tr>
<td>DBP at 90 min</td>
<td>73.23±4.326</td>
<td>74.1±4.64</td>
<td>86.87±3.946</td>
<td></td>
</tr>
<tr>
<td>Heart rate at 90 min</td>
<td>68.87±5.794</td>
<td>68.86±5.79</td>
<td>89.53±4.967</td>
<td></td>
</tr>
</tbody>
</table>

SBP: Systolic blood pressure, DBP: Diastolic blood pressure, SD: Standard deviation

**Table 3: Comparison between time of rescue analgesia**

<table>
<thead>
<tr>
<th>Time of rescue analgesia</th>
<th>N</th>
<th>Mean±SD (h)</th>
<th>Comparison between the groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>30</td>
<td>42.53±13.59</td>
<td>Group A versus Group C P&lt;0.005 (significant)</td>
</tr>
<tr>
<td>Group B</td>
<td>30</td>
<td>46.4±13.27</td>
<td>Group B versus Group C P&lt;0.005 (significant)</td>
</tr>
<tr>
<td>Group C</td>
<td>30</td>
<td>4±0</td>
<td>Group A versus B P=0.270 (not significant)</td>
</tr>
</tbody>
</table>

**Table 4: Incidence of PONV**

<table>
<thead>
<tr>
<th>PONV</th>
<th>Groups</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>No</td>
<td>27 (90.0)</td>
<td>28 (93.1)</td>
</tr>
<tr>
<td>Yes</td>
<td>3 (10.0)</td>
<td>2 (6.9)</td>
</tr>
<tr>
<td>Total</td>
<td>30 (100.0)</td>
<td>30 (100.0)</td>
</tr>
</tbody>
</table>
to receive a single injection of ropivacaine 0.5% or bupivacaine 0.5% at the T4 level. Repeated assessment of the sensory blockade was performed at frequent intervals. Both drugs provided good analgesia, but ropivacaine was characterized by a more rapid onset, a large initial spread and a longer duration of the blockade.15

Many of the previous studies on PVB in breast surgery suffer from methodological errors: The study design is retrospective, samples are small, and randomization and blinding are either absent or inappropriate. Kairaluoma et al. used a single level injection at T3 using bupivacaine (0.3 ml/kg) or saline (2 ml). Patients who received bupivacaine needed less I/V opioid medication in the postanesthesia care unit and had less pain at rest after 24 h.16 In an observer–blinded study Pusch et al. randomized 86 patients to receive either a single injection of bupivacaine 0.3 ml/kg at T4 or general anesthesia. Pain during movement was lower in the PVB group 1, 6, and 24 h after surgery.17 Similar results were obtained in a randomized study by Klein et al. using a multilevel injection PVB at T1-T7.18

Naja et al. randomized 60 patients to receive either a PVB at T1-T5 using nerve stimulator guided technique or general anesthesia. Pain scores both at rest and during movement and consumption of analgesics were significantly lower in the PVB group during the first three post-operative days.19

There are several approaches to achieve the block. Both single and multilevel paravertebral injections have been reported to provide good analgesia.

Encouraged by the utility of nerve stimulator guidance in other peripheral nerve blocks, Wheeler et al. utilized nerve stimulation technique in performing PVB for breast surgery. They recommended twitching of the intercostal muscle at 0.4 mA intensity current as the stimulation end point for the block.20 A similar technique was also reported by Lang et al. in 2002.21

Among the analgesic techniques aimed at patients undergoing breast surgeries, thoracic PVB combined with general anesthesia stands out for the good results and favorable risk–benefit ratio.

In this context, thoracic paravertebral injection of local anesthetics results in ipsilateral somatic nerve block including the posterior ramus in multiple contiguous thoracic dermatomes and is advocated as the technique of choice for analgesia in a patient undergoing breast surgeries.

Many local anesthetics and other adjuvant drugs are being investigated for use in this technique, to improve the quality of analgesia and reduce adverse effects. The most commonly administered local anesthetic used was 0.25-0.5% bupivacaine,16,17,22-24 2% lidocaine in one study,20 while another tested a mixture of 2% lidocaine, 0.5% bupivacaine with epinephrine, fentanyl, and clonidine.11 The addition of fentanyl (0.05%) was associated with nausea and vomiting, while clonidine resulted in hemodynamic changes (arterial hypotension).11

There was a significant difference in the levels of “worst pain during the post-operative period” between TPVB with GA compared with GA alone at <2 h. Data on the need for rescue analgesia were assessed in four studies.11,23-25 Fewer patients required opioid during 0-24 h after surgery with TPVB and GA compared with GA alone. TPVB with GA group also required a lesser amount of morphine during the interval of 0-24 h.

In the current medical literature, there are no clinical trials comparing single level nerve stimulator guided thoracic PVB using injection ropivacaine 0.25% with fentanyl 25 mcg and injection levobupivacaine 0.25% with fentanyl 25 mcg in patients scheduled for various breast surgeries.

The results of our study also demonstrated that thoracic PVB resulted in superior post-operative pain relief when compared with GA alone. PVB using injection ropivacaine 0.25% with fentanyl 25 mcg and injection levobupivacaine 0.25% with fentanyl 25 mcg produced comparable analgesia which persisted for many hours in most of the patients. Group A and B showed the mean duration of analgesia of 42.53 h and 46.4 h, respectively, (P > 0.005) which is comparable. Hence, local anesthetic ropivacaine and
levobupivacaine are equally effective and provided the same duration of analgesia in PVB using nerve stimulator guided single level technique which is in accordance with the previous studies by Kairaluoma et al., Klein et al., and Naja et al., as they also observed improved acute post-operative pain management.16,18,19

We were able to confirm these facts based on mean time of rescue analgesia in Group A and B which was statistically insignificant among the groups. Rescue analgesia was required in Group C at 4 h which means that patients in Group C needed earlier rescue analgesia. TPVB using ropivacaine 0.25% with fentanyl 25 mcg and levobupivacaine 0.25% with fentanyl 25 mcg produced superior and comparable post-operative pain relief compared to GA. In Group A, 70% of cases needed rescue analgesia in 48 h and in Group B, 63% of cases needed rescue analgesia in 48 h. In our study, 2 cases in Group A and 3 cases in Group B needed rescue analgesia at 72 h, so the duration of analgesia is up to 72 h in few cases.

We have used nerve stimulator guided single level technique which provides more patient comfort and lowers the need for sedation during the procedure, thereby improves the patient satisfaction than multilevel injection technique. Nerve stimulation has increased the safety and reliability of the block and hence, may contribute to its ever increasing applications in operative as well as nonoperative pain interventions.

However, on the other hand, inadvertent injection of a larger volume of local anesthetic is more risky than the multiple injections of small volume, but we have not noticed such complication in our study.

The incidence of PONV in Group A and B patients was relatively infrequent than Group C considering that the general risk of PONV in women undergoing breast surgery under general anesthesia is high, which was in accordance with Kairaluoma et al.,22 Klein et al.,18 and Naja et al.,19 as they also found less nausea due to intense analgesia and low requirement of rescue analgesia in post-operative period as compared to control group.

PVB is technically easy to learn with a high success rate. Inadvertent vascular puncture, hypotension, epidural or intrathecal spread, pleural puncture, and pneumothorax are the recorded complications. However, no such complication occurred in our study.

CONCLUSION

It was concluded that combination of injection ropivacaine and injection levobupivacaine with fentanyl as an additive given paravertebally during breast cancer surgeries under GA provides equal and effective hemodynamic stability and satisfactory post-operative analgesia of the same duration and substantially less incidence of any post-operative complication such as nausea and vomiting with reduced post-operative stay.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Study of Left Ventricular Diastolic Dysfunction in Type 2 Diabetes Mellitus Patients

V Suresh Kumar¹, Madavaram Sreelatha¹, K Ramesh², G Chandra Shekar³

¹Assistant Professor, Department of General Medicine, Mahatma Gandhi Memorial Hospital, Warangal, Telangana, India, ²Professor and Head, Department of General Medicine, Mahatma Gandhi Memorial Hospital, Warangal, Telangana, India, ³Professor, Department of General Medicine, Mahatma Gandhi Memorial Hospital, Warangal, Telangana, India

Abstract

The aim of this study is to assess LV diastolic function in patients with diabetes with no overt cardiac symptoms or signs by color flow Doppler study with an intention to detect patients with LV dysfunction at an early stage. To correlate LV diastolic dysfunction (LVDD) with age, gender, duration of Type 2 diabetes, glycatedhemoglobin (HbA1c), and microvascular complications. Materials and Methods: 50 patients of DM with no cardiac symptoms with minimum duration of 2 years are taken for this study. It is an observational type of study. The age group is between 40 years and above, who presented with either cellullitis or some general complaints like weakness of limbs or fever to the hospital with blood glucose being above normal. Results and Conclusion: Left ventricular diastolic is a common cardiac disorder (66%) in patients with type 2 DM without other associated risk factors. E/A ratio and other colorflow Doppler studies are equally good parameters for the assessment of LVDD.

Key words: Diabetes mellitus, Diastolic dysfunction, Echocardiography

INTRODUCTION

Diabetes mellitus (DM) refers to a group of common metabolic disorder that shares phenotype of hyperglycemia. In India, the prevalence rates are estimated to be around 20% in cities, and recent figures showed surprising increasing rates in rural areas. To ascertain the true prevalence in any community, it is essential that there must be standardized methods for the diagnosis with proper acceptable criteria so that the results are comparable. Two broad categories of DM are Type 1 or Type 2. Type 1 is the result of complete or near total insulin deficiency. Type 2 DM is a heterogeneous disorder characterized by variable degrees of insulin resistance, impaired insulin secretion, and increased glucose production.¹⁻¹⁰

This metabolic dysregulation associated with DM causes secondary pathophysiologic changes in multiple organ system that leads to long-term chronic complications which account for much of the morbidity and mortality, attributed to the disease. An early diagnosis on that account can be of great help to prevent or delay the development of these complications. This underlines the necessity of early diagnosis.¹¹⁻¹⁸

Since the advent of insulin, there has been a progressive decline in mortality from diabetes complications such as gangrene and infection but a progressive rise in the deaths from cardiovascular disease.

The association of coronary heart disease and DM is well known, but recent evidence suggests that diabetics may develop congestive heart failure in excess of the predicted prevalence of coronary heart disease.

Clinical and pathological studies have shown that abnormalities of left ventricular (LV) function, cardiomegaly and failure may occur with normal coronary arteries possibly due to microangiopathy of coronary circulation independent of large-vessel atherosclerosis.

Corresponding Author: Dr. V. Suresh Kumar, H.No: 25-8-144/A, Bapuji Nagar, Kazipet, Warangal, Telangana. Pin 506003. E-mail Id: sureshvisampally@yahoo.com.
Congestive heart failure is a major public health problem in developed countries. Several epidemiological investigations have confirmed that up to half of patients in the community have heart failure due to diastolic dysfunction despite normal LV ejection fraction (EF). Some epidemiological and clinical arguments suggest that diastolic abnormalities may contribute to the high morbidity and mortality among patients with diabetes.

Indeed, in the community setting, data from the Framingham heart study have shown an increased incidence of congestive heart failure in patients with diabetes irrespective of coronary heart disease and hypertension. It was also observed in patients enrolled in clinical trials of myocardial infarction. Despite similar LV systolic function, patients with diabetes have more pronounced heart failure symptoms, use more diuretics, and have an adverse prognosis compared with those without diabetes. One putative explanation for this discrepancy is diastolic dysfunction of the left ventricle.17,19-26

Aims of the Study
The aims of this study are as follows:
1. To assess LV diastolic function in patients with diabetes with no overt cardiac symptoms or signs by color flow Doppler study with an intention to detect patients with LV dysfunction at an early stage.
2. To correlate LV diastolic dysfunction (LVDD) with age, gender, duration of Type 2 diabetes, glycated hemoglobin (HbA1c), and microvascular complications.

MATERIALS AND METHODS
Diagnostic Criteria
DM: If a patient is a known diabetic on treatment or with any fasting blood sugar level (F-BSL) ≥126 mg/dL.

Retinopathy
Microangiopathy was assessed by fundoscopy (direct ophthalmoscopy). The ophthalmologist doing fundoscopy was unaware of this study. The fundoscopic examination was done after dilating the pupil with tropicamide (1%). Retinopathy status was labeled as follow:
- No evidence of diabetic retinopathy;
- Background diabetic retinopathy defined as presence of one or more microaneurysms, punctate or striate intraretinal hemorrhages, and hard exudates;
- Pre-proliferative diabetic retinopathy defined as soft exudates, venous beading, and intraretinal microvascular abnormalities;
- Proliferative diabetic retinopathy characterized by neovascularization on or within one disk diameter of the disk in extent.

Autonomic Neuropathy
Autonomic function was evaluated by unmasking the sympathetic dysfunction by the blood pressure (BP) response to standing. A fall in systolic BP on erect position of >20 mmHg and diastolic BP >10 is considered as postural hypotension.

Diastolic Dysfunction
LVDD was considered to be present if any of the following findings were seen, as previously described as follows:
- E/A ratio <0.75 or >1.5,
- DT <150 or > 220 ms,

Selection of the Patients
1. The following patients are taken for the study. It is an observational type of study.
   a. Selection of patients is based on the history of DM, clinical examination, and laboratory parameters.
   b. Asymptomatic patients with minimum of 2-year duration of DM.
   c. Type 2 DM patients were taken for the study.
   d. Patients attending MGM Hospital as outpatients and inpatients from the year 2014 to 2016.
   e. Age range of the patients taken 40 years and above.
2. The following patients are excluded from the study.
   a. Myocardial infarction by history and resting electrocardiogram (ECG)
   b. Patients with angina pectoris
   c. Patients with hypertension
   d. Type 1 DM patients
   e. Significant alcoholic patients
   f. Patients with thyroid diseases
   g. Patients with renal failure
   h. Patients with other underlying heart diseases such as
      I. Congenital heart disease
      II. Valvular heart disease
      III. Pericardial disease – by history, chest X-ray (CXR) posteroanterior (PA) view, and echocardiography (Echo)
      i. Patients with regional wall motion abnormalities are excluded by Echo.

50 patients of DM with no cardiac symptoms with minimum duration of 2 years are taken for this study. It is an observational type of study. The age group is between 40 years and above, who presented with either cellulitis or some general complaints like weakness of limbs or fever to the hospital with blood glucose being above normal.
All patients are non-smokers, had no signs and symptoms of valvular heart disease, hypertension, angina pectoris, and myocardial infarction and did not have the history of alcoholism. All of them were asymptomatic for heart disease and those with symptoms of heart disease were excluded from the study. All the patients fulfilled the inclusion and exclusion criteria.

A thorough clinical examination is done with special emphasis on examination of retina, ankle jerks, and glove, and stocking type of sensory loss for the evidence of peripheral neuropathy, 24 h urinary protein for the presence of nephropathy and supine, and standing BP is recorded for the evidence automatic neuropathy.

All of them are admitted to the hospital with ketoacidosis or cellulitis or had high blood sugar values when presenting to the out patient department and are on treatment with insulin or oral hypoglycemic drugs as required. Routine urine examination, 24 h urinary proteins, fasting blood sugar, post-lunch blood sugar, blood urea, serum creatinine, serum cholesterol, chest x-ray PA view, ECG, M-mode 2D Echo, and color flow study performed.

**Method of Echo Doppler Evaluation**

M-mode, 2D Echo, and Pulsed wave Doppler are done with Hewlett Packard Echo machine. Doppler Echo was done in all patients with diabetes when their fasting blood sugar was below 140 mg% with treatment.

In the 2D Echo evaluation of patients with diabetes, a short axis and long axis view of the heart were obtained with the patient in left lateral recumbent position. An apical 4 chamber view of the heart was also seen. This is done to rule out any subclinical valvular heart disease and pericardial disease, especially constrictive pericarditis. In the short axis view with the cursor aligned just distal to the tips of mitral valve, an M-mode Echo is obtained to take the various dimensions such as LV dimensions in diastole and systole, septal, and posterior wall thickness.

Next, a color flow evaluation is performed to detect any subtle regurgitant lesion from an apical chamber view, and pulsed Doppler cursor is aligned parallel to the stream of inflow of blood from left atrium to left ventricle. A site is chosen along the cursor for sampling the mitral velocity profile such that the sample volume was taken just internal to the tips of mitral leaflets. A pulsed wave Doppler tracing is obtained, and the following parameters are measured.

1. Early diastolic flow velocity (E) cm/s
2. Late diastolic flow velocity (A) cm/s
3. E/A ratio
4. IVRT (ms)
5. Deceleration time (ms).

**RESULTS**

50 patients of Type 2 DM of minimum 2-year duration were included in the study group. These patients had no signs and symptoms of heart disease. They satisfied the inclusion and exclusion criteria and were taken up for the study.

The age of the patients is 40 years above, with a mean value of 53.72 years, of 50 patients studied, 15 patients are females, 35 are males. Heart rate was within normal range. Blood urea, serum creatinine, CUE, ECG, and CXR PA view were within normal limits.

**Age Distribution**

60% of total number of patients have diabetes with duration of 2-5 years. 40% of patients have diabetes with duration of 6-10 years.

63% of patients with diabetes of duration 2-5 years have diastolic dysfunction and 70% of patients with duration 6-10 years have diastolic dysfunction (Table 2).

Females shown more prevalence of diastolic dysfunction (80%) in comparison to the males (57%) (Table 3).

86% of the patients with HbA1c >7.5 have diastolic dysfunction (Tables 1-5).

### Table 1: Age distribution

<table>
<thead>
<tr>
<th>Age</th>
<th>No. of patients (%)</th>
<th>Patients with LVDD (%)</th>
<th>Patients without LVDD</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-45</td>
<td>5 (10)</td>
<td>2 (4)</td>
<td>3</td>
</tr>
<tr>
<td>46-50</td>
<td>16 (32)</td>
<td>10 (20)</td>
<td>6</td>
</tr>
<tr>
<td>51-55</td>
<td>12 (24)</td>
<td>8 (16)</td>
<td>4</td>
</tr>
<tr>
<td>56-60</td>
<td>6 (12)</td>
<td>5 (10)</td>
<td>1</td>
</tr>
<tr>
<td>61-70</td>
<td>11 (22)</td>
<td>8 (16)</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>33</td>
<td>17</td>
</tr>
</tbody>
</table>

LVDD: Left ventricular diastolic dysfunction

### Table 2: Correlation of diastolic dysfunction of diabetes mellitus with duration of diabetes

<table>
<thead>
<tr>
<th>Duration of diabetes (years)</th>
<th>No. of patients with LVDD</th>
<th>No. of patients without LVDD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-5 (30 patients)</td>
<td>19</td>
<td>11</td>
</tr>
<tr>
<td>6-10 (20 patients)</td>
<td>14</td>
<td>6</td>
</tr>
</tbody>
</table>

LVDD: Left ventricular diastolic dysfunction

### Table 3: Correlation of chronic complications of diabetes mellitus with gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>No. of patients with LVDD</th>
<th>No. of patients without LVDD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males (35 patients)</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Females (15 patients)</td>
<td>13</td>
<td>2</td>
</tr>
</tbody>
</table>

LVDD: Left ventricular diastolic dysfunction
Kumar, et al.: Study of Left Ventricular Diastolic Dysfunction in Type 2 Diabetes Mellitus Patients

56% of the patients with HbA1c <7.5 have diastolic dysfunction (Table 4).

Incidence of Diastolic Dysfunction (Tables 6-8)

**DISCUSSION**

Our finding demonstrates that pre-clinical diastolic dysfunction is common in patients with type 2 DM. Pre-clinical diastolic dysfunction is broadly defined as diastolic dysfunction with normal systolic function and no symptoms of heart failure.

Duration of diabetes of 6-10 years had more incidence of diastolic dysfunction.

Diastolic dysfunction was significantly high in patients age >45 years.

Diastolic dysfunction was present in majority of patients with autonomic neuropathy and retinopathy.

Boyer *et al.* stated that prevalence of LVDD in asymptomatic normotensive patient with Type 2 DM is high.

Masugata *et al.* in their study of 77 normotensive patients found that the cardiac diastolic dysfunction without LV systolic dysfunction in patients with well-controlled Type 2 DM is related neither to hypertension nor LV hypertrophy but rather to aging and duration of Type 2 DM.

Mishra *et al.* in their case control study of 71 patients with Type 2 DM found that asymptomatic patients with diabetes have reduced diastolic function as compared with the patient without Type 2 DM. LV diastolic abnormalities correlated with the duration of diabetes.

Hameedullah *et al.* in their study population of 60 patients with type 2 DM found that there was a strong correlation between HbA1c level and diastolic indices. Diastolic dysfunction was more frequent in poorly controlled patients with diabetes, and its severity is correlated with glycemic control. Similarly, in our study, HbA1c >7.5% had a higher prevalence of diastolic dysfunction compared to HbA1c <7.5%.

Exiara *et al.*, in their study, stated that the prevalence of LVDD in normotensive, asymptomatic well-controlled type 2 diabetes patients is high and increases with age.

Sacre *et al.* found that there was an independent association between global cardiac autonomic neuropathy (CAN) and LVDD in patients with Type 2 DM.

Annonu *et al.* in their case control study of 66 patients found that there was an inverse correlation between the duration of diabetes and E/A ratio. E/A ratio <1 was associated with a higher prevalence of retinopathy (49% vs. 20%) and abnormal blood pressure response to standing (29% versus 4%) LV systolic and diastolic abnormalities are correlated with the duration of diabetes and with other diabetic microangiopathies, such as diabetic retinopathy and neuropathy. These results are comparable to our study.
where diastolic dysfunction was present in majority of the patients with autonomic neuropathy and retinopathy.

Poantal et al. in their study of 58 patients found that CAN was associated with LVDD in patients with Type 2 DM but without clinical manifestation of the heart disease. Similarly, Poirier et al. stated that diastolic dysfunction and CAN are associated in patients with otherwise uncomplicated well-controlled Type 2 DM.

The main finding of this study is that 66% of patients with Type 2 DM without evidence of structural heart disease or arterial hypertension demonstrate diastolic dysfunction of the left ventricle.

The systolic function was assessed by fractional shortening (FS) and EF. EF though it is reduced in diabetes patients, it is within normal limits with mean of 57.98 ± 2.1. Similar findings were noted by Verd et al.

FS is in the normal range with a mean of 32.9±4.8, similar findings were noted by Mittal et al and Airaksinen et al. VSWT is within normal range.

LV diastolic function as measured by pulsed wave Doppler was found to be abnormal in 66% of patients (33 patients). In our study, a total of 33 out of 50 patients have diastolic dysfunction as defined by E/A <1, with mean E/A of 0.73 with standard deviation (SD) ± 0.01. Similar findings were noted by Bajraktari et al.11

All the patients with E/A ratio <0.75 equally shown evidence of LVDD in other color Doppler flow studies.

All these 33 patients had prolongation of DT >220 ms, with mean DT of 243.33 with SD ± 6.02.

Abnormal relaxation of the left ventricle is indicated by prolongation of isovolumetric relaxation time. In our study, the 33 patients had IVRT prolonged with a mean 102.77 and SD ± 2.93. Similar findings were noted in studies of Shappiro et al. Mittal et al. found in their study on diabetics the prolongation of IVRT with a mean value of 103.24 ± 3.46 ms.

Out of the 50 patients, 13 (25%) had postural hypotension and 10 out of these had diastolic dysfunction.

11 patients had retinopathy, out of which 9 had associated diastolic dysfunction.

15 patients had HbA1c >7.5, out of which 13 patients had associated diastolic dysfunction. Similar findings were noted in the study of Patil et al.8 Females shown more prevalence of diastolic dysfunction (80%) in comparison to the males (57%).

From the above discussion and comparison of present study findings with various studies, we found that there was a high prevalence of diastolic dysfunction in patients with asymptomatic Type 2 DM, and it was correlated with age, duration of diabetes, HbA1c, autonomic neuropathy, and retinopathy.

Our study demonstrates that the incidence of pre-clinical diastolic dysfunction is high in Type 2 DM patients. Furthermore, we found that there is a direct correlation between the duration of DM and diastolic dysfunction and that significant diastolic dysfunction occurs >5 years after the onset of DM independent of coronary disease or hypertension. Therefore, screening and aggressive management of patients with diabetes with pre-clinical diastolic dysfunction may delay the progression to heart failure.

CONCLUSION

1. Let ventricular diastolic is a common cardiac disorder (66%) in patients with type 2 DM without other associated risk factors.

2. E/A ratio and other color flow Doppler studies are equally good parameters for the assessment of LVDD.

3. Chronic complications of diabetes: Autonomic neuropathy, retinopathy, and nephropathy have correlation with LVDD.

4. Duration of DM, female gender, and HbA1c level are significant factors for the development of diastolic dysfunction.

5. Early diagnosis and institution of treatment with ACE inhibitors, angiotensin II receptor blockers, aldosterone antagonists, and diuretics will reduce the morbidity and improve the outcome of diastolic heart failure.

6. Patients with Type 2 DM should be screened for subclinical LVDD by echocardiography.

REFERENCES


Comparative Study on Safety and Efficacy of Low-Molecular-Weight Heparins with Unfractionated Heparins in the Management of Coronary Artery Disease in A Rural Tertiary Care Hospital

S Selvamuthukumaran
Reader, Division of General Medicine, Department of General Medicine, Rajah Muthiah Medical College and Hospital, Annamalai University, Chidambaram, Tamil Nadu, India

Abstract

Introduction: Low-molecular-weight heparin (LMWH) fractions are prepared from standard unfractionated heparin (UFH) and are thus similar to UFH in many aspects.

Aim: This study compares the safety and efficacy of LMWH with UFH in the management of acute coronary artery disease.

Materials and Methods: A total of 133 patients admitted in critical care unit with a history of chest pain and associated electrocardiogram finding were included administered LMWH and UFH for 5 days and studied.

Results: Compared to UFH group of patients, the average prothrombin time was higher. 4% of patients had thrombocytopenia in UFH and no events seen in LMWH.

Conclusion: Antithrombotic therapy with LMWH was safer and more effective than UFH in reducing the incidence of ischemic events in patients with unstable angina or myocardial infarction in the early phase.

Key words: Anticoagulant, Coronary heart disease, Safety and efficacy, Unfractionated heparin

INTRODUCTION

Both unfractionated heparin (UFH) and low-molecular-weight heparins (LMWHs) have established roles in preventing and treating venous thromboembolism and as adjuvant therapies for atherothrombotic syndromes. UFH acts as an anticoagulant by forming a complex with antithrombin (AT) catalyzing the inhibition of several activated blood coagulation factors: Thrombin (factor IIa), factor IXa, Xa, Xla, and XIIa. This prevents fibrin formation and inhibits thrombin-induced activation of platelets and factors V, VIII, and XI. Smaller heparin chains (<18 saccharide U) are too short to bind to AT and thrombin simultaneously but can inactivate factor Xa by binding to AT alone. LMWHs are derived from UFH by chemical or enzymatic depolymerization and have reduced inhibitory activity against thrombin (factor IIa) relative to factor Xa. LMWHs have more predictable pharmacokinetic properties compared with UFH which allows LMWHs to be administered in fixed doses and without the need for dose adjustment based on laboratory monitoring.

The use of a heparin dosing nomogram is encouraged because it helps achieve and maintain the activated partial thromboplastin time (aPTT) in the therapeutic range efficiently. The aPTT is used to monitor the effects of heparin treatment.

Aim

To study the safety and efficacy of LMWH with UFH in the management of coronary artery disease (CAD).
MATERIALS AND METHODS

This prospective comparative study was conducted in the Department of Medicine at Rajah Muthiah Medical College and Hospital, Annamalai University. 113 patients were selected based on “direct patient recruitment” method. Inclusion criteria: Patients, men, and women above age 18 years of age who were admitted in coronary care unit with a history of chest pain and associated electrocardiogram finding and received either LMWH or UFH for 5 days. Exclusion Criteria: Patients who received more both LMWH and UFH, patients who received anticoagulants other than LMWH and UFH, patients with increased risk of bleeding, ulcer disease or gastrointestinal bleeding during past 5 years, patients who underwent surgery during previous week, surgery of the eye, ear or cerebro neuronal system during previous month, patients with known defects of hemostasis, platelet count <50% of normal, hypersensitivity to study drugs, pregnant and nursing women, patients who received heparin <5 days were excluded from the study.

RESULTS

Overall 113 patients included in the study, 60% were male and 40% were female (Figure 1). 56% of study population were <60 years (Figure 2). Two groups were similar with respect to demographics such as age, sex, and weight. The baseline electrocardiographic changes and risk factors associated with the disease did not differ among the two study groups. 55% of patients received LMWH and 45% of patients received UFH. Myocardial infarction is high in study patients 37% followed by ischemia 35% (Table 1). ST-segment elevation myocardial infarction (STEMI) was observed in 59% of patients, non-STEMI in 22 patients.

LMWH has average prothrombin time 30 s and UFH has 27 s (Table 2). 4% of patients had thrombocytopenia in UFH and no events seen in LMWH (Table 3). 100% of patients in LMWH shown decreased severity of signs and symptoms whereas UFH is shown in 84% patients (Table 4).

DISCUSSION

CAD refers to a spectrum of clinical presentations ranging from those for STEMI to presentations found in NSTEMI or in unstable angina. In terms of pathology, CAD is almost always associated with rupture of an atherosclerotic plaque and partial or complete thrombosis of the infarct-related artery. Initial therapy for CAD should focus on stabilizing the patient’s condition, relieving ischemic pain, and providing antithrombotic therapy to reduce myocardial damage and prevent further ischemia. Previous randomized clinical trials have shown that LMWH is at least as good as, if not better than, UFH in preventing pre-operative deep venous thrombosis and thromboembolism after major abdominal surgery and total hip or knee arthroplasty. The benefit of LMWHs is not canceled by an increase in hemorrhagic complications. At least two studies have also documented the superior efficacy and safety of LMWH administered at home as compared to in hospital intravenous UFH, in treating patients with established deep vein thrombosis. Recently, clinical trials have also been published indicating that LMWH may be beneficial in treating arterial diseases.9–13 Over many years of clinical use, heparin has been a remarkably safe drug, especially considering its biological origin and its heterogeneity. The main concern, as with all anticoagulants, is excessive bleeding, and the issue of whether LMWH is associated with less bleeding than UFH has been dealt with in earlier sections. The methods of manufacture of LMWHs should
Table 1: Diagnosis distribution in study population

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number of patients</th>
<th>Percentage of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unstable angina</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>Stable angina</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>42</td>
<td>37</td>
</tr>
<tr>
<td>Ischemic</td>
<td>39</td>
<td>35</td>
</tr>
</tbody>
</table>

Table 2: Average prothrombin time

<table>
<thead>
<tr>
<th>Age distribution of study population</th>
<th>Average prothrombin time in seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMWH</td>
<td>27</td>
</tr>
<tr>
<td>UFH</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 3: Effect of LMWH and UFH on platelets in the study population

<table>
<thead>
<tr>
<th>Drug</th>
<th>Number of patients</th>
<th>Thrombocytopenia</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMWH</td>
<td>62</td>
<td>0</td>
</tr>
<tr>
<td>UFH</td>
<td>51</td>
<td>5</td>
</tr>
</tbody>
</table>

LMWH: Low-molecular-weight heparin, UFH: Unfractionated heparin

not give additional safety concerns, and any possible differences in side effects between LMWH and UFH are likely to rest on molecular-weight differences, with LMWH having lesser interaction with heparin binding proteins and cells.

REFERENCES


How to cite this article: Selvamuthukumaran S. Comparative Study on Safety and Efficacy of Low-Molecular-Weight Heparins with Unfractionated Heparins in the Management of Coronary Artery Disease in A Rural Tertiary Care Hospital. Int J Sci Stud 2017;5(4):225-227.

Source of Support: Nil, Conflict of Interest: None declared.
Correlative Study Between Clinical, Ultrasound and Histopathological Examination Features and the Management of Hemorrhagic Cysts of Ovary

C K Rajamma¹, C M Sheethal²

¹Associate Professor, Department of OBG, Kannur Medical College, Anjarakandy, Kannur, Kerala, India, ²Assistant Professor, Department of Radiology, Kannur Medical College, Anjarakandy, Kannur, Kerala, India

Abstract

Background: Among the benign, conditions of the ovary hemorrhagic ovarian cysts (HOCs) are commonly encountered in gynecology practice. HOCs resolve spontaneously most of the times but a few require surgical intervention.

Aim: To correlate clinical, ultrasound features of patients diagnosed with HOCs preoperatively and with histopathological examination (HPE) findings in both surgical and medical management groups.

Materials and Methods: A total of 66 patients diagnosed with HOCs were divided into two groups. "A" group requiring surgery for treatment: 31; "B" group not requiring surgery but managed conservatively: 35. Clinical signs, pre-operative ultrasound features and post-operative HPE findings were reviewed and correlated.

Observations and Results: The patients belonged to the age group of 20-45 with a mean age of 31.87±2.25. All the 66 patients were in the reproductive age group. Among the 66 patients, 36 were multipara (54.54%) and 30 (45.45%) were Nullipara. Patients in Luteal phase were 58 (87.87%) and 08 (12.12%) were in follicular phase which was significant statistically with $P < 0.05$ at 0.032. The mean volume of HOCs was 118.4 ± 0.40 ml in Group A and 32.70 ± 1.25 ml in Group B patients with a range of 45.3-340.6 ml and 21.3-44.3 ml, respectively. The difference was statistically significant with $p$ at 0.021.

Conclusions: Clinical, laboratory and ultrasound features of patients diagnosed with HOCs helps the surgeon to plan the management of HOCs in OBG practice and to avoid surgery in suitable patients.

Key words: Cysts, Hemorrhage, Ultrasound

INTRODUCTION

Following bleeding into follicular or corpus luteum hemorrhagic ovarian cyst (HOC) is formed as an adnexal mass.¹ Patients report for HOCs because of the pain caused by the bleeding into the follicle. The spectrum of clinical symptoms ranges from absence of symptoms to presentation to acute abdomen. Associated symptoms are nausea, vomiting, and in few cases fever. Occasional clinical signs include minimal guarding of the abdomen to deep tenderness. Most of the HOCs are diagnosed by regular ultrasound examination of suspected patients. The possibilities of false negative ultrasound reports are common due to their variable sonographic signs. They mimic few other organic adnexal masses. Many of the HOCs are benign, functional but a few can be neoplastic in nature.² Initial conservative management is the rule of treatment of HOCs because majority disappears spontaneously; surgical intervention is the second order of treatment. Hence, a confident clinical and ultrasound diagnosis should be tried and avoid unwanted surgery.³

Definite surgical intervention is required in patients with HOCs measuring more than 5 cm, failure to resolve, chronic persistent abdominal pain. Surgery is also indicated in cases difficult to be diagnosed by ultrasound and those presenting with complications.⁴
Aim
To correlate clinical, ultrasound features of patients diagnosed with HOCs preoperatively and with histopathological examination (HPE) findings in both surgical and medical management groups.

Design of the Study
The study is retrospective comparative study.

Duration of the Study
This study was conducted August 2011 to July 2016 (5 years).

MATERIALS AND METHODS
Medical records of 66 patients admitted to the Department of OBG of Kannur Medical College, Anjarakandy; we included in this study. The study was cleared by the Ethical Committee of the college, and consent letter was not used as the study is a retrospective one. The patients were classified into two groups. Group (A) consisted of 31 patients who presented with acute symptoms; pain in the abdomen, nausea, vomiting, and fainting. These patients were hospitalized and further evaluation done by thorough history taking, clinical examination including per abdomen, and vaginal examination. These patients were subsequently underwent surgery. Group (B) included 35 patients without acute symptoms and were managed conservatively with weekly follow-up by ultrasound. Clinical, laboratory, ultrasound findings of both groups were analyzed and compared. Age, parity, menopausal status, presence of current pregnancy, detection phase of the menstrual cycle, follicular or luteal, body mass index, white blood cells (WBCs) count, hemoglobin level (Hb), and duration of persistent abdominal pain were recorded. Ultrasound examination focused on the maximum diameter of the cyst, volume, and morphological pattern being classified into one of three patterns (solid type, sponge like type, and mixed cystic-solid type). Wherever required the color Doppler was used to assess the vascularity of the lesion. A subjective semi-quantitative assessment of the amount of blood flow within the examined lesion (color score) was used. The reporting was done as amount of blood flow within the cyst was scored as follows: Score of 1: If there is no blood flow detected. Score of 2: Minimal blood flow. Score of 3: Moderate flow was present. Score of 4: If the mass lesion is highly vascular. Patients were treated according to their clinical condition, i.e., Group A: Surgery was done in patients with large HOCs, complicated HOCs, clinical symptoms and signs of acute abdomen with imminent shock. Group B: Patients undergoing conservative medical management. Surgery consisted of laparotomy or laparoscopy approach with cystectomy or ovarectomy or combination of both. Excised specimens were sent for histopathological studies (HPE). The remaining patients were treated with antispasmodics, I.V. fluids and analgesics; follow-up with ultrasound examination at weekly intervals; changes in the diameter of the cyst, appearance, development of torsion, rupture were kept in mind. Total disappearance of the cysts was also noted. All the data were analyzed using standard statistical methods.

OBSERVATIONS AND RESULTS
A total of 66 patients attending the Department of OBG with the clinical diagnosis of HOCs were included in the study after going through thoroughly the medical records of 5 years. Among them, those who underwent surgery were labeled as Group A (31-46.96%) and those treated conservatively were named as Group B (35-53.03%). The patients belonged to the age group of 20-45 with a mean age of 31.87 ± 2.25. All the 66 patients were in the reproductive age group. There was no statistical significance between the two groups in regards with mean age, their parity and Body Mass Index (P was more than 0.05; P taken significant at <0.05), (Table 1). Among the 66 patients, 36 were multipara (54.54%) and 30 (45.45%) were nullipara (Table 1). Patients in luteal phase were 58 (87.87%) and 8 (12.12%) were in follicular phase which was significant statistically with P < 0.05 at 0.032, (Table 1). The mean WBCs count for group B was significantly lower than that for Group A with P value at 0.013 (P significant at < 0.05) while the mean Hb level for Group A was significantly lower than that for Group B with P value at 0.048 (P < 0.05), (Table 1).

Ultrasound findings of 66 patients showed that the mean volume of HOCs was 118.4 ± 0.40 ml in Group A and 32.70 ± 1.25 ml in Group B patients with a range of 45.3-340.6 ml and 21.3-44.3 ml, respectively. The difference was statistically significant with P at 0.021. The mean diameter of the cyst was 7.1 cm in Group A and 3.8 cm in Group B patients with a range of 3.4-11.2 cm and 2.1-4.2 cm, respectively. The difference was statistically

<table>
<thead>
<tr>
<th>Observation</th>
<th>Group A-31</th>
<th>Group B-35</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age</td>
<td>33.10±1.0</td>
<td>30.65±1.25</td>
<td>0.832</td>
</tr>
<tr>
<td>Parity</td>
<td>1.4±1.8</td>
<td>1.3±2.0</td>
<td>0.712</td>
</tr>
<tr>
<td>Nullipara- 30 (45.45)</td>
<td>14 (41.93)</td>
<td>16 (45.71)</td>
<td></td>
</tr>
<tr>
<td>Multipara- 36 (54.54)</td>
<td>17 (58.06)</td>
<td>19 (54.28)</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>26.2±2.4</td>
<td>23 ±3±2.50</td>
<td>0.532</td>
</tr>
<tr>
<td>Detection time pregnancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follicular phase-8 (12.12%)</td>
<td>3 (9.67)</td>
<td>5 (14.28)</td>
<td>0.032</td>
</tr>
<tr>
<td>Luteal phase-58 (87.87%)</td>
<td>28 (90.32)</td>
<td>30 (85.71)</td>
<td></td>
</tr>
<tr>
<td>Pregnancy</td>
<td>0 (0)</td>
<td>11 (31.42)</td>
<td></td>
</tr>
<tr>
<td>WBCs (mm³)</td>
<td>9500±1065</td>
<td>7823±1087</td>
<td>0.013</td>
</tr>
<tr>
<td>Hb level (g/dl)</td>
<td>9.7±0.7</td>
<td>11.7±0.8</td>
<td>0.048</td>
</tr>
</tbody>
</table>

HOC: Hemorrhagic ovarian cysts
significant with \( p \) at 0.038. Score 1 blood flow was found in cysts of 07 patients (10.60%) and 59 patients (89.39%) had cysts with score two blood flow which was significant statistically with \( P \) at 0.461 (Table 2).

Group A patients reported with acute pain in abdomen lasting for a mean time of 6.4 ± 1.1 h. The mean time of hospitalization before a decision is made for surgery was 10.5 ± 35 h which included the time taken for investigations and counseling. Cystectomy was performed in 29/31 (93.54%) of Group A patients and oophorectomy was done in two patients (6.45%). Regular surgical laparotomy was done in 9/31 (29.03%) and in the remaining (70.96%) laparoscopy was done. HPE showed HOCS in 49 (74.24%), corpus luteal cysts in 11 (16.66%), follicular cyst in 5 (7.57%), and in 1 cyst the reporting could not be done as the tissue had minimal epithelium. In 35 patients, Group B abdominal pain was mild in 27 (77.14%) and controlled with antispasmodic injections. 6 patients (17.14%) were diagnosed on regular ultrasound done for other indications such as secondary sterility and endometriosis investigation. Group B patients were relieved of their symptoms in a mean time interval of 7.60 ± 2.35 h in the study. However, the disappearance of the cysts could not be followed up in all the patients. Only 12/35 patients remained in follow-up of 1 year, and among them, 6 cases had total regression, in 4 cases the size of the cyst was reduced to <2 cm and in 2 cases there was no change, and the patients were not willing for surgery.

**DISCUSSION**

HOC are observed on ultrasound examination I patients during routine sonography or during evaluation for acute pain in abdomen. Review of literature shows few studies giving importance to the comprehensive picture of HOCS.\(^5\)\(^7\) The differential diagnosis of acute abdomen in women of reproductive age includes apart from HOCS, torsion of ovarian cyst, tubo-ovarian abscess, or acute appendicitis leading to needless surgery.\(^5\) Ultrasound plays a key role being noninvasive, in the diagnosis of all diseases related to ovary and fallopian tubes. It remains a cornerstone especially in the diagnosis of HOCS.\(^8\)\(^9\) Joshi *et al.* found HOCS to be more common in premenopausal women.\(^10\) However, in this study, HOCS were found to be more common in young patients during their reproductive years. Such an incidence is much easier to explain and consistent with hormonal changes which are common in women of reproductive age.\(^5\) In this study, HOCS were found more commonly in multiparous women; 36 (54.54%). HOCS were observed in Luteal phase 58 (87.87%) than in follicular phase 08 (12.12%); Nenemo *et al.*\(^2\) in his study, expressed identical results. The mean WBCs count was significantly higher in patients suffering from acute abdomen and surgically managed (Group A). Severe inflammatory reaction around the rapidly distended ovary may be the cause for neutrophilia. Lowered Hb concentration in the Group A patients could be explained by the larger size of HOCS formed due to rapid effusion of blood into them. The severity of abdominal pain in the patients of Group A was proportional to the size of the HOCS observed during laparotomy. The pain could be due to rapid distension due to the accumulation of blood in the HOCS and local irritation of the peritoneum. The size of the HOCS in patients managed by surgery (Group A) was significantly higher than the Group B patients. The Doppler study in this study showed a score 2 in 89.89% of the patients indicating low blood flow without blood flow within the mass lesion which suggests a peripheral vascular supply in all the lesions. 7 of the lesions showed score 1 indicating avascular nature of them in the study. The absence of vascularization in the solid areas of HOCS differentiates the blood clots inside the cysts from the papillary projections in the malignant ovarian cysts. The scores would be of Grade 3 and 4 in solid masses which are malignant.\(^11\) The management of HOCS depends on clinical symptoms.

### Table 2: The ultrasound data in the study group (\( n=66 \))

<table>
<thead>
<tr>
<th>Observation</th>
<th>Group A-31</th>
<th>Group B-35</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean volume of cyst- mL</td>
<td>32.70±1.25</td>
<td>118.4±0.40</td>
<td>0.021</td>
</tr>
<tr>
<td>Range</td>
<td>21.3-44.3</td>
<td>45.3-340.6</td>
<td></td>
</tr>
<tr>
<td>Mean size of cyst- cm</td>
<td>3.8</td>
<td>7.1</td>
<td>0.038</td>
</tr>
<tr>
<td>Range</td>
<td>2.1-4.2</td>
<td>3.4-11.2</td>
<td></td>
</tr>
<tr>
<td>Doppler score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score 1-07 (10.60)</td>
<td>3 (4.54%)</td>
<td>28 (42.42%)</td>
<td>0.461</td>
</tr>
<tr>
<td>Score 2-59 (89.39%)</td>
<td>4 (6.06%)</td>
<td>31 (46.96%)</td>
<td></td>
</tr>
</tbody>
</table>
willing for surgery. We recommended strict follow-up on weekly ultrasound basis of the conservatively managed cases due to the liability of occurrence of other complications as torsion or rupture of the cyst leading to more damage of the remaining ovarian tissue, thus interfere with the preservation of healthy tissue if surgery is warranted after that.

**CONCLUSIONS**

Management of HOCs depends on clinical, sonography and natural history of the HOCs in patients. Surgical intervention becomes mandatory in patients with acute abdominal pain, size of the HOCs larger than 5.0 cm and associated complications if any. High Leukocyte count and low Hb levels are supportive lab investigations to decide surgery. Conservative medical management should be well guarded with regular sonography of abdomen until the HOCs disappear.

**REFERENCES**


How to cite this article: Rajamma CK, Sheethal CM. Correlative Study Between Clinical, Ultrasound and Histopathological Examination features and the management of Hemorrhagic Cysts of Ovary. Int J Sci Stud 2016;5(4):228-231.

Source of Support: Nil, Conflict of Interest: None declared.
Clinical Study of Incidence of Malignancy in Solitary Nodule of Thyroid

J Rakesh Fernando¹, S Edwin Kins Raj², A Mohan Kumar², Heber Anandan³

¹Assistant Professor, Department of General Surgery, Tirunelveli Medical College, Tirunelveli, Tamil Nadu, India, ²Junior Resident, Department of General Surgery, Tirunelveli Medical College, Tirunelveli, Tamil Nadu, India, ³Senior Clinical Scientist, Department of Clinical Research, Dr. Agarwal’s Healthcare Limited, Tirunelveli, Tamil Nadu, India

Abstract

Introduction: Solitary nodule of thyroid has increased in incidence in the present day as compared to two decades before. Because of possibility of malignancy, some clinicians especially those in surgical subspecialties recommended that all nodules have to be removed.

Aim: The aim of the study to determine the incidence of solitary nodule thyroid in relation to age and sex and to determine the incidence of solitary nodule of thyroid turning out to be malignancy.

Materials and Methods: Data collection by meticulous history taking and clinical examination, appropriate laboratory and radiological investigations, operative findings, histopathological report, and follow-up of cases.

Results: About, 50 cases selected by Random Sampling Technique, incidence of solitary nodule were observed in 3rd to 5th decade, constituting 60% of the cases studied. 36% of all clinically solitary nodules turned out to be multinodular goiter. The common causes of solitary nodule was multinodular goiter (MNG) (36%), follicular adenoma (22%), adenomatous goiter (24%). 94% of cases presented with euthyroid state. Incidence of malignancy in solitary thyroid nodule was 12%.

Conclusion: Solitary nodule of thyroid is more common in 3rd to 5th decades. Solitary nodules of thyroid are more common in females. Most of the patients presenting with solitary nodule of thyroid are euthyroid and only a small percentage of patient with toxicity or hypothyroidism ultrasonography can be accurately used to detect patients with MNG who clinically present as solitary nodule of thyroid.

Key words: Euthyroid, Malignancy, Solitary nodule

INTRODUCTION

The solitary thyroid nodule (STN) has aroused interest of thyroidologist since the time of Cole and Majarakis and his study concluded that incidence of malignancy is higher when compared with multinodular goiter (MNG). Thyroid nodules are very common entities, though varying in incidence in different geographical regions. The prevalence of palpable nodules in general population is 4-7%. Solitary nodules of thyroid are about four times more common in women than in men. Overall incidence of malignancy in STN ranges from 10% to 30%. Thyroid nodule is a palpably or radiologically distinct lesion from the surrounding thyroid parenchyma. There is a high risk of malignancy in STN than in multiple nodules. Because of this reason, STN have to be treated with high degree of suspicion and plan treatment in a systematic manner. Radionuclide imaging has been the mainstay in the evaluation of STN since 1939 when Hamilton and Soley demonstrated that malignant thyroid tissue concentrates less radioactive iodine than normal thyroid tissue. Thyroid nodules are further classified into cold, warm, and hot according to their ability to accumulate the radioactive isotope. Cold nodules are considered hypofunctional, whereas warm nodules are normal and hot nodules are hyperfunctional. Thyroid fine-needle aspiration (FNA) biopsy is the most accurate test for determining malignancy, and is an integral part of current...
thyroid nodule evaluation. Results are superior when FNA is performed with ultrasound-guidance FNA (USFNA). We describe herein techniques for palpation-directed FNA as well as USFNA.5

Aim
The aim of the study is to determine the incidence of solitary nodule thyroid in relation to age and sex and to determine the incidence of solitary nodule of thyroid turning out to be malignancy.

MATERIALS AND METHODS

The present study on “clinical study of the incidence of malignant changes in solitary nodule of thyroid” has been conducted in Department of Surgery at Tirunelveli Medical College. Prospective analysis of 50 cases of solitary nodule thyroid in the specified period done. These cases were selected by random sampling method and studied in detail clinically and recorded as per the pro forma. Routine investigations and specific investigations including FNA cytology (FNAC) of the nodule, thyroid profile, indirect laryngoscopy, plain X-ray neck, and ultrasonography (USG) neck were done in all cases. Special investigations such as radio-isotope scanning were not performed as the facilities were not available. All the patients were managed by surgery and diagnosis was confirmed by histopathological examination. The patients were grouped according to different variables such as age, sex, size of the nodule, site of the nodule, functional thyroid status, FNAC reports, and histopathological examination reports, and then analyzed and compared with the previous similar studies conducted elsewhere. Finally, conclusions were drawn accordingly.

Pre-operative
Use of antithyroid drugs, beta-blockers, blood transfusions, or any other medications were prescribed based on individual status and was noted.

Operative
Position of the patient, type of anesthesia, incision, type of operation planned, per-operative findings, and type of operation performed were recorded.

Post-operative
Every patient was followed up post-operatively during the course of management in the hospital to note the development of and management of complications.

Follow-up
Any recurrences or complications were noted. Thyroid functional status was assessed, accordingly thyroxine tablets prescribed if necessary.

RESULTS

A total of 50 cases of solitary nodule of thyroid studied and following conclusions were drawn: The age of the patients ranges from 18 years to 66 years, with peaks being in 3rd to 5th decades. The mean age of presentation is 37.24 years. Cases in 3rd to 5th decades constitute 60% of the cases studied. Solitary nodules of thyroid are much more common in females. Of 50 cases studied 46 were females and 4 were males, and the ratio comes to M:F = 1:11.5. In addition, the malignant nodules are common in females. Of 6 cases of malignancy in the study, 5 were females. All the cases in the present study presented complaint of swelling in the region of the thyroid. Only few patients presented with pain, discomfort, and dysphagia. All the mentioned additional symptoms were of mild degree. Of 50 cases, 3 cases had pain, 3 cases had discomfort, and another 2 had dysphagia. In addition, none of the patient had lymphadenopathy which was confirmed by USG examination. Two patients had symptoms of thyrotoxicosis, and one had features of hypothyroidism. The latter patients’ thyroid profile confirmed the functional status. In our study, duration of onset symptoms varied from 15 days to 8 years. In addition, duration of malignant nodules extend from 1 month to 4 years.

Of 50 cases studied, 26 cases presented with nodule in right lobe of the thyroid gland and the remainder in the left lobe of thyroid. One patient among left-sided solitary nodule had undergone right lobectomy 30 years back and presented with recurrent nodule in the rest of the lobe.

In the present study, on clinical examination size of the nodule, in its largest dimension, varies from 2 cm to 12 cm. Most of the patients presented with the size of about 3-5 cm. In the study, as such there is no correlation between the size of the nodule and the occurrence malignant nodule.

Of 50 cases, two presented with features of thyrotoxicosis, one with hypothyroidism, and rest all were in euthyroid state. Patients with thyrotoxicosis were made euthyroid using antithyroid drugs and operated and both cases turned out to be toxic follicular adenoma. Patient with hypothyroidism was treated with thyroxine, USG neck revealed multiple nodules, and managed by subtotal thyroidectomy, histopathological examination confirmed the diagnosis of multinodular (Table 1).

FNAC is the important investigation in the evaluation of solitary nodule of thyroid. All 50 cases were subjected to FNAC during the course of evaluation. FNAC reports are mainly categorized into 6 entities—benign, follicular neoplasm, suspicious (of malignancy), malignant, lymphocytic thyroiditis, and cysts. In our
study, of 11 follicular neoplasms, two turned out to be follicular carcinoma (CA). One suspicious (of papillary CA) case confirmed papillary CA on histopathological examination. Three cases of papillary CA were diagnosed pre-operatively by FNAC alone. Two cases diagnosed as cysts by FNAC confirmed to be simple cysts on histopathological (Table 2).

Of 50 cases studied, common causes of solitary nodule are MNG, follicular adenoma, and adenomatous goiter; the most common being MNG which constitutes about 36% of cases. Follicular adenomas have 22% and adenomatous goiters have 24% incidences. Of 50 cases, six were malignant - 4 papillary CA and 2 follicular CA. USG detected suspicious findings in two cases among six malignant cases - 1 papillary and 1 follicular. Three cases of papillary CA were diagnosed with certainty by FNAC; one case was suspicious which turned out to be papillary CA on histopathological examination. Two cases of follicular CA were diagnosed follicular neoplasm, one of them showed suspicious features on USG (Table 3).

From the study, of 6 CA, 4 were papillary and 2 follicular. No case of medullary or anaplastic or lymphoma was detected. Papillary CA accounts to 67% and follicular CA accounts to (Table 4).

Depending upon the clinical diagnosis and FNAC features, all the 50 patients undergone surgery. Among them, 31 patients had undergone hemithyroidectomy, 12 cases undergone subtotal thyroidectomy, and 7 cases undergone total thyroidectomy.

In one case, histopathological examination (HPE) after hemithyroidectomy showed follicular CA, then completion of total thyroidectomy done. In another case with recurrent nodule (previously hemithyroidectomy was done 30 years back), total thyroidectomy was done, which showed features of MNG.

Post-operatively, suppressive dose of thyroxine was started for patients who had undergone total thyroidectomy. Three cases out of 7 cases of total thyroidectomy showed features of hypocalcemia on 2-4 post-operative day, hence, they are supplemented with oral calcium and Vitamin D3.

All the cases were followed-up for 6 months, two cases had husky voice without any change in vocal cord movements.

**DISCUSSION**

The observations and results of the present study were compared with the available previous similar studies.

---

**Table 1: Thyroid functional status**

<table>
<thead>
<tr>
<th>Thyroid functional status</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euthyroid</td>
<td>47</td>
</tr>
<tr>
<td>Hyperthyroid</td>
<td>2</td>
</tr>
<tr>
<td>Hypothyroid</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 2: FNAC reports**

<table>
<thead>
<tr>
<th>FNAC reports</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benign</td>
<td>32</td>
</tr>
<tr>
<td>Follicular neoplasm</td>
<td>11</td>
</tr>
<tr>
<td>Suspicious</td>
<td>1</td>
</tr>
<tr>
<td>Malignant</td>
<td>3</td>
</tr>
<tr>
<td>Lymphocytic thyroiditis</td>
<td>1</td>
</tr>
<tr>
<td>Cysts</td>
<td>2</td>
</tr>
</tbody>
</table>

**Table 3: HPE reports**

<table>
<thead>
<tr>
<th>HPE reports</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follicular adenoma</td>
<td>11</td>
</tr>
<tr>
<td>Adenomatous goiter</td>
<td>12</td>
</tr>
<tr>
<td>MNG</td>
<td>18</td>
</tr>
<tr>
<td>CA</td>
<td>6</td>
</tr>
<tr>
<td>Lymphocytic thyroiditis</td>
<td>1</td>
</tr>
<tr>
<td>Simple cyst of thyroid</td>
<td>2</td>
</tr>
</tbody>
</table>

**Table 4: Types of Carcinoma**

<table>
<thead>
<tr>
<th>CA</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papillary</td>
<td>4 (67)</td>
</tr>
<tr>
<td>Follicular</td>
<td>2 (33)</td>
</tr>
<tr>
<td>Medullary</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Anaplastic</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Total</td>
<td>6 (100)</td>
</tr>
</tbody>
</table>

**Table 5: Age comparison**

<table>
<thead>
<tr>
<th>Authors</th>
<th>Mean age in years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Das et al.</td>
<td>35</td>
</tr>
<tr>
<td>Talepoor et al.</td>
<td>38.6</td>
</tr>
<tr>
<td>Quari</td>
<td>36.7</td>
</tr>
<tr>
<td>Rehman et al.</td>
<td>34.7</td>
</tr>
<tr>
<td>Anwar et al.</td>
<td>37</td>
</tr>
<tr>
<td>Present study</td>
<td>37.24</td>
</tr>
</tbody>
</table>

**Table 6: Gender comparison**

<table>
<thead>
<tr>
<th>Authors</th>
<th>Sex incidence (M:F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dorairajan and Jayashree</td>
<td>1:09</td>
</tr>
<tr>
<td>Das et al.</td>
<td>01:05.4</td>
</tr>
<tr>
<td>Gupta et al.</td>
<td>1:05</td>
</tr>
<tr>
<td>Present study</td>
<td>01:11.5</td>
</tr>
</tbody>
</table>
In the present study, the most common cause of solitary nodule is MNG, which is comparable with the studies done by Fenn et al., Bhansali. The common causes are follicular adenoma and adenomatous goiter.

Incidence of CA

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fenn et al.17</td>
<td>1980</td>
<td>12.00</td>
</tr>
<tr>
<td>Bhansali16</td>
<td>1982</td>
<td>9.00</td>
</tr>
<tr>
<td>Present study</td>
<td>2015</td>
<td>12.00</td>
</tr>
</tbody>
</table>

From the literature, the incidence of malignancy in thyroid nodule ranges from 5% to 30%. From the present study, the incidence found to be 12%, which is comparable with the study done by Fenn et al.

CONCLUSION

Incidence of malignancy of solitary nodule is about 12%. Commonest presentation of solitary nodule is swelling in front of neck. The peak age at presentation of solitary nodule thyroid is 3rd to 5th decade, constituting about 60% of the cases. Solitary nodule is more common in females. The most common malignancy in solitary nodule thyroid is papillary carcinoma FNAC is an important investigation in the evaluation of the solitary nodule of thyroid. Surgery has been the treatment of choice in most of the cases, either because of cosmetic reasons or toxicity or FNAC diagnosis of follicular neoplasm or malignancy.

REFERENCES

Fernando, et al.: Incidence of Malignancy in Solitary Nodule of Thyroid


Source of Support: Nil, Conflict of Interest: None declared.
Study and Compare the Efficacy of 2 Suture Materials: Poliglecaprone 25, Polyglactin 910 as Subcuticular Skin Stitches in Women Undergoing Elective Cesarean Section

Prashant A Uikey¹, Mrunalini Jagne², Surekha N Khandale³

¹Professor and Head, Department of Obstetrics and Gynaecology, Indira Gandhi Government Medical College, Nagpur, Maharashtra, India,
²Resident, Department of Obstetrics and Gynaecology Indira Gandhi Government Medical College, Nagpur, Maharashtra, India,
³Assistant Professor, Department of Obstetrics and Gynaecology, Indira Gandhi Government Medical College, Nagpur, Maharashtra, India

Abstract

Objectives: To compare the efficacy of two suture materials, that is, poliglecaprone 25 and polyglactin 910 as subcuticular skin stitches in post-cesarean women.

Study Design: This study was a prospective comparative study.

Study Setting and Study Duration: This study was conducted in the Department of Obstetrics and Gynaecology, Indira Gandhi Government Medical College, Nagpur, a Tertiary Care Center in Central India, for 2 years after approval from the Institutional Ethical Committee.

Inclusion Criteria: All pregnant women undergoing elective cesarean section for the first time with hemoglobin more than 10 g% done in same operation theater using same technique of cesarean section as per the hospital standard protocol and by qualified obstetrician, using Pfannenstiel incision. The participants were then assessed for the following parameters - pain, tenderness, swelling, induration, discharge from wound, dehiscence, wound healing, and cosmesis on day 4, day 8, day 15, day 30, and day 45. Participants with healthy wound after removal of sutures were discharged on the 8th post-operative day and followed up in outpatient department on day 15, day 30, and day 45. Pain and tenderness were assessed on the basis of visual analog scale. All data were analyzed for categorical and continuous variables such as age, properties of suture materials, and post-operative wound complications, especially in relation to type of suture materials used for subcuticular skin incision closure.

Result: Poliglecaprone 25 is the most efficacious, with least wound complications, provides better cosmetic outcome compared to polyglactin 910 in cesarean skin closure but little costlier than poliglecaprone 25.

Key words: Cesarean section, Elective, Poliglecaparone 25, Polyglactin 910, Suture materials

INTRODUCTION

Cesarean section is one of the most commonly performed abdominal operations on women worldwide. Its rate has increased markedly in recent years and is about 20-25% of all childbirths in most developed countries.¹

Wound infection can cause serious complications such as necrotizing fasciitis, rupture of the fascia, or dehiscence of the wound. The infection occurs in about 3-6% of women who undergo cesarean delivery. These women translate into a substantial portion of the population, and hence there is a load on the financial resources of health-care system.²³ The use of sutures for tissue approximation is the oldest and still the most common form of wound closure. The oldest known suturing material used on
humans dates back to 1100 BC, and the oldest known suturing material used on live human tissue dates back to 600 BC. These ancient sutures comprised of natural material such as linen, human hair, cotton, and flax and did not change until the 1800’s. Through the 18th century into the 19th century, rapid improvement occurred and new materials were introduced into the field of sutures. By 1901, sutures could be found in the form of catgut and kangaroo gut kept in sterile glass tubes, gold and silver wire, silkworm gut, silk, cotton, linen, tendon, and intestinal tissue from many forms of animals.

In modern times, a variety of surgical techniques and suture materials for all elements of the cesarean section operation are in use. Staples, adhesives, tape, and sutures are commonly used for skin closure in cesarean section. However, there is no enough evidence to say whether any particular technique for closing the abdominal wall during cesarean section is better than the others. Many of these have not yet been rigorously evaluated in randomized controlled trials (RCTs), and it is not known whether or not they are associated with better outcomes.

Most of the times in surgeries, the choice of suture material has been largely surgeon’s choice depending on the availability of suture material. Subcuticular stitches have been used for the closure of surgical wounds with good cosmetic results. Such stitches have now been proven to offer a great advantage in terms of proper healing and cosmetics.

Ideally, a wound closure material and method should be cost-effective, time-efficient, easy to perform, and produce the optimal cosmetic result. The primary goals of treating wounds in general and skin incisions, in particular, are rapid closure with the creation of a functional and esthetic scar.

Although sutures are used frequently in surgery, there are few reviews available in the literature that compare or review the attributes and qualities of sutures.

As there is a lack of enough evidence regarding the best suture materials for cesarean skin closure, our aim is “to study and compare the efficacy of 2 suture materials poliglecaprone 25, polyglactin 910 as subcuticular skin stitches in women undergoing elective cesarean section.” The ultimate aim is to choose the suture material which is cheap, cost-effective, and with least complications.

Aims and Objectives
1. To study the efficacy of two suture materials in terms of pain, tenderness, swelling, induration, discharge, wound healing, and cosmesis, that is, poliglecaprone 25, polyglactin 910 in wound healing.
2. To compare the efficacy of these suture materials.
3. To search the suture material which is cheap, cost-effective, and with least complications.

MATERIALS AND METHODS

This was a prospective, observational study conducted in the Department of Obstetrics and Gynaecology, in a tertiary care center in Central India, for 2 years after approval from the Institutional Ethical Committee.

Inclusion Criteria
1. Participants undergoing elective cesarean section for the first time.
2. Hemoglobin more than 10 g %.

Exclusion Criteria

Were previous abdominal surgeries including previous cesarean section, medical illness - pulmonary Koch’s, bronchial asthma, diabetes, hypertension, hematological disorders, skin infections, and emergency obstetrics indications.

Methods

A total of 240 women fulfilling inclusion and exclusion criteria as above were enrolled for the present study. They were divided into 2 groups of 120 each by systematic sampling technique.

• In Group 1: Poliglecaprone 25 (2-0) (monocryl, centisynth) was used as subcuticular stitch for skin closure.
• In Group 2: Polyglactin 910 (2-0) (vicryl, centricryl, and trusorb) was used.

Elective cesarean section was done in the same operation theater for various indications in both the groups by using pfannenstiel incision using same operative technique and respective suture material was used for skin closure as per the group to which the study participant belonged (i.e., Group 1 poliglecaparone 25, polyglactin 910). All cesarean sections were done by qualified obstetricians as per the standard hospital protocols. Both groups primarily received the same form of treatment including antibiotics and analgesics. The participants were then assessed for the following parameters - pain, tenderness, swelling, induration, discharge from wound, dehiscence, wound healing, and cosmesis on day 4, day 8, day 15, day 30, and day 45. Participants with healthy wound after removal of sutures were discharged on the 8th post-operative day and followed up in outpatient department on day 15, day 30, and day 45. Pain and tenderness were assessed on the basis of visual analog scale. It has rating of no pain at one end and unbearable pain at another end with gradings of mild, moderate, and severe. The rest of the parameters were assessed as follows: Swelling and induration assessed...
in form of erythema, edema, and localized hardening of tissue; discharge from the wound described as serous, serosanguinous, or purulent, wound dehiscence as superficial or deep; and wound healing and cosmesis by the Modified Hollender Cosmesis Scale, which was composed of six components:
1. Step-off borders (0 for yes, 1 for no).
2. Contour irregularity - puckering.
3. Scar width - <2 mm.
4. Edge inversion - sinking, curling.
5. Inflammation - redness, discharge.
6. Overall cosmesis (0 = poor, 1 = acceptable).

The wound score addresses 6 clinical variables: Absence of step-off, contour irregularities, wound margin separation >2 mm, edge inversion, excessive distortion, and overall cosmetic appearance. Each of these categories is graded on a 0- or 1-point scale. A total cosmetic score is derived by the addition of the scores of the 6 categorical variables. A score of 6 is considered optimal, while a score of <5 suboptimal. All data were analyzed for categorical and continuous variables such as age, properties of suture materials, and post-operative wound complications, especially in relation to type of suture materials used for subcuticular skin incision closure. The information regarding the various parameters was then filled in the pro forma of the respective patient. Statistical tests were applied and P value was calculated using Chi-square test and Fischer's exact test. Data obtained were evaluated with the help of relevant statistical analysis using Epi Info Software to compare two groups.

OBSERVATION AND RESULTS

From Table 1, it is obvious that there is statistically significant difference related to post-operative wound complication parameters between Group 1 and Group 2.

From Table 2, it is obvious that there is statistically significant difference related to post-operative wound complication parameters between Group 1 and Group 2.

From Table 3, it is obvious that there is no statistically significant difference related to post-operative wound complication parameters between Group 1 versus Group 2.

Out of total 240 participants, 191 (79.58%) were discharged on the day 8, 29 (12.08%) participants required admission beyond 8 days up to 15 days, 42 (17.50%) required admission for more than 15 days.

In Group 1, 95.83% participants were discharged on day 8, 0.83% required admission beyond 8 days up to 15 days, 3.33% required admission for more than 15 days.

In Group 2, 63.66% participants were discharged on day 8, 12.5% required admission beyond 8 days up to 15 days, and 24.16% required admission for more than 15 days.

From the Table 4, it is clear that the number of participants with severe pain was maximum in Group 2, that is, 25.0% on day 4, 22.5% on day 8, and 20.8% on day 15.

On day 30, 1 (0.8%) participant had moderate and 3 (2.5%) had mild pain in Group 2, whereas there was no complain of pain in Group 1.

On day 45, 1 (0.8%) patient had mild pain in Group 2, whereas there was no complain of pain in Group 1.

The wound healing and cosmesis were assessed on day 30 and day 45 by Modified Hollander's Scale where wound evaluation score (WES) of 6/6 was graded as “excellent.”

Maximum number of participants, that is, 112 (93.3%) and 115 (95.8%) from Group 1 showed excellent wound healing at day 30 and day 45 of cesarean section as compared to 74 (61.66%) and 80 (66.6%) from Group 2.

DISCUSSION

Tables 1-7 shows the comparison of post-operative wound complications between the three suture materials on days 4, 8, 15, 30, and 45 of cesarean section.

Pain
In our study, pain and tenderness were significantly less with poliglecaprone 25 as compared to polyglactin 910 similar findings were noted in a study by Regan and Lawrence at the Center of Dermatologic Surgery at Cooper University Hospital. This study was conducted on 140 patients to compare poliglecaprone 25 and polyglactin 910 in...
Table 2: Comparison of post-operative wound complications parameters on the day 15 between both groups among each other

<table>
<thead>
<tr>
<th>Post-operative wound complications</th>
<th>Group 1 poliglecaprone 25 n=120 (%)</th>
<th>Group 2 Polyglactin 910 n=120 (%)</th>
<th>Total n=240 (%)</th>
<th>P value Group (1 vs. 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>20 (16.7)</td>
<td>45 (37.5)</td>
<td>65 (26.7)</td>
<td>0.001 significant</td>
</tr>
<tr>
<td>Tenderness</td>
<td>21 (17.5)</td>
<td>44 (36.7)</td>
<td>65 (26.9)</td>
<td>0.001 significant</td>
</tr>
<tr>
<td>Swelling</td>
<td>9 (7.5)</td>
<td>33 (27.5)</td>
<td>42 (17.5)</td>
<td>0.0001 significant</td>
</tr>
<tr>
<td>Discharge</td>
<td>4 (3.3)</td>
<td>29 (24.2)</td>
<td>33 (11.7)</td>
<td>0.0001 significant</td>
</tr>
<tr>
<td>Induration</td>
<td>9 (7.5)</td>
<td>32 (26.7)</td>
<td>41 (17.2)</td>
<td>0.0001 significant</td>
</tr>
<tr>
<td>Dehiscence</td>
<td>0 (0.0)</td>
<td>7 (5.8)</td>
<td>7 (2.2)</td>
<td>0.014 significant</td>
</tr>
</tbody>
</table>

Table 3: Comparison of post-operative wound complications parameters on day 30 between two groups among each other

<table>
<thead>
<tr>
<th>Post-operative wound complications</th>
<th>Group 1 poliglecaprone 25 n=120 (%)</th>
<th>Group 2 Polyglactin 910 n=120 (%)</th>
<th>Total n=240 (%)</th>
<th>P value group (1 vs. 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>0 (0.0)</td>
<td>4 (3.3)</td>
<td>4 (1.1)</td>
<td>0.122 not significant</td>
</tr>
<tr>
<td>Tenderness</td>
<td>0 (0.0)</td>
<td>4 (3.3)</td>
<td>4 (1.1)</td>
<td>0.122 not significant</td>
</tr>
<tr>
<td>Swelling</td>
<td>0 (0.0)</td>
<td>2 (1.7)</td>
<td>3 (0.8)</td>
<td>0.498 not significant</td>
</tr>
<tr>
<td>Discharge</td>
<td>0 (0.0)</td>
<td>4 (3.3)</td>
<td>4 (1.1)</td>
<td>0.122 not significant</td>
</tr>
<tr>
<td>Induration</td>
<td>0 (0.0)</td>
<td>2 (1.7)</td>
<td>3 (0.8)</td>
<td>0.498 not significant</td>
</tr>
<tr>
<td>Dehiscence</td>
<td>0 (0.0)</td>
<td>4 (3.3)</td>
<td>4 (1.1)</td>
<td>0.122 not significant</td>
</tr>
</tbody>
</table>

Table 4: Distribution of participants according to severity of pain by VAS on post-operative days 4, 8, 15, 30, and 45

<table>
<thead>
<tr>
<th>Post-operative days</th>
<th>Severity of pain by VAS</th>
<th>Poliglecaprone 25 n=120 (%)</th>
<th>Polyglactin 910 n=120 (%)</th>
<th>Total n=240 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 4</td>
<td>Mild</td>
<td>12 (10.0)</td>
<td>8 (6.7)</td>
<td>20 (8.33)</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>13 (10.8)</td>
<td>18 (15.0)</td>
<td>31 (12.92)</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>3 (2.5)</td>
<td>30 (25.0)</td>
<td>32 (13.33)</td>
</tr>
<tr>
<td>Day 8</td>
<td>Mild</td>
<td>12 (10)</td>
<td>12 (10)</td>
<td>24 (10.0)</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>12 (10)</td>
<td>17 (14.2)</td>
<td>29 (12.08)</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>3 (2.5)</td>
<td>27 (22.5)</td>
<td>30 (12.5)</td>
</tr>
<tr>
<td>Day 15</td>
<td>Mild</td>
<td>15 (12.5)</td>
<td>11 (9.1)</td>
<td>26 (10.83)</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>3 (2.5)</td>
<td>9 (7.5)</td>
<td>12 (5.0)</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>2 (1.7)</td>
<td>25 (20.8)</td>
<td>26 (10.83)</td>
</tr>
<tr>
<td>Day 30</td>
<td>Mild</td>
<td>0</td>
<td>3 (2.5)</td>
<td>3 (1.25)</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>0</td>
<td>1 (0.8)</td>
<td>1 (0.41)</td>
</tr>
<tr>
<td>Day 45</td>
<td>Mild</td>
<td>0</td>
<td>1 (0.8)</td>
<td>1 (0.41)</td>
</tr>
</tbody>
</table>

VAS: Visual analog scale

Table 5: Comparison of post-operative wound complications parameters on day 8 between two groups among each other

<table>
<thead>
<tr>
<th>Post-operative wound complications</th>
<th>Group 1 poliglecaprone 25 n=120 (%)</th>
<th>Group 2 Polyglactin 910 n=120 (%)</th>
<th>Total n=240 (%)</th>
<th>P value group (1 vs. 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>27 (22.5)</td>
<td>55 (45.8)</td>
<td>82 (34.16)</td>
<td>0.0001 significant</td>
</tr>
<tr>
<td>Tenderness</td>
<td>27 (22.5)</td>
<td>54 (45.0)</td>
<td>81 (33.75)</td>
<td>0.0001 significant</td>
</tr>
<tr>
<td>Swelling</td>
<td>12 (10.0)</td>
<td>37 (30.8)</td>
<td>49 (20.41)</td>
<td>0.0001 significant</td>
</tr>
<tr>
<td>Discharge</td>
<td>2 (1.7)</td>
<td>34 (28.3)</td>
<td>36 (15)</td>
<td>0.0001 significant</td>
</tr>
<tr>
<td>Induration</td>
<td>12 (10.0)</td>
<td>37 (30.8)</td>
<td>49 (20.41)</td>
<td>0.0001 significant</td>
</tr>
<tr>
<td>Dehiscence</td>
<td>0 (0.0)</td>
<td>2 (1.7)</td>
<td>2 (0.83)</td>
<td>0.498 not significant</td>
</tr>
</tbody>
</table>

cutaneous surgery and it was found that poliglecaprone 25 was less painful than polyglactin 910 as it resulted in significantly less extruded sutures than did polyglactin 910 (3.1% vs. 11.4%). Similarly, Vats and Pandit Suchitra conducted a randomized clinical trial on 90 patients at LTMMC, Sion Mumbai, to compare the suture materials in cesarean section and showed that poliglecaprone 25 absorbable suture is associated with significantly less pain.
and tenderness at the suture site ($P < 0.05$) as compared to polyglactin 910.

**Swelling and Induration**

Our study showed that the number of participants with swelling and induration was significantly more in participants with polyglactin 910 as compared to poliglecaprone 25. Similar results were demonstrated in a study by Vats and Pandit Suchitra, which showed that incidence of swelling and induration is significantly ($P < 0.05$) less with poliglecaprone (monofilament suture) as compared to the multifilament polyglactin suture.

**Discharge**

Our study showed that the number of participants with discharge was significantly more with polyglactin 910 as compared to poliglecaprone (Table 8). Similar findings were noted in a study by Regan and Lawrence, which demonstrated that poliglecaprone 25 (3.1%) resulted in significantly less extruded sutures than did polyglactin 910 (11.4%), and hence found to be less inflammatory or infectious, less pustular, or papular. Similarly, Vats and Pandit Suchitra, showed that wound discharge is significantly ($P < 0.05$) less with poliglecaprone as compared to multifilament polyglactin suture. Molea et al. compared the biocompatibility and absorption times of three absorbable monofilament suture materials (polydioxanone, poliglecaprone 25, and glycomer 631) and showed near-total absence of acute inflammatory cells at 1 month and “extremely low-tissue reaction values with poliglecaprone 25.” Similarly, LaBagnara noted that poliglecaprone 25 was “nearly non-reactive in tissue and no cases of stitch abscess or excessive wound inflammation were found which also corresponds with our study. This could be explained by the fact that Islam and Ehsan conducted this study at Military Hospital, Rawalpindi, Pakistan, on a large sample size of two thousand patients.

**Wound Dehiscence**

In our study, wound dehiscence was significantly more in polyglactin 910 compared to poliglecaprone 25. It is in compliance with the study by Vats and Pandit Suchitra, which showed that wound dehiscence and requirement of resuturing are significantly ($P < 0.05$) less with poliglecaprone as compared to the polyglactin suture. However, Sajid et al. reported a systematic review of published RCTs and demonstrated that absorbable sutures do not increase the risk of skin wound dehiscence, rather lead to a reduced risk of wound dehiscence compared to non-absorbables which could be explained by the fact that non-absorbable sutures need to be removed manually, and if inadvertently removed in improperly healed wound, it may result in wound dehiscence.

Table 7 shows the comparison of excellent wound healing between suture materials assessed on the day 30 and day 45 of cesarean section.

The current study found that poliglecaprone 25 has excellent wound healing properties compared to polyglactin 910. Similar findings were found in a study by Niessen et al., which demonstrated that poliglecaprone 25 resulted in a significantly lower number of patients requiring wound resuturing and reduced pain at the suture site.

**Table 6: Distribution of study participants according to hospital stay**

<table>
<thead>
<tr>
<th>Duration of hospital stay</th>
<th>Total number of participants n=240 (%)</th>
<th>Group 1 poliglecaprone 25 n=120 (%)</th>
<th>Group 2 polyglactin 910 n=120 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 days</td>
<td>191 (79.58)</td>
<td>115 (95.83)</td>
<td>76 (63.33)</td>
</tr>
<tr>
<td>8-15 days</td>
<td>29 (12.08)</td>
<td>1 (0.83)</td>
<td>15 (12.5)</td>
</tr>
<tr>
<td>&gt;15 days</td>
<td>42 (17.50)</td>
<td>4 (3.33)</td>
<td>29 (24.16)</td>
</tr>
<tr>
<td>Total</td>
<td>360</td>
<td>120</td>
<td>120</td>
</tr>
</tbody>
</table>

**Table 7: Comparison of wound healing and cosmesis between two suture materials**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Excellent wound healing with WES (6/6)</th>
<th>At 30 days</th>
<th>At 45 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 poliglecaprone 25 n=120 (%)</td>
<td>112 (93.3)</td>
<td>115 (95.8)</td>
<td></td>
</tr>
<tr>
<td>Group 2 polyglactin 910 n=120 (%)</td>
<td>74 (61.66)</td>
<td>80 (66.6)</td>
<td></td>
</tr>
<tr>
<td>Pearson Chi-square test value</td>
<td>39.42</td>
<td>40.18</td>
<td></td>
</tr>
<tr>
<td>$P$ value</td>
<td>0.0001</td>
<td>0.0001</td>
<td></td>
</tr>
</tbody>
</table>

**Table 8: Comparison of post-operative wound complications parameters among our study and Pandit Suchitra study**

<table>
<thead>
<tr>
<th>Post-operative wound complications</th>
<th>Day 4 Pandit Suchitra study $P$ value</th>
<th>Our study $P$ value</th>
<th>Day 8 Pandit Suchitra study $P$ value</th>
<th>Our study $P$ value</th>
<th>Day 30 Pandit Suchitra study $P$ value</th>
<th>Our study $P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>No difference</td>
<td>0.0001 significant</td>
<td>No difference</td>
<td>0.0001 significant</td>
<td>No difference</td>
<td>0.122 not significant</td>
</tr>
<tr>
<td>Tenderness</td>
<td>$&gt;0.05$ not significant</td>
<td>0.0001 significant</td>
<td>$&gt;0.05$</td>
<td>0.0001 significant</td>
<td>Test invalid</td>
<td>0.122 not significant</td>
</tr>
<tr>
<td>Swelling</td>
<td>$&lt;0.05$ significant</td>
<td>0.0001 significant</td>
<td>$&lt;0.05$</td>
<td>0.0001 significant</td>
<td>Test invalid</td>
<td>0.498 not significant</td>
</tr>
<tr>
<td>Discharge</td>
<td>$&lt;0.05$ significant</td>
<td>0.0001 significant</td>
<td>$&lt;0.05$</td>
<td>0.0001 significant</td>
<td>No difference</td>
<td>0.122 not significant</td>
</tr>
<tr>
<td>Induration</td>
<td>$&lt;0.05$ significant</td>
<td>0.0001 significant</td>
<td>$&lt;0.05$</td>
<td>0.0001 significant</td>
<td>Test invalid</td>
<td>0.498 not significant</td>
</tr>
<tr>
<td>Dehiscence</td>
<td>$&gt;0.05$ not significant</td>
<td>---</td>
<td>$&lt;0.05$</td>
<td>Test invalid</td>
<td>0.0001 significant</td>
<td>0.122 not significant</td>
</tr>
</tbody>
</table>
in significantly less hypertrophic scars than polyglactin 910. Vats and Pandit Suchitra.\textsuperscript{15} showed that wound healing is excellent with poliglecaprone and polypropylene. However, Meiring et al.\textsuperscript{16} demonstrated no difference in wound cosmesis ($P = 0.08$ for incisions with “excellent” cosmetic result). Wounds were evaluated at 6 weeks post-operatively by a plastic surgeon blinded to the repair material and were assessed on a scale of excellent, good, fair, or poor. Our study shows that poliglecaprone 25 is superior over polyglactin 910 and polypropylene for subcuticular skin stitches in cesarean section.

Bezwada et al.\textsuperscript{17} published a paper on “monocryl suture, a new ultra-pliable absorbable monofilament suture” and showed that monocryl sutures display excellent handling properties, minimal resistance during passage through tissue, and excellent tensile properties. These sutures provide an in vivo breaking strength retention of approximately 20-30% after 2 weeks, considered by many to be the critical wound healing period and produces slight or minimal tissue reaction. Yag-Howard and Lavallee,\textsuperscript{18} in their study showed that the absorbable monofilament poliglecaprone 25 can serve as the sole suture material in closing deep surgical defects involving subcutaneous and epidermal tissue with the benefits of providing esthetically pleasing outcomes, possibly due to the material's low tissue reactivity and clear colorless appearance, and cost-effectiveness. Additional advantages include increased versatility, ease of handling, and convenience. Some disadvantages include a slight stiffness of the suture material, which may require a surgeon to make minor adjustments to his/her knot tying technique, as well as a transparent appearance that may make suture removal more challenging when using the undyed version of suture material. However, the many benefits of using poliglecaprone 25 for closure of surgical defects outweigh the few disadvantages.

Summary
A prospective study was carried out in the Department of Obstetrics and Gynaecology in a Tertiary Care Center of Central India from October 2014 to September 2016. This analysis was to study and compare the efficacy of two suture materials, that is, poliglecaprone 25, polyglactin 910 in subcuticular skin stitches in women undergoing elective cesarean section to establish the more efficacious and cost-effective suture material with least complications. A total number of 240 pregnant women undergoing elective cesarean section were divided in two groups by systematic sampling technique. Group 1 was given to poliglecaprone 25, Group 2 was given to polyglactin 910 for subcuticular skin closure. Both groups were followed up in post-operative period on days 4, 8, 15, 30, and 45 to assess the post-operative wound complication parameters such as pain, tenderness, swelling, induration, wound discharge, dehiscence, wound healing, and cosmesis. Data thus obtained from all three groups were evaluated and compared with each other with the help of relevant statistical tests. The results of our study can be summarized as follows.

1. Out of total 240 study participants participated in the study,
   a. Maximum number of participants, that is, 124 (51.66%) belonged to the age group of 21-25 years. b. Most of them, that is, 144 (60.0%) were primigravida. c. Maximum number of participants, that is, 84 (35.0%) belonged to upper-lower class. d. 60 (25%) were under the category of normal body mass index of 18.5-25. e. 186 (77.5%) were booked, whereas 52 (22.5%) were unbooked cases. f. Overall, the most common indication of cesarean section was breech (26.4%), followed by cephalopelvic disproportion (26.11%) and transverse lie (23.3%).

2. There was a statistically significant difference ($P < 0.05$) between Group 1 (poliglecaprone 25) and Group 2 (polyglactin 910) with respect to post-operative wound complications parameters, that is, pain, tenderness, swelling, discharge, and in duration as assessed on post-operative days 4, 8, and 15.

3. On a post-operative day 30, there were no wound-related complications with Group 1 (poliglecaprone 25), whereas 10 participants in Group 2 (polyglactin 910) had post-operative wound complications out of which 4 (3.3%) participants had pain, 4 (3.3%) had tenderness, 2 (1.7%) had swelling, 4 (3.3%) had discharge, 2 (1.7%) had induration, and 4 (3.3%) had dehiscence.

4. Severity of pain by VAS was significantly more with polyglactin 910 as compared to poliglecaprone 25 on the post-operative days 4, 8, and 15.

5. There was no complain of pain with poliglecaprone 25 and polyglactin 910 on day 30 and day 45 whereas with polyglactin 910; 1 (0.8%) participants had moderate and 3 (2.5%) had mild pain on day 30 and 1 (0.8%) had mild pain on day 45.

6. Overall, 42 (11.66%) women required prolonged hospital stay for more than 15 days out of which maximum 29 (24.16%) belonged to Group 2 (polyglactin 910) and minimum 4 (3.33%) belonged to Group 1 (poliglecaprone 25).

7. 93.3% participants in poliglecaprone 25 group, 61.66% in polyglactin 910 group had “excellent” wound healing and cosmesis as per Modified Hollander’s scale on day 30 and the difference was statistically significant.

8. 95.8% of participants in poliglecaprone 25 group, 66.6% in polyglactin 910 group had “excellent” wound healing and cosmesis as per Modified Hollander’s scale on day 45 and the difference was statistically significant.
CONCLUSION

Thus, from the present study, we can summarize that poliglecaprone 25 is the most efficacious, with least wound complications, provides better cosmetic outcome compared to polyglactin 910 in cesarean skin closure but little costlier than poliglecaprone 25.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Acute Coronary Syndrome (ACS) in the Young: Angiographic Features and Risk Factor Analysis of Patients with ACS before the Age of 35 Years

Mohmad Iqbal Wani¹, Aamir Rashid¹, Jahangir Rashid Beig¹, Shahood Ajaz²

Senior Resident, Department of Cardiology, Sher-I-Kashmir Institute of Medical Sciences, Soura, Srinagar, Jammu and Kashmir, India, ²PG Scholar, Department of Medicine, Government Medical College, Srinagar, Jammu and Kashmir, India

Abstract

Introduction: Although there are many studies of acute coronary syndrome (ACS) in young, there are very few studies of ACS in age group <35 years. Besides, there is hardly any data available about clinical and angiographic profile of our regional population in our young ACS patients <35 years of age.

Aims and Objectives: The aim of the study is to study the clinical and angiographic profile in age group <35 years presenting as ACS.

Material and Methods: It was a prospective hospital-based study. All patients with age <35 years presenting as acute myocardial infarction (MI) from March 2012 to March 2014 were enrolled. Clinical presentation, conventional risk factors, and angiographic profiles were noted.

Results: A total of 30 patients were studied. The mean age of the patients was 30.87 ± 3.72 (range 21-35) years. All patients were males. Of these 14 patients had anterior wall ST elevation MI and other two had anterior wall non-ST elevation MI. 14 patients had infarct of the inferior wall. Smoking (66.66%) and dyslipidemia (50%) were two major conventional coronary risk factors followed by family history of premature coronary artery disease (26.6%) and hypertension (13.3%). The most common arteriographic finding was the involvement of one vessel (60%) followed by zero-vessel disease (23.33%), double-vessel disease was seen in only three patients and there were two patients with triple-vessel disease. None of the patients had left main involvement. The most common vessel to be involved was left anterior descending (LAD) (83.3%).

Conclusion: Smoking and dyslipidemia are the most common modifiable conventional risk factors. Single-vessel disease of LAD was common anatomic presentation. Further larger studies are needed to confirm the findings and implement various preventive strategies to decrease disease burden.

Key words: Angiographic profile, Risk factors, Young acute coronary syndrome

INTRODUCTION

Coronary artery disease (CAD) is the leading cause of death among adults in the developed countries and its incidence is increasing in the developing countries as well¹ by 2020 atherosclerotic disease will become the leading cause of both death and disability worldwide, with number of fatalities projected to increase to more than 24 million a year by 2030² the disease has also been to affect Indians at a younger age sometimes with severe diffuse form of involvement and unrelenting course.³ The overall prevalence of CAD in Jammu and Kashmir population studied by all diagnostic measures was 7.54% with rural of 6.7% and urban of 8.37%, prevalence was higher in males, 7.80% than in females 6.63%.⁴ Studies from the 1970s to 1980s suggested that approximately 2-6% of myocardial infarctions (MIs) occur in young patients.⁵,⁶ There is documented evidence that South Asian people develop CAD at a higher rate and also at an early age.⁷ In India, 12%-16% of CAD patients are young. Half of
the cardiovascular disease (CVD) related deaths (52% of CVDs) in India occur below the age of 50 years, and about 25% of acute MI (AMI) in India occurs under the age of 40 years. Indians have a three-fold risk of developing AMI before age of 46 compared to Malays (1.25-fold risk) and Chinese (0.7-fold risk), respectively. In general, MI develops 5-10 years earlier in Asian Indians than in other populations, and its occurrence in patients under 40 is 5-10-fold higher. It is predominantly a disease of men, women have been thought to comprise only approximately 5-10% of all MIs in the younger age groups. Studies have shown that CAD is increasing in younger population. Although MI in young patients is most often the result of coronary atherosclerosis, there are a significant number of patients in whom there is no evidence of coronary atherosclerosis. Most of the studies have reported a predominance of single-vessel disease by coronary arteriography as the underlying etiological lesion. Although there are many studies of acute coronary syndrome (ACS) in young, there are very few studies of ACS in age group <35 years. Besides, there is hardly any data available for our regional population in our young ACS patients <35 years of age.

**Aims and Objectives**

The aim of the study is to study the clinical and angiographic profile in age group <35 years presenting as ACS.

**MATERIALS AND METHODS**

The study was conducted at Fortis Hospital Mohali (Punjab) between the period March 2012 and March 2014. This was a prospective study where 30 patients who presented with ischemic chest pain, evolutionary changes on serial electrocardiogram, and elevated cardiac markers with clinical diagnosis of acute MI in the department of emergency medicine and shifted to cardiac care unit were enrolled for the present study when they fulfilled the study criteria as mentioned below and underwent coronary angiography during the same hospital stay.

**Inclusion Criteria**

1. Age equal to or <35 years.
2. Definite AMI at admission, i.e., having 2 of the following three (as per the WHO definition of AMI).
   a. Ischemic type chest discomfort
   b. Evolutionary changes on serially obtained electrocardiogram (EKG) tracings
   c. Rise and fall of serum cardiac markers.

**Exclusion Criteria**

(a) Age was >35 years
(b) Patients not willing for coronary arteriography
(c) Patients not having definite AMI (i.e., patients who did not fulfill the World Health Organization criteria of AMI)
(d) Congenital valvular heart disease or cardiomyopathies
(e) End organ damage.

A detailed history was taken and thorough physical examination was carried out. All patients were investigated for the presence of conventional coronary risk factors. Conventional risk factors included a family history of premature CAD, hypertension, diabetes mellitus, smoking and hyperlipidemia.

All patients enrolled for the study underwent coronary arteriography during the hospitalization. All angiograms were recorded on Innova angiography system and analyzed on ADW/Centricity/DICOM/VIEWLITE. On the basis of coronary anatomy patients were classified as having: Zero-vessel disease (normal coronaries or with 50% or less luminal narrowing), left main disease, single-vessel, double-vessel, and triple-vessel disease. The study was approved by the Institute Ethics Committee.

**Statistical Analysis**

Thirty patients were taken for the study, the study sample was estimated on the basis of very low incidence of MI in young (2%) with confidence interval of 95% and accuracy of 5%. Cochran Formula was applied for estimation of sample size. The data were analyzed by using statistics is a software package version 20. Mean and standard deviations were calculated for all quantitative data. Frequencies and percentages were calculated for all categorical data.

**OBSERVATION AND RESULTS**

A total of 30 patients were studied. The mean age of the patients was 30.87 ± 3.72 and range was 21-35 years. All patients were males. The age and sex distribution of participants are shown in Table 1. None of the patient in the current study gave history of angina preceding ACS. 28 patients had ST elevation MI, 14 patients had anterior wall MI, 14 had MI, 2 had Non-ST elevation MI. Of 28 patients who were eligible for thrombolysis, 5 were given streptokinase as initial reperfusion therapy, 21 out of 23 patients who had obstructive CAD underwent percutaneous coronary intervention (balloon angioplasty ± stenting).

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-25</td>
<td>3</td>
<td>0</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>26-30</td>
<td>8</td>
<td>0</td>
<td>6</td>
<td>26.66</td>
</tr>
<tr>
<td>31-35</td>
<td>19</td>
<td>0</td>
<td>20</td>
<td>63.33</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>0</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 1: Age and sex distribution in studied patients**
Risk Factor Analysis
The conventional risk factors are shown in Table 2 smoking (66.66%) and dyslipidemia (50%) were two major conventional coronary risk factors in the present study followed by family history of premature CAD (26.6%) and hypertension (13.3%). One patient had no conventional risk factor, two patients had one risk factor, three patients had two risk factors and 24 patients had more than two risk factors. The lipid profile is shown in Table 3.

Angiographic Findings
The distribution of coronary artery involvement in various patients is shown in Table 4 and Figure 1. The distribution of lesion morphology is shown in the Table 5. The most common involvement was single-vessel disease of left anterior descending (LAD). None of the patients had coronary artery anomaly.

DISCUSSION
Most of the studies involving young ACS patients are reported from Western countries and presently, there is very less contemporary data on the prevalence, risk factors, clinical characteristics, and outcome of such patients in our local population. All the patients in the present study were men. This is similar to the observation made in the Framingham Heart Study where women comprise only 5-10% of young MI patients. Before menopause, women have lower age adjusted incidence and mortality rates for coronary heart disease than men. Gender specific incidence rates converge after menopause, suggesting a major role for estrogens in delaying progression of atherosclerosis. Much of this effect results from beneficial actions of estrogen on lipid fractions. Other potentially beneficial effects include direct vascular mechanisms such as improved endothelial-dependent vasomotion, reduced low-density lipoprotein oxidation, altered adhesion molecule levels, increased fibrinolytic capacity, and enhanced glucose metabolism.

Conventional Risk Factors
Of the five conventional risk factors, the incidence of smoking was quite high in our study (66.66%). This parallels the findings of various studies which have reported a very high incidence of smoking (60-95%). Smoking therefore appears to be the most common conventional coronary risk factor in young MI patients.

| Table 2: Incidence of conventional risk factors in 30 young ACS patients |
|-----------------------------|--------------------------|
| Conventional risk factors   | Number of patients (%)   |
| Smoking                     | 20 (66.66)               |
| Family history of premature CAD | 8 (26.66)               |
| Hypertension                | 4 (13.33)                |
| Diabetes mellitus           | 2 (6.66)                 |
| Dyslipidemia                | 15 (50)                  |
| CAD: Coronary artery disease, ACS: Acute coronary syndrome |

<table>
<thead>
<tr>
<th>Table 3: Lipid profile of 30 young MI patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lipid profile (mg%)</td>
</tr>
<tr>
<td>Hypercholesterolemia (&gt;240)</td>
</tr>
<tr>
<td>Hypertriglyceridemia (&gt;200)</td>
</tr>
<tr>
<td>Low HDL (&lt;35)</td>
</tr>
<tr>
<td>High LDL (&gt;160)</td>
</tr>
<tr>
<td>Number of patients</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4: Distribution of coronary involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessel involvement</td>
</tr>
<tr>
<td>Number of patients (%)</td>
</tr>
<tr>
<td>SVD</td>
</tr>
<tr>
<td>LAD</td>
</tr>
<tr>
<td>RCA</td>
</tr>
<tr>
<td>LCX</td>
</tr>
<tr>
<td>DVD</td>
</tr>
<tr>
<td>LAD+RCA</td>
</tr>
<tr>
<td>LCX+RCA</td>
</tr>
<tr>
<td>LAD+LCX</td>
</tr>
<tr>
<td>TVD</td>
</tr>
<tr>
<td>Left man</td>
</tr>
<tr>
<td>Zero-vessel disease</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5: Type of lesions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of lesions</td>
</tr>
<tr>
<td>Number of patients</td>
</tr>
<tr>
<td>Type A</td>
</tr>
<tr>
<td>Type B</td>
</tr>
<tr>
<td>Type B1</td>
</tr>
<tr>
<td>Type B2</td>
</tr>
<tr>
<td>Type C</td>
</tr>
</tbody>
</table>
patients, the incidence varies between 60% and 95%, as compared with approximately 40% in the older patients. Dyslipidemia was found in 15 (50%) of our patients and rank second to smoking as the conventional coronary risk factor in the present study. This parallels the incidence in other studies (29-68%).20,22 Eight (26.66%) participants of the current study gave family history of premature CAD. This was similar to the findings of the study by Biswas et al.19 However, other studies have reported a higher incidence of this coronary risk factor.23,24 It is not clearly known that how a positive family history increases the risk of MI in young patients, although it may involve inherited disorders of lipid metabolism, blood coagulation, or other genetic factors as yet unknown. Diabetes mellitus was present in two (6.66%) patients in our study. This is consistent with other studies.23,24 In young patients, the incidence is <10% in most studies. Only four (13.33%) of our patients were hypertensive. This was similar to the incidence reported by various studies.20,24 Hypertension is therefore less common in young MI patients than in older patients.

Angiographic Profile

Literature is full of studies describing lesion distribution in large series of patients studied with coronary arteriography, but there have been only few reports dealing with patients aged 35 years or less.18 Quantification of coronary angiographic findings was limited to visual interpretation of attending cardiologist, which is representative of real world practice. Majority had single-vessel disease. This observation parallels the findings of various other studies.18,19,21 However, other studies have reported a lower incidence of single-vessel disease.20,24 The most commonly involved vessel in the present study was LAD (83%) followed by right coronary artery (RCA) (16.66%), none of the patients in the present study had single-vessel involvement of left circumflex (LCX). This finding parallels the findings of the other studies.18,19,21 In our study, the incidence of double-vessel disease (LCX + RCA and LAD + LCX) was 10%. Two vessel diseases are less commonly reported, and the incidence varies from 18% to 36%.18,19,21 The incidence of triple-vessel disease in the present series was very low. Only two patients (6.66%) had triple-vessel disease. There have been conflicting reports in various studies, some reporting low18,19 and some high20,24 incidence of triple-vessel disease. None of the participants of the present study had involvement left main coronary artery. Other studies have also reported no or low (0-2%) involvement of left main.18,19,21 The incidence of zero-vessel disease was 23.33% in the present study which compares favorably with other studies.20,25 In a recent review, Choudhury and Marsh14 have reported 20% incidence of normal coronary-MI.

CONCLUSION

Smoking and dyslipidemia are the most common modifiable conventional risk factors. Single-vessel involvement of LAD was the most common anatomic presentation. Further larger studies are needed to confirm the findings and implement various preventive strategies to decrease disease burden.

REFERENCES

Wani, et al.: Acute Coronary Syndrome in Young


How to cite this article: Wani MI, Rashid A, Beig JR. Acute Coronary Syndrome (ACS) in the Young: Angiographic Features and Risk Factor Analysis of Patients with ACS before the Age of 35 Years. Int J Sci Stud 2017;5(4):244-248.

Source of Support: Nil, Conflict of Interest: None declared.
Study of Postmortem Findings of Neck Structures in Cases of Asphyxial Deaths

Suresh Chand¹, Rishi Solanki², Anil Aggrawal³, P C Dikshit⁴, Rajesh Ranjan⁵

¹Assistant Professor, Department of Forensic Medicine, G S Medical College, Pilkhuwa, Hapur, Uttar Pradesh, India, ²Senior Resident, Aruna Asaf Ali Government Hospital, Rajpur Road Civil Lines, New Delhi, India, ³Director and Professor, Department of Forensic Medicine, MAMC, New Delhi, India, ⁴Professor and Head, Department of Forensic Medicine, Hamdard Institute of Medical Sciences and Research, New Delhi, India, ⁵Department of Community Health Administration, Resident, NIHFW, New Delhi, India

Abstract

Introduction: Asphyxial deaths are common in forensic practice. The term “asphyxia” commonly means “lack of oxygen” and literally means “defective aeration of blood” due to any cause.

Materials and Methods: The study was conducted in Department of Forensic Medicine, Maulana Azad Medical College, New Delhi. It is a descriptive cross-sectional study. The present study was conducted between September 2010 and March 2012. Cases of asphyxial deaths coming for medicolegal postmortem were examination.

Results: Out of these 73 cases of asphyxial deaths, 58 cases of asphyxial deaths due to constriction of the neck were considered and studied to see various changes in the neck structures in deaths due to asphyxia. This study includes 89.65% of cases of hanging, 8.62% of cases of manual strangulation, and 1.72% of cases of ligature strangulation of either sex between 0 and 79 years of age group.

Conclusion: The incidence of asphyxial deaths due to constriction of the neck is more in males as compared to females and in most of these cases; the mode of death is hanging. The maximum numbers of cases are seen in young adults (20-29 years). In most of the cases, the soft cloth was used as ligature material. The knot of the ligature material was mostly either on right side or left side in comparison to front and back of the neck. The typical position of the knot is found in a few cases. In a maximum number of cases, the hanging is complete.

Key words: Postmortem Findings, Medico legal, Asphyxial Deaths

INTRODUCTION

Asphyxial deaths are common in forensic practice. The term “asphyxia” commonly means “lack of oxygen” and literally means ‘defective aeration of blood’ due to any cause. However, the term has been translated from the original Greek, implying “pulselessness/absence of pulsation”. Adelson defined “asphyxia” as the physiological and chemical state in a living organism in which acute lack of oxygen available for cell metabolism is associated with inability to eliminate excess of CO₂.

Generally the term “anoxia” implies “absence of oxygen”. However, Bacroft using this term divided the condition into three groups: (1) Anoxic anoxia - meaning prevention of oxygen from reaching the lungs, (2) anemic anoxia - meaning inability of blood to carry sufficient oxygen to the tissues due to low hemoglobin content, and (3) stagnant anoxia - meaning lack of oxygenated blood transport to the tissues due to impaired circulation. Later on, Peters and Van Slyke in 1931 added a fourth group to it called histotoxic anoxia - wherein, though freely available in the blood stream, oxygen cannot be utilized by the tissues.

Although many natural disease processes may involve inadequate uptake and/or delivery of oxygen (e.g. chronic obstructive pulmonary disease), the term “asphyxia” is generally reserved for conditions related to abnormal atmosphere and mechanical and chemical effects directly leading to the aforementioned abnormalities. Determination of the specific type(s) of asphyxia operative
in a particular case, the cause of death, and the manner of death is dependent on information elicited during the medicolegal death investigation - namely, history (circumstances), scene investigation, and postmortem examination (including appropriate ancillary radiographic and laboratory studies).

Despite the differences of opinion regarding the term “asphyxia” in medical literature, it is widely used for medicolegal purposes and is categorized as mechanical and non-mechanical asphyxia.\(^1\)\(^-\)\(^15\)

In mechanical asphyxia,\(^1\) the flow of air into the body is interfered through some physical impediments such as (1) pressure on exterior of the neck, e.g., hanging and strangulation, (2) obstruction of airways from exterior, e.g., suffocation and smothering, (3) obstruction of airways from interior, e.g. gagging, choking, (4) pressure on the chest, e.g., traumatic asphyxia, and (5) submersion death, e.g., drowning.

In non-mechanical asphyxia,\(^1\) physiological impediments cause the exclusion of oxygen by its depletion and replacement by another gas or by chemical interference with its uptake and utilization by the body itself or where there is insufficient oxygen in the atmosphere itself, e.g. CO poisoning and CN poisoning.

At present, the term asphyxia has been used to denote death or sub-lethal injury from mechanically induced cerebral hypoxia accompanied by signs of impeded venous return. Similar degree of hypoxemia of any organ/tissue can be produced by interference with its blood supply or by obstructing its drainage. Pressure on the neck can affect the brain in either way or both ways at the same time, resulting in infarction (ischemic or hyperemic).\(^16\)\(^-\)\(^30\)

Asphyxial deaths may be caused by any of the above methods individually as well as in combination with each other. A case study from Romania indicates that a victim was killed by three different mechanisms of asphyxia: Smothering with the hand, manual strangulation (MS) with the other hand, and traumatic asphyxia by thoracic compression with the knees. Certain unusual forms of asphyxial deaths such as autoerotic, positional, and neck holds have also been reported.\(^2\)

**MATERIALS AND METHODS**

The study was conducted in the Department of Forensic Medicine, Maulana Azad Medical College, New Delhi.

- **Study design:** Descriptive cross-sectional study.
- **Study period:** The present study was conducted between September 2010 and March 2012.
- **Study population:** Cases of asphyxial deaths coming for medicolegal postmortem examination.
- **Sample size:** 58 cases.

**Inclusion Criteria**

1. Asphyxial deaths (hanging and strangulation) coming for medicolegal postmortem examination.

**Exclusion Criteria**

1. Decomposed bodies.
2. Asphyxial cases due to drowning, suffocation.

**Methods**

A careful general examination was conducted with special reference to the neck and all characteristics were noted. Ligature when present around the neck was released by preventing the noose. The skull and chest were opened and contents were taken out to drain out the blood from the neck so that the neck structures could be examined in a relatively bloodless field thus avoiding artifactual hemorrhages. We put the Y-shaped incision which permitted a thorough examination of the anterior examination of the anterior neck organs.

The skin and superficial tissue of the neck were reflected to expose the underlying structures by grasping and retracting the cut border of the skin using the fingers or non-toothed forceps and making gentle horizontal slices along the dermosubcutaneous tissue plane. Then, the neck was dissected layer wise.

Following layers were examined in a stepwise fashion:

1. Platysma.
2. Sternoleidomastoid.
3. (a) Omohyoid (b) digastric.
4. Sternohyoid.
5. (a) Sternothyroid and (b) thyrohyoid.

Following structures and associated pathological findings were noted:

1. External injuries - in the form of abrasions, contusions, etc.
2. Internal injuries - Contusions and hemorrhages in the substance of each muscle layer and in front and behind it.
3. Contusion, congestion, and hemorrhages in various neck structures such as lymph nodes, submandibular gland, thyroid, and parathyroids.
4. Damage to the carotid arteries, jugular veins (internal and external), vagus, and phrenic nerves.
5. Fractures of the hyoid, thyroid cartilage, cricoid cartilage, and corniculate and cuneiform cartilages.
6. Damage to vertebral artery.
RESULTS

The study was conducted in the Department of Forensic Medicine, Maulana Azad Medical College. A total of 1889 medicolegal autopsies were conducted during the period (September 2010 to March 2012) of study, of which 73 (3.86%) cases of asphyxial deaths were recorded. Out of these 73 cases of asphyxial deaths, 58 cases of asphyxial deaths due to constriction of the neck were considered and studied to see various changes in neck structures in deaths due to asphyxia. This study includes 89.65% of cases of hanging, 8.62% of cases of MS and 1.72% of cases of ligature strangulation (LS) of either sex between 0 and 79 years of age group.

Table 1 shows that out of total 73 cases of asphyxia, maximum numbers of cases were of hanging (71.23%), followed by drowning (20.54%). Only 6.84% of cases of MS and 1.36% of cases of LS contribute to deaths due to asphyxia.

Table 2 shows that out of total 58 cases of asphyxial deaths due to constriction of the neck, 89.65% of cases were of hanging, 8.62% of cases of MS and 1.72% of cases of LS.

Table 3 shows that maximum numbers of cases (51.72%) were seen in the age group of 20-29 years followed by 30-39 years of age group (15.51%) in both the sexes. The minimum numbers of cases were seen in extremes of age, i.e., below 10 years and above 60 years. Male predominance was seen in most of the age groups except age group below 10 years. Male-to-female ratio is 2:1. During the study, one case was seen kinner in 20-29 years of age.

Table 4 shows that maximum number of cases were in March (10 cases, 17.24%) followed by February (9 cases, 15.51%) and followed by September (8 cases, 13.79%).

Table 5 shows that the cloth was used in a maximum number of cases (28) followed by rope (19) and in 4 cases the nature of ligature material was not known.

Table 6 shows that in 43.39% of cases, the knot was located on the right side of the neck and in 41.50% of cases, the knot was on the left side of the neck. Typical site of knot was seen only in 6 cases (11.32%).

Table 7 shows that the percentage of atypical hanging is more as compared to typical.

Table 8 shows that the ligature mark in hanging is present at the level of thyroid cartilage in 25 (48.07%) cases, above the level of the thyroid cartilage in 26 (50%) cases, and in 1 (1.92%) case, the ligature mark was present below the level of the thyroid cartilage.

<table>
<thead>
<tr>
<th>Table 1: Distribution of cases of asphyxia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of asphyxia</td>
</tr>
<tr>
<td>Hanging</td>
</tr>
<tr>
<td>Drowning</td>
</tr>
<tr>
<td>MS</td>
</tr>
<tr>
<td>LS</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Distribution of cases of asphyxial deaths due to constriction of the neck</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of asphyxia</td>
</tr>
<tr>
<td>Hanging</td>
</tr>
<tr>
<td>MS</td>
</tr>
<tr>
<td>LS</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3: Distribution of cases according to age groups and gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (years)</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>0-10</td>
</tr>
<tr>
<td>10-19</td>
</tr>
<tr>
<td>20-29</td>
</tr>
<tr>
<td>30-39</td>
</tr>
<tr>
<td>40-49</td>
</tr>
<tr>
<td>50-59</td>
</tr>
<tr>
<td>60-69</td>
</tr>
<tr>
<td>70-79</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4: Distribution of cases according to months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Months</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>January</td>
</tr>
<tr>
<td>February</td>
</tr>
<tr>
<td>March</td>
</tr>
<tr>
<td>April</td>
</tr>
<tr>
<td>May</td>
</tr>
<tr>
<td>June</td>
</tr>
<tr>
<td>July</td>
</tr>
<tr>
<td>August</td>
</tr>
<tr>
<td>September</td>
</tr>
<tr>
<td>October</td>
</tr>
<tr>
<td>November</td>
</tr>
<tr>
<td>December</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5: Distribution of cases according to ligature material used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ligature material used</td>
</tr>
<tr>
<td>Cloth</td>
</tr>
<tr>
<td>Rope</td>
</tr>
<tr>
<td>Wire</td>
</tr>
<tr>
<td>Rubber fan belt</td>
</tr>
<tr>
<td>Not known</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
Table 9 shows that a number of complete hanging cases are more (98.07%) as compared to incomplete ones (1.92%).

Table 10 shows that ligature mark was present in all the cases of hanging.

Table 11 shows that the saliva stain is present in 25 (48.07%) cases of hanging only.

Table 12 shows that saliva mark/stain present in 25 hanging cases was distributed on both sides of the mouth. It was seen at left angle of the mouth in more than 50% of cases.

Table 13 shows that in <50% of cases, facial congestion was present.

Table 14 shows that petechial hemorrhages were found in 32 (61.53%) cases of hanging and in 2 (33.33%) cases of strangulation.

Table 15 shows that muscle hemorrhage was seen in all cases of MS while it was seen only in 3 (5.76%) cases of total cases of hanging.

Table 16 shows that the incidence of fracture of the hyoid bone and thyroid cartilage was more common as compared to other findings. Intimal tears were found in 3 (5.17%) cases of hanging.

---

**Table 6: Distribution of cases according to the position of knot**

<table>
<thead>
<tr>
<th>Position of knot in hanging and LS cases</th>
<th>Number of cases n=52+1 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below chin</td>
<td>2 (3.77)</td>
</tr>
<tr>
<td>Right side of neck</td>
<td>23 (43.39)</td>
</tr>
<tr>
<td>Occiput</td>
<td>6 (11.32)</td>
</tr>
<tr>
<td>Left side of neck</td>
<td>22 (41.50)</td>
</tr>
<tr>
<td>Total</td>
<td>53 (100)</td>
</tr>
</tbody>
</table>

LS: Ligature strangulation

**Table 7: Distribution of cases according to position of knot in hanging cases**

<table>
<thead>
<tr>
<th>Type of hanging</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical</td>
<td>6 (11.53)</td>
</tr>
<tr>
<td>Atypical</td>
<td>46 (88.46)</td>
</tr>
<tr>
<td>Total</td>
<td>52 (100)</td>
</tr>
</tbody>
</table>

**Table 8: Distribution of position of ligature mark in relation to thyroid cartilage**

<table>
<thead>
<tr>
<th>Position of ligature mark</th>
<th>Number of hanging cases n=52 (%)</th>
<th>Number of LS cases n=1 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above</td>
<td>26 (50)</td>
<td>0</td>
</tr>
<tr>
<td>At</td>
<td>25 (48.07)</td>
<td>0</td>
</tr>
<tr>
<td>Below</td>
<td>1 (1.92)</td>
<td>1 (100)</td>
</tr>
</tbody>
</table>

MS: Manual strangulation, LS: Ligature strangulation

**Table 9: Distribution of hanging cases on the basis of degree of suspension**

<table>
<thead>
<tr>
<th>Type of hanging</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete</td>
<td>51 (98.07)</td>
</tr>
<tr>
<td>Incomplete/Partial</td>
<td>1 (1.92)</td>
</tr>
<tr>
<td>Total</td>
<td>52 (100)</td>
</tr>
</tbody>
</table>

**Table 10: Distribution of hanging cases according to ligature mark**

<table>
<thead>
<tr>
<th>Ligature mark</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>52 (100)</td>
</tr>
<tr>
<td>Absent</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

**Table 11: Distribution of hanging cases according to saliva stain**

<table>
<thead>
<tr>
<th>Saliva stain</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>25 (48.07)</td>
</tr>
<tr>
<td>Absent</td>
<td>27 (51.92)</td>
</tr>
<tr>
<td>Total</td>
<td>52 (100)</td>
</tr>
</tbody>
</table>

**Table 12: Distribution of hanging cases according to the location of saliva stain**

<table>
<thead>
<tr>
<th>Site</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right angle of mouth</td>
<td>12 (48)</td>
</tr>
<tr>
<td>Left angle of mouth</td>
<td>13 (52)</td>
</tr>
<tr>
<td>Total</td>
<td>25 (100)</td>
</tr>
</tbody>
</table>

**Table 13: Distribution of facial congestion**

<table>
<thead>
<tr>
<th>Facial congestion</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>28 (48.27)</td>
</tr>
<tr>
<td>Absent</td>
<td>30 (51.72)</td>
</tr>
<tr>
<td>Total</td>
<td>58 (100)</td>
</tr>
</tbody>
</table>

**Table 14: Distribution of petechial hemorrhages**

<table>
<thead>
<tr>
<th>Presence of petechial hemorrhages</th>
<th>Complete hanging</th>
<th>Partial hanging</th>
<th>Strangulation (MS+LS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>32 (61.53%)</td>
<td>0</td>
<td>2 (33.33%)</td>
</tr>
<tr>
<td>Absent</td>
<td>20 (38.46%)</td>
<td>0</td>
<td>4 (66.66%)</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>

MS: Manual strangulation, LS: Ligature strangulation

**Table 15: Frequency of muscle hemorrhages in the neck**

<table>
<thead>
<tr>
<th>Type of asphyxia</th>
<th>Number of cases</th>
<th>Hemorrhage in muscles</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanging</td>
<td>52</td>
<td>3</td>
<td>5.76</td>
</tr>
<tr>
<td>MS</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>LS</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>8</td>
<td>13.79</td>
</tr>
</tbody>
</table>

MS: Manual strangulation, LS: Ligature strangulation
cases. Fracture of the cricoid cartilage not seen in even a single case. The laryngohyoid complex was fractured in 9 (15.51%) cases out of 58 cases of asphyxia.

Table 17 shows that hyoid bone fracture was found in 5 cases: 1 Hanging, 3 MS, and 1 LS. Hyoid fractures in males were present in the age group 20-29 (1 case of hanging), 50-59 (1 case of MS), and 70-79 (1 case of MS). Hyoid fractures in females were present in the age group 50-59 (1 case of MS) and 70-79 (1 case of LS). Thyroid cartilage fracture was found in 4 cases: 2 Hanging, 1 MS, and 1 LS. Thyroid cartilage fractures in males were present in the age group 30-39 (1 case of hanging) and 50-59 (1 case of MS). Thyroid cartilage fractures in females were present in the age group 30-39 (1 case of hanging) and 70-79 (1 case of MS). Both hyoid and thyroid cartilage fractures simultaneously were found in 2 cases: 1 MS and 1 LS.

Table 18 shows that hyoid bone fracture occurs in all the cases of strangulation. In MS cases, 3(60%) out of 5 cases showed presence of hyoid bone fracture, and all cases of LS showed this finding. It was present in only one case (1.92%) of hanging.

Table 19 shows that fractures of both greater cornua of the right and left sides were seen in 2 (50%) cases of MS. The fracture left greater cornu was seen in 2 (50%) cases, one in MS, and one in LS. The fracture right greater cornu was seen in 1 case of hanging.

Table 20 shows that fracture of thyroid cartilage was found in 6.89% of all cases. It was evident in 20% of cases of MS and 3.84% of cases of hanging. Fracture of the thyroid cartilage was present in single case of LS.

Table 21 shows that thyroid cartilage fracture was seen in maximum cases at the upper end (laryngeal prominence) of thyroid cartilage in midline followed by the lower end of thyroid cartilage in midline.
Table 22 shows the presence of intimal tears in 5.172% of total cases, out of which it was seen in 20% of cases of MS and in 3.84% of cases of hanging.

Table 23 shows that intimal tears were seen in 2 cases of hanging. In one case of hanging, it was located in Rt. CCA and in another case in both ICA. In one case of MS, tears were present in both internal carotid arteries.

No injuries were noted in the cervical lymph nodes, submandibular gland, and thyroid and parathyroid glands.

No specific findings were noted in the jugular veins (internal and external), vagus, and phrenic nerves.

DISCUSSION

Asphyxial deaths due to constriction of neck are common in all parts of the world. In our study, asphyxial deaths contributed to 3.86% deaths between September 2010 and March 2012. Asphyxial deaths due to hanging were most common and seen in 52 cases (71.23%) followed by drowning in 15 cases (20.54%), MS in 5 (6.84%) cases, and LS in 1 (1.36%) cases. The incidence of hanging was the highest (71.23%) among the other types of asphyxia. According to Sharma et al., 5% of cases contribute to asphyxial deaths, hanging was the most common mode observed in 66 (69%) cases, followed by drowning in 10 (11%). In the retrospective study of Amandeep, out of the total number of autopsies conducted during the period of 4 years, i.e., 2000-2003, 111 (5.26%) cases were due to asphyxia, out of which drowning was found to be most common, i.e., 66 cases (59.4%), followed by hanging 27 (24.3%), traumatic asphyxia 7 (6.3%) cases, strangulation 6 (5.4%) cases, and throttling 5 (4.5%) cases. The incidence of drowning was highest among the asphyxial deaths, so this study does not coincide with our study and it may be due to the geographical variations and the presence of easily accessible water bodies in that area.

All the cases of hanging in this study were suicidal, and all the cases of strangulation were homicidal in nature. This finding coincides with findings of the most other authors as hanging is almost always suicidal unless proved otherwise and strangulation is mostly homicidal. Hanging is a leading method of suicide in Germany and Japan, and it is the second leading suicidal method after intoxicated suicides in India and United States. The age ranges of the victims in this study were between newborn infant to 70 years. Maximum numbers of cases (51%) were seen in the age group of 20-29 years followed by 30-39 years (15.51%) in both the sexes. This is similar to study reported by Amandeep where maximum number of cases were seen in the age group 21-25 years (29.62%) and 16-20 years (29.62%) followed by 26-30 years (18.51%).

In this study, there was male predominance in all the cases of asphyxia (65.51%) as compared to females (32.75%). The ratio is being 2:1. This is similar to studies reported by various authors. Male predominance in cases of hanging can be explained by the fact that it is not a commonly opted method of suicide by females as compared to poison intake and burning. This figure contrasts with high incidence of hanging in woman (40%) reported in Denmark by Simonsen.

A maximum number of cases in our study were seen in March (10 cases, 17.24%) followed by February (9 cases, 15.51%) and followed by September (8 cases, 13.79%). The incidence of asphyxial deaths due to constriction of the neck in our study was highest in March. Uzun et al. reported similar findings of maximum asphyxial deaths in the winter season (December-February) like our study.

General Gross Findings

In this study, facial congestion and saliva stain were present in <50% of cases and petechial hemorrhages in 58.62% of cases of which 61.53% of cases were of hanging, and 33.33% of cases were of strangulation. In a study on hanging cases by Suárez-Peñaranda et al., facial congestion was found in 42.9% and petechial hemorrhages of the face and conjunctiva in 23.4%.

These findings are not consistent with the study of Sharma et al. where petechiae were found only in hanging cases (42%) of which 75% were of incomplete hanging and 25% were of atypical complete hanging.
Type of Suspension
In this study, complete hanging was found in 98.07% of cases whereas partial hanging only in 1.92% of cases. These incidences were found lower for complete hanging by Suárez-Peñaranda et al.,19 i.e., 62.4% but slightly higher by Sharma et al.,18 i.e., 68%. Similarly, higher incidences of complete hanging were found in a study conducted by Naik and Patil13 in 217 cases out of 232 cases of hanging. In the study of Luke et al.,20 the complete hanging was seen in 20 (32.78%) cases of hanging.

Placement of the Ligature Knot
In this study, typical hanging was seen in 6 (11.53%) cases. Atypical hanging was seen in 46 (88.45%) cases where the knot was present at the left side of the neck in 41.50% of cases, at the right side of the neck in 43.39% of cases, and at the chin in 3.77% of cases. These findings are similar to the study reported by Naik and Patil13 where they found typical hanging in 7.39% and atypical hanging in 92.6% of cases. Our study differs from the study of Suárez-Peñaranda et al.19 where typical hanging was seen in 32.1% and the rest of the knot locations were 35.3% on the left side of the neck, 28.5% on the right, and 4.1% on the back of the neck. These results are not consistent with our results. Atypical hanging was found in more number of cases (88.46%) as compared to typical (11.53%) which is consistent to Sharma et al.,18 found 88% of cases atypical hanging. In 1985, Luke et al.20 conducted a study on 61 cases of hanging. The ligature material used in most cases was rope or clothesline. The site of ligature knot was at the left side of the neck in 20 cases, at the right side and back of the neck in 17 cases, and at the front of the neck in 3 cases. No fracture of cricoid cartilage was found.

Ligature Mark
In our study, ligature mark was present in all the cases of hanging and LS. The ligature mark in hanging was present above the level of thyroid cartilage in 50% of cases, at the level of thyroid cartilage in 48.07% of cases. In one case of LS (1.92%), the ligature mark was present below the level of the thyroid cartilage. These findings are consistent with Sharma et al.18 who reported the presence of ligature above the level of the thyroid in 58% of cases, 27.3% of cases at the level of the thyroid cartilage, and in 15.2% of cases below the level of thyroid cartilage. Naik and Patil13 documented that out of 257 cases of hanging, the level of constriction was found above the laryngeal prominence in 159 (61.86%) cases. In cases of strangulation, the level of constriction was found on and above the laryngeal prominence and below laryngeal prominence in 3 cases each out of the 7 cases.

In this study, the soft material in the form of cloth was used as a ligature material in a maximum number of cases 28 (48.27%), followed by rope 19 (32.75%), wire 4 (6.89%), and rubber fan belt in 2 (3.44%) cases. In the study of Sharma et al.,18 sari was the most common ligature material used by the males, 14 (30%), whereas females preferred chunni 9 (45%) followed by the sari 7 (35%), so soft material in the form of cloth was used in 45.45% of cases. Hence, our study coincides with the study of Sharma et al.18 Naik and Patil13 found that soft ligature such as scarf, napkin, sari, and bed sheet was used in 127 cases of hanging, and hard ligature such as jute rope, plastic or nylon rope, and electric wire were used in 105 cases of hanging whereas hard ligature were used in the most cases of strangulation. However, in study conducted by Uzun et al.,15 the most victims selected rope (652 cases) for the ligature with the rest using sheet, belt, cable, and necktie. In one case in our study, fan belt was used as a ligature material. Deceased committed suicide by in a small factory. Hence, by analyzing the ligature material, it was possible to explain to some extent the profession and work place of the deceased.

Internal Neck Findings
Muscle hemorrhages
In this study, we found muscle hemorrhage only in 13.79% of total cases, including all the cases of MS and 5.76% of cases of hanging. These incidences are lower than that reported in literature, 55.8% by Suárez-Peñaranda et al.,18 42% by Sharma et al.,18 and 100% by Uzun et al.15

Fractures of the hyoid bone and/or laryngeal cartilages
In this study, the changes in internal structures of the neck present in 20.69% of cases. Out of these, the incidence of fracture of hyoid bone was common and seen in 8.62% followed by fracture of thyroid cartilage (6.89%) and intimal tears found in 5.17% of cases. Fracture of cricoid cartilage not seen in even a single case. Laryngohyoid complex was fractured in 15.51% of cases. Similar order of occurrence has been reported by Uzun et al.16 and Sharma et al.18 in their studies. Uzun et al.16 found fractures in the neck organs in 59.93% of cases including hyoid fracture in 23.26%, a thyroid fracture in 21.42%, and both hyoid and thyroid fractures in 13.93% of the cases. Sharma et al.18 documented hyoid bone fracture in 21% of cases, thyroid cartilage fracture in 17% of cases, and laryngohyoid complex fracture in 33%. Suárez-Peñaranda et al.19 also reported more number of cases of hyoid bone fracture (48.4%) as compared to thyroid cartilage fractures (47.1%). They also found no fractures of the cricoid cartilage. Khokhlov et al.19 found cricoid fractures in 13 (9.5%) cases of hanging.

Age- and sex-wise distribution
Hyoid bone fracture was more common in males (3 cases) as compared to females (2 cases) while thyroid cartilage...
fracture was more common in females. The occurrence of fracture of both bones simultaneously was equal in both sexes. The male: female ratio reported by Sharma et al. was 2.5:1 while Suárez-Peñaranda et al. found no significant differences in hyoid bone fracture between men and women.

Several authors have shown that the rate of fractures increases with age. It was more common in the age group of 50-59 years followed by 60-69 years. According to Morild, the proportion of fractures seemed to increase with age and possibly also with increasing suspension time.

In our study also, we found that the damage to laryngeal apparatus increases with the advancement of age and zero occurrences seen in age <20 years. Among both the sexes, the occurrence of hyoid bone fracture was common in the age group of 50-59 years and 70-79 years followed by 20-29 years. However, fracture of the thyroid cartilage was more common in 30-39 years followed by 50-59 years and 70-79 years of age group. In the study of Paparo and Siegel, thyroid cartilage fracture was found more common in females as compared to males combined fracture of both bones seen in the age group of 50-59 years and 70-79 years. Sharma et al. also reported maximum cases of laryngohyoid complex fracture in the age group 41-60 years (72%), followed by the 21-40 years age group (16%). Uzun et al. also reported a maximum number of cases (25.69%) in 20-29 age group.

Hyoid bone fracture was found in all the cases of LS, in 60% of cases of MS, and in 1.92% of cases of hanging. Fracture of the left greater horn was more common (69% cases) followed by combined fractures of both greater cornuas (66.66% cases) and followed by the right greater cornua (1.92%). Sharma et al. in their study found that fracture left lesser horn was more common, 9 (14%) followed by the fractures of left greater and right lesser horns, and 8 (12%) each in cases of hanging whereas left greater horn was found fractured more commonly in LS, 2 (67%) and right greater horn in cases of throttling, 2 (67%). Khokhlov studied a total of 137 cases of hanging and using various methods of examinations, e.g., visualization, palpation, and radiography; they got different results. Using stereomicroscopy as the method of choice for examination, they found hyoid bone fracture in 58 (42.3%) cases, mostly of greater cornu. Suárez-Peñaranda et al. found fractures slightly more on the right side (17.7%) followed by the left (16.2%) and on both the sides in 14.5% of cases. Fracture of the right greater cornu of the hyoid appeared in 16.7% of all cases, of the left in 17.1%, and both greater cornu were damaged in 13.2%. Naik and Patil found not a single victim having fracture of the hyoid bone in hanging cases whereas in 42.87% of cases of LS and 80% of cases of throttling hyoid bone fracture was present. In the study carried out by Luke et al., hyoid bone was fractured in 14 (22.95%) cases of hanging.

Fracture of thyroid cartilage was found in 6.89% of all cases, including 20% of cases of MS, 3.84% of cases of hanging, and 100% of cases of LS. It was seen in maximum cases at the upper end (Laryngeal prominence) of thyroid cartilage in midline followed by the lower end of the thyroid cartilage. Sharma et al. reported fracture of thyroid cartilage in 17% of all cases. In his study, the incidences of fracture of the body of thyroid (17%) were more as compared to the fractures of superior horn (6%). Fracture of the body of thyroid cartilage found in 9% of cases of hanging and 75% of cases of throttling. Nikolic et al. reported that superior horn thyroid cartilage fractures were more frequent injuries of the solid neck structures (27.40% left and 25.70% right) and statistically more significant than those of the horn hyoid bone. Suárez-Peñaranda et al. reported 47.1% of cases of thyroid cartilage fractures. Khokhlov et al. studied stereomicroscopically and found thyroid cartilage fracture in 75 (54.7%) cases, mostly of superior cornua. Luke et al. conducted a study in which he found thyroid fractures in 8 (13.11) cases of hanging.

Vascular lesions

In this study, the presence of intimal tears was more in 6.89% of total cases, out of which it was seen in 20% of cases of MS and in 5.76% of cases of hanging. These tears are commonly seen in ICA bilaterally followed by right CCA. Our findings are consistent to Sharma et al. showing 10.3% incidence of injuries to the blood vessels of which 25% found in throttling and 9.1% in hanging. In 9.1% of cases, Suárez-Peñaranda et al. found injuries of the intima of the carotid artery. In the study of Nikolic et al., the neck blood vessel injuries (transverse intimal tears and perivascular hematoma) in hanging were rare, i.e., 7.40% on the left side of the neck and 10.90% on the right. There is a higher tendency of blood vessel ipsilateral injuries related to the location of the ligature knot. This finding corresponds to the theory that the injuries of blood vessels in hanging are caused by a traction not a direct pressure on a blood vessel. Bilateral blood vessel injuries (5 cases) found only in the posterior type of hanging also support the same finding.

We could not find the references to correlate the changes in lymph nodes, submandibular gland, thyroid and parathyroid glands, jugular veins (internal and external), vagus, and phrenic nerves.
CONCLUSION

The conclusion drawn from this study is that in Delhi, the incidence of asphyxial deaths due to constriction of the neck is more in males as compared to females, and in most of these cases, the mode of death is hanging. A maximum numbers of cases are seen in young adults (20-29 years). A maximum numbers of cases are seen in March. In most of the cases, the soft cloth was used as ligature material. The knot of the ligature material was mostly either on the right side or left side in comparison to front and back of the neck. The typical position of the knot is found in a few cases. In a maximum number of cases, the hanging is complete. The ligature mark was present in all the cases of hanging and LS, and in most cases, it was at the level of thyroid cartilage followed by above the level of the thyroid cartilage.

Muscle hemorrhage was present in all cases of MS and in a few cases of hanging. The changes in the internal structures of the neck were present in a few cases only. Hyoid bone fractures were more common in comparison to thyroid cartilage fractures and more commonly seen in males whereas thyroid cartilage fracture was more common in females. The occurrence of fracture of both the bones simultaneously is equal in both the sexes. Combined fracture of both the bones increases with the increase of age and decreases in the lower age groups. Hyoid bone fracture was seen mainly in MS and was very rare in hanging. Fracture of the thyroid cartilage was seen at the upper end in midline.

Intimal tears were seen commonly in the cases of MS and were very rare in cases of hanging.

REFERENCES

5. Paparo GP, Siegel H. Neck markings and fractures in suicidal hangings.

FORENSIC SCI Int 1984;24:27-35.
Ketamine Pre-treatment to Alleviate the Pain of Propofol Injection - A Prospective, Double-blind, Randomized, Placebo, Controlled Study

Neha Mehra1, Abhishek Khanna2, Rajesh Ranjan3, Pratibha Dabas4, Pragati5, Shoma Mukherjee6

1Assistant Professor, Department of Anesthesia, Critical Care and Pain, Shri Guru Ram Rai Institute of Medical Sciences, Dehradun, Uttarakhand, India, 2Assistant Professor, Department of Anaesthesia, Shridev Suman Subharti Medical College, Dehradun, Uttarakhand, India, 3Associate Professor, Department of Community Medicine, ESIC Medical College and Hospital, Faridabad, India, 4Associate Professor, Department of Community Medicine, Mediciti Institute of Medical Sciences, Medchal Mandal, Ghanpur, Telangana, India, 5Professor, Department of Community Medicine, GS Medical College, Pilkhuwa, Hapur, India, 6Associate Professor, Department of Pharmacology, HIMSAR, Jamia Hamdard, India

Abstract

Background: Pain during injection is a limiting factor in the use of some anesthetic drugs like propofol.

Objective: The present study was done to find the efficacy of low-dose ketamine pre-treatment in decreasing pain after propofol injection.

Methods: A total of 100 ASA 1 and ASA 2 category patients of both gender aged 18-60 years receiving general anesthesia for elective surgery, were randomly divided into two groups of 50 patients each by shuffle envelope method. Group A patients received 2 ml ketamine (0.2 mg/kg), and Group B patients received 2 ml 0.9% normal saline intravenously. The levels of pain were assessed at 0, 1, and 2 min after administration of propofol by the second observer who was unaware of the group to which the patient had been allocated. A score of 0-3 corresponded to no pain, mild, moderate, and severe pain which were recorded at 0, 1 and 2 min. Data were analyzed using statistical SPSS software.

Results: There was no statistically significant difference in mean dose of propofol used between the groups. The mean pain score at 0, 1, and 2 min was statistically different in between ketamine and control group (P < 0.05). At 0 min, mean pain score in ketamine group (Group A) was 0.38 (0.73) as compared to 2.52 (0.71) in control group (Group B). At 1 min, mean pain score in Group A was 0.22 (0.61) while in Group B, was 2.54 (0.71). At 2 min in Group A, it was 0.26 (0.57) while in Group B, it was 2.18 (0.83).

Conclusion: The present study has concluded that low-dose ketamine pre-treatment is effective in reducing the incidence and severity of pain as compared to saline. The pre-treatment with ketamine in low dose is also free of hemodynamic consequences.

Key words: General anesthesia, Ketamine, Propofol pain

INTRODUCTION

Propofol is an intravenous (IV) sedative and hypnotic agent commonly used for the induction of anesthesia. Its rapidity and reliability in causing loss of consciousness and quick, smooth recovery are the most favorable features. However, pain on injection when given IV is a common problem with propofol, the incidence of which is between 40% and 86%.

Mechanism of propofol injection pain is not known completely, but number of factors may be responsible for the pain. Chemically, propofol belongs to the group of sterically hindered phenols. Like the phenols, propofol irritates the skin and mucous membrane. The pain on injection of propofol could be due to other factors too, the osmolality of the solvent used for the preparation, the pH of solution, and concentration of propofol in the aqueous phase of emulsion. Propofol, by an indirect action on the endothelium activates the plasma Kallikrein–Kinin system and releases bradykinin, thereby producing venous...
dilation and hyperpermeability, which increases the contact between the aqueous phase of propofol and free nerve endings, and resulting in pain on injection. To attenuate this pain, several adjuvants have been used, such as addition of lidocaine, cooling, or warming of the drug, diluting propofol solution, pre-treatment with ondansetron, metoclopramide, opioids, thiopentone, and fentanyl with varying results. Lidocaine pre-treatment is most commonly used to decrease the injection-related pain. Unfortunately, the failure rate is between 13% and 32%. Ketamine is an anesthetic agent that has analgesic and local anesthetic properties. It is a phencyclidine derivative that produces dissociative anesthesia in clinical doses of 1-2 mg/kg IV. In the subanesthetic doses, it reduces the propofol injection pain by virtue of its local anesthetic property. In the above scenario, the present study was to look at the efficacy of low-dose ketamine pre-treatment in decreasing pain during injection propofol.

**METHODS**

The efficacy of low-dose ketamine pre-treatment in decreasing pain during injection propofol was studied for 1 year till required number of patients was enrolled in the study.

**Inclusion Criteria**

A total of 100 ASA 1 and ASA 2 category patients of both gender aged 18-60 years receiving general anesthesia for elective surgery enrolled for this study, were randomly divided into two groups of 50 patients each by shuffle envelope method.

**Exclusion Criteria**

The following participants were excluded from the study:

i. Unwilling participants.

ii. Participants with severe respiratory, cardiovascular, neurological, or renal disease (ASA physical status 3 and 4).

iii. Participants with a history of allergy to any of the study drugs.

iv. Hemodynamically unstable participants.

v. Participants having chronic analgesic use before surgery.

vi. Participants with difficult and/or more than one trial of venous cannulation with 18G IV cannula satisfactorily in any large peripheral vein of the hand.

vii. Pregnant women.

viii. Participants with morbid obesity.

ix. Participants with psychological disorders.

After the approval from the hospital ethics committee, written informed consent was obtained from all the patients. All patients were made familiar with verbal pain score. Intensity of pain during injection was assessed using a four-point verbal response scale (Table 1).

Primary outcome variables: The primary outcome variables were the incidence of pain on pre-treatment of ketamine drug injection in each group.

**Sample Size Calculation**

Sample size was determined based on the results of the pilot study. The power analysis (taking $\alpha = 0.05$ and $\beta = 0.90$) showed that we need to enroll minimum of 50 patients in each group. On this basis of that we have chosen 50 patients in each group. Total 100 patients were selected and were randomized equally into 2 groups with the help of shuffle envelope method.

Group A patients received 2 ml ketamine (0.2 mg/kg) IV and Group B patients received 2 ml 0.9% normal saline IV.

A thorough evaluation of each patient was done before taking up for surgery. A detailed history including history of major illness or diseases in the past was taken. General physical examination and systemic examination of each patient were performed to check the general well-being of each patient and to exclude any major medical disorder. All routine biochemical, hematological, and radiological investigations were performed in all patients and were checked against the exclusion criteria of this study. In the operating room, after cleansing of the local area with 70% alcohol, venous cannulation was done in a large peripheral vein of the hand using an 18G polyurethane IV cannula, and IV drip with Ringer’s lactate was started at 100 mL/h. To ensure blinding, coded syringes containing test drugs were prepared by an anesthesiologist not involved in evaluation of

**Table 1: Comparison of Group ketamine (A) n (50) and Group control (B) n (50)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group ketamine (A) n (50)</th>
<th>Group control (B) n (50)</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td>37.72 (8.86)</td>
<td>35.32 (7.88)</td>
<td>0.15</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>64.10 (8.15)</td>
<td>63.50 (7.88)</td>
<td>0.79</td>
</tr>
<tr>
<td>Dose of propofol mean (SD)</td>
<td>39.56 (4.97)</td>
<td>39.68 (5.39)</td>
<td>0.98</td>
</tr>
</tbody>
</table>

**Comparison of pain at 0, 1, and 2 min between group ketamine and control**

<table>
<thead>
<tr>
<th>Time interval</th>
<th>Pain score Mean (SD)</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 min</td>
<td>0.38 (0.73)</td>
<td>0.01</td>
</tr>
<tr>
<td>1 min</td>
<td>0.22 (0.61)</td>
<td>0.01</td>
</tr>
<tr>
<td>2 min</td>
<td>0.26 (0.57)</td>
<td>0.01</td>
</tr>
</tbody>
</table>
the pain score. All patients were fasted for at least 6 h before surgery. All patients were pre-medicated with oral alprazolam 0.25 mg and ranitidine 150 mg approximately 2 h before induction of anesthesia. On arrival of the patient in the operating room, routine monitoring was applied, and baseline hemodynamic values were recorded. An 18-gauge IV cannula was inserted on dorsum of the non-dominant hand without use of local anesthetic. No other solution was injected before the induction of anesthesia. The study solutions were prepared by an independent anesthesiologist and the investigator did not know the content of the solution.

Injection propofol (2.5 mg/kg) was loaded in a syringe. The venous drainage was occluded manually by rubber tourniquet at mid-arm, 1 min after pre-treatment of study solutions. Occlusion was released and one-fourth of the total calculated dose of propofol was administered over 5 s. The level of pain was assessed at 0, 1, and 2 min after administration of propofol by the second observer who was unaware of the group to which the patient had been allocated.

The patients were asked a standard question about the pain on injection of propofol, the verbal response, and the behavioral signs, such as facial grimacing, arm withdrawal, or tears were noted. A score of 0-3 which corresponds to no pain, mild, moderate, and severe pain was recorded at 0, 1, and 2 min (Table 1). Adverse effects, if any, were noted. Induction of anesthesia was completed with the remaining calculated dose of propofol. Tracheal intubation was facilitated with injection vecuronium, and anesthesia was maintained as per surgical requirement.

Different methods have been used to decrease the discomfort of pain for drug pre-treatment by brief venous retention with tourniquet, which was used before propofol injection that isolates the forearm veins from the rest of the circulation. It presented a useful model for studying the peripheral actions of a drug in the absence of a central effect. Briefly, applied venous tourniquet did not cause pain by itself. Although this technique was straightforward in elective surgery and adult participants, its clinical applicability in emergency induction and children remains doubtful.

**Statistical Analysis**

Data were analyzed using statistical software (SPSS -13). Data from categorical variables were presented as proportions and percentages. Data from continuous variables were presented as mean (SD). Unpaired t-test was used to see the difference between the two groups; P < 0.05 was considered to be statistical significant.

**RESULTS**

Out of 100 patients, 50 in each group, no local complication (e.g. pain, edema, wheal, flare) was noted at local site at the time of administration of injection and up to 24 h.

With respect to demographic characteristics such as weight and age, no statistically significant difference between the groups was noted (Table 1 and Figures 1 and 2).

The mean propofol dose required in ketamine group was 39.56 ± 4.97 mg compared to 39.68 ± 5.39 mg in group control. There was no statistically significant difference in mean dose of propofol between the groups (Table 1 and Figure 3).

The mean pain score at 0, 1, and 2 min was statistically different in between ketamine and control group (P < 0.05) (Table 1 and Figure 4).

In ketamine group (A) at 0 min, out of 50 patients, 38 patients experienced no pain (76%), 5 patients mild pain (10%), 7 patients moderate pain (14%), and 0 patient severe pain. In control group (B), 1 patient experienced no pain (2%), 3 patients mild pain (6%), 15 patients moderate pain (30%), and 31 patients experienced severe pain (62%) (Table 2 and Figure 5).

In ketamine Group (A) at 1 min, out of 50 patients, 43 patients experienced no pain (86%), 4 patients mild pain (8%), 2 patients moderate pain (4%), and 1 patient experienced severe pain (2%). In control Group (B),

<table>
<thead>
<tr>
<th>Pain score</th>
<th>Incidence of pain at 0 minute</th>
<th>Incidence of pain at 1 minute</th>
<th>Incidence of pain at 2 minute</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group A n (%)</td>
<td>Group B n (%)</td>
<td>Group A n (%)</td>
</tr>
<tr>
<td>0</td>
<td>38 (76)</td>
<td>5 (10)</td>
<td>34 (68)</td>
</tr>
<tr>
<td>1</td>
<td>3 (6)</td>
<td>3 (6)</td>
<td>2 (4)</td>
</tr>
<tr>
<td>2</td>
<td>15 (30)</td>
<td>15 (30)</td>
<td>15 (30)</td>
</tr>
<tr>
<td>3</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (2)</td>
</tr>
</tbody>
</table>

Figure 1: Comparison of age between the two groups
0 patient experienced no pain, 3 patients mild pain (6%), 15 patients moderate pain (30%), and 32 patients experienced severe pain (Table 2 and Figure 6).

In ketamine Group (A) at 2 min, out of 50 patients, 40 patients experienced no pain (80%), 7 patients mild pain (14%), 21 patients moderate pain (42%), and 20 patients experienced severe pain (40%) (Table 2 and Figure 7).

No statistically significant difference in hemodynamic variables was found at 0, 1, and 2 min after administration of propofol between ketamine group and control (Table 3 and Figures 8-10).

**DISCUSSION**

Pain has been often described as an unpleasant sensory and emotional experience associated with tissue or cell damage and it gives a warning that such damage is taking place. Pain on injection of IV drugs is usually not considered as a serious complication of anesthesia but it may be distressing to the patients and can reduce the acceptability of an otherwise useful agent. Although the pain on injection of propofol is not considered as a serious complication, yet it is common problem, the incidence of which is between
either in the vascular endothelium or in the central nervous system. It seems likely that the reduction in injection pain was the result of a peripheral action which attenuated the efferent pain pathway by its local anesthetic action.

The present study was designed to ascertain whether the low dose of ketamine could attenuate the pain produced by propofol and 1 min was allowed for its action to begin. We chose 1 min interval because previous investigators have found 20 mg lidocaine with a venous occlusion for 10, 20, or 30 s to be significantly better than placebo, suggesting that venous occlusion is important.

Mangar and Holak demonstrated that administering lidocaine after a tourniquet was inflated to 50 mmHg for 1 min virtually abolished the pain associated with propofol injection. The tourniquet isolates the arm veins from the rest of the circulation and increases the action of locally acting substances.

The pain was monitored using pain score at 0, 1, and 2 min after administration of propofol by an independent observer. We have not used VAS score in the present study because of the probable impairment of reading and motor coordination skills of the patients after propofol injection. The mean pain score at 0 min was 0.38 compared to 2.52 in group control. The mean pain score was more in control group as compared to ketamine group and was statistically significant. The mean pain score at 1 min was 0.22 compared to 2.54 in group control. The mean pain score was more in control group as compared to ketamine group and was statistically significant at 1 min. The mean pain score at 2 min was 0.26 compared to 2.18 in group control. The mean pain score was more in control group as compared to ketamine group and was statistically significant at 2 min. The present study has shown a significant difference in pain score at 0, 1 and 2 min.

Ozkoçak et al. have done a similar study in which they have compared the effect of saline 2 mL, ketamine 0.5 mg/kg, and ephedrine 70 µg kg on propofol injection pain. They have used pain using numerical scale (0-10) as compared to the present study in which pain scale (0-3) was used. The mean pain score in their study was 2.1 in group ketamine, 4.9 in group saline, and 4.6 in group ephedrine. Their study has shown significant decrease in pain score in ketamine group compared to other two groups. The dose of ketamine used in their study was 0.5 mg/kg as compared to 0.2 mg/kg in the present study. The pain was monitored at regular time interval in the present study as compared to Ozkoçak et al. study in which it was at a point of time.

Saadawy et al. have done similar study to assess efficacy of ketamine (0.4 mg/kg), thiopental (0.5 mg/kg), meperidine

### Table 3: Comparison of hemodynamic variable in Group ketamine and control

<table>
<thead>
<tr>
<th>Time interval</th>
<th>Mean (SD) Group ketamine</th>
<th>Mean (SD) Group control</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate (beats/min)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 min</td>
<td>80.86 (9.81)</td>
<td>79.04 (10.79)</td>
<td>0.38</td>
</tr>
<tr>
<td>1 min</td>
<td>83.64 (9.03)</td>
<td>81.20 (9.21)</td>
<td>0.18</td>
</tr>
<tr>
<td>2 min</td>
<td>82.92 (9.49)</td>
<td>80.50 (10.45)</td>
<td>0.23</td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 min</td>
<td>127.80 (6.29)</td>
<td>126.74 (5.69)</td>
<td>0.38</td>
</tr>
<tr>
<td>1 min</td>
<td>129.88 (8.83)</td>
<td>129.48 (8.91)</td>
<td>0.82</td>
</tr>
<tr>
<td>2 min</td>
<td>125.90 (5.60)</td>
<td>126.20 (5.75)</td>
<td>0.79</td>
</tr>
<tr>
<td>Diastolic blood pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 min</td>
<td>78.02 (9.37)</td>
<td>75.92 (7.85)</td>
<td>0.23</td>
</tr>
<tr>
<td>1 min</td>
<td>78.76 (9.55)</td>
<td>78.74 (9.11)</td>
<td>0.99</td>
</tr>
<tr>
<td>2 min</td>
<td>78.38 (7.01)</td>
<td>77.98 (7.35)</td>
<td>0.78</td>
</tr>
</tbody>
</table>

SD: Standard deviation

40% and 86% As the quality of an anesthetic is judged by any recall of discomfort or pain at the time of anesthetic induction and its interference with patient satisfaction, efforts are underway to reduce the severity of the pain or discomfort.

In the present study, we used ketamine in a dose of 0.2 mg/kg, which is much lower than the dose producing central analgesic effects. As a non-competitive NMDA receptor agonist, ketamine may activate NMDA receptors

---

**Figure 7: Incidence of pain at 2 min**

**Figure 8: Comparison of heart rate at 0, 1, and 2 min in between group ketamine and saline group**
Chand, et al.: Propofol Pain and Ketamine

(0.4 mg/kg), saline and lidocaine (1 mg/kg) on propofol injection pain. As compared to the present study, they have seen pain at one point of time rather than at different point of times. The incidence of pain in their study was significantly less in ketamine group (8%) as compared to saline group (88%). The dose of ketamine used in their study was 0.4 mg/kg as compared to 0.2 mg/kg in the present study. The present study has shown similar significant different incidence of pain with lower dose of ketamine as compared to their study.

The mean systolic blood pressure in ketamine group at 0, 1, and 2 min was 127.80, 129.88, and 125.90 mmHg, respectively. The control group has shown mean systolic blood pressure 126.74, 129.48, and 126.20 mmHg at 0, 1, and 2 min, respectively. The present study has not shown any effect of 0.2 mg/kg on systolic blood pressure as compared to saline group. Ozkocak et al. have found mean systolic blood pressure of 120 mmHg in group ketamine, 123 mmHg in group ephedrine, and 104 mmHg in group saline. They have found significant difference in the mean systolic blood pressure in between ketamine and saline group in their study, (P < 0.05). They have stated that ketamine pre-treatment may prevent hypotension due to propofol induction. The present study has not found any significant difference in the systolic blood pressure in between two groups with 1/4th of induction dose of propofol.

The mean diastolic blood pressure in ketamine group at 0, 1, and 2 min was 78.02, 78.76, and 78.38 mmHg, respectively. The control group has shown mean systolic blood pressure 75.92, 78.84, and 77.98 mmHg at 0, 1, and 2 min, respectively. The present study has not shown any effect of 0.2 mg/kg on systolic blood pressure as compared to saline group.

Saadawy et al. have found statistical significant difference in ketamine group (85.6 mmHg) as compared to saline group (74.4 mmHg). The present study has not found any significant difference in systolic and diastolic blood pressure in between two groups.

Strengths of the Study
Our study demonstrates that the incidence of pain on low-dose ketamine pre-treatment was effective in reducing the incidence and severity of pain during induction of anesthesia among our study participants.

Limitations of the Study
We had several limitations. Many factors can affect the incidence of pain, which include site of injection, size of vein, speed of injection, buffering effect of blood, temperature of propofol, and concomitant use of drugs such as local anesthetics and opioids, all of which could not be get rid of.

Future Directions of the Study
Further studies are needed to establish the feasibility of this technique in children and emergency induction of anesthesia.

CONCLUSION
Propofol (2,6-diisopropylphenol) used for the induction of anesthesia often causes mild-to-severe pain or discomfort...
on injection, for which various methods have been tried, but with conflicting results. The present study concluded that low-dose ketamine pre-treatment is effective in reducing the incidence and severity of pain as compared to saline. The pre-treatment with ketamine in low dose is also free of hemodynamic consequences.

REFERENCES


How to cite this article: Chand S, Solanki R, Aggrawal A, Dikshit PC, Ranjan R. Ketamine Pre-treatment to Alleviate the Pain of Propofol Injection - A Prospective, Double-blind, Randomized, Placebo, Controlled Study. Int J Sci Stud 2017;5(4):258-264.

Source of Support: Nil, Conflict of Interest: None declared.
Development of Microencapsulation: A Review of Literature

Mohd Gayoor Khan¹, Vinod Gauttam², H S Chandel³, Asra Ali⁴, Kasma Tariq⁵

¹Truba Institute of Pharmacy, Bhopal, Madhya Pradesh, India, ²Principal, IES College of Pharmacy, Madhya Pradesh, India, ³Principal, Truba Institute of Pharmacy, Bhopal, Madhya Pradesh, India, ⁴Research Scientist, Macleods Pharmaceuticals Ltd., Mumbai, India, ⁵Director, Business Intelligence Services, Arogya Retail Chains, Madhya Pradesh, India

Abstract

It is a new technology that has been used in the cosmetics industry as well as in the pharmaceutical, agrochemical and food industries, being used in flavors, acids, oils, vitamins, microorganisms, and among others. Microencapsulation is a process in which active substances are coated by extremely small capsules the success of this technology is due to the correct choice of the wall material, the core release form and the encapsulation method some important microencapsulation aspects such as the capsule, wall material, core release forms, and encapsulation methods and their use in food technology. Microencapsulation is receiving considerable attention fundamentally, developmentally, commercially, etc.

Key words: Controlled release, Cosmetics, Microcapsules, Microencapsulation, Microorganism

INTRODUCTION

Microencapsulation is a rapidly expanding technology. As a process, it means applying relatively thin coating to small particles of solid or droplets of liquids and dispersors for the purpose of this chapter; microencapsulation is arbitrarily differentiated for micro coating techniques, in that the former involves the coating of particles ranging dimensionally from several tenths of micron to 5000 microns in size. As the technology has developed, it has become apparent that the concept offers the industrial pharmacists a new working tool. Microencapsulation provides the means converting liquids to solid, of alternative colloidal and surface property of providing environmental protection, and of controlling the release characteristics or availability of coated materials. Several of these properties can be attained by micro packaging technique; however, the uniqueness of microencapsulation is the smallness of the coated particles and their subsequent use and adaptation to a wide variety of dosage form and product applications, which therefore might not have been technically feasible because of the smallness of the particles, drug moieties can be widely distributed through the gastrointestinal tract, thus potentially improving drug absorption. This new technology does not exclude problem areas; for instance, no single microencapsulation process is adaptable to all core materials candidates or product applications. Difficulties, such as incomplete or discontinuous coating, inadequate stability or shelf-life of sensitive pharmaceuticals, nonreproducible and unstable release characteristics of coated products, economic limitations are often encountered in the attempt to apply a particular microencapsulation method to a specific task. Many times, successful adaptation is, in part, a result of the technical ingenuity of the investigators.¹⁻⁶

Microencapsulation is receiving considerable attention fundamentally, developmentally, and commercially. In view of this interest, it is the purpose of chapter to present a description of the more prominent microencapsulation method to be discussed are air suspension conservation- phase separation, spray drying and congealing, and polymerization techniques. A survey of the ever expanding patent and published literature reveals that not all microencapsulation techniques are included within the methods cited in this chapter however, the methods described represent the currently established,
Chemical methods capsules for carbonless paper and for many other applications are produced by a chemical technique called complex coacervation. This method of encapsulation takes advantage of the reaction of aqueous solutions of cationic and anionic polymers such as gelatin and gum Arabic. The polymers form a concentrated phase called the complex coacervate. The coacervate exists in equilibrium with a dilute supernatant phase. As water-immiscible core material is introduced into the system, thin films of the polymer coacervate coat the dispersed droplets of core material. The thin films are then solidified to make the capsules harvestable. Interfacial polymerization (IFP) is another chemical method of microencapsulation. This technique is characterized by wall formation via the rapid polymerization of monomers at the surface of the droplets or particles of dispersed core material. A multifunctional monomer is dissolved in the core material, and this solution is dispersed in an aqueous phase. A reactant to the monomer is added to the aqueous phase, and polymerization quickly ensues at the surfaces of the core droplets, forming the capsule walls. IFP can be used to prepare bigger microcapsules, but most commercial IFP processes produce smaller capsules in the 20-30 micron diameter range for herbicides and pesticide uses, or even smaller 3-6 micron diameter range for carbonless paper ink. Polymer-polymer incompatibility, also called phase separation, is generally grouped with other chemical encapsulation techniques, despite the fact that usually no actual chemical reaction is involved in the process. This method utilizes two polymers that are soluble in a common solvent; yet do not mix with one another in the solution. The polymers form two separate phases, one rich in the polymer intended to form the capsule walls, the other rich in the incompatible polymer meant to induce the separation of the two phases. The second polymer is not intended to be part of the finished microcapsule wall, although some may be caught inside the capsule shell and remain as an impurity. In situ polymerization is a chemical encapsulation technique very similar to IFP. The distinguishing characteristic of in situ polymerization is that no reactants are included in the core material. All polymerization occurs in the continuous phase, rather than on both sides of the interface between the continuous phase and the core material, as in IFP. Examples of this method include urea-formaldehyde (UF) and melamine formaldehyde (MF) encapsulation systems. Centrifugal force processes were developed in the 1940s to encapsulate fish oils and vitamins, protecting them from oxidation. In this method an oil and water emulsion is extruded through small holes in a cup rotating within an oil bath. The aqueous portion of the emulsion is rich in a water-soluble polymer, such as gelatin, that gels when cooled. The resulting droplets are cooled to form gelled polymer-matrix beads containing dispersed droplets of oil that are dried to isolate. Similar in concept to centrifugal force processes, submerged nozzle processes produce microcapsules when the oil core material is extruded with gelatin through a two-fluid nozzle. The oil droplets are enveloped in gelatin as they are extruded through the nozzle. Then, the capsules are cooled to gel the walls, before being collected and dried.7,10

TECHNIQUES TO MANUFACTURE

Microcapsules Physical Methods

The pan coating process, widely used in the pharmaceutical industry, is among the oldest industrial procedures for forming small, coated particles or tablets. The particles are tumbled in a pan or other device while the coating material is applied slowly. Air suspension coating gives improved control and flexibility compared to pan coating. In this process the particulate core material, which is solid, is dispersed into the supporting air stream and these suspended particles are coated with polymers in a volatile solvent leaving a very thin layer of polymer on them. This process is repeated several hundred times until the required parameters such as coating thickness are achieved. The air stream which supports the particles also helps to dry them, and the rate of drying is directly proportional to the temperature of the air stream which can be modified to further affect the properties of the coating. The recirculation of the particles in the coating zone portion is effected by the design of the chamber and its operating parameters. The coating chamber is arranged such that the particles pass upward through the coating zone, then disperse into slower moving air and sink back to the base of the coating chamber, making repeated passes through the coating zone until the desired thickness of coating is achieved. Centrifugal extrusion liquids are encapsulated using a rotating extrusion head containing concentric nozzles. In this process, a jet of core liquid is surrounded by a sheath of wall solution or melt. As the jet moves through the air it breaks, owing to Rayleigh instability, into droplets of core, each coated with the wall solution. While the droplets are in flight, the molten wall may be hardened or a solvent may be evaporated from the wall solution. Since most of the droplets are within \( \pm 10\% \) of the mean diameter, they land in a narrow ring around the spray nozzle. Hence, if needed, the capsules can be hardened after formation by catching them in a ring-shaped hardening bath. This process is excellent for forming particles 400-2,000 \( \mu m \) (16-79 millions) in diameter. Since the drops are formed by the breakup of a liquid jet, the process is only suitable for liquid or slurries.
A high production can be achieved, up to 22.5 kg (50 lb) of microcapsules can be produced per nozzle per hour. Vibrational nozzle core-shell encapsulation or microgranulation (matrix-encapsulation) can be done using a laminar flow through a nozzle and an additional vibration of the nozzle or the liquid. The vibration has to be done in resonance with the Rayleigh in stability and leads to very uniform droplets. The liquid can consist of any liquids with limited viscosities (0-10,000 mPa·s have been shown to work), e.g., solutions, emulsions, suspensions, and melts. The solidification can be done according to the used gelation system with an internal gelation (e.g., sol-gel processing, melt) or an external (additional binder system, e.g., in a slurry). The process works very well for generating droplets between 20 and 10,000 μm (0.79-393.70 millions), applications for smaller and larger droplets are known. The units are deployed in industries and research mostly with capacities of 1-20,000 kg per hour (2-44,000 lb/h) at working temperatures of 20-1500°C (68-2732°F) (room temperature up to molten silicon). Heads are available with from one up to several hundred thousand nozzles. Spray–drying Spray drying serves as a microencapsulation technique when an active material is dissolved or suspended in a melt or polymer solution and becomes trapped in the dried particle. The main advantages are the ability to handle labile materials because of the short contact time in the dryer and the operation is economical. In modern spray dryers the viscosity of the solutions to be sprayed can be as high as 300 mPa·s. Applying this technique, along with the use of supercritical carbon dioxide, sensitive materials like proteins can be encapsulated.

**Chemical Methods**

Capsules for carbonless paper and for many other applications are produced by a chemical technique called complex coacervation. This method of encapsulation takes advantage of the reaction of aqueous solutions of cationic and anionic polymers such as gelatinoids gum Arabic the polymers form a concentrated phase called the complex cooperate. The coacervate exists in equilibrium with a dilute supernatant phase. As water-immiscible core material is introduced into the system, thin films of the polymer coacervate coat the dispersed droplets of core material. The thin films are then solidified to make the capsules harvestable. IFP is another chemical method of microencapsulation. This technique is characterized by wall formation via the rapid polymerization of monomers at the surface of the droplets or particles of dispersed core material. A multifunctional monomer is dissolved in the core material, and this solution is dispersed in an aqueous phase. A reactant to the monomer is added to the aqueous phase, and polymerization quickly ensues at the surfaces of the core droplets, forming the capsule walls. IFP can be used to prepare bigger microcapsules, but most commercial IFP processes produce smaller capsules in the 20-30 micron diameter range for herbicides and pesticide uses, or even smaller 3-6 micron diameter range for carbonless paper ink. Polymer-polymer incompatibility, also called phase separation, is generally grouped with other chemical encapsulation techniques, despite the fact that usually no actual chemical reaction is involved in the process. This method utilizes two polymers that are soluble in a common solvent; yet do not mix with one another in the solution. The polymers form two separate phases, one rich in the polymer intended to form the capsule walls, the other rich in the incompatible polymer meant to induce the separation of the two phases. The second polymer is not intended to be part of the finished microcapsule wall, although some may be caught inside the capsule shell and remain as an impurity. In situ polymerization is a chemical encapsulation technique very similar to IFP. The distinguishing characteristic of in situ polymerization is that no reactants are included in the core material. All polymerization occurs in the continuous phase, rather than on both sides of the interface between the continuous phase and the core material, as in IFP. Examples of this method include UF and MF encapsulation systems. Centrifugal force processes were developed in the 1940s to encapsulate fish oils and vitamins, protecting them from oxidation. In this method an oil and water emulsion is extruded through small holes in a cup rotating within an oil bath. The aqueous portion of the emulsion is rich in a water-soluble polymer, such as gelatin, that gels when cooled. The resulting droplets are cooled to form gelled polymer-matrix beads containing dispersed droplets of oil that are dried to isolate. Similar in concept to centrifugal force processes, submerged nozzle processes produce microcapsules when the oil core material is extruded with gelatin through a two-fluid nozzle. The oil droplets are enveloped in gelatin as they are extruded through the nozzle. Then, the capsules are cooled to gel the walls, before being collected and dried.

The applications of microencapsulation might well include sustained-release or prolonged-action medications, taste-masked chewable tablets, powders and suspensions, single layer tablets containing chemically incompatible ingredients, and new formulation concepts for creams, ointments, aerosols, dressings, plasters suppositories, and injectable. Pharmaceutically related areas, such as hygiene, diagnostic aids, and medical equipment design, also are amenable to microencapsulation applications. Three important areas of microencapsulation applications are the stabilization of core materials, the control of the release or availability of core materials, and separation chemically reactive ingredients within a tablet or powder mixture.

**Scratch-n-sniff**

Scratch and sniff technology generally refers to stickers or cardboard items that have been treated with a fragrant
coating. When scratched, the coating releases an odor that is normally related to the image displayed under the coating. The technology has been used on a variety of surfaces from stickers to compact discs. Minvented the technology in 1965, using a process originally developed for carbonless copy paper called microencapsulation.

Uses of Scratch
Scratch and sniff stickers became popular in the late 1970s, and remained so through to the mid-1980s. In 1977, creative teaching press produced some of the earliest scratch and sniff stickers. These stickers were mainly marketed to teachers as rewards for their students. For a time, scratch and sniff stickers were used to diagnose anosmia, although this practice later declined. Utility companies have enclosed scratch and sniff cards in their bills to educate the public in recognizing the smell of a methane gas leak. In 1987, cards distributed by the Baltimore Gas and Electric Company led to a rash of false alarms when the scents of cards in unopened envelopes were mistaken for real gas leaks.

1. Prolonged release dosage forms. The microencapsulated drug can be administered, as microencapsulation is perhaps most useful for the preparation of tablets, capsules or parenteral dosage forms.
2. Microencapsulation can be used to prepare enteric-coated dosage forms so that the medicament will be selectively absorbed in the intestine rather than the stomach.
3. It can be used to mask the taste of bitter drug.
4. It has been used to protect drugs from environmental hazards such as humidity, light, oxygen, or heat. Microencapsulation does not yet provide a perfect barrier for materials, which degrade in the presence of oxygen, moisture or heat, however, a great degree of protection against these elements can be provided.
5. From the mechanical point of view, microencapsulation has been used to aid in the addition of oily medicines to tableted dosage forms. This has been used to overcome problems inherent in producing tablets from otherwise tacky granulations and in direct compression to tablets.
6. Microencapsulation can be used to decrease the volatility. An encapsulated volatile substance can be stored for longer times without substantial evaporation.
7. The separations of incompatible substances, for example, pharmaceutical eutectics have been achieved by encapsulation. This is a case where direct contact of materials brings about liquid formation. The stability enhancement of incompatible aspirin-chlorpheniramine maleate mixture was accomplished by microencapsulating both of them before mixing.
8. Many drugs have been microencapsulated to reduce gastric irritation.
9. Microencapsulation method has also been proposed to prepare intrauterine contraceptive device.
10. In the fabrication of multilayered tablet formulations for controlled release of medicament contained in medial layers of tableted particles.

Recent advances in microencapsulation:
Several methods and techniques are potentially useful for the preparation of polymeric microparticles in the broad field of microencapsulation. The preparation method determines the type and the size of microparticle and influences the ability of the interaction among the components used in microparticle formulations. The term microparticle designates systems larger than one micrometer in diameter and is used usually to describe both microcapsules and microspheres.

Microparticles-containing drugs are employed for various purposes including - but not restricted to - controlled drug delivery, masking the taste and odor of drugs, protection of the drugs from degradation, and protection of the body from the toxic effects of the drugs. Polymeric carriers being essentially multidisciplinary are commonly utilized in microparticle fabrication, and they can be of an erodible or a nonerodible type. The method is comprised administering an effective amount of an ester prodrug of the active drug such as tazarotene (prodrug of tazarotenic acid) subconjunctivally or periocularly since a systemic administration requires high systemic concentration of the prodrug. The ester prodrug is contained in biodegradable polymeric microparticle system prepared using the o/w emulsion solvent evaporation methods. Prepared a composition in the form of thin film or strip composed of microspheres containing antibiotic such as minocycline HCl. It was made using a biodegradable polymer, prepared by a modified o/w emulsification technique followed by solvent evaporation. Water-soluble polysaccharide polymers such as pectin were used for making thin film or strip containing microspheres intended for local sustained release administration into the periodontal pocket. The thin film or strip is coated by spray coating with cation salt aqueous solution of calcium or barium chlorides. In one embodiment, Traynor et al. used the o/w emulsion to produce sol-gel microcapsules (containing sunscreens) that are highly positively charged using non-ionizing cationic additives which can include cationic polymers.

REFERENCES
3. Boh B, Hauser K, Dasilva A. Microencapsulation pollution prevention,
Khan, et al.: Development of Microencapsulation


Source of Support: Nil, Conflict of Interest: None declared.
Basics of Management of Medical Emergencies in Dental Office and Emergency Drug Kit

Khadijah Mohideen¹, B Thayumanavan², A Murali Balasubramaniam³, K M Vidy¹, S Rajkumari², S K Indu Bharkavi⁴

¹Reader, Department of Oral Pathology and Microbiology, Sathyabama University Dental College and Hospital, Chennai, Tamil Nadu, India, ²Dean, Professor and Head, Department of Oral Pathology and Microbiology, Sathyabama University Dental College and Hospital, Chennai, Tamil Nadu, India, ³Senior Lecturer, Department of Oral Pathology and Microbiology, Sathyabama University Dental College and Hospital, Chennai, Tamil Nadu, India, ⁴Private Practitioner, Chennai, Tamil Nadu, India.

Abstract

Medical emergencies are rare medical events that may occur unexpectedly in the dental office during dental treatment. If encountered those events require immediate diagnosis and management to avoid potential consequences. In case of an emergency, the roles and activities of the dentist and the team members should be planned, documented, and displayed. The staff members should be trained and updated in first aid, cardiopulmonary resuscitation, and other emergency procedures. The best office emergency kit is one that is prepared and maintained by the dentist based on his/her needs and easily accessible for immediate use. The knowledge of management of medical emergencies will increase the confidence of the dental surgeons in their clinical practice.

Key words: Emergency drug dosage, Emergency drugs, Emergency kit, Emergency management

INTRODUCTION

Medical emergencies at dental office are a rare situation. When the dentist encounters such occasional incidences, they should initiate emergency procedures to save the life of the patient. All the dental team members of the clinic should be well trained to recognize and handle medical emergencies in the dental office.¹ The aim of this article is to elucidate the primary sequential approach, essential medical equipment, and drugs required in the management of such emergencies.

PRINCIPAL LINE OF TREATMENT: POSITION, CIRCULATION, AIRWAY, BREATHING, AND CIRCULATION APPROACH

In a survey conducted in North America, dentists have reported 13,836 medical emergencies over a period of 10 years which occurred during dental treatment procedures. These emergencies were not related to dental problems.²

The more common adverse events encountered during dental practice are vasovagal/hypoglycemic syncope, angina, epilepsy, asthmatic episode, and anaphylaxis (Table 1).

When such an emergency occurs, the sequential steps should be followed is listed here.

Position of the Patient

The primary positions during emergency situations are supine position (seizure), supine position with elevated legs (syncope and cardiac arrest), semi-erect and upright position (angina, myocardial infarction, heart failure, and asthma).

Circulation

To record heart rate by assessing carotid pulse in neck. To check carotid pulse, the rescuer must place the hand on victim’s chin, and fingers should be placed in the groove between the thyroid cartilage and sternocleidomastoid muscle band in the neck and feel for pulse. If carotid pulse is not palpable, the rescuer has to start cardiopulmonary resuscitation (CPR) immediately. Look at the hands and
fingers for color changes. Touch the patient’s hand to assess the upper limb temperature. Apply blanching pressure for 5 s on the fingertip at heart level to assess capillary refill time. Normal refill time is <3 s. Dentist should record and monitor all vital signs.

**Airway**
- Assess airway patency: Try to maintain a patent airway in unconscious patients by head tilt–chin lift technique or jaw thrust maneuver.
- Opening Airway Technique: The rescuer must stand behind the victim’s head to perform this procedure.
- Head tilt: Place one hand on patient’s forehead and apply backward pressure with the palm to rotate the head upward and backward.
- Chin lift: Place the tips of middle and index fingers on the symphysis of the mandible.
- Jaw thrust technique: Place the fingers on the angle of the mandible and displace the mandible forward.

---

**Table 1: Essential drugs and dosages**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Indication</th>
<th>Administration</th>
<th>Adult dosage</th>
<th>Pediatric dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td>All medical emergencies except hyperventilation</td>
<td>Therapy mask nasal cannula</td>
<td>2-6 l/min</td>
<td>3-5 l/min</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pocket mask bag valve mask</td>
<td>10-15 l/min</td>
<td></td>
</tr>
<tr>
<td>Epinephrine</td>
<td>Anaphylaxis</td>
<td>IM/SC</td>
<td>1:1000 dilution 0.3-0.5 mg</td>
<td>1:1000 0.05-0.3 mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IV</td>
<td>1: 10,000 dilution</td>
<td>1:10,000 0.01 mg/kg</td>
</tr>
<tr>
<td>Chlorpheniramine</td>
<td>Mild allergy</td>
<td>Oral/IM</td>
<td>10-20 mg</td>
<td>1-2 mg q 6 h max 8 mg/day</td>
</tr>
<tr>
<td>Diphenhydramine</td>
<td></td>
<td>Sublingual tablets</td>
<td>0.4 mg q 5 min 2-3 times</td>
<td>Amyl nitrate 0.3 mL vaporole</td>
</tr>
<tr>
<td>Nitro-glycerine</td>
<td>Angina</td>
<td>Spray</td>
<td>400 μg per actuation</td>
<td></td>
</tr>
<tr>
<td>Salbutamol (albuterol)</td>
<td>Asthma</td>
<td>Metered aerosol inhaler</td>
<td>100 μg per actuation</td>
<td>100 μg per actuation</td>
</tr>
<tr>
<td>Aspirin</td>
<td>Myocardial infarction</td>
<td>Sublingual PO/PR</td>
<td>325 mg tablet</td>
<td>5-10 mg/kg q 6 h</td>
</tr>
<tr>
<td>Diazepam</td>
<td>Status epilepticus</td>
<td>Oral/Rectal</td>
<td>2-10 mg</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>IM</td>
<td>5-10 mg</td>
<td>0.1-0.2 mg/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intrasanal/Intranasal</td>
<td>0.2 mg/kg</td>
<td>0.2 mg/kg</td>
</tr>
<tr>
<td>Midazolam</td>
<td></td>
<td>Oral/intranasal/topical</td>
<td>5 mg/ml</td>
<td>0.25-0.5 mg/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IM/IV</td>
<td>4 mg</td>
<td>0.02-0.04 mg/kg</td>
</tr>
<tr>
<td>Lorazepam</td>
<td>Morphine sulfate</td>
<td>IM/IV RR&lt;12 Don’t re-administer</td>
<td>2-5 mg repeat every 5-30 mn</td>
<td>0.05-0.1 mg/kg max 10 mg/dose</td>
</tr>
<tr>
<td></td>
<td>Angina unresponsive to nitroglycerin</td>
<td>SC</td>
<td>0.1-0.2 mg/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oral</td>
<td>50% dextrose 100 ml</td>
<td>25% dextrose 1-4 ml/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rectal</td>
<td>0.5 mg</td>
<td></td>
</tr>
<tr>
<td>Dextrose</td>
<td>Hypoglycaemia</td>
<td>IM/SC/IV</td>
<td>1 mg</td>
<td>0.5 mg</td>
</tr>
<tr>
<td>Glucagon 50 mL amp</td>
<td></td>
<td>IM/IV</td>
<td>100 mg</td>
<td>1 mg/kg</td>
</tr>
<tr>
<td>Hydrocortisone</td>
<td>Adrenal crisis anaphylaxis</td>
<td>IM</td>
<td>4 mg</td>
<td>0.25-0.5 mg/kg</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td></td>
<td>Oral/intranasal/topical</td>
<td>Up to 100 mg</td>
<td>0.02 mg/kg</td>
</tr>
<tr>
<td>Propranolol</td>
<td>Hypertension</td>
<td>Oral</td>
<td>100 mg</td>
<td>0.04 mg/kg</td>
</tr>
<tr>
<td>Atropine</td>
<td>Bradycardia</td>
<td>IV</td>
<td>0.5-1 mg</td>
<td>0.025 mg/kg</td>
</tr>
<tr>
<td>Aromatic ammonia</td>
<td>Syncope</td>
<td>IM/SC</td>
<td>0.3 ml</td>
<td>0.3 ml</td>
</tr>
<tr>
<td>Dicloacaine 2%</td>
<td>Premature ventricular tachycardia</td>
<td>IV/IV/ET</td>
<td>1-1.5 mg/kg</td>
<td>0.5-1 mg/kg</td>
</tr>
<tr>
<td>Nifedipine</td>
<td>Hypertension</td>
<td>Oral capsules</td>
<td>10-20 mg</td>
<td>0.25-0.5 mg/kg/dose max 10 mg</td>
</tr>
<tr>
<td>Verapamil</td>
<td>Hypertension</td>
<td>IV/IV</td>
<td>2-4 ml</td>
<td>2-5 mg/dose</td>
</tr>
<tr>
<td></td>
<td>supraventricular tachycardia</td>
<td></td>
<td>5-10 mg</td>
<td></td>
</tr>
<tr>
<td>Flumazenil</td>
<td>Benzodiazepine overdose</td>
<td>IV</td>
<td>0.2 mg</td>
<td>0.1-0.2 mg max 1 mg</td>
</tr>
<tr>
<td>Naloxone</td>
<td>Opioid overdose</td>
<td>IV/IM</td>
<td>0.4 mg</td>
<td>0.1 mg/min</td>
</tr>
<tr>
<td>Vitamin K</td>
<td>Bleeding due to liver damage</td>
<td>PO/IV/IM/SC</td>
<td>2.5-10 mg</td>
<td>1 mg, SC or IM</td>
</tr>
<tr>
<td>Tranexamic acid</td>
<td>Post-operative bleeding</td>
<td>IV/PO</td>
<td>10 mg/kg</td>
<td>10 mg/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO</td>
<td>25 mg/kg</td>
<td>25 mg/kg</td>
</tr>
<tr>
<td>Gel foam with</td>
<td>Mouth wash</td>
<td>Available as variably sized sheets</td>
<td>Per need</td>
<td></td>
</tr>
<tr>
<td>Thrombin/oxidized</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cellulose pack</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Breathing**

Using the “look – listen – and – feel” technique, the rescuer can determine the victim’s breathing status. The rescuer must place his ear 1 inch from the nose and mouth while looking toward the victim’s chest. If airway is obstructed, signs may be gurgling, “stridor,” expiratory “wheeze,” or silent chest with no breath sounds.

Count respiratory rate (RR): Normal adult RR is 12-20 breaths/min and child RR is 20-30 breaths/min. To assess depth and symmetry of inspiration by observing chest expansion. The signs of respiratory distress are sweating, central cyanosis (tongue and mucous membranes), use of accessory muscles of respiration (neck muscles), and abdominal breathing. Oxygen must be administered if the patient is not ventilating adequately.

This can be done by three ways:

- Exhaled air ventilation
- Atmospheric air ventilation
- \( O_2 \) Enriched ventilation.

**Exhaled air ventilation:** This can be given by 2 methods.

- Mouth-to-mouth breathing
- Mouth-to-nose breathing.

**Atmospheric air ventilation:** Manually operated self-inflating bag-valve-mask device is used to deliver atmospheric air to the victim’s lungs (trained person only).

**Oxygen enriched ventilation:** Portable E cylinder with adjustable flow (10-15 L/min) and a face mask.

**Definitive Management**

If patient is unconscious, the initial steps to be followed are P-C (position of the patient - assessing circulation). Next step is A-B (airway maintenance - adequate breathing) - if carotid pulse is not palpable, then the team must immediately start CPR. After achievement of adequate ventilation, diagnosis must be made, and definite treatment must be provided. The basic procedures are same for all the age groups of the patients, but for the adults, the main effort is to bring early defibrillation, and for children, the focus should be on early ventilation.

**CPR Guidelines**

- Call 108 (emergency management of India) or call adjacent hospital ambulance number.
- Call for assistance.
- Open air way by head tilt–chin lift procedure.
- Give 2 breaths and make the chest rise.
- Check the person’s responsiveness; if patient is unconscious, then start chest compressions.
- The lower half of the sternum is compressed, with care taken not to compress the xiphoid process (infants – just below nipples and children and adults – between nipples).
- Place the heel of your hand on the center of the victim’s chest and keep your other hands on top of the first with the interlaced fingers.
- Press down so you compress the chest at least 2 inches deep in adults and children and 1.5 inches deep in infants (Rate of compression 100/mn).
- 30 compressions with short pause (10 s or less) between the compressions.
- After each compression, the chest must be allowed to recoil fully.
- After 30 compressions, the rescuer must start to ventilate the patient, by mouth-to-mouth/mouth-to-mask breath (1 s breath 2 with a gap of 3 s).
- Continue compressions and breaths - 30 compressions, two breaths - until help arrives.
- For a pediatric patient, start with 30 chest compressions and two rescue breaths should be given if there is absent of palpable pulse.
- 15 chest compressions and 2 rescue breath are advised for children with the presence of two rescuers.
- If palpable pulse >60/mn give rescue breath 12-20/mn (1 breath lasting for 1 s for every 3-5 s).

**EMERGENCY EQUIPMENT FOR THE DENTAL OFFICE**

1. Portable oxygen cylinder (E size) with regulator (supplemental oxygen-delivering devices - oxygen therapy mask, nasal cannula, pocket mask, and bag valve mask unit).
2. Oropharyngeal airways (sizes 1-4).
3. Portable suction with suction catheters.
4. Intravenous (IV) fluids/lines, syringes, needles, and tourniquets.
5. Automated blood glucose measurement device.
7. Sphygmomanometer.
8. A spacer device for inhaled bronchodilators.
10. Pulse oximeter with audible alarm.
11. Automated external defibrillator (AED).

**Pulse Oximeter**

Pulse oximeter should be used to check heart rate (pulse) and the oxygen saturation level of the patient. Tachycardia was above 100 beats/mn. Bradycardia was below 60 beats/mn. Targeted oxygen saturation level is 94-98%.

**AED**

Early defibrillation with the use of AED in cardiac dysrhythmias, ventricular fibrillation, and ventricular tachycardia by passing an electric current across the
myocardium restores normal sinus rhythm and blood perfusion to vital organs.\textsuperscript{21} For the emergency management of cardiac arrest, dentist requires strong training of basic CPR with additional knowledge and practice of AED.\textsuperscript{10,11,18,19} Modified AED with pediatric pads is available for children.

**AED Algorithm**\textsuperscript{6,7}
- Turn on the AED and attach adult pad (use child pad for children)
- Allow the AED to check heart rhythm (push analyze button if needed)
- Do not touch the patient
- If shock is advised, deliver shock, and start CPR after shock delivery (CPR 30:2 repeat for 2 min).
- For children CPR, 15:2 for 2 min.
- If shock is not advised, repeat the CPR cycles till patient’s responsiveness.

### EMERGENCY MEDICATIONS USAGE IN DENTAL OFFICE

#### Aromatic Ammonia
It acts as respiratory stimulant for patients experiencing syncope. It should be administered after maintaining patent airway of the patient.\textsuperscript{2,21}

#### Oxygen
Oxygen is indicated for all emergency conditions except hyperventilation.\textsuperscript{27,28} A portable full “E” size cylinder should be readily available for the patient oxygenation until the arrival of emergency services. Oxygen is delivered with a clear full face mask at a flow rate of 10 L/min for the spontaneously breathing adult patient and 3-5 L/min for breathing children. Bag-valve-mask device is required for the administration of oxygen for the unconscious and apnoeic patient at a flow rate of 10-15 L/min, and in case of positive pressure device usage, the flow rate should not exceed 35 L/min for adults.\textsuperscript{2,8,17,28}

#### Atropine
This anticholinergic drug is used to manage hypotension accompanied with bradycardia. IV atropine in a dose of 0.5 mg for every 3-5 min is needed. Pediatric dose of atropine sulfate: 0.02 mg/kg for IV route and 0.04 mg/kg for intramuscular injection. Maximum dose for IV injection is 1 mg.\textsuperscript{3}

#### Antihistamines
Oral administration of antihistamines is advisable for mild non-life-threatening allergic reactions. Parenteral administration (IM) is required for life-threatening reactions. Diphenhydramine (25-50 mg) or chlorpheniramine - avil (10-20 mg) is administered by oral or parenteral route. Pediatric dose of chlorpheniramine is 1-2 mg every 6 h and diphenhydramine dose is 1-1.25 mg/kg every 6 h.\textsuperscript{2,17,28}

#### Adrenaline
Adrenaline is used for acute allergic reactions which manifest as hypotension, bronchospasm, and laryngeal edema. Preloaded syringes of adrenaline are useful for the management of acute asthmatic attack which is not relieved by albuterol and in case of cardiac arrest. Epinephrine IV has very rapid and short duration of action, but it may be associated with high risks if given to ischemic heart disease, hypertension, cerebrovascular disease, and patients taking nonselective beta blockers.\textsuperscript{20,17,28}

Adrenaline 1:1,000 (1 mg/ml) for intramuscular, intralingual, and subcutaneous injections and 1:10,000 (1 mg/10 ml) is advisable for IV injections. Initial dose for the management of anaphylaxis and asthma not relieved by beta-2 adrenergic receptor agonists is 0.3-0.5 mg subcutaneously/ intralingually, 0.4-0.6 mg intramuscularly, or 0.1 mg of Adrenaline 1:10,000 solution IV. The dose in cardiac arrest is 1 mg IV. Repeat the doses in 5 min as required until the resolution of the event or the arrival of ambulance.\textsuperscript{8,17,28,29}

Acceptable alternative is EpiPen a self-injector device. Available as 300 µg single dose for adults and 150 µg single dose for 4-11-year-old children.\textsuperscript{2,24,30}

#### PAEDIATRIC DOSES OF ADRENALINE
Epinephrine: Prepared as 1: 1000, which equals 1 mg per mL for SC/IM/Intra lingual injections (0.05 - 0.3 mg Maximum); diluted to 1: 10,000 for IV administration.

Children 12-18 yrs: 500 mcg (0.5 ml). Repeat Dose: 300 mcg (0.3 ml).

Children 6-12 years: 300 mcg (0.3 ml).

Children less than 6 years: 150 mcg (0.15 ml). Repeat every five minutes until the arrival of ambulance.\textsuperscript{5,6,8,24,28,31}

#### Ephedrine
Ephedrine is like adrenaline but a less potent vasopressor agent with prolonged action. For severe hypotension, 5 mg IV or 10-25 mg IM should be given.\textsuperscript{17,28}

#### Nitroglycerin
Nitroglycerin is the drug of choice to treat acute angina or myocardial infarction. It has a rapid onset of action. It is available as oral and transmucosal preparations, transcutaneous patches, and IV solutions. Sublingual tablets or spray are suitable forms for dental office.\textsuperscript{8,21} Sublingual tablets should be freshly opened because of short shelf-life of opened bottle tablets.\textsuperscript{17} For Angina -1 tablet/metered
Mohideen, et al.: Management of Medical Emergencies

spray (0.4 mg) should be administered. If angina pain is not relieved within 1-2 min, then repeat this dosage to 2-3 times at 5 min intervals.2,21,17,28

**Aspirin**
Aspirin reduces overall mortality from acute myocardial infarction by preventing further clot formation. Patient experiencing ischemic chest pain should chew and swallow aspirin 325 mg tablet. For pediatric patients, 10-15 mg/kg is recommended. Aspirin is contraindicated in asthma, bleeding disorders, and in known hypersensitivity to aspirin.17, 21,28

**Morphine**
Morphine is used for the management of severe pain of myocardial infarction. The dose involves titration in 1-3 mg increments IV/5 mg increments intramuscularly until the relief of pain. Lower doses should be considered for older patients.17,28

**Naloxone**
Naloxone is a specific opioid antidote that converses opioid-induced respiratory depression. This should be used for the emergency management of opioid (morphine) overdose. For intramuscular injection, adult dose 0.4 mg and pediatric dose of 0.01 mg/kg are advisable. The dose involves titration in 0.1 mg increments IV with slower administration for the beneficial effect.17,21,28

**Nitrous Oxide**
This is an alternative to morphine to manage pain of myocardial infarction. It should be administered in a concentration of approximately 65% with 35% oxygen.17,28

**Salbutamol**
This is a short-acting selective beta-2 adrenergic receptor agonist. This is the first drug of choice for bronchospasm with acute asthmatic episode. 2-3 inhalations from a metered dose inhaler (MDI) provide selective bronchodilation with lesser systemic cardiovascular effects. MDI with spacer remarkably increases the dose deposited in the respiratory tract. It has peak effect in 30 min to 1 h and duration of action is 4-6 h. Adult dose is 2-3 sprays/1-2 mn, up to 3 times if needed. Pediatric dose is 1 spray/1-2 mn, up to 3 times if needed.2,17,20,21,28

**Corticosteroids**
Corticosteroids such as hydrocortisone used to prevent recurring anaphylaxis and manage adrenal insufficiency. Onset of action is slow (1 h) on IV administration; for this reason, their use in emergency is limited. Hydrocortisone 100-200 mg IV/IM is administered for the management of acute phase of these emergencies. Pediatric dose is 50-100 mg.17,28

**Benzodiazepines**
Benzodiazepine is administered to manage prolonged or recurrent seizures (status epilepticus). IV diazepam 5-10 mg is rapid in stopping all types of seizures. An alternative treatment for status epilepticus is midazolam or lorazepam IM/IV. Patients should be monitored carefully after administration since respiratory depression and sedation are the side effects of these drugs which can be reversed by antidote drug. Adult doses for lorazepam are 4 mg IM or midazolam 5-10 mg IM. A repeat dose can be given if necessary for a normally breathing patient. Pediatric dose of diazepam is 0.5 mg/kg for 2-5 year olds and 0.3 mg for 6-11-year-old children. Pediatric dose for lorazepam is 0.05-0.1 mg/kg. Pediatric dose of midazolam is 0.1-0.3 mg/kg. For IV administration, these drugs should be slowly titrated for the favorable effect. Recently, buccal midazolam is also recommended to treat seizures.6,25,26,29

**Calcium Channel Blockers**
This group of drugs is indicated for the management of hypertension, angina, and supraventricular tachycardia. Nifedipine 10-20 mg sublingual administration is recommended for a known patient of coronary artery spasm. Verapamil IV (5-10 mg) administration is primarily indicated for paroxysmal supraventricular tachycardia.3

**Flumazenil**
The benzodiazepine antagonist flumazenil antagonizes the side effects of sedation and respiratory depression induced by benzodiazepines administration. Dosage is 0.1-0.2 mg IV increments with a maximum dose of 1 mg.17,21,28

**Oral Carbohydrate**
Oral carbohydrates such as fruit juice or non-diet soft drink or glucose gel in a 30 g tube are used to manage early hypoglycemia in conscious patients. Oral carbohydrates act rapidly to restore blood sugar level. Missed meal may be the possible etiology for hypoglycemia for insulin-dependent diabetic patient.5,8,17,20,21,28

**Glucagon**
Glucagon intramuscular administration is required to manage hypoglycaemia in unconscious patients. Glucagon acts within 10 min after administration. Adult dosage for glucagon is 1 mg. Pediatric dose is 0.5 mg. Alternative for glucagon for severe hypoglycaemia management is 50% IV dextrose (glucose) 50-100 ml.17,20

**PREVENTION OF MEDICAL EMERGENCIES**
The physical examination of the patient and assessment of previous medical history are essential to prevent emergencies.32
With careful planning of emergency protocol with team approach and specialized theoretical and practical training in effective expired air resuscitation, CPR, and oxygen administration, many emergency conditions can be prevented. A poster listing basic life support measures should be prominently displayed in the dental office.

**ACTIVATION OF EMERGENCY MEDICAL SERVICE**

The goal of most emergency medical services is to deliver first-line treatment and transfer the patient to a nearest hospital for definitive care. Emergency contact numbers of adjacent hospital oral surgeon, physician, and ambulance should also be displayed visibly near the phone. Duty for every member of the dental staff should be pre-planned for an emergency.

**ACKNOWLEDGMENT**

We thank Dr. Suraj Balaji, Professor and Head, Department of General Surgery, Sathyabama University Dental College and Hospital, Mr. Syed Imran Maktoum, Director, BioPlus Multi Speciality Clinic, Chennai, for helping us toward this manuscript preparation.

**CONCLUSION**

Adequate staff training and availability of appropriate drugs and equipment are all essential for the management of emergencies of dental clinic. Prevention, by ensuring good history and physical examination, is better and cheaper than embarking on therapeutic measures.

**REFERENCES**


Source of Support: Nil, Conflict of Interest: None declared.


A Case Report of Pancreatic Lipomatoses

Reema Kashiva¹, Ramshyam Agarwal², Dattatrya Patil²
¹Head, Department of Medicine, Noble Hospital, Pune, Maharashtra, India, ²Resident, Department of Medicine, Noble Hospital, Pune, Maharashtra, India

Abstract

The pancreas is an exocrine and endocrine organ that is related to the stomach, duodenum, colon, and spleen. Fatty degeneration of the pancreas is common with aging; the entire pancreas may be replaced by fat, and the patient may have no clinical symptoms. We here present a case of an 18-year-old male known case of Type 1 diabetes who was admitted to our hospital for diffuse abdominal pain for the past 8 days, which was non-colicky in nature associated with nausea, anorexia and generalized weakness, no aggravating or relieving factors. With this scenario, he was investigated further for abdominal pain and found to have pancreatic lipomatoses.

Key words: Common bile duct, Computed tomography, Magnetic resonance cholangiopancreatography

INTRODUCTION

The pancreas is an exocrine and endocrine organ approximately 15-20 cm long that is related to the stomach, duodenum, colon, and spleen. Fatty degeneration of the pancreas is common with aging; the entire pancreas may be replaced by fat, and the patient may have no clinical symptoms. Fatty replacement of exocrine pancreas, also known as fatty infiltration, lipomatosis, adipose atrophy, or lipomatous pseudohypertrophy is a well-documented benign entity of speculative origin.¹ The exact etiopathogenesis behind fatty replacement is not known; however, several predisposing factors have been suggested. These include obesity, diabetes mellitus, chronic pancreatitis, hereditary pancreatitis, pancreatic duct obstruction by calculus or tumor, and cystic fibrosis.²

Fatty replacement may be focal or diffuse. Focal fatty replacement is the most common degenerative lesion of pancreas and has no major clinical significance. Total fat replacement is a rare condition and is associated with pancreatic enzyme deficiency and malabsorption. Following are few subtypes:

• Even pancreatic lipomatoses
• Uneven pancreatic lipomatoses.

There are four different types of uneven pancreatic lipomatoses. Type 1a (35% of cases) is characterized by replacement of the head with sparing of the uncinate process and peribiliary region; Type 1b (36%), by replacement of the head, neck, and body, with sparing of the uncinate process and peribiliary region; Type 2a (12%), by replacement of the head, including the uncinate process, and sparing of the peribiliary region; and Type 2b (18%), by total replacement of the pancreas with sparing of the peribiliary region.³

Progressive B-cell dysfunction, in the context of insulin resistance, is a hallmark of Type 2 diabetes.⁴ Glucose toxicity, ensuing from diabetes-related hyperglycemia, has been regarded as a contributor to B-cell damage.⁵ In contrast, chronic exposure of the pancreatic islets to non-esterified fatty acids (NEFAs) is considered as a potential primary cause of B-cell dysfunction.⁶ In obese individuals, increased lipolysis contributes to high levels of circulating NEFAs, whereas liver insulin resistance leads to elevated hepatic output of triglyceride-rich particles.⁷ When NEFA supply exceeds utilization, non-adipose tissues, including the pancreatic islets, start accumulating triglycerides,⁸ which is aggravated by the simultaneous presence of hyperglycemia.⁹ Experimental and autopsy data indicate that fatty infiltration of the pancreas may contribute to a decrease in B-cell mass and function.

Access this article online

www.ijss-sn.com

Corresponding Author: Dr. Reema Kashiva, Department of Medicine, Noble Hospital, Magarpatta City Road, Hadapsar, Pune, Maharashtra, India. Phone: +91-9922616286, E-mail: reemakashiva@gmail.com

Print ISSN: 2321-6379
Online ISSN: 2321-595X
DOI: 10.17354/ijss/2017/378
CASE REPORT

We here present a case of an 18-year-old male known case of Type 1 diabetes who was admitted to our hospital for diffuse abdominal pain for the past 8 days, which was non colicky in nature, radiating to back associated with nausea, anorexia, and generalized weakness, no aggravating or relieving factors. General examination revealed tachycardia, elevated blood pressure with a normal respiratory rate. Physical examination revealed mild generalized tenderness all over abdomen, respiratory, and cardiovascular examination showed no abnormality. Blood sugar level at the time of admission was 81 mg/dL. Hemoglobin A1c was 13.9% serum ketones were 4+ and urinary ketones 1+. Routine blood tests, liver function test, renal function test, arterial blood gases, serum amylase and lipase, and levels were normal. Ultrasound of abdomen was normal. Computed tomography (CT) of abdomen revealed gross atrophy with near complete fatty replacement of pancreas. No intrapancreatic mass, calcification, or pancreatic ductal dilatation was seen. Magnetic resonance cholangiopancreatography (MRCP) using 2D fast spin echo (FSE) and spoiled gradient (SPGR) sequences revealed near complete fatty replacement pancreatic parenchyma, suggests pancreatic lipomatosis. Both hepatic ducts, common hepatic duct, cystic duct, their confluence and common ducts were normal. There was no evidence of dilatation of intra/extrapancreatic biliary or portal radicals. On the basis of the above-mentioned findings, the diagnosis of diffuse pancreatic lipomatosis was made. Patients were managed with adequate hydration and insulin therapy and other supportive treatments (Figures 1-3).

DISCUSSION

The accumulation of fat in the pancreatic gland has been referred to using various synonyms, such as pancreatic lipomatosis, fatty replacement, fatty infiltration, fatty pancreas, lipomatous pseudohypertrophy, non-alcoholic fatty pancreatic disease, and pancreatic steatosis.\(^{10}\) Pancreatic lipomatosis is becoming an increasing problem worldwide due to the increasing incidence of obesity and diabetes mellitus. Fatty infiltration of the pancreas has been also reported in advanced cases of cystic fibrosis, Shwachman syndrome and Johanson-Blizzard syndrome. Other conditions related to diffuse fatty replacement of pancreas include steroid therapy, Cushing’s syndrome, chronic pancreatitis, hemochromatosis, and malnutrition. Fatty replacement may be focal or diffuse. Focal fatty replacement is the most common degenerative lesion of pancreas and has no major clinical significance. Total fat replacement is a rare condition and is associated with pancreatic enzyme deficiency and malabsorption. Fatty replacement may be uniform or unevenly distributed in the pancreas.

Patients are usually asymptomatic with small focal fatty replacement but may present with atypical abdominal pain, and/or steatorrhea, mass effect of pancreas on the duodenal loop, or malabsorption with severe fatty replacement.\(^{11,12}\) It is common in elderly and obese individuals and very rarely in youngs. Our patient was a young male who presented
with pain in abdomen and was diagnosed as pancreatic lipomatosis on CT abdomen. CT of abdomen revealed gross atrophy with near complete fatty replacement of pancreas. No intrapancreatic mass, calcification, or pancreatic ductal dilatation was seen. MRCP using 2D FSE and SPGR sequences revealed near complete fatty replacement pancreatic parenchyma, suggests pancreatic lipomatosis. Both hepatic ducts, common hepatic duct, cystic duct, their confluence and common ducts were normal. There was no evidence of dilatation of intra/extrahepatic biliary or portal radicals. Thus, probable cause of Type 1 diabetes in our patient was pancreatic lipomatosis. Considering the age of our patient it is a very rare entity in this age group.

Cross-sectional imaging, namely, CT has an important role in the evaluation of pancreatic disease. CT is particularly useful in detecting pancreatic duct obstruction by the calculus or tumor. Fatty infiltration of pancreas is seen on CT evidenced as pancreatic parenchymal soft tissue intermixed with fat. Associated atrophy is also seen in aged individual.

Fat accumulation in the pancreatic islets leads to a decreased insulin secretion and might explain why insulin resistant people cannot encounter the higher demands of insulin and then develop Type 2 diabetes mellitus. In addition, a greater proportion of pancreatic fat was associated with increased insulin levels in obese non-diabetic participants. This may indicate that the toxic effect of pancreatic fat accumulation might require a long time before manifesting in impaired B-cell function and it has been assessed that pancreatic B-cell damage is present for more than a decade before diabetes is diagnosed.

CONCLUSION

An 18-year-old male case of Type 1 diabetes found to have total pancreatic lipomatosis.

ACKNOWLEDGMENT

All the contributors would like to thank the entire medicine department which worked as a team in making the diagnosis and assisting the various procedures done for the patient.

REFERENCES

16. Liang Y, Buettger C, Berner DK, Matschinsky FM. Chronic effect of fatty acids on insulin release is not through the alteration of glucose metabolism in a pancreatic beta-cell line (beta HC9). Diabetologia 1997;40:1018-27.
Rare Presentation of Angiomyolipoma and Renal Cell Carcinoma in a Young Male Child with Tuberous Sclerosis - A Case Report and Review of Literature

Sibi Chakravarthi¹, Hariharasudhan Sekar², Ramesh Babu³, Sandhya Sundaram⁴

¹Resident, Department of Urology, Sri Ramachandra Medical College and Research Institute, Chennai, Tamil Nadu, India, ²Associate Professor, Department of Urology, Sri Ramachandra Medical College and Research Institute, Chennai, Tamil Nadu India, ³Professor, Department of Urology & Renal Transplantation, Sri Ramachandra Medical College and Research Institute, Chennai, Tamil Nadu, India, ⁴Professor and Head, Department of Pathology, Sri Ramachandra Medical College and Research Institute, Chennai, Tamil Nadu, India

Abstract

Tuberous sclerosis complex commonly involves renal angiomyolipoma (AML). We report synchronous primary renal neoplasm’s in an 8-year-old male tuberous sclerosis patient. He presented with hematuria and was found to have a lesion of mixed attenuation in the interpolar region of left kidney on computed tomography. Left radical nephrectomy revealed a 4.4 cm × 4 cm × 3.2 cm circumscribed gray to yellow, soft to firm lesion with solid and cystic areas. Careful examination also revealed a 0.5 cm × 0.2 cm × 0.2 cm gray-white lesion in upper pole. On microscopy, the larger lesion was reported as Fuhrman Grade 2 - pT1b pNx cM0 clear cell variant of renal cell carcinoma (RCC) and smaller lesion as AML. By immunohistochemistry, RCC was CD10 positive, and HMB 45 negative whereas AML was positive for HMB 45 and negative for CD10.

Key words: Angiomyolipoma, Child, Nephrectomy, Renal cell carcinoma, Tuberous sclerosis

INTRODUCTION

Tuberous sclerosis is an autosomal dominant disorder involving multiple organ systems with mutations in tuberous sclerosis complex 1 (TSC1) or TSC2 occupying chromosome 9q34 and chromosome 16p13, respectively. TSC1 codes for hamartin and TSC2 for tuberin, the complex of which functions as tumor suppressor gene through mTOR inhibition.¹ The simultaneous occurrence of angiomyolipoma (AML) with renal cell carcinoma (RCC) is uncommon, especially in a young male child. Clear cell variant of RCC is the most common renal cell neoplasm. The earlier classification of AML as hamartomatous lesion has been changed to neoplasm in the recent years. Studies found that cysts, renal epithelial neoplasm, especially RCC and AML were most commonly associated with tuberous sclerosis.²

CASE REPORT

An 8-year-old male tuberous sclerosis patient presented with hematuria. Ultrasonography kidneys, ureters, and bladder revealed multiple cortical cysts in the right kidney with a space occupying lesion involving the middle segment of left kidney. Computed tomography scan showed a mass lesion of mixed attenuation with focal hypoattenuation in the interpolar region of left kidney (Figure 1). Left radical nephrectomy revealed a 4.4 cm × 4 cm × 3.2 cm well circumscribed grayish-yellow soft to firm lesion with solid and cystic areas. Careful examination also revealed a small 0.5 cm × 0.2 cm × 0.2 cm grayish-white solid firm lesion 2 cm away from primary lesion in the upper pole with a nearby cortical cyst (Figure 2). The larger lesion was reported as Fuhrman Grade 2 - pT1b pNx cM0 clear cell RCC and smaller lesion as AML (Figure 2). RCC was CD10,
Chakravarthi, et al.: RCC with AML in Tuberous Sclerosis

Tuberous sclerosis has an incidence rate of 1 in 6000\(^6\) with 80% of TS patients developing renal lesions of which AML is the most common followed by cysts and RCC.\(^1,3,4\) AML develops very early in the patients with tuberous sclerosis. In addition to these identifiable macroscopic diseases, renal tissue that is radiologically normal can also have microscopic AML.\(^5\) Clear cell variant of RCC was found to be the most common epithelial renal neoplasm in tuberous sclerosis patients.\(^6\) When compared to sporadic RCCs, those associated with tuberous sclerosis tend to be multiple, affecting younger age with increased female: male ratio. Renal lesions are now the second most common cause of death following central nervous system lesions. Jun \textit{et al.} reported three primary renal neoplasms in a 62-year-old male which were two RCC (chromophobe and clear cell variants) and one epitheloid AML.\(^7\) According to Jimenez \textit{et al.} who evaluated 11 cases of tuberous sclerosis with AML and renal lesions, clear cell RCC was present in six cases with increased female: male ratio. Clear cell RCCs were HMB 45 negative and AML were HMB 45 positive.\(^6\) Guo \textit{et al.} studied RCC in 18 tuberous sclerosis patients and found that RCCs are often multiple with female preponderance, younger age at diagnosis, and AML association in 17 patients.\(^8\) Even though multiple synchronous renal tumors have been reported in non-tuberous sclerosis patient, Bjornsson \textit{et al.} found that tuberous sclerosis associated RCC occurs much earlier than sporadic RCC and was associated with TSC tumor suppressor gene.\(^2\) In 2009, Khallouk \textit{et al.} reported a 35-year-old tuberous sclerosis patient with AML and RCC in both the kidneys stressing the importance of radical surgery when malignancy is highly suspected.\(^4\) Regular follow-up of the other kidney is essential to monitor the occurrence of AML or RCC. AMLs are known for their bilaterality and spontaneous bleeding tendencies which require careful follow-up as therapy by embolisation may prevent nephrectomy or chronic kidney disease which is known to occur in tuberous sclerosis patients.\(^10\)

### Points to Ponder

- Concurrent presence of AML and RCC is a very rare occurrence in a young male child with tuberous sclerosis
- A meticulous and systematic examination of the kidney tissue is mandatory to rule out multiple lesions

CA IX positive and negative for HMB 45 whereas AML was HMB 45 positive and CD10, CA IX negative (Figure 3).

**DISCUSSION**

CA IX positive and negative for HMB 45 whereas AML was HMB 45 positive and CD10, CA IX negative (Figure 3).

CA IX positive and negative for HMB 45 whereas AML was HMB 45 positive and CD10, CA IX negative (Figure 3).
• Immunohistochemistry proves useful in delineating these varied lesions.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Large Vesical Calculus Causing Labor Dystocia: A Case Report

Sangeeta Ramteke¹, Medha Davile², Purnima Bhandari³, Mangala Sonak¹

¹Associate Professor, Department of Gynaecology and Obstetrics, Government Medical College and Hospital, Nagpur, Maharashtra, India, ²Lecturer, Department of Gynaecology and Obstetrics, Government Medical College and Hospital, Nagpur, Maharashtra, India, ³Postgraduate Student, Department of Gynaecology and Obstetrics, Government Medical College and Hospital, Nagpur, Maharashtra, India

Abstract

Obstructed labor is a well-known clinical entity in maternity units, cephalopelvic disproportion being the most common cause. Here, we report a rare case of obstructed labor, where the cause was a large vesical calculus. Patient was a referred case from the district hospital. The diagnosis of large vesical calculus causing labor obstruction was made by doing per vaginal examination. On per vaginal examination, a large calculus of size approximately 6 cm × 6 cm was palpated from anterior vaginal wall which was preventing the descent of head of the fetus. Hence, emergency cesarean section was performed with simultaneous removal of vesical calculus by cystolithotomy. The post-operative period was uneventful.

Key words: Cesarean section, Cystolithotomy, Labor dystocia, Large vesical calculus

INTRODUCTION

Obstructed labor is a well-known clinical entity, and cephalopelvic disproportion is the most common cause. However, a large vesical calculus causing labor obstruction is extremely rare.¹ Very few cases of large vesical calculus causing labor obstruction have been reported in literature till date. During pregnancy, it may cause infection, abortion, premature delivery, urinary fistula and rarely labor dystocia² and uterine rupture. Sometimes, vesical calculus remains asymptomatic, and it attains a large size of several centimeters. In such cases, it may be diagnosed first time during labor, causing labor obstruction where timely intervention must be taken to prevent vesicovaginal fistula or uterine rupture. Thus, timely diagnosis and intervention can prevent maternal and fetal morbidity and mortality.

CASE REPORT

A 35-year-old female was referred from district hospital as a case of the second gravida with full term gestation with obstructed labor. She had previous full term normal delivery 4 years back without any complications. She was unbooked and had no any antenatal check-up and ultrasonography anywhere in this pregnancy. She did not have any complaints in view of vesical calculus, i.e., dysuria, lower abdominal pain, incontinence, urinary frequency, urgency during preconception, and antenatal period. Hence, she did not required to visit any doctor. Day before the admission, she had abdominal pain and per vaginal leaking, so she went to district hospital. After observation for around 12 h, they referred her to Government Medical College and Hospital, Nagpur, as the second gravida with full term gestation with obstructed labor with per vaginal findings mentioned as cervix 5 cm dilated, station at −3. Patient reached to us after around 3 h of referral. On examination, she had good uterine contractions, cephalic presentation, fetal heart rate was 110/min, cervical dilatation was 5 cm, membrane was absent, liquor was thick meconium, station was at −3, and caput of 2 cm × 2 cm was present. A hard mass of size approximately 6 cm × 6 cm was palpated in the anterior vaginal wall which was preventing the descent of head of the fetus. Hence, the patient was immediately shifted for cesarean section with an indication of obstructed labor due to large vesical calculus with fetal distress. Surgeons were called in operation theater for the management of vesical calculus. Foley’s catheterization was done. Cesarean section was performed under spinal anesthesia. A female baby of 2.5 kg was delivered. Baby cried weakly after birth. Hence, the baby was immediately shifted to neonatal intensive care unit. A large calculus of size approximately 6 cm × 6 cm palpated...
in bladder. Hence, cystotomy was done by surgeons, and a 6 cm × 6 cm calculus was removed. The urinary bladder incision was closed in two layers.

Baby was given injectable antibiotics. However, baby expired on day 3 in neonatal intensive care unit due to sepsis.

Foley’s catheter was kept for 21 days and then removed. Patient was observed for another 2 days after removal of the catheter and then she was discharged.

The patient came for follow-up after 15 days, and she had no complaints. The patient was advised contraception (Figures 1-3).

**DISCUSSION**

Vesical calculus is often found in women with urinary stasis due to outlet obstruction or detrusor instability resulting in significant post-void residual urine. It is also found in healthy women.\(^1\) Alkaline urine caused by urea splitting organisms (Proteus, Klebsiella, Serratia, and Enterobacter) is responsible for struvite stones (ammonium magnesium phosphate stones).\(^2\) Renal calculus if drops in the urinary bladder may remain as foreign body and attains larger size due to deposition of phosphates around it.\(^3,4\) Vesical calculus is usually associated with irritating symptoms such as dysuria, lower abdominal pain, incontinence, urinary urgency, and frequency. However, if vesical calculus does not obstruct the urinary bladder inflow, outflow or get infected, it may remain asymptomatic and may attain a large size of several centimeters. In such cases, it is found incidentally,\(^3\) as in our case. The symptoms usually found due to vesical calculus are often overlooked in pregnancy because the distinction between clinical features of normal physiology and pathology during pregnancy is often unclear.\(^5\) The common complications of vesical calculus during pregnancy are infection, abortion, premature deliveries, and rarely, a large calculus can cause labor dystocia, urinary fistula and very rarely, uterine rupture. Vesical calculus is diagnosed by X-ray and intravenous pyelogram which are not commonly performed during pregnancy.\(^6\) Ultrasonography during pregnancy can diagnose but it can miss vesical calculus in the second half of pregnancy due to the interference of the fetal head.\(^6\) It may be very difficult to diagnose vesical calculus during pregnancy unless strong symptoms develop and persist or clinician is suspicious. A large vesical stone may be palpable on vaginal examination, as in our case. The management of a large vesical calculus depends on gestational age. If it is symptomatic and diagnosed during antenatal period, then cystolithotomy is preferred,\(^1,7\) and by this, we can avoid cesarean section. If calculus is neglected, then it can trap between symphysis pubis and fetal head causing arrest of fetal descent and labor dystocia.\(^2,8,9\) Rarely, the calculus dislodges and comes in front of fetal head, and subsequent pressure on fetal head by each and every uterine contraction causes prolapse of the calculus along with anterior vaginal wall, and this causes pressure damage to the
urinary bladder wall.\textsuperscript{10} If calculus is detected at this stage then cesarean section with cystolithotomy may be associated with post-operative hematuria and vesicovaginal fistula.\textsuperscript{6} If labor is further neglected, then calculus may be expelled out by rupturing the urinary bladder and vaginal wall.\textsuperscript{10}

**CONCLUSION**

Vesical calculus is a rare cause of dystocia. The diagnosis is typically made by patient's history, clinical examination and routine antenatal ultrasonography preferably in the first trimester. Mode of delivery can be planned according to the size of the calculus and gestational age. Complications can be prevented by timely diagnosis and proper management. If a large vesical calculus is diagnosed during antenatal period, then cystolithotomy should be done, and cesarean delivery can be avoided, but the indications are same as for non-pregnant state. If large vesical calculus is diagnosed during labor, then a cesarean section with cystolithotomy should be done to minimize urinary bladder damage and chances of fistula formation.

Hence, the pregnant woman with urinary complaints should not be neglected and should be evaluated to rule out vesical calculus. We should remain vigilant while doing ultrasonography, especially in the first trimester to rule out vesical calculus as in some cases vesical calculus may remain asymptomatic.

**REFERENCES**