SURGICAL MANAGEMENT AND EARLY OUTCOMES OF INFECTIVE ENDOCARDITIS: A DESCRIPTIVE STUDY AT A TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: To determine the factors associated with the early postoperative outcomes of patients with valvular infective endocarditis at a tertiary care hospital.

Study Design: Descriptive cross sectional study.

Place and Duration of Study: Armed forces Institute of Cardiology and National Institute of Heart Disease (AFIC/NIHD) Rawalpindi from 2013-2015

Material and Methods: We retrospectively reviewed all the data from our infective endocarditis registry at AFIC&NIHD from January 2013 to December 2015. During this period 41 patients underwent surgical treatment of infective endocarditis. Patients were only included in the study according to the Modified Duke's Criteria. Data collection was done through structured performa consisting of demographics, pre, per and post operative characteristics of the patients.

Results: A total number of 41 patients were included in this study with males 22(53.7 %) and females 19(46.3%) respectively. The mean age of our study population was 37 ± 13.3 years whereas majority 23(56.1%) of the patients were young <36 years of age. Maximum number of procedures performed were mitral valve replacements 13 (31.7%) among all the surgical procedures conducted. The mean bypass time and aortic clamp times noted were 149 ± 81.0 and 98± 52.5 minutes respectively and almost all the operation used mechanical valves 40(97.6%) as valve replacements. Reexploration was done for tamponade 3(7.3%) and bleeding (3(7.3%). Wound sepsis was minimal 1(2.4%). The overall mortality of our study population was 12.2% (5 patients).

Conclusion: In our local population, the incidence of infective endocarditis is in young adults. The clinical presentation, site of valvular infection, and the type of pathological microorganisms were typical of infective endocarditis reported from our region.

Keywords: Infective endocarditis, Prosthetic valve endocarditis, Rheumatic heart disease.

INTRODUCTION

Infective endocarditis (IE) is coupled with a high risk of morbidity and mortality. Despite improvements in medical and surgical therapies it persists as a therapeutic challenge[1]. The epidemiology, clinical and micro biologic spectrum of IE varies in different parts of the world. Its profile also depends on the clinical circumstances, (i.e. young versus elderly, native valve versus prosthetic valve). Information of this profile is necessary for early diagnosis and choice of appropriate treatment[2].

Prolonged appropriate antibiotic therapy remains the most imperative element in the treatment for native valve endocarditis once the pathological organism has been recognized. Improvement in patient outcomes has been attributed to early diagnosis, effective treatment, and timely recognition of complications. Nevertheless, depending on the virulence of the microorganism, the extent of involvement of surrounding tissues, and whether the infected valve is native or prosthetic, surgery may become necessary to eradicate the infection[3,4].

Modified Dukes criteria and transesophageal echoecardiography has enhanced early detection of infective endocarditis but patients are still at high risk of severe morbidity and mortality. Whether an

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exclusive antibiotic regimen is superior to surgical intervention is subject to ongoing debate. However the current guidelines indicate when surgery is the preferred treatment, but decisions are often based on physician choice. The risk of short term mortality has been decreased by surgery in patients who present with specific symptoms or microorganisms[5,6].

board. During this period 41 patients underwent surgical treatment of infective endocarditis. Patients were only included in the study if they confined to the "definite" and "possible" Modified Duke's Criteria. According to Modified Duke's Criteria, cases were defined as "definite" if they possessed two of the Duke

Table-1: Demographical characteristic of patients with infective endocarditis (n=41).

Variables	N (%)
Gender N (% age)	Male= 22 (53.7%) Female=19 (46.3%)
Age (Mean, SD) Age groups N (% age) < 36 36-55 56-75 >75	37.05± 13.3 23 (56.1%) 9 (22.0%) 7 (17.1%) 2 (4.8%)
BMI (Mean, SD)	22.4 ± 4.69

Early surgical interventions positively alter the disease track and reduce the associated morbidity and mortality rate. Definite indications for surgery include moderate to severe congestive heart failure, unstable prosthetic valve, obstructed prosthetic valve orifice, uncontrolled infection despite optimum antimicrobial therapy, unavailable effective antimicrobial therapy, e.g. Fungi, Brucella, Pseudomonas aeruginosa and relapse of prosthetic valve endocarditis after best possible treatment[7].

New aspects on the management of endocarditis are becoming evident and there is hope for decreasing the mortality rate by accelerating the process of diagnosis and risk stratification, starting antimicrobial therapy by reducing delays, rapid transfer of high risk patients to specialized medico-surgical centres, development of new surgical techniques, and long term follow-up[8].

MATERIAL AND METHODS

It was a retrospective study and we reviewed the data from our infective endocarditis registry at AFIC&NIHD from January 2013 to December 2015. The study was approved from the institutional ethical review

major criteria, one major and three minor criteria, or five minor criteria; they were defined as "possible" if they had one major plus one minor criteria, or three minor criteria.

Data collection tool was developed regarding patient demographics, preoperative medical history, intra-operative and post-operative course. Infective endocarditis was diagnosed by using a combination of clinical and laboratory findings and was confirmed by transesophageal echocardiography in all patients. Mandatory preoperative investigations included Computed Tomography (CT) scan to rule out septic foci and abdominal ultrasound. Doppler studies or Duplex scan of peripheral limb arteries was used to confirm peripheral arterial embolism. CT scan brain was done if there was a suspicion of stroke. Indications for surgical treatment during the active phase of IE included progressive cardiac failure, uncontrollable infection despite antibiotic therapy, recurrent embolic events, large size mobile vegetations and prosthetic valve endocarditis.

Operative Technique & Definitions:

All patients underwent surgery with cardiopulmonary bypass with mild to moderate

hypothermia. Radical debridement of infected and necrotic tissue was made and followed by

detecting extension of infective process. The decision of valve replacement and the type of

Table-2: Preoperative characteristics of patients with Infective Endocarditis (n=41).

Variables	N (%)
Native valve Endocarditis(NVE)	31 (75.6%)
Prosthetic valve Endocarditis (PVE)	9 (22.0%)
Rheumatic Heart Disease (RHD)	5 (12.21%)
Hepatitis C Positive	1 (2.4%)
Pulmonary Tuberculosis positive	1 (2.4%)
Pregnancy	1 (2.4%)
Coarctation of aorta	1 (2.4%)
Atrial Myxoma	1 (2.4%)
Hypertension	13 (31.7%)
Diabetes	4 (9.8%)
Stroke	2 (4.9%)
COPD	3 (7.3%)
Current/ ex smoker <1year	Current=2 (4.9%) Ex smoker=5 (12.2%)
Intravenous drug user	3 (7.3%)
Fever	41 (100%)
Fatigue	20 (48.7%)
Raised ESR	35 (85.3%)
Raised CRP	32 (78.0%)
Peripheral (lower limb)Embolism	2 (4.8%)
Renal profile	Compensated 8 (19.5%) On Dialysis 3 (7.3%)
Splenic abscess	2 (4.8%)
NYHA Class	I= 2 (4.9%) II=25 (61.0%) III=14 (34.1%)
Blood culture positive	17 (41.6%)
Ejection Fraction (EF)	Good (>50%) 28(68.3%) Moderate (30-50%) 13 (31.7%)
Mitral Regurgitation (MR)	I=3 (7.3%) II=9 (22.0%) III=12 (29.3%)
Aortic Regurgitation(AR)	I= 3 (7.3%) II= 3 (7.3%) III= 11 (26.8%) IV=1 (2.4%)
Tricuspid Regurgitation(TR)	Mild=2 (4.9%) Moderate= 2 (4.9%)
Atrial Fibrillation(AF)	10 (24.4%)
Pulmonary Hypertension (Pulmonary Arterial Pressure(PAP)) Mild (PAP 25-40 mmHg) Moderate (PAP 41-60mmHg) Severe (PAP 61-120 mmHg)	6 (14.6%) 8 (19.5%) 4 (9.8%)
Valve vegetation confirmed on the TEE	41 (100%)

generous irrigation with antibiotic solution. The valvular annulus and the adjoining structures were vigilantly examined   with the aim of

implant valve was generally determined by the cardiac surgeon. Objectives of postoperartive intensive care therapy included hemodynamic

stabilization and control of local and systemic infection. Intravenous antibiotic therapy was maintained for 06 weeks. Postoperative Transthoracic Echoecardiography (TTE) or

Statistical analyses were conducted in IBM SPSS version 21. Catagoric data were presented as percentages and frequency whereas descriptive statistics were expressed as mean

Table-3: Procedural parameters of patients with Infective Endocarditis (n=41).

Procedural information	N (%)
Procedure	
Mitral valve replacement(MVR)	13(31.7%)
Aortic valve replacement (AVR)	10(24.4%)
Tricuspid valve replacement (TVR)	3(7.3%)
Double valve replacement (DVR)	1(17.1%)
Redo MVR	4(9.8%)
Redo AVR	1(2.4%)
Redo MVR and AVR	3(7.3%)
Type of Procedure	
Elective	38(92.7%)
Emergency	3(7.3%)
CPB time in min	Mean=149 SD=81.0
CXP time in min	Mean=98 SD=52.5

Table-4: Post operative characteristics of patients with Infective Endocarditis (n=41).

Ventilation time (hrs)(Mean , SD)	18.07 ± 30.0
Inotropes duration (hrs) (Mean , SD)	62.1 ± 59.6
ICU stay (hrs) (Mean , SD)	72.02 ± 61.4
Total chest drain (ml) (Mean , SD)	878.1 ± 839.3
Use of blood products N (%)	22 (53.7%)

Trans Esophageal Echocardioraphy (TEE) were performed to exclude the possibility of recurrent vegetations or paravalvular leaks. In hospital mortality refer to all deaths within the same admission after cardiac surgery regardless of the length of hospital stay. Renal complications refer to post operative renal failure that required dialysis or in patients with conservative managmentwith no prior history of the same or patients with pre existing impaired renal functions that aggravated after the surgery requiring dialysis. Neurological complications refer to the incidence of transient ischaemic attacks or permanent stroke. Gastrointestinal complications refer to gastrointestinal bleed, pancreatitis, bowel ischaemia and obstruction. Infective complications refer to sternal / leg wound infections (requiring antibiotics and surgical intervention) and sepsis. Pulmonary complications refer to postoperative chest infections, pleural effusions requiring drainage, tracheostomy insertion and reintubation5.

and standard deviation for quantitative analyses.

RESULTS

A total number of 41 patients were included in this study with males 22 (53.7 %) and females 19 (46.3%) respectively. The mean age of our study population was 37 ± 13.3 years whereas majority 23(56.1%) of the patients were young <36 years of age. Native valve endocarditis was the most common primary cardiac condition in our local patient population 31(75.6%). The number of patients presented with prosthetic valve endocarditis was 9(22.0%). Rheumatic heart disease (RHD) was present in 5 (12.2%) patients. Pulmonary Tuberculosis, atrial myxoma and coarctation of aorta were present in 01(2.4%) patient each. Three (7.3%) patients were intravenous drug users. Greater part of the study participants had hypertension 13(31.7%) whereas 4 (9.8%) had diabetes and 7(17.1%) were smokers. History of persistent fever was more 20(48.8%) as

compared to intermittent fever 11(26.8%). Peripheral (lower limb) embolism and splenic abscesses were reported in 2(4.8%) patients each. The preoperative characteristics are summarized in table- 2.

Blood cultures were obtained from all the 41 patients. More than half of the study subjects had 24(58.5%) negative blood cultures.

Transesophageal echoecardiography (TEE) was performed in all the patients to verify the existence of vegetations on the affected valves. Majority of the patients had good (>50%) left ventricular ejection fraction 28(68.3%). Most of the patients had moderate to severe mitral regurgitation 21(51.3%), while 15(36.5) had moderate to severe aortic regurgitation.

Maximum number of procedures reported to be Mitral Valve Replacement (MVR) 13(31.7%) among all the surgical procedures

supraventricular tachycardias (SVT). Paravalvular leak occurred in 1 (2.4%) patient.

Reexploration was performed for cardiac tamponade 3 (7.3%) and bleeding 3 (7.3%). Wound sepsis documented was minimal 1 (2.4%). The overall mortality of our study cohort was 5 (12.2%).

DISCUSSION

The present study helped us to understand various factors associated with the surgical management of infective endocarditis in our local population. The incidence and mortality of infective endocarditis has not been reduced significantly over the years, but there is an apparent change in the pattern of IE globally. The mean age in our study subjects was 37.05 ± years with majority of young patients. This is in accordance with the results of different studies conducted in our neighboring countries. A
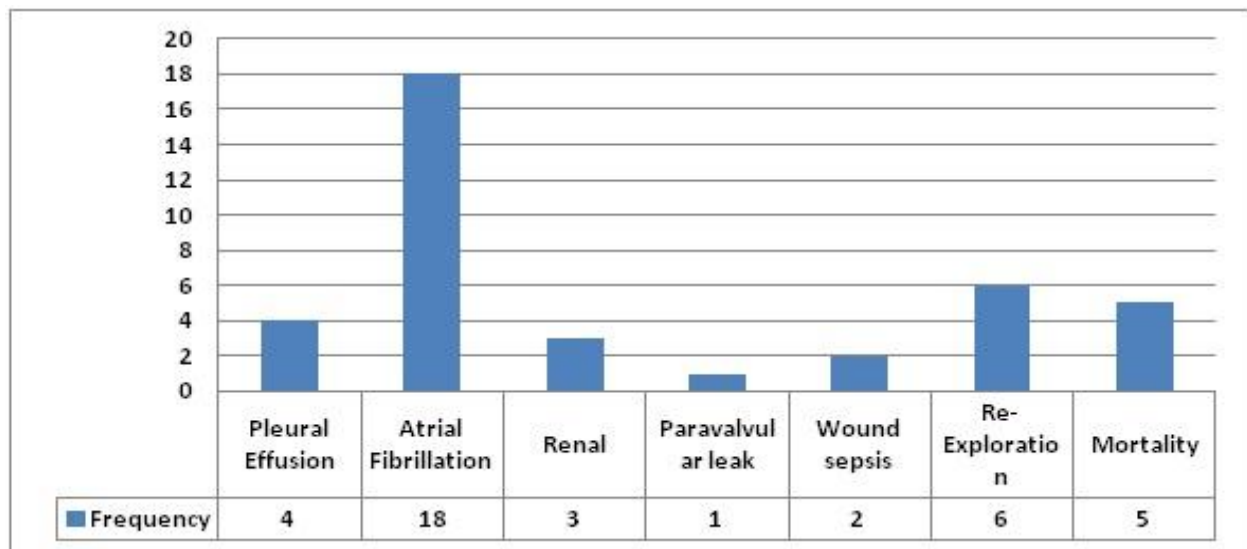

Figure-1: Frequency of postoperative complications of patients with Infective Endocarditis N=41.

conducted. The mean bypass time and aortic clamp times noted ±valves 40(97.6%) for valve replacements table-3.

Table-4 summarises the post operative findings of all the patients. The mean ventilation time in hrs was 18.07 ± 30.0 whereas mean ICU stay reported to be 72 ± 61.41 hrs. Blood products were used to compensate haemodynamic instability in 22 (53.7%) of the patients. 18 (43.9%) patients had atrial fibrillation (AF) and 4 (9.8%) developed

study by Garg N et al. in Indian patients during the last decade revealed that 76% of the patients with infective endocarditis were of younger age group less than 40 years (median age 27.6 ± 12 years)[7]. This lower age is attributed to the higher incidence of Rheumatic heart disease (RHD) and congenital heart disease in the developing world like ours.

In the developed countries, there has been a gradual increase in the median age of the patients from the fourth decade in the premature antibiotic era to the sixth and

seventh decade lately. According to European heart survey, the number of patients was 26% who were older than 70 years. This is due to the fact that the incidence of RHD has declined and there is a concomitant rise in cases of degenerative valvular leisons over the years in developed countries[7,9]. In our study a major contributor towards IE was RHD which is concordant with the previous published data from the developing countries[10].

The distribution of infection for native and prosthetic valves in our study were 31(75.6%) and 9(22%). This is in agreement with the documented data from both the developed and third world countries[11,12].

Mitral valve vegetation and mitral regurgitation was the commonest valvular lesion in our study and minority of the patients had Tricuspid regurgitation as well. Similar findings have been reported in previous studies[13].

Blood cultures are one of the basic tools for the diagnosis of IE. In our study culture negative endocarditis was seen in 24 (58.5%) of the patients, and is likely attributed to the prior antibiotic use. Other studies also showed low rate of culture positivity[14]. Streptococci were the most commonly isolated organism whereas staphylococcus aureus and enterococci were also recovered from some of the culture positive patients. One of these patients had Berkhurderia and aspergillus positive cultures.

Overall mortality for our study participants was 5(12.2%) which is similar to the other studies from our region. There is reduced in-hospital and long-term mortality in case of early surgery compared with non-early surgical treatment for infective endocarditis, especially in NVE. However, the most favorable timing of surgery is still unclear[15,16]. One third of the mortality in our study patients is attributed to previous cardiac surgery for prosthetic valve endocarditis[17].

CONCLUSION

In our local population, the incidence of infective endocarditis is in young adults. The clinical presentation, site of valvular infection, and the type of pathological microorganisms were typical of infective endocarditis reported from our region. There had been a poor prognosis in patients with a history of previous cardiac surgery and those with neurologic, renal and pulmonary complication.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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