Surgical treatment of active infective endocarditis: A single center experience

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ABSTRACT

Objective This study was undertaken to examine the outcomes of surgery for active infective endocarditis.

Methods Fifty consecutive patients underwent surgery for active infective endocarditis in a tertiary care center between January 2000 and June 2003. Modified Duke Criteria was used to include the patients in the study.

Results Mean age of the patients was 55.72 years (range 18-89 years). Underlying heart disease was the most common cause of acute infection, accounting for 30 % of all the cases. 16 % patients had a recent dental procedure and 10 % had a recent surgical procedure.

The most common infective organism was staphylococcus aureus (24%), followed by streptococcus viridians (20%). The most common indications for surgery were congestive heart failure (CHF) (52%), embolic phenomenon (18%) and septic shock (10%). Most common postoperative complication was respiratory failure (30%) followed by renal failure (24%) pacemaker implantation 22%; stroke 18%, bleeding 16% and GI bleeding 2 %. Seven out of 50 patients died during hospital course that accounts for 14% of the motility rate.

Conclusions Surgery for endocarditis continues to be challenging and associated with high operative mortality and morbidity. Age, shock, prosthetic valve endocarditis, impaired ventricular function, and recurrent infections adversely affect long-term survival.

Key Words: active infective endocarditis; surgery

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Introduction

Appropriate antibiotic therapy is the most important component in the treatment of patients with infective endocarditis (1). Depending on how promptly the disease is diagnosed and appropriate antibiotics are started, the virulence of the microorganism, and whether the infected valve is native or prosthetic, surgery may become indispensable to save the patient' s life and eradicate the infection. Timing of surgery is crucial for patients for whom medical therapy fails. Delaying surgical treatment often increases the probability of complications and also operative mortality and morbidity. The notion that less virulent microorganisms, such as Streptococcus viridans, always respond to antibiotics alone is erroneous, because these bacteria can cause extensive damage to a heart valve and surrounding tissues if inadequately treated (2). Certain cases of infective endocarditis are deemed inoperable because of multiorgan failure or extensive cerebral damage from septic emboli, and these patients die of the disease. This study is a retrospective review of a single center experience with surgery for active infective endocarditis.

Methods

Between January 2000 and June 2003, 50 patients underwent surgery for native valve infective endocarditis in a tertiary care medical center. Modified Duke's clinical Criteria were used to include the patients in this study.

All Patients were diagnosed with native valve endocarditis based on clinical findings, blood cultures, echocardiography, cultures and intraoperative findings. No case of Prosthetic valve endocarditis was included.

Preexisting conditions including congenital heart disease (bicuspid aortic valve, Coactation of aorta, ventricular septal defect) and acquired heart disease (rheumatic heart disease), as well as previous invasive procedures including dental, gynecological etc were taken in to account as potential causes of increased susceptibility in patients.

No potential conflict of interest.

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Table 1. Patient characteristics

Age	Mean 55.72	Range 18-89	
Gender			
Male		34	68%
Female		16	32%
Predisposing factors			
		15	30%
	Bicuspird aortic valve	12	24%
Underlying heart diseases	Rheumatic heart disease	1	2%
	Coactation of aorta	1	2%
	VSD	1	2%
Dental procedures		8	16%
IVDA		1	2%
	Post-abortal	1	2%
	Post delivery (oligohydramnios)	1	2%
Others	Post-pericardial window	1	2%
	Left ankle debridement/Right toe amputation	1	2%
	Post-stenting for obstructive uropathy	1	2%

VSD = ventricular septal defect; IVDA = Intravenous drug abuse

Results

Mean age of the patients was 55.72 years (range 18-89 years). 68 % of the patients were male and 32 % were female. Statistical analysis of the risk factors revealed that underlying heart disease was the most common cause of acute infection, accounting for 30 % of all the cases. 16 % patients had a recent dental procedure and 10 % had a recent surgical procedure.

Microorganisms

Table 3 shows the incidence of all infective organisms. The most common infective organism was staphylococcus aureus (24%), followed by streptococcus viridians (20%). 1 patient grew HACEK organism. Negative cultures were found in 4% patients.

Trans-esophageal echocardiogram (TEE)

TEE revealed the presence of vegetations in 32 patients (64%), perforated leaflet or ruptured in chorda tendinae in 10 patients (20%) and an abscess in 8 patients (16%).

Indication for surgery

The most common indications for surgery were congestive heart failure (CHF) (52%), embolic phenomenon (18%) and septic shock (10%). The other indications for surgery were interval procedure (6%), heart block (4%), para-aortic abscess (2%), cardiogenic shock (25), abscess (2%), LBBB (2%) and past history of endocarditis (2%).

Surgical procedures performed

Table 5 shows surgical procedures performed. The surgical procedures performed include both single valve and double valve operations. Single valve procedures included MVr 12%, MVR 16%, AVR 30%, MV debridment only 2% and concomitant CABG in 20% of the patients. Double valve operations included AVR/MVR 24%, AVR/MVr 12%, AVr/MVr 2%, MVR/TVr 2 % and with commitment CABG in 0%.

Postoperative complications

Table 6 shows postoperative complications. Most common postoperative complication was respiratory failure (30 %) followed by renal failure (24%) pacemaker implantation 22%; stroke 18%, bleeding 16% and GI bleeding 2 %. 4 patients (20 %) underwent re-operation including 12 % for sepsis and 8 % for bleeding. Seven out of 50 patients died during hospital course that accounts for 14% of the motility rate.

Discussion

This report describes outcomes of surgery for active infective endocarditis in a cohort of patients during a three-year interval. Although, we are aware of a few patients with disease deemed inoperable during this period, their number was very small. The operative mortality and morbidity in this report probably

Table 2. Native valve endocarditis microbiology

Microorganism		N	%
Staphylococcus	Aureus	12	24%
	Non-aureus	6	12%
Streptococcus	Viridans	10	20%
	GB	2	4%
	Sanguis	1	2%
	Pneumoniae	2	4%
	Mitis	1	2%
	Salivarius	1	2%
	Bovis	1	2%
Enterococci		3	6%
Pseudomonas		1	2%
H. Para influenza		1	2%
Rothia dento forms		1	2%
E. coli		1	2%
Nesisseria elangata		1	2%
Candidia		1	2%
HACEK		1	2%
Clostridial sporogens		1	2%
Negative cultures		2	4%
Not available		2	4%
Fastidious		1	2%

Table 3. TEE findings

TEE findings	N	%
Vegetations	32	64%
Perforated leaflets/cusps or ruptured chordae	10	20%
Abscess	8	16%
Sever AI	3	6%
Fistula	2	4%
Frail MV leaflet	1	2%

TEE = transesophageal echocardiogram, AI = aortic insufficiency, MV = mitral valve

Table 4. Indications for surgery

Indications	N	%
CHF	26	52%
Embolic phenomenon	9	18%
Septic shock	5	10%
Interval procedure	3	6%
Heart block	2	4%
Periaortic abscess	1	2%
Cardiogenic shock	1	2%
Abscess	1	2%
LBBB	1	2%

CHF = congestive heart failure, LBBB = left bundle branch block

Table 5. Procedure performed for treatment of infective endocarditis

Procedures		N	%
Single valve procedures	Aortic valve replacement	13	26%
	Mitral valve replacement	8	16%
	Mitral valve repair	6	12%
Double valve procedures	Combined aortic and mitral valve replacement	12	24%
	Combined aortic valve replacement and mitral valve repair	6	12%
	Combined mitral valve replacement and tricuspird valve repair	1	2%
	Combined aortic and mitral valve repair	1	2%

Table 6. Post-op complications

Complications	N	%
Respiratory failure	15	30%
Renal failure	12	24%
Pacemaker implant	11	22%
Stroke	9	18%
Bleeding	8	16%
Death	7	14%
Re-op sepsis	6	12%
Re-op bleeding	4	8%
GI bleeding	1	2%

reflect an accurate risk of surgery in patients with active infective endocarditis in a large tertiary care hospital.

Although cardiac surgery is necessary in less than a third of patients who have infective endocarditis of native valves and fewer than half of those with prosthetic valves (3-6), a multidisciplinary approach is necessary to treat these patients and must involve at least specialists in infectious disease, cardiology, and cardiac surgery (7). The indications for and timing of surgery are still controversial among internists who treat these patients, and the input of a cardiac surgeon is needed if mortality and morbidity are to be reduced (7, 8). Close surveillance of these patients is indispensable to detect early failure of adequate antibiotic therapy to avoid Cardiogenic or septic shock and multi-organ failure.

It has been shown that cases of endocarditis caused by S aureus and other virulent microorganisms on valves in the left side of the heart are best treated with early surgery. In a large merged database on native valve endocarditis, the overall mortality was higher among patients with S aureus endocarditis than among those with other bacteria (20% vs 12%, P <0.001); surprisingly, however, fewer patients infected with S aureus had surgery (26% vs. 39%, P <0.001). S aureus emerged as an independent predictor of operative mortality in many surgical series.

The outcomes of prosthetic valve endocarditis are worse than those of native valve endocarditis. We found that not only was prosthetic valve endocarditis associated with higher operative mortality, but also it adversely affected long-term survival relative to native valve endocarditis. In a report from the United Kingdom Heart Valve Registry on 322 cases of prosthetic valve endocarditis, the 30-day mortality was 20% and the 5- and 10-year survivals were 55% and 37%, respectively (9). Investigators from the Cleveland Clinic reported an operative mortality of 13% among 146 patients with prosthetic valve endocarditis; among those who survived surgery, the 5-year survival was 82% and the freedom from reoperation was 75% (10). In another report from the same institution on prosthetic aortic valve endocarditis treated exclusively with aortic valve homograft, the operative mortality was only 3.9% and the 5- and 10-year survivals were 73% and 56%, respectively.

The main reason the operative mortality for prosthetic valve endocarditis is higher than that for native valve endocarditis is the complexity of the operation and the fact that it is often associated with para-valvular abscess. Resection of aortic root abscess is indeed a complex operation, but resection of mitral annulus abscess can be even worse. Although aortic valve homografts are believed to be the best valve for aortic root abscess, they are not a substitute for radical debridement and implantation of the new valve on healthy and strong tissues. Persistent or early recurrent endocarditis is probably related more to the surgeon'

s recognition of and ability to extirpate all infected tissues than to the type of valve used for replacement. We believe that aortic homograft is ideally suited for reconstruction of the aortic root, however, because it is easier to handle than prosthetic materials and its anterior leaflet of the mitral valve can be used to patch defects created by the resection of the abscess.

In conclusion, surgery for active infective endocarditis continues to be challenging and to be associated with high operative mortality and morbidity. The long-term survival is satisfactory, although these patients are at higher risk for development of recurrent endocarditis than are patients who have never had valve infection.

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