Infective Endocarditis

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Background	Infective endocarditis continues to pose a therapeutic challenge to treating clinicians. We believe that the successful management of endocarditis mandates a thorough understanding of the risk factors for adverse outcomes and a co-ordinated team approach.
Methods	Between the years 2000 and 2009, 85 patients required surgery for infective endocarditis, with a total of 112 infected valves being treated surgically. Data was analysed to determine factors significantly associated with morbidity and mortality.
Results	The mean age was 50.5 years. Nine (10.5%) of these patients had Prosthetic Valve Endocarditis, the remaining 76 (89.5%) had Native Valve Endocarditis. Twenty-nine percent of patients were NYHA 4 pre-operatively, 15% of patients were haemodynamically unstable requiring inotropic support, 34% were persistently febrile despite antibiotic therapy, and 48% had suffered any embolic event, 20% suffered cerebral emboli. The commonest causative organism in our series was Staphylococcus Aureus (54.1%) with 2.3% of cases being due to MRSA. The second commonest organism isolated was Streptococcus spp. at 21.1%. Operative mortality was 12.9%, of which on-table mortality was 2.2%. Mean follow-up was 56 months (range 1-151). Early recurrence rates (<3 months) were 2.3%. Late recurrence was 7.0%. The pre-operative factors associated with increased mortality were age over 65, inotropic requirement, uncontrolled sepsis and cerebral emboli. We summarise our experience and recommendations for a team approach to the management of infective endocarditis.
Keywords	Infective endocarditis • Bacterial • Infective endocarditis • Acute • Infective endocarditis • Subacute • Valvular heart disease • Cardiac surgery

Introduction

Endocarditis patients are a very heterogenous group of patients with a broad spectrum of symptoms and presentations. The patients with late presentations, severe structural heart disease, multi-organ involvement especially cerebral emboli and systemic sepsis pose huge therapeutic challenges. Furthermore, the traditional paradigm of postponing surgery where possible, and aiming to sterilise the patient, is being assailed by new evidence [20] and expert opinion [21,22] suggesting improved outcomes with aggressive early surgical intervention.

A team approach involving surgeons, cardiologists, ID physicians and, when needed, neurologists and other specialist physicians, is required to achieve consensus and optimise outcomes. Early surgical intervention, valve-sparing/reconstructive techniques and co-ordinated targeted antimicrobial therapy we believe should deliver better outcomes.

We have reviewed our results with surgically treated endocarditis over the past 10 years during which time a more aggressive surgical approach has been introduced. We wished to identify the problem areas in our experience to enable a focus for changes in team management going forward.

Table 1 Pre-operative variables.

Age (>/< 65 years)
Gender
Intravenous drug abuse
Causative organism
Prosthetic Valve Endocarditis vs. Native Valve Endocarditis
Valvular involvement (Pure Aortic vs. Pure Mitral vs. Multivalvular)
Periannular extension
Uncontrolled sepsis pre-operatively (defined as ongoing fevers >38 C despite antibiotics)
NYHA Class
Inotropic requirement
Duration of pre-operative antibiotics
Pre-operative cerebral emboli

To our knowledge, this article is the largest published series of surgically treated infective endocarditis to come from Australasia.

Materials and Methods

Data collection

Between the years 2000 and 2009, 85 patients underwent surgery for treatment of their infective endocarditis at Royal Perth Hospital. A total of 112 infected valves were treated surgically. These patients' records were scrutinised by retrospective chart review. Long-term follow-up was conducted by telephone interview with the patients themselves, if contactable, and with their current general practitioner or cardiologist. All data was collected and entered into a database.

All post-operative complications were recorded, the following were analysed based on their incidence and/or associated morbidity (Table 1).

The following post-operative variables were also analysed to determine their association with In-hospital mortality

- Return to Theatre for Bleeding
- Tracheostomy
- Cerebrovascular Accident
- Acute Renal Failure

Operative technique

All operations were performed through a median sternotomy incision with cardiopulmonary bypass. Cardiac arrest was achieved using hyperkalaemic cold blood cardioplegia solution delivered using a combination of antegrade and retrograde delivery in a 50:50 ratio. Cardioplegia was maintained with intermittent retrograde cardioplegia at 20-30 minute intervals depending on surgeon preference or at any sign of cardiac electrical activity.

The most commonly performed procedure was a mechanical valve replacement, which was the procedure of choice for 78 (69.6%) of the surgically treated valves. A bioprosthetic valve was used in 13 cases (11.6%). A total of 91 (81.2%) valve replacements were performed out of a total of 112 infected valves.

As displayed in Table 2, 23 valves (20.5%) underwent repair by a variety of techniques, while six valves (5.3%) were treated solely by vegetectomy.

A small proportion of patients required concomitant cardiac procedures unrelated to their infective endocarditis. Coronary artery surgery was performed in three (3.5%) patients. Ventricular septal defects were closed in two (2.3%) patients and one patient (1.1%) had a left ventricular myectomy to repair hypertrophic obstructive cardiomyopathy.

Statistical methods

Non-parametric statistical analysis was applied in the analysis of the dataset that was predominantly comprised of nominal (binary) variables, with the exception of age as an interval variable. ICU stay was categorised as either three days, five days, seven days or more than seven days. Pre-operative antibiotic administration was categorised as either seven days, 14 days or more than 14 days. Univariate tests of independence between variables were achieved with the McNemar test, and where relevant, Fisher's exact test, based on the null hypothesis of a shared marginal distribution, with p-values reported for these tests in conjunction with a

Table 2 Distribution of procedures by type and valve.

	Aortic	Mitral	Tricuspid	Pulmonary
Valve Replacement	42 (37.5%)	43 (38.3%)	3 (2.6%)	3 (2.6%)
Bentall's	3 (2.6%)			
Vegetectomy	1 (0.8%)	2 (1.7%)	3 (1.7%)	0
Suture Repair	0	3 (2.6%)	4 (3.5%)	0
Commisuroplasty	0	2 (1.7%)	2 (1.7%)	0
Annuloplasty	0	3 (2.6%)	0	0
Neochords	0	1 (0.8%)	1 (0.8%)	0
Quadrangular Resection	0	1 (0.8%)	0	0