بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

" وَيَسْأَلُونَكَ عَنِ الرُّوحِ قُلِ الرُّوحُ مِنْ أَمْرِ رَبِّي وَمَا أُوتِيتُمْ مِنَ الْعِلْمِ إِلَّا قَلِيلًا "

صَدَقَ اللهُ العَظِيم

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Surgical management of infective endocarditis: Predictors of in-hospital and early outcome

Thesis

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By

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CONTENTS

LIST OF ABBREVIATIONS

AR	Aortic regurgitation
AS	Aortic stenosis
AV	Aortic valve
AVR	Aortic valve replacement
BCNE	Blood culture-negative endocarditis
BMI	Body mass index
CAVH	Cryopreserved aortic viable homograft
CD	Cardiac device
CDRIE	Cardiac device related infective endocarditis
CHD	Congenital heart disease
CHF	Congestive heart failure
CI	Confidence interval
CNS	Central nervous system
CoNS	Coagulase-negative staphylococci
COPD	Chronic obstructive pulmonary disease
CPB	Cardiopulmonary bypass
CRP	C-reactive protein
CT	Computed tomography
CVC	Cerebrovascular complications
DM	Diabetes mellitus
DVT	Deep venous thrombosis
EECC	Estimated endogenous creatinine clearance
EF	Ejection fraction
ESC	European Society of Cardiology
ESR	Erythrocyte sedimentation rate
HAIE	Healthcare-associated IE
Hb	Hemoglobin

HF	Heart failure
HIV	Human immunodeficiency virus
HR	Hazard ratio
IA	Infectious aneurysm
ICD	Implantable cardioverter defibrillator
ICE	International Collaboration on Endocarditis
ICE-PCS	International Collaboration on Endocarditis-Prospective Cohort Study
ICU	Intensive care unit
IDUs	Injection drug users
IE	Infective endocarditis
IVDA	Intravenous drug abuser
LV	Left ventricle
MIC	Minimal inhibitory concentration
MR	Mitral regurgitation
MRI	Magnetic resonance imaging
MRSA	Methicillin-resistant Staphylococcus aureus
MS	Mitral stenosis
MSSA	Methicillin-susceptible Staphylococcus aureus
MV	Mitral valve
MVR	Mitral valve replacement
NVE	Native valve endocarditis
NYHA	New York Heart Association
OR	Odds ratio
PASP	Pulmonary artery systolic pressure
PBP	Plasma-binding protein
PCR	Polymerase chain reaction
PET	Positron emission tomography
PPM	Permanent pacemaker
PVE	Prosthetic valve endocarditis
RHD	Rheumatic heart disease

ROC	Receiver operating characteristic
RR	Relative risk
SAM	Subaortic membrane
SD	Standard deviation
STS	Society of Thoracic Surgeons
TEE	Transoesophagal echocardiography
TIA	Transient ischemic attack
TR	Tricuspid regurgitation
TTE	Transthoracic echocardiography
TV	Tricuspid valve
TVR	Tricuspid valve replacement
VISA	Vancomycin-intermediate Staphylococcus aureus
VSD	Ventricular septal defect
WBC	White blood cell

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Aim of the work :

The aim of this study is to audit the surgical experience in the cardiothoracic surgical department, Kasr El-Aini regarding patients with native or prosthetic valve endocarditis and determining predictors of in-hospital and early mortality (6 months following surgery) as an outcome for the primary endpoints in this study which include mortality and recurrence of infection and the need for reoperation within this time frame.

Abstract

Background: Infective endocarditis (IE) is a serious and life threatening disease with significant morbidity and mortality. Despite major advances in diagnostic technology, improvements in antimicrobial selection and monitoring and parallel advances in surgical techniques, the morbidity and mortality due to IE remains high.

Objective: The aim of this study was to audit the surgical experience in the cardiothoracic surgical department, Kasr El-Aini regarding patients with native or prosthetic valve endocarditis and determining predictors of in-hospital and early mortality (6 months following surgery) as an outcome for the primary endpoints in this study which included mortality and recurrence of infection and the need for reoperation within this time frame.

Patients and Methods: Fifty patients diagnosed with definite IE who underwent valve surgery were enrolled in this study. We tested preoperative, intraoperative, and postoperative data as potential predictors of both in-hospital and 6-month mortality.

Results: The in-hospital mortality was 20% and the 6-month mortality was 12.5%. Recurrence of infection occurred in 4% of patients during the follow-up. By multivariate analysis, the independent predictors of in-hospital mortality were CHF (OR=30.914; 95% CI, 2.017 to 473.872; P=0.014), followed by embolization (OR=18.24; 95% CI, 1.935 to 171.906; P=0.011), then periannular extension of infection (OR=12.675; 95% CI, 1.302 to 123.431; P=0.029). Also, by multivariate analysis, periannular extension of infection was the only independent predictor of 6-month mortality (OR=22.667; 95% CI, 1.562 to 328.949; P=0.022). According to the ROC curve, EuroSCORE II > 5.93% is associated with the best predictive value for in-hospital mortality, with a sensitivity of 80%

and a specificity of 75% (area under the curve: 0.813).Also, EuroSCORE II > 5.93% is associated with the best predictive value for 6-month mortality, with a sensitivity of 80% and a specificity of 82.9% (area under the curve: 0.834). Valve repair was associated with lower mortality (11%), excellent durability and resistance to re-infection.

Conclusion: Congestive heart failure, embolization, and periannular extension of infection are the most powerful predictors of in-hospital mortality. Periannular extension of infection is the most powerful predictor of 6-month mortality. EuroSCORE II has a good discrimination ability to predict both in-hospital and 6-month mortality in IE surgery. Satisfactory results can be obtained with valve repair in IE.

Keywords: Infective endocarditis, Surgery, Predictors, Mortality, EuroSCORE II, Valve repair

Introduction

Infective endocarditis (IE), or infection of an endocardial surface of the heart, remains an uncommon disease associated with significant morbidity, including complications of heart failure, stroke, systemic embolization, and sepsis. Despite continued progress in the diagnosis and treatment of this condition, IE continues to have an in-hospital mortality of approximately 20%, essentially unchanged over the past 2 decades ***(Murdoch et al., 2009).***

Antibiotics contributed to an improvement in survival, but also changed the major cause of death from infection to congestive heart failure. Although antibiotics remain the first line treatment of bacterial endocarditis, it becomes insufficient when complications develop. Under these circumstances mortality rates are unacceptable with medical treatment alone (50-90%), when compared to surgery (30%) ***(Dodge et al., 1995; Alexiou et al., 2000).***

Surgery is potentially lifesaving ***(Olaison and pettersson, 2002)***, and is required in 25% to 50% of cases during acute infection and 20% to 40% during convalescence ***(Jault et al., 1997; Castillo et al., 2000; Wang et al., 2007; Murdoch et al., 2009).*** Overall surgical mortality in active IE is 6% to 25%, with long-term survival rates of approximately 70% in most series ***(Revilla et al., 2007; Slater et al., 2007; Tleyjeh et al., 2008; Murdoch et al., 2009; Thuny et al., 2011).***

The goals of surgical therapy are as follows: 1) to eradicate the infection; 2) to repair cardiac destruction; 3) to prevent the development of complications and relapse of infection; 4) to offer a survival advantage to medical therapy alone, when indicated ***(Delahaye et al., 2004).***

The indications for and the timing of surgery remain controversial as there are few randomized trials to guide patient management ***(Kang and Smith, 2013).*** Reasons to consider early surgery in the active phase, i.e. while the patient is still receiving antibiotic treatment, are to avoid progressive HF and irreversible structural damage caused by severe infection and to prevent systemic embolism ***(Delahaye et al., 2004; Baddour et al., 2005; Aksoy et al., 2007; Thuny et al., 2011).*** On the other hand, surgical therapy during the active phase of the disease is associated with significant risk. Surgery is justified in patients with high-risk features which make the possibility of cure with antibiotic treatment unlikely and who do not have co-morbid conditions or complications which make the prospect of recovery remote ***(Habib et al., 2009).***

Identification of patients requiring early surgery is frequently difficult. Each case must be individualized and all factors associated with increased risk identified at the time of diagnosis. Frequently, the need for surgery will be determined by a combination of several high-risk features ***(Thuny et al., 2011).***

The results of surgery depend upon many factors.The general preoperative condition of the patient, antibiotic treatment, timing of surgery, perioperative management, surgical techniques (including choice of valve replacement versus repair, type of valve and methods of reconstruction), postoperative management, and follow up are all important determinants of outcome. Preoperative New York Heart Association (NYHA) classification, age, and preoperative renal failure are common predictors of operative mortality ***(Olaison and pettersson, 2002).***