Original Article

Do outcomes justify emergence of new cardiac centres

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Abstract

Objective: To assess if quality cardiac surgical results can be delivered in a third world country like Pakistan.

Methods: Our report focused on the initial 2-years experience (June 2005-June 2007) at a new institution Tabba Heart Institute, Karachi. Individual mortality rates of adult cardiovascular surgeries done at our institution were compared with the Society for Thoracic Surgery (STS), European Association of Cardiothoracic Surgery (EACTS) databases and one of the more commonly applied models for predicting post-operative mortality, EuroSCORE. All sets of data were not adjusted for risk.

Results: Total of 1017 open heart surgeries were performed. Age range for our series was 15-80 years, 777 were men and 240 females. Of these 891 were isolated CABG, 25 AVR, 50 MVR, 27 AVR+MVR, 11 CABG+AVR and 13 CABG+MVR. 12.9% patients had LVEF <30% and 11.7% had critical left main coronary disease. In all, 15% of our cases were performed on an emergency basis.

Observed mortality rates at Tabba Heart Institute (3.94%) were much lower when compared to those documented by STS database (5.45%), EACTS (6.18%) and EuroSCORE (8.7%).

Conclusion: With post-operative mortality an inverse indicator of quality health care, the results were good, despite several geographical, financial and demographical limitations in reproducing results comparable to international standards. This shows a maximum contribution in providing first grade cardiac support in a developing country like Pakistan.

Keywords: STS, EACTS, EuroSCORE, Pakistan. (JPMA 62: 763; 2012)

Introduction

Since its advent, the ultimate aim of cardiovascular surgery has been to achieve long term symptom free survival. Patients outcome depends on individual hospital's performance and standard of care provided to them pre and post operatively.[1] Therefore every technique of cardiovascular surgery is judged by these outcome measures. Outcome based quality of care monitoring is currently the object of a lively debate, particularly in cardiovascular surgery. Medical, technical, and economical reasons subtend comparisons between surgeons, hospitals, or regions.[2] Cardiac operative mortality rates are defined as "any death occurring within 30 days of surgery" reduction of which remains a

significant challenge for medical science.[3]

Obtaining an estimate of disease requires standardized morbidity data. The goal of this study was to evaluate operative mortality and its causes comprehensively across the entire spectrum of cardiac surgical procedures in a developing country. Mortality from cardiac surgery is an essential indicator of quality and forms the basis of treatment strategy decisions in eligible patients.[4]

This study was performed to assess the relationship between adult cardiovascular surgeries and operative mortality at Tabba Heart Institute, Pakistan. The number and cause of operative mortality following cardiovascular surgeries were determined and it was determined if quality cardiac surgical results were reproducible in a developing country like Pakistan.

Methods

Included were the results of the initial 2 year experience from June 2005 to June 2007 at Tabba Heart Institute (THI), Karachi. The individual mortality rates of adult cardiovascular surgeries at the Institute (THI) were compared with the Society of Thoracic Surgery (STS) - 2007 spring report and the European Association of Cardiothoracic Surgery (EACTS) - 2006 report. The logistic European system for cardiac risk evaluation (EuroSCORE)[5,6] for each patient was calculated and compared with the actual results. This is one of the most updated predictive models available and was developed with data collected across 8 European countries. All sets of data are not adjusted for risks.

All patients undergoing either Coronary Artery Bypass Grafting (CABG) or heart valve surgery at THI were recruited for this study. Two investigators led by a chief investigator retrospectively studied and retrieved data from the patient's individual charts and database of THI. This database included prospectively collected information on all patients undergoing surgery. Random cross-checking was performed to minimise inter observer errors. Within the database the patients were coded according to the procedure they respectively underwent. They were also coded according to age, gender and pre-operative co-morbids. All analyses were performed using Microsoft Excel Programme.

Left ventricular function was estimated by echocardiography performed by a trained cardiologist at the Tabba Heart Institute. Impaired left ventricular function is defined ejection fraction <30% measured by echocardiography. Cardiogenic shock was identified as systolic blood pressure below 90 mmHg with clinical signs of hypo-perfusion i.e. cold extremities, oliguria and altered mental state.

Results

From June 2005 to June 2007, 1017 cases of open heart surgeries were performed at Tabba Heart Institute. Surgeries were performed on a daily basis by 2 cardiothoracic surgeons. The category of the surgeries included, 891 (87.5%) isolated CABG (16 Redo), 25 (2.5%) cases of Aortic Valve Replacement (AVR), 50 (5%) MVR, 27 (2.6%) AVR + Mitral Valve Replacement (MVR), 11 (1.1%) CABG + AVR and 13 (1.3%) CABG + MVR. The age range of our series was 15-81 years.

Out of 1017 cases, a total of 131(12.9%) patients had left ventricular ejection fraction (LVEF) <30% and 119 (11.7%) had critical left main coronary disease evident on angiography. Total 15% cases were performed on an emergency basis, due to ongoing chest pain or haemodynamic compromise. One hundred and sixty seven patients who underwent CABG had suffered from an acute myocardial Infarction. Troponin-I levels in our study ranged from 2.9 to 227. In all there were 76.4% males and 23.6% females.

There were 50 mitral valve replacements (MVR) done at the THI, 44 patients were implanted with St. Jude mechanical valves and 6 were implanted tissue valves. Twenty three of 25 aortic valve replacement (AVR) patients were implanted St. Jude mechanical valves with 2 patients receiving tissue valves.

The demographic characteristics of participating

Table-1: Clinical characteristics of the study population (n=1017).

Mean Age (years)	**58 ± 9**
Gender, male	**777 (76.4%)**
Preoperative cardiovascular risk factors	
Hypertension	588 (57.8%)
Current Smoking	343 (33.7%)
Dyslipidaemia	702 (69.1%)
Diabetes Mellitus	287 (28.2%)
History	
Previous MI	274 (27.1%)
Prior Cardiac Surgery	016 (01.5%)
Impaired LV function (EF<30%)	131 (12.9%)
Critical left main disease	119 (11.7%)
Clinical Parameters	
Heart Rate, beats per minute	81 ± 16
Diagnosis	
Acute Myocardial Infarction	167 (18.7%)
Mechanical Complication of (A) MI	231 (25.9%)
Cardiac Angiography	
Three vessel coronary disease or left main stem stenosis >70%	837 (82.3%)
Type of Surgery	
Isolated Coronary Artery Bypass Grafting (CABG)	891 (87.5%)
Isolated Aortic Valve Replacement (AVR)	25 (2.5%)
Isolated Mitral Valve Replacement (MVR)	50 (5%)
AVR + MVR	27 (2.6%)
CABG + AVR	11 (1.1%)
CABG + MVR	13 (1.3%)

Table-2: Comparison of Post-operative mortality (P.M).

	THI Operative Mortality (n) %	STS Spring Report 2007 P.M.	EACTS Database 2006 P.M.	EuroSCORE Predicted P.M.
Isolated CABG	(19/891) 2.13%	2.2%	2.8%	6.9%
Isolated AVR	(0/25) 0%	3.1%	3.0%	2.3%
Isolated MVR	(1/50) 2%	5.4%	5.3%	4.3%
AVR+MVR	(0/27) 0%	10.6%	8.4%	5.3%
CABG+AVR	(0/11) 0%	5.4%	4.8%	11.7%
CABG+MVR	(1/13) 7.69%	10.4%	8.2%	9.7%
Combined Mortality (All Procedures)	(21/1017) 2.06%	6.18%	5.45%	—

patients are shown in Table-1. Table-2 shows the post-operative mortality at THI compared to the operative mortality as documented in the Society for Thoracic Surgery (STS), European Association of Cardiothoracic Surgery (EACTS) databases and one of the more commonly applied models for predicting post-operative mortality, EuroSCORE.

During the 2 year period, a total of 21 surgical deaths occurred of the 1017 open heart surgeries performed from June 2005 - June 2007. Of these 5 were due to acute septicaemia, 5 acute respiratory distress syndrome (ARDS), 3 arrhythmias, 3 suffered myocardial infarction, 2 had an acute cerebrovascular accident (CVA), 2 patients had haemorrhage and 1 death occurred due to an ischaemic leg.

The postoperative mortality at THI was CABG 2.13%, MVR 2%, CABG + MVR 7.69%. The overall post operative mortality was 2.06% (21/1017) with 98% positive outcomes, as compared to STS spring report 2007 and EACTS database 2006 which were 6.18% and 5.45% respectively.

Discussion

Many factors play vital roles in determining the surgical outcomes in patients undergoing invasive cardiothoracic procedures. Studies have shown these risk factors to predominate in developing countries.[7-11] Factors significantly and independently influencing mortalities are unstable angina, intractable congestive heart failure, chronic obstructive pulmonary disease, renal failure, dependence on dialysis, shock and pre-operative intra-aortic balloon pumping.

In this study post-operative mortality was the standard used to measure the quality of health care at a tertiary hospital. Some studies show that post-operative morbidities, length of hospital stay and patient satisfaction are also important factors in accessing the quality of health service provided. However, accurate documentation remains unconquered in developing countries, leaving operative mortalities the sole indicator for quality of care. This is in stark contrast to the industrialized nations where hospital mortality is not necessarily a measure of overall quality but is simply a rough guide to the success of the surgical episode.[12,13]

Previous data collected by the Society of Cardiothoracic Surgeons clearly indicates that surgeons in the same unit tend to have similar mortalities, highlighting the importance of additional local influences on surgical outcomes.[14] This may include the socioeconomic status of the catchment areas, state of awareness and resources, severity of cardiac illness, prevalence of co-morbidities, threshold of referral from both the general practitioner and the cardiologist, threshold of acceptance by the surgeons, standards of anaesthesia, surgery and intensive care, adequacy of facilities and staffing levels, attitude to training, interpersonal relationships between staff, and architectural dispersion within the unit,[15,16] each having enough influence to alter surgical outcome.[17]

Many studies have been conducted to assess the long term survival in patients undergoing cardiovascular surgery but few that discuss operative mortality and their cause at different cardiac institutions around the world, and only fewer that highlight the outcome of cardiovascular surgeries in 3rd world countries.[18] Perhaps a concern aroused by the publication of death-rate data is that some hospitals and physicians may avoid surgery involving high-risk patients who are appropriate candidates for CABG in an attempt to lower their risk-adjusted mortality.[19] Also such countries with developing economies do not consider surgical health to be a public health priority, with a large body of evidence consistently showing variations in process, resulting in more advanced cardiac disease with poorer outcomes.[20]

According to WHO 80% of all cardiovascular deaths (CVD) worldwide take place in developing, low and middle-income countries, while these countries also account for 86% of the global CVD disease burden.[21] In the wake of such disastrous revelations, the need for providing quality cardiac care is now more than ever. But working in a third world environment presents unique challenges.[22] Potentially modifiable risk factors that are associated with social

deprivation — such as smoking, extremely high or low body mass index, can adversely affect the outcome of cardiac management.[23] Also, one has to constantly battle with the availability of materials (equipment etc.) and skilled manpower. Financial resources both that of the individual patient and health care providers limit the scope of care that is available. Another modern reality in our part of the world is geopolitical uncertainty which restricts and limits the ability to consistently impart high standard of care.

The need to contain and combat the impact of CVD in terms of mortality and morbidity in the developing countries is, therefore, obvious and urgent. National strategies to meet this objective are being developed and effectively implemented by individual countries.[24] New regional and global initiatives by international agencies concerned with health care programme facilitation, policy development, and research funding are also required to strengthen and speed up these national efforts.[25]

Nevertheless, it is incumbent on institutions that are involved in rendering health care to monitor quality and outcomes independently and collectively as well.[18] Inpatient lessons can be learnt from shared experiences. Improvement in the independent outcomes and collective out comes has to be the goal of the medical community, especially those of us who are involved in the delicate work of cardiac care.

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