Editorial

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Cardiac surgery Types and Materials and Methods

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Abstract

Cardiac surgery is the specialty of medicine concerning the surgical treatment of pathologies related to the heart and thoracic aorta. The spectrum of modern cardiac surgery can be understood by its history beginning at the end of the 19th century. Since then cardiac surgery developed through the work of numerous dedicated surgeons offering more and more treatments for diverse cardiac pathology. This development is still ongoing today.

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Introduction

In 1882, Billroth performed the first pericardiectomy [1]. The first successful treatment of cardiac trauma was done by Ludwig Rehn when he operated on a cardiac stab wound in 1896 against the wide held belief that the heart is not an organ on which surgeons should operate [2]. The development of cardiopulmonary bypass was necessary to reach the structures of interest and was pushed by the high mortality of the early cardiac operations like embolectomy (first completed by Trendelenburg) [3].

Surgical revascularization is one option to relieve ischemic heart disease with complicated atherosclerosis. Vineberg implanted the left internal mammary artery (LIMA) into the anterior free wall forming no direct anastomoses to the coronary vessels. He has observed, in earlier experiments, that collaterals develop when ischemia is present. During the 1960s several surgeons in different locations pioneered the first coronary artery bypass grafting (CABG) operations [4, 5]. The era of reversing coronary artery disease started with the invention of cardiac catheterization by Forssman in 1929 and injection of contrast media to visualize coronary vessels and locate stenosis by Shirey in 1962. Bypass grafting and interventional revascularisation form the 2 main possibilities to treat ischemic heart disease besides drug treatment [6].

Surgical treatment of valvulopathies started closed mitral commissurotomy by passing a finger or instrument through the narrow orifice of the mitral stenosis to dilate or cut it as did Cutler in 1923 for the first time. The Hufnagel cage and ball valve was the first artificial valve introduced in 1952 [7]. It was placed in the descending thoracic aorta to prohibit blood flow reversal in aortic regurgitation. In 1967 a similarly structured valve, the Edwards cage and ball valve, had been implanted 1000 times for mitral valve disease. Surgical techniques improved from early, single valve procedures to 4-valve replacement in 1992. Special techniques were introduced, for example, the Ross procedure replacing the aortic valve with pulmonic valve autograft. To treat proximal aortic dissection or aneurysm, Bentall implanted an artificial aortic valve combined with ascending aortic vessel prosthesis.

In 1944, cardiac surgeons Blalock, Taussig, and Thomas first forayed into the field of congenital heart lesions, when they operated on the tetralogy of Fallot, one of the cyanotic heart lesions. There are also acyanotic heart lesions such as pulmonary stenosis [8, 9].

Materials and Methods

This is a retrospective cross-sectional observational study conducted at Cardiac Vascular Sentral Kuala Lumpur (CVSKL). The data of patients who underwent open-heart surgery from November 2017 until December 2018 were prospectively recorded in the NCTSD [10]. Below is the list of surgeries that were included:

1. Coronary artery bypass graft (CABG) surgery
2. Valve surgery
3. Combined CABG and valve surgery
4. Surgery on the thoracic aorta
5. Surgery for congenital heart disease

Conclusion

The data were collected from our Hospital Information System (HIS), patient charts, verbal interview with the patients and

information gathered from specialists which were then entered into the NCTSD system. The preoperative clinical status and operative interventions were classified using the European System for Cardiac Operative Risk Evaluation (EuroSCORE). The data included were demographic characteristics, angina status using Canadian Cardiovascular Society grading of angina pectoris (CCS), New York Heart Association (NYHA) class, history of Percutaneous Coronary Intervention (PCI), history of previous cardiac surgery, history of myocardial infarction, diabetic status, hypertension, hypercholesterolemia, smoking status, renal disease, pulmonary disease, neurological disease, preoperative heart rhythm, ejection fraction, left main stem disease and critical preoperative state. The expected mortality rate was calculated using the EuroSCORE II. The patients were risk stratified to either low-to-medium risk (EuroSCORE II less than 5) or high risk (EuroSCORE II of 5 and above). The critical preoperative state was defined as aborted sudden cardiac arrest, preoperative use of Intra-Aortic Balloon Pump (IABP), acute renal failure or preoperative inotropes. The operative data that were included were operative urgency status (urgent defined as surgery during the same admission as angiography), redo-procedures, types of cardiac procedure, number of procedures, cardioplegia solution, cumulative CPB time, cross clamp time and use of Intra-Aortic Balloon Pump (IABP). Early postoperative complications during hospital and intensive care stay were also collected. The data included were length of ICU stay from the day of surgery, length of postoperative intubation, readmission to ICU within 24 hours of discharge, reintubation within 24 hours of extubation, in-hospital mortality, unplanned reoperation, pulmonary complications (defined as prolonged ventilation > 48 hours, pneumonia or tracheostomy), new arrhythmias, new renal failure (requiring dialysis), graft harvest site infection or sternal wound infection (requiring surgical intervention).

Acknowledgement

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Conflict of Interest

None

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