Valvular Heart Disease

A Comparative Study of Results after Primary Operation, Reoperation, and after Multiple Reoperation

Reoperation for valvular heart disease has been associated with a higher operative mortality than primary operations, especially in patients who had multiple prior operations. We have analyzed the 226 consecutive patients who underwent valve replacement. These involved 163 primary operations, 52 first reoperation, and 11 second/third reoperations. Preoperative left ventricular dysfunction was more severe, and operation time and cardiopulmonary bypass time were significantly greater according to the number of operations, associated with a greater amount of intraoperative blood loss. The operative mortality after a second/third reoperation was 27.3%, which was significantly higher than that after primary operation (6.7%) (p < 0.05), and that after first reoperation (5.8%) (p < 0.05). Seven (64%) patients who underwent a second/third reoperation had poor preoperative left ventricular function (%FS < 25%), and 5 (71%) of these required postoperative mechanical supports, and 3 (60%) of the 5 patients died of low output syndrome. We have found that poor preoperative left ventricular function and the duration on cardiopulmonary bypass, but not the number of reoperation were correlated with operative mortality. Continued efforts should be directed to decrease the mortality for multiple reoperative valve surgery. (J JTCVS 1999; 47: 377-382)

Index words: valvular heart disease, multiple reoperation

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As the low perioperative risk for most primary cardiac surgical procedures, the gradual increasing number of cardiac operations being performed, and favorable long survival of postoperative patients, many patients survive to become potential candidates for reoperations to repair or replace cardiac valves. Deterioration in valves following conservative procedure and late complications in the valvular prosthesis can require valve reoperation. However, reoperations are technically difficult because of adhesive processes around the heart, common association with pulmonary hypertension, and functionally compromised patients, particularly in the eldery. In the past, reoperation valve surgery has been associated with a considerably higher operative mortality than primary valve operations, especially in patients who had multiple prior operations. Recent advanced techniques involving blood cardioplegic myocardial protection, early institution of partial femorofemoral bypass to prevent injury to the heart during reoperative sternotomy, and other reoperative techniques have now reduced the operative risk and postoperative morbidity after reoperative valve surgery. Therefore, we have reviewed our data of primary, reoperation, and multiple reoperations of valve replacement to update our knowledge on the risks and complications of these procedures.

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Subjects and Methods

The 226 consecutive patients who underwent valve replacement from 1987 to 1996 at Kobe University Hospital form the basis of this report. There were 102 male and 124 female patients. Their age ranged from 26 to 75 years and averaged 53 ± 11 years (± standard deviation). Two hundred and eleven patients received a mechanical prosthesis and 15 a biological prosthesis.

The replaced valve was as the aortic valve in 63 patients (all 63 replaced by a mechanical valve), the mitral valve in 127 patients (113 replaced by a mechanical valve and 14 by a biological valve), and a double valve in 32 patients (31 replaced by a mechanical valve and one by a biological valve). The associated procedures included tricuspid annuloplasty in 66 patients, tricuspid replacement in 3 patients, mitral comissurotomy in 4 patients, mitral plasty in 3 patients, and coronary artery bypass grafting in the other 3 patients.

Each operation was performed through a median sternotomy and cardiopulmonary bypass was initiated under moderate hypothermia. In most reoperation cases, early institution of partial cardiopulmonary bypass was established with femoral artery/femoral vein cannulation with a Bio-Medicus (Eden Prairie, MN) venous cannula inserted into the femoral vein well up into the right atrium, which helped to prevent physical injury and decompressed the hypertensive right ventricle during reoperative sternotomy and manipulation of the adhesive heart. After dissecting the heart with femoro-femoral bypass, another venous cannula was inserted to the superior vena cava via the right atrial appendage to establish the total extracorporeal circulation. Dissection of the heart proceeded as minimally as possible for valve replacement. Before 1987 antegrade cold cardioplegia with local hypothermia was applied, and retrograde cold blood cardioplegia has been applied since then. Each mitral valve reoperation was performed through either standard lateral approach or Dubost’s transatrial approach. There were 163 primary operations, 52 first reoperation, and 11 second or third reoperations.

Perioperative data, clinical course, and operative mortality were investigated in all patients, and comparative studies were performed among the groups based on the number of previous cardiac procedures to assess the risk of multiple cardiac procedure for valve replacement. Operative mortality included death occurring before discharge or within 30 days after the operation. Perioperative data were expressed as mean ± standard deviation of the mean. Univariate analysis was performed on all discrete clinical data using Student’s t-test, chi-square test, and Fisher’s extract test as appropriate. Continuous data were tested by analysis of variance, and differences were specified by Scheffe’s F test when analysis of variance showed significance (p < 0.05). Correlation between intraoperative bleeding and operation time cardiopulmonary bypass time was assessed using linear regression. Multivariate logistic regression was then performed for operative mortality using all discrete and continuous variables.

Results

Of the 226 patients in our valve replacement series, 63 patients underwent reoperations, 52 of which was a first reoperation, and 11 a second or third reoperation. The 52 first reoperations were indicated for a mitral valve restenosis after commissurotomy in 30 (58%), for regurgitation after mitral/aortic valve plasty in 2, and for prosthetic valve dysfunction in 18 (5 mechanical valve dysfunction, 4 valve thrombosis, 9 leaflet tears/calcification in bioprosthesis), and for prosthetic endocarditis in the other 2. Eleven second or third reoperations were performed for all prosthetic valve troubles including mechanical valve dysfunction in 1, leaflet tears/calcification of bioprosthesis in 7, peri prosthetic leak in 1, and endocarditis in 2. The mean interval from the previous operation was 21 years for those undergoing first reoperation, and 12 years for second or third reoperation.

Perioperative data of primary operation, first reoperation, second/third reoperation are summarized in Table I. There were no significant differences in age, cardiomegaly in chest X-p, NYHA class. Although cardiac index showed no difference among the groups, PA wedge pressure, echo LV fractional shortening, and respiratory function showed significantly worse values in reoperation groups, which suggested that preoperative LV dysfunction with