THE CLINICAL RESULTS AND LONG TERM FOLLOW-UP OF MITRAL VALVE REPLACEMENT WITH MECHANICAL PROSTHETIC HEART VALVES

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SUMMARY : *In our retrospective study, 514 patients who underwent mitral valve replacement with or without associated procedures during the period from April 1986 until March 1994 have been evaluated with respect to surgical outcome and prognosis.*

306 patients received mitral valve prosthesis; 88 mitral valve replacement (MVR) as well as tricuspid valve plasty, 5 MVR with coronary artery bypass grafting, 86 MVR and aortic valve replacement (AVR), and 29 AVR+MVR+tricuspid valve plasty.

The early mortality rate was 6.8 % for single MVR, 10.4 % for AVR+MVR, 5.6 % for MVR+tricuspid plasty, 20 % for MVR+coronary artery bypass grafting, 20.6 % for AVR+MVR+tricuspid valve plasty within a total mortality rate of 8.1 %.

Key Words : *Carbomedics Prostatic Heart Valve, Rheumatic Heart Disease, Prosthatic Heart Valve Replacement.*

INTRODUCTION

The evolution in cardiac surgical practice has important implications related to peer review and quality assurance screening, diagnosis-related group reimbursement, and reporting of surgical outcomes.

In our retrospective study, 514 patients who underwent mitral valve replacement with or without associated procedures over a period of 8 years have been evaluated with respect to surgical outcome and prognosis in the follow-up period.

Since current reports demonstrate that mitral valve reconstruction carries a lower operative mortality and better long term survival than does replacement; we tried to illuminate the results and additional risks or complications of replacement with or without associated procedures, which has been defined as the last choice in mitral valve surgery, when repair is not feasible.

MATERIALS AND METHODS

A) PATIENTS

During the period from April 1986 until March 1994, 679 patients undewent operations for mitral valve disease. 306 patients received mitral valve prosthesis; 88 mitral valve replacement (MVR) as well as tricuspid valve plasty; 5 MVR with coronary artery bypass grafting (CABG); 86 double valve replacement (MVR and Aortic valve replace-

ment / AVR); 29 double valve replacement as well as tricuspid valve plasty. The rest of the patients were performed reconstructive procedures (149 open mitral commissurotomy and valvuloplasty, 12 commissurotomy with tricuspid valve plasty, 2 valvuloplasty with CABG and 2 commissurotomy with AVR and tricuspid valve plasty).

The age of the patients undergoing mitral valve replacement with or without associated procedures was ranging from 14 to 65 with an avarage of 34 ± 8.3 years. 228 of the patients were female and 286 were male.

Preoperatively, 86 of the patients were evaluated to be in Class II-b, 396 in Class III and the remaining 32 in Class IV according to NYHA Classification.

188 patients had pure mitral stenosis (MS), 175 had mitral regurgitation (MR) and 151 patients had combined valvular lesions (MR+MS). 115 patients had a coexisting aortic valve pathology (66 patients had aortic valve regurgitation and 49 had aortic stenosis); 117 patients had tricuspid valve incompetence; and 5 had coronary artery stenosis (3 patients had LAD and 2 had LAD+circumflex coronary artery lesions).

13 of the patients were operated because of restenosis of mitral valve (8 after closed mitral valvulotomy and 3 after open mitral valvuloplasty and 2 after previous MVR) 2 of the patients were operated urgently because of the locking of the previous prosthetic mitral valves.

The rhythym of 182 patients (35 %) were sinus and 332 (65 %) were atrial fibrillation, preoperatively.

All of the patients were evaluated with M-Mode or Colored Doppler Echocardiography (since 1992) and patients over 50 years with also control coronary angiography, preoperatively as well.

B) SURGERY

Standart techniques of cardiopulmonary bypass with a bubble or membrane oxygenator (for about all of the patients since 1990) were used in all cases. Moderate hypothermia (28-32°C), cold potassium cardioplegia and topical hypothermia were used for myocardial protection. Since 1991, cold intermittant blood cardioplegia and terminal warm cardioplegia have also been used.

All valve replacements were performed with continuous suture technique. Posterior mitral valve leaflet has been preserved when feasible, according to the demonstrated benefits by literature (4, 6).

Oral anti-coagulant therapy with warfarin and also aspirin and diprydamole were employed in all patients, postoperatively.

Statistical analysis were estimated with "SPSS for Windows Release 5.0" computer programme.

RESULTS

306 patients received mitral valve replacement; 88 MVR+De Vega tricuspid valve plasty, 86 double valve replacement : AVR+MVR 29 AVR+MVR+De Vega tricuspid valve plasty, 5 MVR+CABG : 2 LAD-LIMA bypass, 2 LAD-LIMA and Cx saphenous vein bypass and 1 LAD-LIMA+Diagonal-saphenous vein bypass grafting.

Mean cardiopulmonary bypass time and aortic cross clamp time were 66.2±7.1 min. and 36.9±6 min, respectively.

132 patients received Bjork-Shiley prosthesis, 107 St. Jude mechanical valves, 168 Medtronic-Hall valves, 71 Sorin, 146 Carbomedics, 2 Duramedics and 3 Hancock bioprosthetic heart valves in mitral position and including aortic position in double valve replacements.

18 patients received size 21, 30 size 23, 82 size 25, 197 size 27, 101 size 29 and 86 size 31 mitral prosthesis.

During operations, 21 patients had thrombi in left atrium and thrombectomy were employed. Intraaortic baloon counterpulsation were used in 6 of the patients becaues of low cardiac output.

289 patients (56 %) needed positive inotropic support/dopamine or adrenaline, in the postoperative period for 1 to 15 days (mean : 3.68 ± 2.1).

12 patients underwent revision because of hemorrhage in the early postoperative period.

The early mortality rate was 6.8 % (21/306) for single MVR; 10.4 % (9/86) for AVR+MVR; 20.6 % (6/29) for AVR+MVR+Tricuspid Valve Plasty; 5.6 % (5/88) for MVR+Tricuspid Valve Plasty and 20 % (1/5) for MVR+CABG; within a total mortality rate of 8.1 % (42/514). The vast majority of patients died of low cardiac output syndrome (36 patients). 2 patients died because of acute renal failure,

2 of cerebrovascular events, 1 of respiratory failure and one of mediastinitis.

LATE FOLLOW-UP

All survived patients were requested control on the postoperative first, sixth, twelfth months and annualy thereafter. Late follow-up information was obtained in 58.8 % (278/472) patients. Survival rate was 97.2 % (270/278) in 8 years. 4 patients died of cerebrovascular events, 2 of gastrointestinal bleeding, 3 of congestive heart failure and 1 of prosthetic valve endocarditis.

During the follow-up period 84.1 % (234/278) of the patients were in NYHA Class I or II

NON-STRUCTURAL DYSFUNCTION

Paravalvular leak was observed in only 1 patient, but it was evaluated that it did not worth doing repair.

STRUCTURAL DYSFUNCTION

Two patients were reoperated urgently because of stuck prosthetic valve leaflets. One of them died because of low cardiac output.

THROMBOEMBOLIC COMPLICATIONS

2 patients died of cerebrovascular embolism possibly of cardiac origin (0.7%). 5 patients had stroke (1.7 %) that resulted in hemiplegia, hemiparesis or limited neurological deficits and only two of them responded well to therapy.

8 patients (2.8 %) underwent femoral embolectomy procedures because of peripheral emboli.

ANTICOAGULATION RELATED HEMORRHAGE

2 patients died of gastrointestinal bleeding (0.7 %). 5 patients (1.7 %) were reported to have epistaxis and 8 others (2.8 %) had gastrointestinal bleeding that were considered to be of warfarin overdose.

2 patients (0.7 %) had cerebrovascular bleeding and died in two weeks time. 2 patients (0.7 %) were also suspected of cerebrovascular bleeding that responded well to therapy without any deficit.

PROSTHETIC VALVE ENDOCARDITIS

4 patients had symptoms of endocarditis and 2 of them were culture positive. Staphylococcus aureus (+) were demonstrated in blood cultures. 1 of them that admitted very late after the beginning of symptoms died becuse of sepsis and the other one survived by the aid of antibiotics. The other 2 patients responded well to therapy as well.

DISCUSSION

Mitral valve replacement should be performed only after careful intraoperative assessment of the mitral valve and a decision that valve reconstruction is not possible or advisable. But in our country, because of social status of the patients and the widespread effect of rheumatic fever; the patients admit very late to hospitals; only after the symptoms are unbearable and the disease has destructed the valve and subvalvular apparatus itself, so, unfortunately reconstruction procedures becomes more and more difficult to perform (7, 9).

It is possible, however, to perform MVR with a very low operative mortality and with most satisfactory clinical results by properly planning and executing the operation and by correctly matching the patient to the type and size of the prosthetic valve.

Because of the attachments between mitral annulus and papillary muscles play an important role in left ventricular geometry and mechanics after MVR, the native mitral valve should not be excised completely (3, 6). The amount of leaflet tissue that should be resected varies according to the valve pathology. In rheumatic mitral valve disease, the length of chordae tendineae and the degree of leaflet calcification determine how much valve tissue has to be resected (2).

Matching the patient to the size of the prosthetic valve is also very important. An excessively large mitral prosthesis may adversely affect left venricular short axis shortening. A small mitral prosthesis may leave an unacceptably high transvalvular gradient, with a consequent suboptimal clinical result. Thus, sizing mitral prosthesis is not always simple. Mechanical valves smaller than 25 mm should be implanted in very old, inactive or small patients (body surface area below 1.5 sqm.) (1).

The decision on the type of mitral prosthesis is also very important that should involve the patient and the surgeon as well (5). Because of the difficulties of the folow-up of the patients and of the reoperation chances, we seldom implant bioprosthesis; usually in very old cases. In our patients we also did not demonstrate any significant difference in mortality and morbidity of various mechanical prosthe-

OPERATION	PATIENTS	MORTALITY
MVR	306	(21/306) 6.8 %
MVR + TRICUSPID PLASTY	88	(5/88) 5.6 %
AVR + MVR	86	(9/86) 10.4 %
AVR + MVR + TRICUSPID PLASTY	29	(6/29) 20.6 %
MVR + CABG	5	(1/5) 20 %
OVERALL MORTALITY	(42/514) 8.1 %	

MVR : Mitral valve replacement
AVR : Aortic valve replacement
CABG : Coronary artery bypass grafting

Table 1 : Mortality rates of MVR with or without associated procedures.

sis.

In our study, we did not find significantly different mortality or morbidity rates than other reported studies in the literature.

We must confess that, in our country it is not always possible to control patients postoperatively, because of social and financial dilemma; so especially the dosing of warfarin has become a very important problem after valve replacements.

In the past years, the number of patients with combined treatment of heart valves and coronary arteries rised as well as the patients' age did (8). Although it seems that we have an higher mortality or morbidity rate in MVR with associated procedures, it must have been because of the limited number of patients.

In conclusion, although reconstruction procedures of mitral valve has become more and more preferable choice in mitral valve surgery; valve replacement would consist of the majority of cases in especially developing countries with an acceptable range in mortality and morbidity.

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