

MID-TERM RESULTS OF AORTIC VALVE REPLACEMENT OVER AGE SEVENTY

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Increasing life expectancy due to higher living standards and technology level made operations on elderly people become more frequent every year. Not only coronary artery disease but also valvular diseases are becoming very common in the elderly. Valve replacement in the elderly is one of the most difficult decisions due to the complications of anticoagulation. Most of the time, the surgeon finds it difficult to chose the right type of valve. In our clinic, we investigated our results of mechanical aortic valve replacement in cases aged over 70.

Key words: Aortic valve replacement, +70 years of age, mechanical valves

Cardiovascular surgeons face with elderly patients more frequently as life expectancy increases (1). Aortic valve disease can be detected very commonly in the elderly. Degenerative rather than rheumatic etiology is the leading predictive factor. Aortic valve replacement in the elderly can cause thromboembolism, infection and hemorrhagic complications as it necessitates long term anticoagulation (2). These complications are rarely found with bioprostheses but structural destruction is the most important limitation of these valves (3). In our clinic, patients over 70 years of age underwent aortic valve replacement by bileaflet mechanical valves. In this study, we summarized our midterm results.

MATERIALS AND METHOD

Twenty four patients over 70 years of age underwent aortic valve replacement between 1990-2000. Mean age was 74.3 (youngest 70 and oldest 81 years old). Nine were women (37.5%). Eight patients were diabetic and 3 of them were insulin dependent. According to the New York Heart Association (NYHA) classification, 17 of them were Class II and 7 were Class III. In 11 patients CAD was diagnosed. Five of the

Table 1. Preoperative patient characteristics

Characteristics	Number	%
Mean age		74.3
Male	15	62.5
Female	9	37.5
Functional Capacity (NYHA)		
NYHA Class II	17	70.8
NYHA Class III	7	29.2
Coronary artery disease	11	45.8
Preoperative rhythm		
Sinusal	15	62.5
Atrial fibrillation	9	37.5
Recent MI	5	20.8
Tobacco use	13	54.16
Diabetes Mellitus	8	33.3
Dyspepsia	5	20.8
Recent thromboembolism	3	12.5
Operated carotid disease	1	4.16

CAD patients have suffered myocardial infarction in their history (Table 1).

All patients were operated via median sternotomy after induction of general anesthesia with fentanyl citrate (50 µg/kg) and vecuronium (0.1 mg/kg initial induction and 2 mg in every 30 min). In patients who had operative CAD, prior to aortic and two-stage venous cannulation, LIMA and saphenous vein grafts were prepared and CPB was started. Topical cooling was done, as well. Oblique aortotomy was performed after antegrade induction of cold crystalloid cardioplegia. Both coronary ostia were exposed and diastolic arrest was maintained by cold blood cardioplegia given intermittently in every 20 min. Distal anastomoses other than LAD anastomosis were performed by saphenous vein grafts. After placing stage sutures, aortic cusps were excised by scalpel and scissors. Fibrotic tissues were excised by scalpel. After measuring the size of the valve area by sizer (in two patients, as adequate area could not be established, Nicks procedure was performed for aortic root enlargement and No. 23 valve became befitting), bileaflet mechanical valves were replaced in the usual manner (St. Jude or Sorin). After replacing the aortic valve LIMA-LAD anastomoses were performed. Aortotomy was closed by 3/0 prolene over and over suture technique. Then proximal anastomosis was performed. During CPB, 5 mg midazolam was infused as hypnotic.

Membrane oxygenator (Bentley Spiral Gold Hollow fiber) and 4000 ml Bentley heart venous reservoir was used. 1500 cc Isolyte (multiple electrolyte solution, Eczacıbaşı), 150 ml mannitol (20%), 100 cc 20% human albumin (albumin buminat, Eczacıbaşı), 50 mEq sodium bicarbonate, 5 mEq KCl, 1 g cefepime and 10000 U heparin was added to priming solution. All patients were heparinized by 400 U/kg heparin. Activated clotting time, (ACT) was maintained above 480 sec. ACT time was calculated by Hemachron 800. In normothermic cardiac arrest, pump flow was non-pulsatile 2.4 lt/min/m² and in mild hypothermia (28°C) non-pulsatile 1.6 lt/min/m².

All patients were evaluated by transesophageal echocardiography for paravalvular leakage and transvalvular gradient.

By termination of CPB, protamine amount was calculated by Texas Instruments TI-74 Basicalc and was given in required amounts. All patients were transferred to ICU intubated and all patients were extubated at postoperative 5-12th hours. Postoperatively, 2g/day cefepime was given for 5 days for prophylaxis.

All patients were evaluated by transesophageal echocardiography prior to discharge. All patients were coumadinized in order to maintain international normalized ratio (INR) as 2-2.5- fold. During the first postoperative year, follow-up examinations were carried out in every 6 months, while in following years transesophageal echocardiography was performed every year. All deaths during the first postoperative month were accepted as hospital mortality. Death, re-operation, thromboembolism, endocarditis, paravalvular

Table 2. Characteristics of prosthetic valves

Valves	Number of patients	%
21 St. Jude	3	12.5
21 Sorin	0	0
23 St. Jude	5	20.83
23 Sorin	3	12.5
25 St. Jude	4	16.66
25 Sorin	3	12.5
27 St. Jude	3	12.5
27 Sorin	1	4.14
29 St. Jude	2	8.33
29 Sorin	0	0

leakage was investigated for the following 5 years. Peak transvalvular gradient, measurement of diameter, degree of insufficiency, left ventricular diastolic and systolic diameters were calculated by Doppler echocardiography.

RESULTS

All replacements were performed by bileaflet mechanical valves (St Jude and Sorin). Nicks procedure was performed by Dacron patch for aortic root enlargement. Valve types and sizes were shown in Table 2. In 11 patients CABG was also performed and mean distal anastomosis number was 2.3.

Mean cross-clamping time was 74 ± 6.1 min and mean CPB time was 92 ± 9.2 min. Mean drainage was 637.5 ± 57 cc for the first postoperative day and 148.8 ± 23 cc for the second day. All drainage tubes were taken out at the second postoperative day. Mean duration of ICU stay was 21 ± 0.4 days.

Hospital mortality was 8.3% (2 patients). One of these patients died from stroke and the other one from renal insufficiency in the postoperative 28th day. All patients were followed up to an average of 51 ± 14 months (range: 6-88 months). During the 5 years that follow the operation, thromboembolism rate was detected as 12%. One patient died from lung cancer (during the first year), one patient died from renal insufficiency (in 2.3 years),

one patient died from an unknown cause (in the 3rd year).

Eight patients suffered from non fatal complications (33.3%). Atrial fibrillation began in 3 patients, and became permanent in one patient. In the postoperative 23rd day, peripheral thromboembolism was detected in one patient and in 32nd day in another patient and embolectomy was performed without any complications. One of the patients who was operated on for carotid endarterectomy preoperatively, suffered from cerebral embolism in the postoperative 14th month, but was cured without a sequel. Gastrointestinal bleeding occurred in two patients in the postoperative 8th and 25th months. Their symptoms were taken under control by medical therapy. No endocarditis was detected.

Functional capacity of all the patients advanced according to the NYHA classification. Two patients were Class I, 15 were Class II and 4 were Class III in the postoperative first year. Eleven patients were Class II and 4 patients were Class III in the postoperative 5th year (Table 3).

DISCUSSION

Aortic valve replacement in cases aged over 70 makes surgeons feel uncomfortable due to the complications of anticoagulation. Valve

Table 3. Functional capacity of the patients according to the NYHA classification during the follow-up years

	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year
Class I %	2 9.5	3 14.3	1 5	0 0	0 0	0 0	0 0
Class II %	15 71.5	14 66.7	16 80	14 82.3	11 73.3	8 72.7	5 71.4
Class III %	4 19	3 14.3	3 15	3 17.7	4 26.7	3 27.3	1 14.3
Class IV %							1 14.3
Number of patients	21	21	20	17	15	11	7

replacement can cause complications of thromboembolism, infection and bleeding (1,2,3). Although, bioprostheses lowered the complication rates, structural destruction beginning at the 7th year has still been the most serious problem (4,5). Aortic stenosis in cases aged over 70 can be treated by aortic valve debridement; however, due to the high risk of re-stenosis and aortic insufficiency we do not prefer to perform this procedure in our clinic.

Widespread studies on the mid and long term results of aortic valve replacement in the aged over 70 made mechanical valve replacement a more reliable method. Tsung et al. (6) followed 247 patients over the age of 70 with aortic valve replacement, and concluded that depressed left ventricular function and preoperative pacemaker implantation were the most important factors that affected early postoperative mortality. They also stated that postoperative renal insufficiency is another important factor which affects mortality. In our study, two patients have died; one in early and the other one in later period from renal insufficiency.

In our country, with increased life expectancy and advancing technology the number of patients aged over 70 is increasing. Davis et al (7) followed 211 patients for a long period of time after either mechanical or bioprosthetic valve replacement; they found no statistically significant difference between the two groups. In the same study, there was no difference between these two groups from the point of complications of thromboembolism, endocarditis and anticoagulation. But the most striking result was that all re-operated patients were from the bioprosthetic group. In a study, Davis concluded that mechanical prosthesis were superior to bioprosthesis in the patients aged over 70. Our midterm results were in line with this study. Only two patients who had preoperative dyspepsia suffered from gastrointestinal bleeding.

Ruygrok et al. (8) compared two groups according to hospital mortality; one group was comprised of 183 aortic valve replacement patients over the age of 70 and the other group included 340 patients who were 60-69 years old. They found no statistically significant difference between these two groups. However, preoperative stroke rate was higher

in the elderly group. In our study, only one patient who had preoperative carotid endarterectomy suffered from cerebral embolism.

Smaller sized valves can cause a higher residual transvalvular gradient which necessitates aortic root enlargement (9). As this procedure prolong the operation, we preferred Nicks procedure as it is thought to require a shorter operation time and be more conservative. In our opinion, this procedure is much safer in the patients aged over 70.

In conclusion, aortic valve replacement in the patients aged over 70 can be performed safely with acceptable complication rates. Bleeding complication rates due to anticoagulation is not as high as it was estimated. From the point of durability, as well, mechanical valves can be a safe option.

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