HOMOGRAFT VALVE REPLACEMENT FOR NATIVE AND PROSTHETIC AORTIC VALVE ENDOCARDITIS

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SUMMARY : *Between September, 1992 and September, 1995, 4 patients with native or prosthetic valve endocarditis underwent homograft replacement of the aortic valve. 1 patient, who had had a Starr-Edwards mechanical valve prosthesis 20 years ago, received homograft aortic valve due to destructive prosthetic valve endocarditis. 2 of the patients who had native valve endocarditis were also complicated with acute renal insufficiency in the preoperative period. One of them underwent also mitral and tricuspid valve annuloplasty besides the aortic homograft valve replacement. 1 patient with native valve endocarditis underwent a successful Ross procedure with pulmonary autograft instead of the aortic valve and pulmonary homograft for the pulmonary valve. All the patients were well, without clinical or echocardiographic evidence of aortic incompetence and in NYHA functional class in the postoperative period.*

Infective endocarditis, especially in active native and prosthetic valve infection, is still a difficult surgical intervention. The operative mortality rate in complicated active infective endocarditis, like in patients with cardiac failure, sepsis or both, is still high (10-35 %).

The viable homograft appears to have the greatest resistance to endocarditis, therefore it is the valve of choice for bacterial endocarditis affecting the native or prosthetic aortic valves. The aortic homograft immediately offers excellent hemodynamics of a totally competent valve and restores normal anatomy.

We believe that homograft replacement of the aortic valve gives satisfactory results in native and prosthetic valve endocarditis with a very low incidence of valve related complications.

Key Words : *Homograft Aortic Valve Replacement,Native and Prosthetic Valve Endocarditis, Ross Procedure.*

INTRODUCTION

Surgical intervention is generally accepted as the preferred choice of treatment for infective endocarditis complicated by cardiac failure, sepsis or both (2). Previous studies have shown a remarkable difference between homograft valve replacement and prosthetic replacement, an early high peaking phase of infective endocarditis also is present. Mechanical valves have their own failings in serving as foci of infection and contributing to wear and tear of normal surrounding tissues (8). As a result, tissue destruction from prosthetic valve endo-

carditis is extensive and makes surgical treatment very difficult (13).

The present report summarizes our experience with 4 patients who underwent homograft aortic valve replacement for native or prosthetic valve endocarditis between September, 1992 and September, 1995.

PATIENTS AND METHODS

Fresh, antibiotic sterilized homograft valves for aortic valve replacement have been used at Gazi University Faculty of Medicine in Ankara, Turkey since October, 1991. From 1991 to 1995, a total of 16 patients underwent homograft replacement of the aortic valve with Yacoub's technique (Fig. 1, 2, 3, 4, 5). Of these, 4 patients who had active native or prosthetic valve endocarditis, were treated with successful homograft aortic valve replacement procedures. The hospital records, operative and follow-up notes were reviewed in this report. The postoperative follow-up period was performed at a mean of 20 months (range, 1-36 months).

Patient 1

A 36-year-old male patient diagnosed to be active native endocarditis was seen with a 20-day history of fever, malaise, vomiting and chest pain. On echocardiogram calcific vegetations were seen on the aortic annulus. He was put on a regimen of appropriate antibiotics for acute staphylococcal native aortic valve endocarditis. On the 14th day of the treatment he developed acute renal insufficiency. After the hemodialysis program, his condition began to stabilize and he was operated. There was intense inflammation on the aortic annulus and the aortic leaflets were thickened and ulcerated. Aortic valve was excised and was replaced with an aortic homograft valve. The patient came off cardiopulmonary bypass well with minimal positive inotropic support. After an uneventful postoperative period he was discharged from the hospital on the 14th day. His 3-year follow-up revealed no signs of aortic stenosis or failure and postoperative echocardiograms showed a normally functioning aortic valve (Table 1).

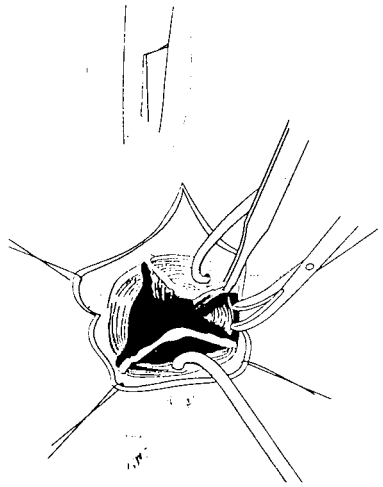

Fig - 1 : The excision of completely destructed and ulcerated aortic valve.

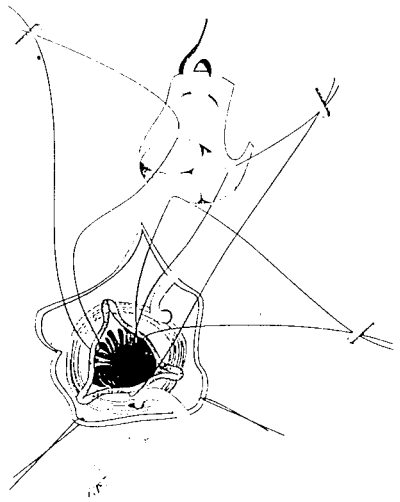

Fig - 2 : The unsewn aortic homograft is held and three primary sutures run from the base of the aortic root.

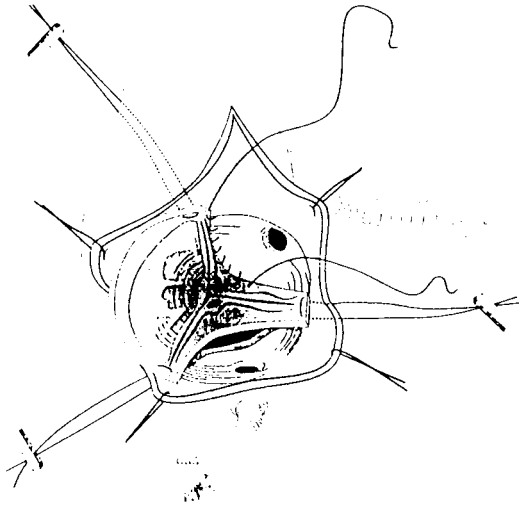

Fig - 3 : The left and right coronary sinuses have been sewn appropriately and a running suture approximates the homograft to the aortic wall.

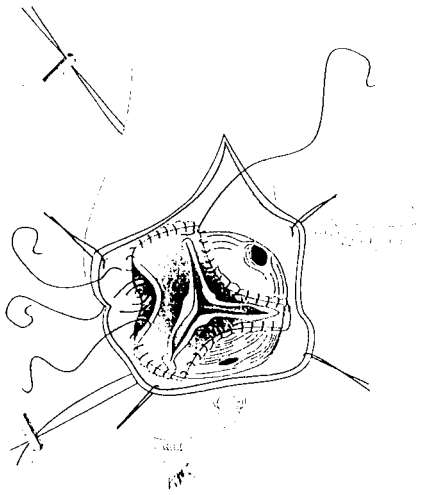

Fig - 4 : The suture which closes the aortotomy approximates the intact noncoronary sinus.

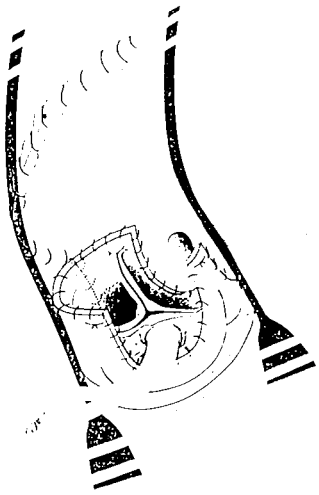

Fig - 5 : The homograft in the aortic position.

Patient 2

A 40-year-old female patient was referred for active native valve endocarditis. On echocardiography aortic valve failure and stenosis and mitral valve insufficiency were seen. During medical treatment infective endocarditis was complicated with acute renal insufficiency. Since her condition was failed to stabilize on medical therapy she was taken for operation. Aortic homograft valve replacement and mitral ring annuloplasty was performed. She needed moderate doses of inotropic support. Her recovery period was uneventful. Postoperative echocardiogram revealed normally functioning aortic and mitral valves (Table 1).

Patient 3

A 67-year-old male patient with a diagnosis of prosthetic valve endocarditis, was hospitalized. In 1974 he had had a Starr-Edwards mechanical valve replacement for combined aortic regurgitation and stenosis. The patient had a 6-day history of chills, fever up to 39-40°C, malaise, syncope attacks which were thought to be due to cerebral microemboli and the signs of congestive heart failure. He also had gastrointestinal bleeding, which was thought to be due to anticoagulation. He was started on an intensive antibiotic therapy with vancomycin and ciprofloxacin. His blood culture was positive for Staphylococcus aureus. Doppler echocardiography revealed left ventricular concentric hypertrophy and a systolic gradient of 64 mmHg with minimal aortic regurgitation. After his fever began to fall down and the vital findings were stabilized, the operation was undertaken. At the operation the pannus formation and the destruction of the teflon cloth of the prosthetic valve were noted (Fig. 6). The aortic wall was very fragile with necrotic areas in some parts. After the prosthetic valve was excised, a fresh-antibiotic-sterilized aortic homograft valve was implanted with the freehand technique. Total perfusion and aortic clamping times were 124 and 80 minutes respectively.

The patient recovered uneventfully and was discharged after an additional 14-day course of intravenously administered antibiotics. He was well, without clinical evidence of aortic incompetence and in Newyork Heart Association (NYHA) functional class I one month after the operation. A posto-

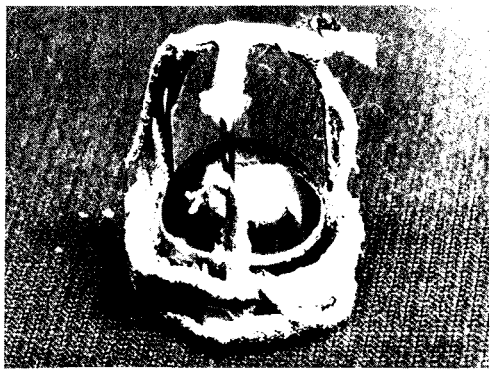

Fig - 6 : The destructed Starr-Edwards aortic valve excised from the patient.

perative echocardiogram showed a normally functioning aortic valve (Table 1).

Patient 4

A 19-year-old man with grade III-IV aortic incompetence was seen with a history of native valve endocarditis one month ago. On admission his blood culture was negative. At the operation, thick and retracted aortic leaflets with severe aortic incompetence were noted. Operative cultures were positive for S.aureus. A successful Ross procedure was performed by implanting the pulmonary autograft to aorta and using a pulmonary homograft for pulmonary artery. On the eighth day of the operation he began to have subfebrile fever upto 37,6°C. His blood culture was positive for Staphylococcus aureus. After 21-day course of intravenously administered antibiotic therapy with vancomycin, ciprofloxacin, rifampicin and fluconazole his blood cultures became negative and he was discharged from the hospital with no evidence of aortic or pulmonary valve failure. His postoperative echocardiogram was also normal (Table 1).

		Preoperative	Postoperative
Patient 1	LVESD (mm)	48	38
	LVEDD (mm)	66	57
	EF (%)	52	62
	FS (%)	27	33
Patient 2	LVESD (mm)	34	32
	LVEDD (mm)	50	46
	EF (%)	52	58
	FS (%)	26	30
Patient 3	LVESD (mm)	32	30
	LVEDD (mm)	50	45
	EF (%)	56	68
	FS (%)	26	40
Patient 4	LVESD (mm)	46	38
	LVEDD (mm)	69	58
	EF (%)	65	67
	FS (%)	33	36

Table 1 : Preoperative and postoperative Doppler echographic data of the patients.

DISCUSSION

Infective endocarditis is still a difficult surgical intervention. Although considerable progress has been made in antibiotic therapy, many patients develop progressive serious complications during medical treatment and eventually require surgical treatment. Thus surgical treatment has improved the survival rate achieved by medical therapy for complicated active endocarditis, the operative mortality rate is still high (10-35 %) (2, 3).

Streptococci (50-70 %), enterococci (10 %), and staphylococci (25 %) account for the majority of cases of infective endocarditis on native valves in nonintravenous drug abusers (9, 15). Staphylococcus infection is now as important as streptococcus. Miller reported that gram-positive microorganisms were most frequently responsible for infective endocarditis and noted a significantly high incidence of mortality in patients with Staphylococcus aureus infection. Almost all species of bacteria occasionally are identified as causes of native valve endocarditis. Most commonly encountered are N.gonorrhoeaae, Haemophilus sp., Pseudomonas, Listeria and difteroids (9). In 2 of our 3 patients who had native valve endocarditis S.aureus was isolated in blood cultures. In the other patient whose blood cultures were sterile, the preoperative cultures were positive for S.aureus.

The most common sources of the prosthetic valve endocarditis are intraoperative contamination or postoperative wound infection in the early-onset type and dental infection or operative procedures in the late-onset type. Staphylococci are the most common of the cultured organisms in early and late infections, 60 % and 64 % respectively (4,5,7). Infection of the prosthesis begins at the sewing ring and extends to involve the interface between the prosthesis and aortic annulus. Extention of the infection usually results in the formation of root abscesses, intracardiac fistulous communications, septic ulcerations and perforations of the anterior mitral leaflet (10). Congestive heart failure is the most important indication for surgery, without which moderate or severe failure in PVE is almost always fatal (7). The reported incidence of PVE ranges from 0,5 % to 2 % with a 60 % to 86 % mortality among patients with early-onset endocarditis. Late-onset PVE is equally fulminant with a mortality of 89 % (3, 10).

Therapeutic approaches to infective endocarditis have gradually evolved during the post decade. Many patients develop progressive serious complications during antibiotic therapy and eventually require surgical treatment. Postmortem examinations revealed that many patients especially with PVE did not respond to antibiotic therapy alone, because

the infection frequently extended into surrounding annular and myocardial tissue (1, 6). Indications for early surgical intervention are heart failure caused by valvular dysfunction, more than one clinically evident arterial embolus, or a single cerebral embolus, lack of improvement in the clinical or microbiological state of systemic toxicity after one week of appropriateantibiotic therapy, evidence of progressive spread of intacardiac infection, renal dysfunction and any degree of dehiscence or interference with mechanical poppet or disc movement for PVE (3).

Prosthetic valve replacement for infective endocarditis is now accepted as a standard mode of treatment in combination with the antibiotic therapy early in the course of the disease. The most important problem, the surgeon is faced to, is the choice of the cardiac valve substitute. All types of contemporary cardiac valve substitutes suffer deficiencies and complications that limit their success. Mechanical and bioprosthetic valves are intrinsically obstructive, especially in small sizes. Mechanical valves are associated with thromboembolic complications; the chronic anticoagulation used in all mechanical valve recipients causes hemorrhage in some. Calcification limits the success of porcine and pericardial bioprosthesis. The most important potential complication of mechanical and bioprosthetic valves is the early high peaking phase of infective endocarditis (14). Mechanical prosthesis have the highest rate of infection, homografts the least and the bioprosthetic valves have an intermediate risk (11). The other advantages of the homograft valves are their perfect designs, no need for anticoagulation, the absence of thromboembolic complications and the satisfactory long-term results. The aortic homograft valve immediately offers excellent hemodynamics of a totally competent valve and restores normal anatomy (12).

In summary, it seems that the most important consideration in the management of the patients with infective endocarditis is early operative intervention and the valve of choice is the homograft valve which has the highest resistance to infection.

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