Early Experience and Mid – Term Results with Homograft Aortic Root Replacement

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Abstract

Background– An obvious substitute for the diseased aortic valve is a healthy duplicate.[1-2] Despite increasing experience in a half century, the search for an ideal valve replacement for a diseased aortic valve continues.[1] Homograft (allograft) aortic valve is a good choice in endocarditis and complex aortic valve and ascending aorta pathology.[3-4-5]

Methods– Between March 1996 and Oct. 2000, ten patients (3 females, 7 males), aged 16 - 58 years (mean 32.6) underwent aortic root replacement using cryopreserved aortic homograft, due to native or prosthetic aortic valve endocarditis and aneurysm of ascending aorta.

Results– The length of hospital stay was 10 to 85 days (mean 32.6) with one in-hospital death (%10). The patients were followed up for 1 to 90 months (mean 35.2) with no incidence of thromboemboli, endocarditis, or reoperation and are now in good functional class.

Conclusion- Aortic root replacement is the procedure of choice in endocarditis. It could be done even in high-risk and redo patients with acceptable mortality[6] ***(Iranian Heart Journal 2004; 5(1,2):26-28).***

Key word: aortic root replacement (ARR) ■ aortic homograft ■ascending aorta

Since there is no single ideal valve substitute, the selection of a suitable valve for aortic valve replacement must be individualized through consideration of the relative advantages and disadvantages of available heart valves.[1.2] Excellent hemodynamic profile with low transvalvular gradients, low risk of thromboembolism, freedom from need for anticoagulation, possibly enhanced regression of LV mass, low infection risks and pliability make the aortic homograft (AH) the choice in a variety of clinical conditions.[7] However, durability is limited due to antibody directed against HLA antigens and technical error.

Four decades have passed since the first successful implantation of AH, with three different preservation techniques (cryopreserved, fresh and antibiotic preserved) and with 3 different implantation techniques (free-hand, mini root and ARR).

In procurement and implantation of AH, two important considerations are critical. Since structural integrity and thus function depends on cellular viability, the warm ischemic time should be less than 12 hours, and technical factors during insertion are increasingly important. ARR may be less prone to technical problems and may provide more consistent results in the hands of most surgeons.[1, 2, 8]

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Methods

Between March 1996 and Oct. 2000, ten patents (3 females, 7 males), aged 16-58 years old (mean 32.6 years) underwent ARR with cryopreserved AH using standard mid-sternotomy, hypothermic CPB and antegrade cold blood cardioplegia. The demographic data and diagnosis are presented in Table I. The length of hospital stay was 10-85 days (mean 32.6 days). The patients were followed up for 1-90 months (mean 35.2 months) in the out-patient clinic with clinical examinations and serial echocardiography.

Results

In-hospital mortality occurred in one patient (10%) with no mid-term mortality. Freedom from thromboemboli, infection, and reoperation was 100%. Trivial-to-mild AI was noted in three patients. All the patients (except case X) are in functional class 1–2 with preserved EF.

Indication and technical consideration

Allograft should be considered in:

A. Aortic endocarditis, either native or prosthetic,
B. 30 to 60-year-old patients who cannot be anticoagulated,
C. Patients with small aortic annuli,
D. Patients requiring composite replacement of the aortic valve and ascending aorta.

Allograft may be relatively contraindicated in:

A) Patients who have heavily calcified aortic root,
B) Patients younger than 20 years old, and
C) In aortic annulus $\geq$ 30 mm.

To reduce ischemic and cross clamp times, preoperative TEE is superior to TTE in predicting homograft size. It is important to assess the aortic valve hemodynamics after the patient is weaned from CPB by TEE. The accuracy of TEE assessment can be further enhanced with volume loading and administration of phenylephrine to effect vasoconstriction. With appropriate loading conditions, moderate to severe AI warrants the reinstitution of CPB with inspection and revision of the allograft as needed. Trivial to mild AI is usually tolerated well.[1,2]

Discussion

Excellent long-term results have been reported in terms of survival, freedom from reoperation and other valve-related events with cryopreserved homograft.[9] Thirty days' mortality following ARR in elective patients is less than 5%; operative mortality in patients with endocarditis is 8 to14% and higher in patients with prosthetic valve endocarditis.

The primary shortcoming of AH is the progressive deterioration of the valve structure and function over time, which limits its use in younger patients with long life expectancy. Root replacement technique has become the most commonly used technique for the placement of homograft in the aortic position.[1]

Although a small group of patients have been presented, early and mid-term results in complicated patients with endocarditis, redo cases and aortic aneurysms presented here is encouraging.

Conclusion

We recommend ARR using homograft in patients with active endocarditis, either native or prosthetic. It can be done even in high risk patients and redo cases with acceptable mortality in the hands of most surgeons.[10-11]

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