Tricuspid valve replacement with a cryopreserved pulmonary homograft

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Tricuspid valve infective endocarditis (IE) has been managed mostly medically.¹ Some patients have had repetitive pulmonary emboli, uncontrolled infection, or congestive heart failure and deserved surgical intervention. The surgical treatment for tricuspid valve IE ranged from vegetectomy to tricuspid valve replacement.² For those patients proposed to have tricuspid valve replacement, the argument in selection of prostheses has not been settled. However, the advantages of the valvular homograft are well known.³ Current practices of valve replacement have extended the use of homografts.^{4,5} However, use of a pulmonary homograft in the tricuspid location has not been reported.

Clinical Summary

A 24-year-old man had persistent fever, productive cough, respiratory distress, and general weakness. The chest film revealed bilateral, patched pulmonary infiltrates. According to his statement, he was an illicit intravenous drug abuser. Blood cultures revealed *Staphylococcus aureus*. Tricuspid vegetation of 1.5 cm in size and moderate-to-severe regurgitation were noted. None of the left-sided heart valves had involvement. One week after antibiotic treatment, he remained febrile and experienced shortness of breath. The surgical indications were recurrent septic pulmonary emboli and intractable systemic sepsis.

A median sternotomy was applied. Cardiopulmonary bypass was commenced after aortic and bicaval cannulation. The tricuspid valve pathology was examined and then resected. Meanwhile, a 34-mm cryopreserved pulmonary homograft had been thawed. The adventitia and the muscular remnant were trimmed. Six 2-0 pledget-supported Ti-Cron sutures (Sherwood Davis & Geck, St Louis, Mo) were put inside the right ventricle, and 3 of them were transmural. These 6 stitches were arranged in a circular fashion with regular distance. The depth of these stitches from the tricuspid annulus was the same as the height of the homograft. Then these stitches brought the homograft down into place (Figure 1). The annulus of the homograft and tricuspid valve was sewn with continuous 4-0 Prolene sutures (Figure 2). After we completed the procedures, the patient was weaned off cardiopulmonary bypass

smoothly. Postoperative transesophageal echocardiography showed good opening and competence of the homograft. The patient had resolution of sepsis and improvement in respiratory status within 48 hours, followed by an uneventful recovery.

Discussion

IE involving the tricuspid valve is common for intravenous drug abusers. The tricuspid valve is usually involved extensively, and preservation of the valvular apparatus seems infrequent. For certain patients, the septic emboli and inflammatory infiltrates have

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Figure 1. Arrangement of 6 double-armed, pledgeted sutures in the right ventricle, 3 of which were transmural. The homograft was implanted into the right ventricle when these stitches were tied.

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Figure 2. Both tricuspid and homograft annuli were simply repaired with continuous sutures.

caused an increase in pulmonary vascular resistance. Congestive heart failure would be worse after tricuspid valve resection, especially for those with mild tricuspid valve insufficiency preoperatively. Tricuspid valve replacement for this group of patients is

indicated, despite ongoing septicemia. For all valvular substitutes, a homograft has been considered the best choice in terms of durability, biocompatibility, and infection control. Freedom from explantation for leaflet degeneration was 95% at 8 years.³ However, the decision regarding the choice of prosthesis must be individualized.

Aortic or pulmonary homografts have been applied in mitral valve replacement. Therefore we tried to apply this concept in tricuspid IE. We believed careful surgical techniques could bring the natural and competent valve into the tricuspid location. The compliant characteristics of the homograft provided benefits in right ventricular geometry rather than the rigid housing of prostheses. The competency of the homograft played an important role in the early postoperative course. In addition, the homograft carried the best properties for infection control. All the characteristics justified the procedure.

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