

Tricuspid Valve Reconstruction in a Patient with Ventricular Septal Defect and Subacute Endocarditis

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Abstract

Objective: Tricuspid valve reconstruction was advocated as the operative method for the treatment of tricuspid valve endocarditis recently. Many people accept that valve replacement therapy should be performed if more than two valve leaflets are involved. The aim of the study to discuss if reconstructive surgery could be done to treat two valve leaflets involved in tricuspid valve endocarditis. **Methods:** A 17-year-old boy with ventricular septal defect (VSD) and tricuspid valve subacute endocarditis was surgically treated through extracorporeal circulation. Two-thirds of the defective septal cusp, and half of the defective anterior cusp were excised during operation. The tricuspid valve was reconstructed with autologous pericardial strip, cusp commissuroplasty and 4-0 prolene sutures made as chordae tendineae. VSD was repaired using a pericardial patch. **Results:** The patient was discharged post-operation with excellent restoration of the tricuspid valve activity. Cardiac ultrasound revealed normal tricuspid valve activity and low degree of regurgitation two years follow-up. **Conclusions:** It seems that tricuspid valve reconstruction could be performed for two defective leaflets or half of the tricuspid valve.

Keywords: Tricuspid Valve Subacute Endocarditis, VSD, Reconstruction Technique

1. Introduction

Infective endocarditis often induces acute valvular insufficiency, and causes significant hemodynamic variations. Surgical therapy is indicated if this disorder is associated with other heart malformations.

2. Material and Methods

A 17-year-old patient (Kirkiz nationality) was transferred to our hospital after experiencing recurrent fever for 4 months. The patient did not undergo regular anti-infective therapy. He had no history of drug addiction. Physical examination revealed a systolic murmur (Grade 3/4) existing in the left third and fourth intercostals. Blood culture was negative. Cardiac ultrasound examination revealed a tumor-like bulge in the membranous septum; Color Doppler flow imaging revealed left to right shunt. In the verge of ventricular septal defect, septal tricuspid valve, and the chordae, abscission of the vegetation with

distinct sized of high echogenic mass induced septal valve defect and considerable tricuspid regurgitation (**Figures 1 and 2**). The electrocardiogram showed sinus tachycardia. From above the diagnosis of congenital VSD with subacute endocarditis was made, and antibiotics were started.

A median sternotomy was performed 5 days after admission, after aortobicaval cannulation, cardiopulmonary bypass was instituted at mild hypothermia. The aorta was cross-clamped and cold blood cardioplegia was delivered antegradely. After cardioplegic arrest, a right transverse atriotomy allowed for an examination of the VSD and the tricuspid valve. A perimembranous VSD was found located near the aortic valve ring; the size of the defect was about 1.2×0.8 cm, and a large vegetation had accreted in the septal leaflet nearby the anterior valve. A large vegetation had also accreted in the anterior leaflet next to the septum leaflet, and another vegetation (diameter, 0.6 cm) was seen on the anterior leaflet. In addition, a part of the chordae in the anterior and septal leaflets

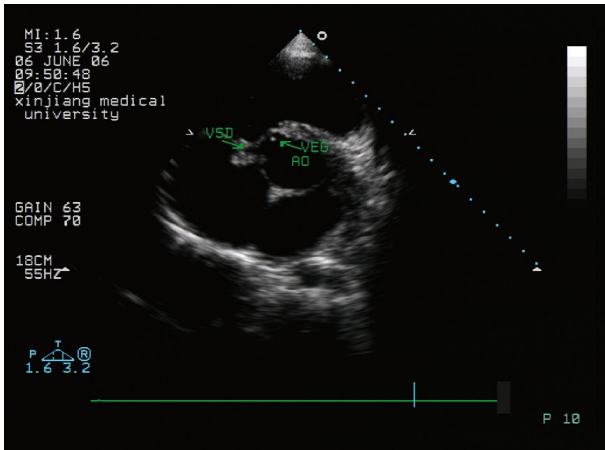


Figure 1. Aortic short axis view: anechoic region in the interventricular septal periphery, vegetations adhesion to the inter-stump gap.

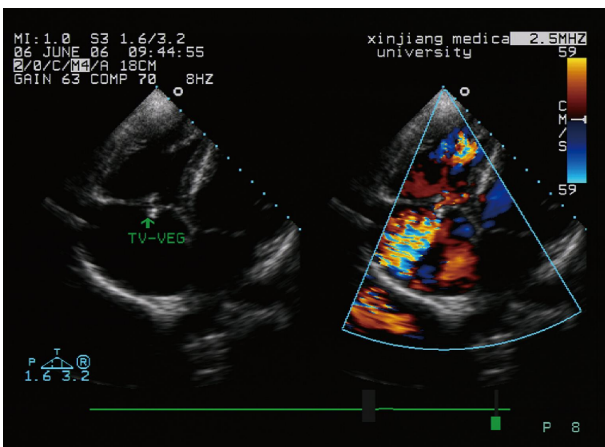


Figure 2. Two-dimensional color flow mapping in the apical four-chamber view: abscission of the septal leaflet of the tricuspid valve in the right atrium, significant vegetations formation was seen in the septal and anterior leaflets. The color graph showed a high degree of tricuspid regurgitation.

was ruptured. The excess tissue was excised from the annular edge of the anterior and the septal leaflet. Therefore, we excised two-thirds of the defective septal cusp, half of the defective anterior cusp, and the involved chordae; the 0.6 cm vegetation in the anterior leaflet was also excised (**Figure 3**). VSD was repaired using a pericardial patch and sutured continuously using 4-0 prolene sutures. The small defective anterior cusp was patched using a pericardial patch and sutured continuously using 6-0 prolene sutures. The brick-shaped pericardial strip was ideal for the patch, and it was sheared into sizes corresponding to anterior and septal leaflets. Then the patch was stitched to annulus using running 4-0 sutures. Because of the patient's poor economic condition, we constructed chords with prolone rather than gortex. After

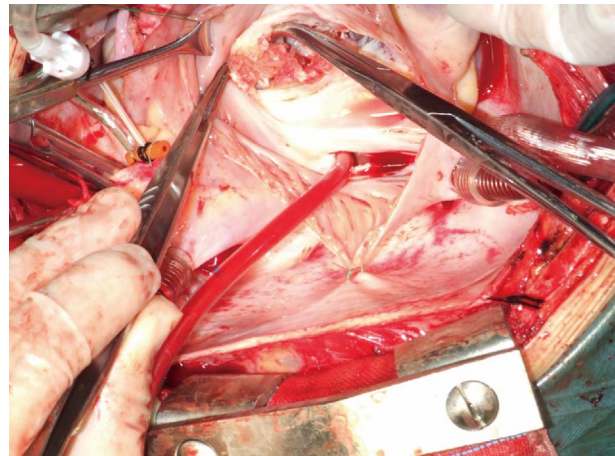


Figure 3. Perioperative findings revealed significant vegetation formation in the tricuspid valve and anterior leaflets.

repeating ligaturing the same 4-0 prolene suture which stitched in the anterior and posterior papillary muscles, we made three artificial chordae to fix the free edge of the pericardial prosthetic cusp. (**Figure 4**). One was placed at the point of “the anterior and the septal leaflet commissure”, the other two were inserted at the suture intersection of the natural and prosthetic cusps. The optimal length of the artificial chorda was determined by filling the right ventricle with saline. The water filling test showed slight regurgitation at the intersection of the septum and the posterior valve. Using 3-0 prolene sutures, the tricuspid ring in the intersection of the septum and the posterior tricuspid valve was shortened with a figure-of-eight suture (cusp commissuroplasty), and the water filling test revealed absence of regurgitation. The patient was in normal sinus rhythm after the aortic cross-clamp removed.

Extracorporeal circulation was successfully discontinued, the bypass was maintained for 147 minutes and the aortic clamp time was 94 minutes.

3. Results

The patient was treated with Cefazolin (2g/d) for 4 weeks after discharging from hospital and got recovered successfully. The central venous pressure (CVP) postoperation was less than 6.5 cm H₂O. Cardiac ultrasound examination performed the ninth day postoperation revealed restored apposition of the artificial septal and anterior leaflets of the tricuspid valve, low degree of tricuspid regurgitation in the systolic phase, and significant restoration of the enlarged right atrium and ventricle (**Figure 5**). Cardiac examinations during the 2-year-follow-up period revealed normal tricuspid valve activity and low degree of regurgitation. No recurrent symptoms of subacute endocarditis were observed.

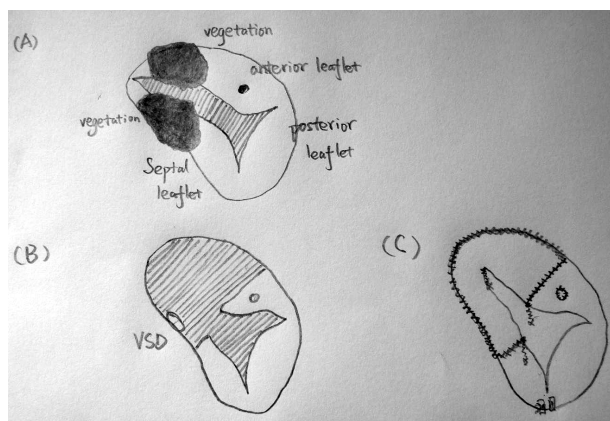


Figure 4. Operative procedures: (A) two large and one small vegetations were presented at the anterior and septal leaflets of the tricuspid valve, (B) two-thirds of the septal cusp and half of the anterior cusp were excised, (C) pericardial patch was used to replace the defected leaflets, artificial chordae tendineae and Cusp commissuroplasty were used to reconstruct the tricuspid valve.

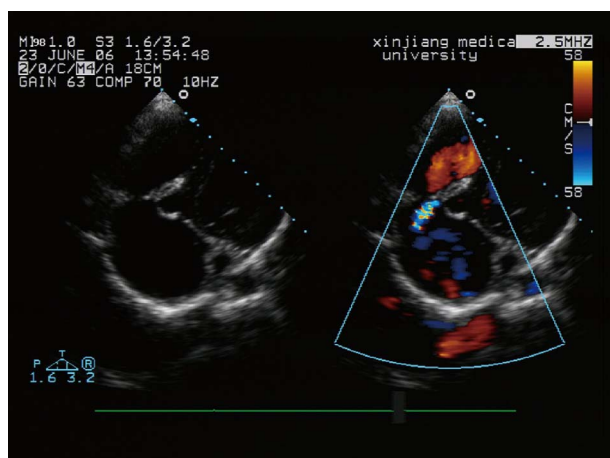


Figure 5. Apical four-chamber 2-dimensional and color flow aspect postoperation: The right atrial and ventricular chambers were significantly reduced; the apposition between the septal and anterior cusps of the tricuspid valve was excellent; and the representative color graph showed a low degree of tricuspid regurgitation in the systolic phase.

4. Comment

Tricuspid valve reconstruction was advocated as the operative method for the treatment of tricuspid valve endocarditis [1]. Most scholars considered that operative indication of tricuspid valve repair surgeries means when only one valve cusp was defective and the posterior leaflet was resected, the left two valve cups were still able to remain the valve function [2]. Valve replacement therapy

should be performed if more than two leaflets are involved [3]. In our patient, since the septal and anterior leaflets of the tricuspid valve showed accretions of large vegetations and partial rupture of the chordae tendineae, replacement of the tricuspid valve was essential. However, because of the patient's poor economic condition, we performed repair therapy instead of valve replacement. Sasaki [4] reported a similar case, in his report a large vegetation involving the anterior and septal leaflets, one-third of the anterior leaflet was removed. He used the sliding plasty technique and the triple-orifice technique to reconstruct the tricuspid valve, and the result was good. In our study, we reconstructed tricuspid valve by combined using autologous pericardial strip, artificial chordae tendineae and Cusp commissuroplasty technique with good result. From our experience it seems that tricuspid valve reconstruction could be performed for two defective leaflets or half of the tricuspid valve. But the pericardial patches was not treated with glutaraldehyde, the construct chords were used with prolene rather than gortex, and without placing a ring to help support the repair in our operation. The long-term effect of this therapy requires further investigation.

5. Competing Interests

The authors declare that they have no competing interests.

6. References

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