How-to-do-it

Reconstruction of the free margin of the anterior mitral leaflet with autologous pericardium in active infected endocarditis

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Abstract

In patients with active infective endocarditis mitral valve repair is better than mitral valve replacement, but it remains a challenge when there is massive destruction of the rough zone of the anterior leaflet. We report a technical modification of mitral valve repair for advanced active infective endocarditis in which a widely infected rough zone and the chordae were successfully replaced with autologous pericardium and multiple artificial chordae. The procedure described here is capable of improving the prospects of mitral valve repair in advanced infective endocarditis.

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1. Introduction

Many studies have suggested that mitral valve (MV) repair is better than MV replacement for active infective endocarditis (IE). Various technical modifications have increased the rate of MV repair rate, but repair of massive destruction of the rough zone of the anterior leaflet remains difficult. Recently, we encountered a case of advanced active IE, and reconstructed the destroyed rough zone and the attached chordae with autologous pericardium and artificial chordae. This technique facilitates MV repair for advanced active IE.

2. Technique

A 33-year-old female was referred to our hospital for surgical treatment for mitral regurgitation (MR) due to active IE. She was 155 cm tall and weighed 42.7 kg; her body surface area was 1.37 m². She had had a tooth extracted and then become slightly febrile for 2 months. During that period, she had been given antibiotics at a local hospital, but their effectiveness was transient. To determine the cause of the fever, she was admitted to another hospital. Transesophageal echocardiography (TEE) revealed severe MR; the A2 and A3 segments flailed with very large mobile vegetation; vegetation was spread on the posterior wall of the left atrium beyond the posterior leaflet. Blood culture showed an 'Abiotrophia defective' status. She was transferred to our hospital and underwent an urgent operation.

Intra-operatively, the MV was exposed via the superior septal approach. The characteristics of the lesion proved identical to those revealed by preoperative echocardiography (Figs. 1a and 2). We undertook debridement of the anterior leaflet; the entire rough zone of the A2 segment and most of the rough zone of the A3 segment were sharply resected, along with ruptured and infected chordae. Some infected A1 chordae were also resected. Thereafter, vegetation on the posterior leaflet and on the left atrial wall was scratched out without leaflet resection. Next, multiple Gore-Tex sutures (W.L. Gore and Associates, Flagstaff, AZ, USA), serving as neochordae, were placed at the free margin of the remaining anterior leaflet. However, leaflet coaptation was not obtained. We therefore augmented the anterior mitral leaflet with autologous pericardium so as to obtain leaflet coaptation, as follows. Autologous pericardium that had been tanned for 2 min in 1% glutaraldehyde solution was sutured to the free edge of the A2 and A3 segments using a 5/0 polypropylene running suture, and then was trimmed. Thus, the height of the leaflet increased by 1.3 cm (Fig. 1b, Video 1). Five pairs of neochordae were placed on the free margin of the reconstructed anterior leaflet, from either the anterior or the posterior papillary muscle; the first pair of neochordae was on the A1 segment, and the next pair was on the remnant of
the A3 segment, and the last three pairs were on the pericardial patch (Figs. 1c and 2). Using the inter-commisural distance as a guide, a 28-mm semi-rigid annuloplasty ring (Carpentier-Edwards Physio Annuloplasty Ring; Edwards Lifesciences, Irvine, CA, USA) was secured, and the length of the neochordae was adjusted (Fig. 1d). TEE after separation from cardiopulmonary bypass revealed that mitral leaflet coaptation was adequate, residual MR was trivial, and systolic anterior motion of the leaflet did not occur (Video 2).

Postoperative hemodynamics was stable. After 6 weeks on antibiotics the patient was discharged, and has been in the New York Heart Association (NYHA) class 1 for 8 months. Echocardiographic findings prior to discharge from hospital and at 5 months after surgery were both identical to the results of intra-operative TEE, that is, good leaflet coaptation with only trivial MR.

3. Comment

MV repair is better than MV replacement for surgical treatment of active IE, based on its excellent early and long-term results [1,2]. Although numerous series have demonstrated successful MV leaflet repair with fresh or glutaraldehyde-treated autologous pericardium, or xenograft, these materials have been used only for patch repair of leaflet perforation, annuloplasty, or leaflet patch augmentation [1,3–6].

In the present case, the main lesion was the rough zone of the anterior leaflet including the chordae, so that replacement of the rough zone with suitable materials was required. The restoration of adequate leaflet coaptation is vital for successful repair in such cases. Gogoladze and colleagues measured the mitral leaflet coaptation zone using three-dimensional TEE; they found that the coaptation lengths of the anterior and posterior leaflets were asymmetric, with anterior dominance in normal valves, and that the coaptation length of the A2 segment was longer than other segments [7]. In other words, in cases in which the rough zone suffered destruction, especially in the A2 segment, a considerable leaflet coaptation length has to be restored with appropriate material. We used glutaraldehyde-treated pericardium, which was easy to handle and had the necessary pliability despite the relatively short fixation time. In performing this operation, we believe that the attached pericardium should be tailored to be taller than that of the resected rough zone in order to achieve sufficient coaptation length, and that the length of the artificial chordate should be adjusted, verifying leaflet coaptation after placement of the annuloplasty ring.

The procedure described here is capable of improving the prospects for MV repair in IE. The fate of the reconstructed part should be followed closely.

References


Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.ejcts.2010.08.045.