Pericardial patch anterior leaflet extension in rheumatic mitral insufficiency

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Received 15 June 2010; received in revised form 23 August 2010; accepted 25 August 2010; Available online 16 October 2010

Abstract

This report describes a technique for anterior leaflet extension using an autologous pericardial patch in patients suffering from rheumatic mitral regurgitation. The technique has recently evolved and now enables us to correct both vertical and transversal fibrotic leaflet retraction.

Keywords: Mitral valve repair; Pericardium; Rheumatic disease

1. Introduction

Pericardial patch extension of the posterior or anterior leaflet has been proposed for the treatment of patients with severe rheumatic mitral regurgitation [1,2]. Leaflet extension is used to deal with fibrotic leaflet retraction, a common finding in rheumatic mitral regurgitation. However, previous surgical techniques only dealt with vertical retraction. Our strategy has recently evolved and now enables us to treat valves with transversal leaflet retraction.

2. Technique

Three types of anterior leaflet enlargement can be performed in rheumatic patients (Fig. 1). All use an autologous pericardial patch that has been pretreated with a 0.625% glutaraldehyde-buffered solution.

The first type of enlargement consists of vertical extension of the anterior leaflet. It is performed when the height of the leaflet is judged to be inadequate (our goal is to implant a 32-mm ring at least). The anterior leaflet is detached from its annular attachment. An incision is made 2 mm from the annulus, and runs from one commissure to the other (Figs. 1 and 2). An oval-shaped patch is tailored with a height of 2—3 cm. Its length should be slightly longer than the intercommissural distance. The extremities of the patch are cut so that they are rounded and not sharp, to confer a greater height in the commissural region. Suturing of the patch is done using two running sutures with a 4/0 non-absorbable monofilament. Interrupted sutures are also used to reinforce the suture lines.

A second type of enlargement has recently been introduced to deal with transversal fibrotic anterior leaflet retraction. This consists of a grossly triangular leaflet extension (Figs. 1 and 2). The anterior leaflet is divided vertically. The incision starts at the mid-level of the free edge of the A2 segment and stops when two-thirds of its height has been cut. A grossly triangular patch with a 1.5-cm base is then sutured to the anterior leaflet with two running sutures (4/0 non-absorbable monofilament). To prevent patch prolapse, two artificial chordae (Gore-Tex, CV-5, WL Gore & Associates, Inc., Flagstaff, AZ, USA) are inserted between each papillary muscle and the triangular patch. The first is placed between the anterior papillary muscle and the anterior part of the free edge of the triangular patch, and the second extends from the posterior papillary muscle to the posterior part of the patch.

The third type of enlargement allows the anterior leaflet to be enlarged vertically and transversally at the same time, which has a mushroom shape (Fig. 1(C)). The anterior leaflet is first divided transversally 2 mm from its annular attachment. The incision runs from one commissure to the other. It is then cut vertically at the level of A2 (the final incision is roughly T-shaped). Four running sutures (4/0 monofilaments) are used to attach the patch to the anterior leaflet. The transversal extension is performed first, followed by the vertical extension. As in the previous case, two artificial...
chordae (5/0 sutures) are required to prevent patch prolapse.

3. Comments

The mechanism of mitral regurgitation in rheumatic disease is usually multifactorial [3]. Repair may be simple (typically, ring annuloplasty in pure type 1 lesions) or more complicated. The most difficult lesions to deal with are those involving fibrotic retraction of the valvular and subvalvular apparatus. Surgical techniques used to correct chordal retraction include chordal resection or fenestration, chordal replacement, or papillary muscle fenestration [4]. Fibrotic retraction of the posterior leaflet is common in rheumatic mitral regurgitation. Several authors have proposed leaflet thinning to increase the posterior leaflet area [5]. Pericardial patch leaflet extension has been developed and is widely used in our center [1].

Fibrosis also involves the anterior leaflet. The free edge is always thickened in rheumatic mitral regurgitation, but fibrosis may affect the whole anterior leaflet. As a result, the leaflet is less pliable and transversal or vertical retraction may occur. Acar et al. recently proposed pericardial patch vertical extension of the anterior leaflet [2] and found that residual mitral regurgitation was less frequent in patients with anterior leaflet patch extension compared to those without.

Transversal anterior leaflet extension was developed after our team was faced with a few cases of residual mitral stenosis after valve repair despite the presence of non- or mildly retracted chordae, anterior leaflet vertical patch extension, and use of large ring annuloplasty. These patients had fibrotic thickening of their anterior leaflet, which bent poorly during valve opening. Transversal leaflet extension may solve this problem in two ways. First, as the stenotic area is found at the free edge of the leaflet in most instances, increasing the length of the free edge is necessarily and mechanically associated with an increased valve area (Fig. 1). Second, the pericardium used for leaflet extension is more pliable than the fibrotic leaflet, further improving valve opening.

In our experience, the decision to vertically extend the anterior leaflet relies on the measurement of its height. Vertical extension is performed whenever the height of the anterior leaflet does not allow a 32-mm ring to be implanted (risk of residual stenosis increases with smaller rings). In our last 70 patients, vertical extension was performed in 21% of cases. The decision to extend transversally is more difficult to take as it is not based on objective measurements. However, we believe that a much thickened anterior leaflet is the ideal indication for this type of extension. Thickened leaflets, indeed, do not bend transversally (transversal bending is a major determinant of valve opening as it can be easily seen in short-axis view of the mitral valve). Transversal extension is rarely necessary in clinical practice. We have performed it in only four cases (6%) among our last 70 patients.

In rheumatic mitral regurgitation, current results are known to be suboptimal in terms of repair feasibility and stability. In two recent studies, there was a trend toward being more surgically aggressive [2,6]. Extension of the
anterior leaflet is one aspect of this trend. Its long-term impact, however, needs to be evaluated.

References


