

# The triple-orifice repair: a new technique for the treatment of mitral regurgitation in severe Barlow's disease

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## Key words:

Mitral regurgitation;  
Mitral valve repair.

We report a case of severe Barlow's disease with a very complex pathology, in which we applied the "edge-to-edge" technique, creating a triple-orifice mitral valve. Different techniques should be used to correct a similar valve defect; the combination of different surgical procedures and the valve pathology may influence the post-repair recurrence of regurgitation. We believe that it is better to perform a simple and reproducible repair than to carry on with combined complex procedures that could increase the risk of a suboptimal outcome.

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## Introduction

Degenerative mitral valve disease is the most common cause of mitral regurgitation in the western world<sup>1</sup>. In Barlow's disease<sup>2</sup> the central feature is prolapse of both leaflets due to elongation of the subvalvular apparatus and redundant leaflet tissue. In severe forms of this disease, reparative surgery of the mitral valve is challenging. As a matter of fact, advanced myxomatous changes with prolapse of both leaflets may cause failure of reparative surgery<sup>3</sup>. We report a case in which, due to the anatomic complexity of the pathology, we applied the "edge-to-edge" technique<sup>4,5</sup>, creating a triple-orifice mitral valve<sup>6</sup>.

## Case report

A 40-year-old male was referred to our hospital with a diagnosis of Barlow's disease and severe mitral regurgitation. The patient underwent two-dimensional Doppler echocardiography for the evaluation of the anatomy of the valve and of the mechanism of the regurgitation. Diagnostic findings included annular dilation, bileaflet thickening and redundancy with billowing and prolapse due to elongation of the subvalvular apparatus, involving the central (A2, P2) and postero-medial (A3, P3) segments of the anterior and posterior leaflets, with two main regurgitant jets caused by the nu-

merous mechanisms of regurgitation. Mitral valve repair was performed through a conventional midline sternotomy with normothermic cardiopulmonary bypass, using bicaval cannulation and intermittent antegrade/retrograde crystalloid cardioplegia. The mitral valve was approached through the left atrium. On intraoperative inspection of the valve, severe annular dilation and deformation were present; the chordae tendinae were thickened and elongated causing a prolapse of the A2, P2 and A3, P3 segments (Fig. 1). Repair was performed by anchoring the free edges ("edge-to-edge") of the central and postero-medial segments of the anterior and posterior leaflets with a running 5/0 polypropylene suture (Fig. 2). An annuloplasty procedure was performed. At the end of the procedure the three valve orifices were measured using Hegar dilators. After weaning from cardiopulmonary bypass, transesophageal echo-Doppler examination showed a competent mitral valve (Figs. 3 and 4).

## Discussion

The anatomy of this valve was very complex with diffuse chordal elongation and prolapse of the central and postero-medial segments of both leaflets<sup>7</sup>. To correct this severe form of Barlow's disease, in which multiple lesions are present, different techniques should be combined, includ-

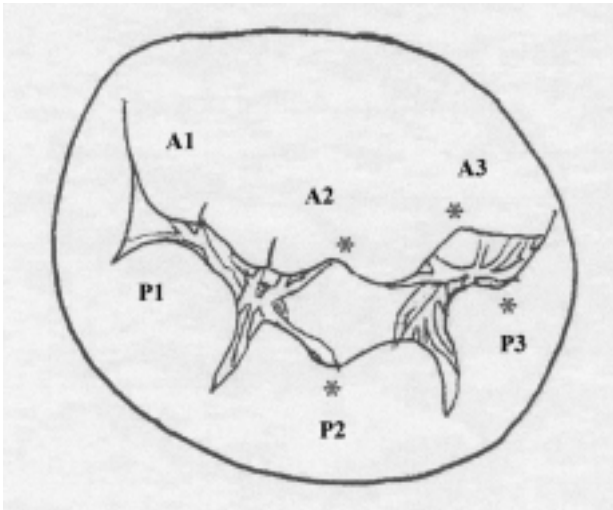


Figure 1. The prolapsing segments (\*) are identified.

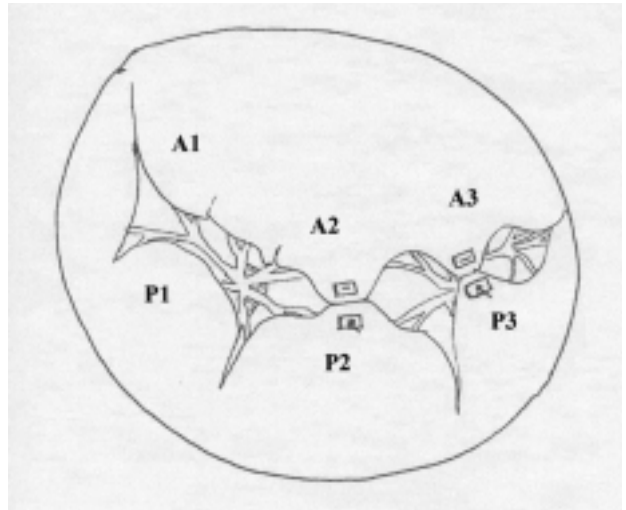


Figure 2. The two stitches create a triple-orifice valve.

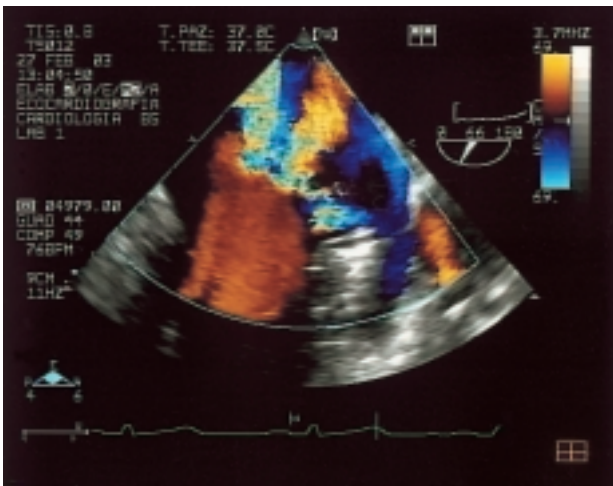
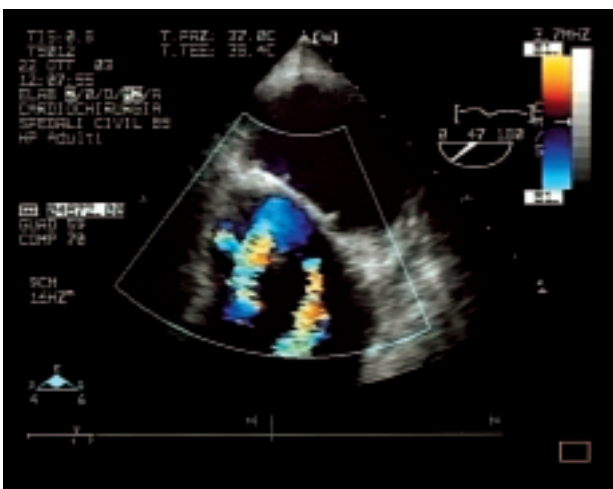
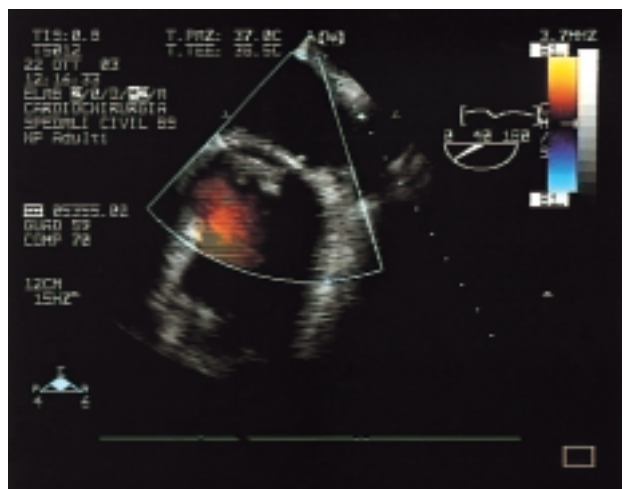


Figure 3. Preoperative transesophageal long-axis view of the prolapsing mitral valve; three regurgitant jets may be seen (postero-medial, central, and antero-lateral).

ing chordal shortening, triangular resection of the anterior leaflet, quadrangular resection of the posterior leaflet, implantation of artificial chordae, and annuloplasty<sup>8,9</sup>. The combination of different surgical procedures and the valve pathology (advanced myxomatous changes with prolapse of both leaflets) may influence the post-repair recurrence of regurgitation, suggesting a less favorable outcome in Barlow's disease. We applied the "edge-to-edge" technique to correct the mitral insufficiency by anchoring the facing free edges of both leaflets either in the central or in the postero-medial area, thereby creating a triple-orifice mitral valve. This technique is very effective in repairing the mitral valve by forcing coaptation of the leaflets in the area of prolapse. An additional advantage of the "edge-to-edge" technique, especially in leaflet redundancy, is that the risk of systolic anterior motion of the anterior leaflet is markedly reduced<sup>5</sup>. The combined annuloplasty in-



A



B

Figure 4. Postoperative transesophageal long-axis view. A: triple jet diastolic inflow; B: absence of systolic regurgitation.

creases the coaptation surface. Postoperative echocardiographic examination was performed both intraoperatively and at hospital discharge and showed a perfectly competent mitral valve; the preoperative area was approximately 10 cm<sup>2</sup>; that following surgery was 3.2 cm<sup>2</sup>. These data demonstrate that the triple-orifice technique reduces the mitral valve area. However, this is not a problem in Barlow's disease with very important annular dilation. At follow-up (6 months) the patient was found to be in good clinical conditions and echocardiography confirmed that the quality of the repair was satisfactory, without residual or recurrent mitral regurgitation. We believe that it is better to perform a simple, safe and reproducible repair than to carry on with combined complex procedures that may increase the risk of a suboptimal outcome. In spite of the fact that the long-term outcome of this new technique has yet to be determined, it was possible to correct this very severe form of Barlow's disease avoiding combined complex procedures and its application should be reserved to such complex anatomical cases.

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