Folding mitral valvuloplasty without posterior leaflet resection for calcified mitral annulus

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Abstract

Mitral valve annular calcification has long been a challenge in repairing posterior mitral valve prolapse. Folding valvuloplasty of the posterior leaflet without resection provides a means of circumventing common procedural complications. This report demonstrates the success of folding valvuloplasty without resection in the treatment of mitral valve prolapse and severe annular calcification.

Keywords: Mitral valve repair • Valvuloplasty • Calcification mitral annulus

INTRODUCTION

Mitral valve repair is the standard operative technique to correct posterior mitral leaflet prolapse. The standard technique, as described by Carpentier, has been quadrangular resection of the posterior leaflet with annular plication along with ring annuloplasty [1]. Mitral valve repair in patients with posterior leaflet prolapse and a calcified annulus can be challenging [2]. A technique in which folding of the posterior leaflet is employed without resection [3, 4] may be a useful alternative to repair posterior leaflet prolapse in patients with mitral annular calcification (MAC). We describe a folding valvuloplasty technique to repair the prolapse of the P2 scallop of the posterior leaflet without resection of the prolapsing segment in a patient with severe MAC.

CLINICAL SUMMARY

The patient was an 80-year-old woman who presented with a sudden onset of shortness of breath and symptoms of congestive heart failure. Physical examination revealed increased jugular venous pressure and a systolic murmur best heard at the apex. Transthoracic echocardiography showed prolapse of the P2 scallop of the posterior leaflet of the mitral valve with severe mitral regurgitation, ruptured chords, severe MAC and moderate tricuspid regurgitation with systolic pulmonary artery pressure of 70 mmHg. Left ventricle ejection fraction was measured at 70–75%. Transoesophageal echocardiography (TEE) confirmed these findings. Cardiac catheterization showed severe mitral regurgitation and MAC as well as normal coronary arteries. Operation was recommended.

Operative technique

The standard operative technique using cardiopulmonary bypass was utilized. Aortic and bicaval venous cannulation was performed. A transeptal approach was used. Examination of the mitral valve revealed multiple ruptured cords of the P2 scallop of the posterior leaflet. Extensive calcification was also noticed on the posterior annulus and the base of the posterior leaflet. The prolapsed P2 scallop was imbricated using multiple 4-0 Ethibond sutures in a vertical mattress fashion (Figs 1 and 2). A ring annuloplasty was performed with a #30 Carpentier-Edwards Physio ring (Edwards Lifesciences, Irvine, CA, USA). The tricuspid valve was repaired with a #30 ATS annuloplasty ring (ATS Medical, Minneapolis, MN, USA). TEE confirmed competent mitral and tricuspid valves without regurgitation. The patient was weaned off cardiopulmonary bypass uneventfully. The hospital course was uneventful and the patient was discharged home postoperative day 10.

DISCUSSION

Mitral valve repair of posterior leaflet in patients with calcified mitral annulus can be a formidable challenge for the surgeon. Carpentier advocates P2 scallop resection and ring annuloplasty after complete en bloc decalcification of the posterior mitral valve annulus followed by primary closure of the atrioventricular junction with or without a patch [1]. This technique is fraught with complications such as thromboembolic events and atrioventricular disassociation [5]. The folding valvuloplasty technique without resection of the posterior leaflet [3, 4, 6] may be a useful alternative to Carpentier’s technique, in patients with MAC and P2 prolapse because it avoids systolic anterior motion and the risk of atrioventricular disassociation caused by aggressive decalcification of the posterior annulus [3, 7].

The technique we describe is markedly different than the procedures described before [3, 4, 6]. Grossi’s ‘folding plasty’ includes quadrangular resection of the posterior leaflet followed by folding of the leaflet edges up to a common centre point on the
annulus. His technique, however, does not avoid the need for decalcification of the posterior annulus in patients with MAC.

The technique described by Mihaljevic eliminates all posterior leaflet resection. The free edge of the prolapsing leaflet of P2 is sutured with horizontal mattress sutures. The sutures were then passed through the inferior border of the annulus creating a downward fold of the P2 leaflet edge. The repair was completed with ring annuloplasty, using the same sutures used for the folding. Additional sutures were used to secure the remaining medial and lateral portions of the ring.

The procedure we describe is different than the one described by Mihaljevic in that the P2 scallop was imbricated using vertical mattress sutures without securing the imbricated leaflet into the annuloplasty ring. Another useful technique involves placing a magic suture on the leaflet edge that folds the leaflet edge and repairs the regurgitation jet. Triangular resection of P2 scallop may allow repair with minimal tension in patients with calcified annulus. However, extension of the calcification on the proximal third of the leaflet, such as in our patient’s case, may preclude implementation of triangular resection technique that usually requires extension of the resection close to the annulus. Creation of artificial chords (neochords) is another technique that has been proven useful in patients with calcified annulus. However, it usually takes more time to complete than our technique and usually requires precise measurements of the length of the neochords in order to succeed. In our patient, we were able to pass the annuloplasty sutures through the mitral annulus and a ring annuloplasty was performed. In patients with heavily calcified posterior mitral valve annulus, this may not be feasible and a ring annuloplasty may be omitted since the annular calcification will prevent future annular dilatation of the posterior annulus. Ring choice is also not important for the above reason.

In conclusion, our folding valvuloplasty technique is simple, avoids systolic anterior motion and omits the need for annular decalcification and the complications associated with it. To the best of our knowledge, there are no reports in the literature describing the

Figure 1: Mitral folding valvuloplasty of the P2 segment of the posterior leaflet of the mitral valve in a heavily calcified posterior annulus. (a) Prolapsing P2 segment due to chordal rupture. (b) Vertical mattress sutures to create the folding of the prolapsing P2 segment (annuloplasty ring not shown).

Figure 2: Final result of P2 segment folding valvuloplasty (annuloplasty ring not shown). (a) The surgeon’s view of the valvuloplasty. (b) Leading edge of the posterior leaflet and the imbricated P2 segment (anterior leaflet and annuloplasty ring not shown).
use of this folding valvuloplasty technique in the treatment of mitral prolapse in patients with severe MAC. Follow-up studies are required to demonstrate the durability of this repair.

Conflict of interest: none declared.

REFERENCES