



Massive Mitral Annular Calcification in an Elderly Patient: Is a Simple Mitral Valve Repair Still Possible?

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Abstract

Massive mitral annular calcification represents a complex situation capable of making mitral valve repair more challenging. To deal with this condition may be burdened with high surgical mortality risk whereas the usual conservative mitral valve repair techniques may be associated with recurrence of mitral regurgitation during in the mid and long term.

Moreover, patients suffering of this disease are generally more elderly, with associated co-morbidities and therefore with increased operative risk.

We report a paradigmatic case of an elderly female patient, needing mitral valve surgery for severe mitral regurgitation and expressing a massive posterior mitral annular calcification, treated with extensive edge-to edge repair technique. She experienced an uneventful post-operative course and no recurrence of mitral valve regurgitation was recognized at 3 years follow-up.

Introduction

Massive mitral Annular Calcification (MAC) is a chronic degenerative condition that dramatically increases the difficulty of mitral valve procedures.

The calcification usually involves the posterior annulus sometimes extending into the Left Ventricular (LV) muscles.

Extensive debridement of MAC is associated with relatively high mortality and morbidity due to the possibility of posterior atrioventricular groove rupture, circumflex coronary artery injury or prosthetic valve dehiscence [1,2]. In this setting the reported surgical mortality rate reaches 9% [3].

Moreover, MAC is often present in advanced age patients affected by chronic kidney disease [2] in which a less aggressive intervention is preferable in order to reduce morbidity and mortality.

Although several techniques have been described over the time to address this issue, actually there is not unanimous agreement on which is the treatment of choice.

Case Presentation

We report a case of a 82-year-old female admitted at our institute with history of hypertension, renal failure (creatinine level: 1.7 mg/dL), moderate COPD, peripheral arterial disease and non insulin dependent diabetes. In the last year she developed increasing dyspnea (NYHA III), multiple episodes of paroxysmal atrial fibrillation and she had one hospital admission for congestive heart failure.

Echocardiography showed severe mitral regurgitation with preserved left ventricular dimensions and function (LVEF 55%; LVESD 48 mm) and severe pulmonary hypertension (SPAP 65 mmHg).

Careful evaluation of the mitral valve using 3D trans-esophageal echo revealed a flail of the central scallop of the posterior leaflet (P2), an extensive prolapse of the anterior leaflet (A2-A3) and a heavily calcified posterior annulus (Figure 1). A large regurgitant jet (V.C. 10 mm) arising from central and postero-medial portion of the valve was identified (Figure 2).

To complete the pre-operative evaluation, a coronary angiography was performed, showing no coronary artery disease and further confirming the severe calcification of the posterior mitral annulus (Figure 3).

Taking into consideration the high risk profile of the patient (Euroscore II 8.3%, STS score 9.8%) a percutaneous solution would have been recommended but then excluded due to the

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Figure 1: 3D trans-esophageal echo showing the mitral valve.

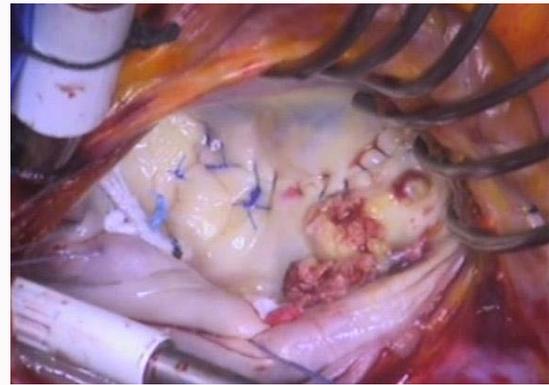


Figure 4: Intra-operative image showing the repair.

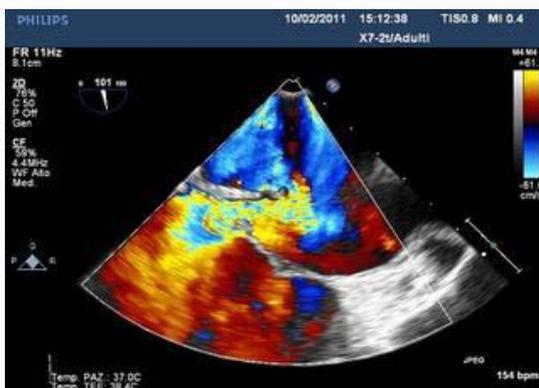


Figure 2: Trans-esophageal echo showing the large regurgitant jet arising from central and postero-medial portion of the valve.



Figure 3: Coronary angiography highlighting the severe calcification of the posterior mitral annulus.

complexity of the valve lesions. Giving that, we opted for a standard approach so the patient underwent median sternotomy and was placed on cardiopulmonary bypass (CPB) in the usual manner. After opening the left atrium, the mitral valve apparatus and the annulus were exposed and the lesions, identified at echocardiography, were confirmed.

Particularly, a dramatic calcification of the posterior annulus, sparing only the segment involving the anterolateral Commissure and P1, was observed.

In order to carry out an intervention less traumatic as possible,

the operative strategy consisted in performing an extensive edge-to-edge repair, approximating the anterior and the posterior leaflet with a 5-0 polypropylene running suture, from the postero-septal commissure to the central portion of the valve, excluding “de facto” two-thirds of the orifice area. In addition, a flexible annuloplasty ring was implanted only on the non calcified portion of the annulus (Figure 4).

Intraoperatively, the residual orifice area was checked and judged enough for the patient (2.9 cm²) and the saline test showed no residual insufficiency.

The postoperative course was uneventful and the patient was discharged on sixth postoperative day. At 3 years follow-up the patient was in NYHA functional status I, not experiencing congestive heart failure episodes anymore. No residual mitral regurgitation was observed and the left ventricular ejection fraction was 55%. Comment Surgery for heavily calcified mitral annuli can be challenging and burdened by non-negligible risk of intraoperative serious complications such as cardiac rupture and left circumflex coronary artery injury.

Moreover, the huge calcium may consistently interfere with correct insertion of the prosthesis, increasing the risk of paravalvular leakage [1].

In order to avoid these risks, several techniques, have been proposed over the years. They may be distinguished by their characteristics of dealing or not with the MAC.

In case of mitral valve replacement, without debridement of the calcium, the prosthesis may be implanted with sutures passed through or around the MAC, or at the level of mitral leaflets [4] or, in some cases, at the level of left atrial wall [5]. These approaches showed a high hospital mortality rate (20-28%) associated to an elevated risk of dehiscence of the prosthesis so they must be carefully considered.

Mitral valve repair without management of the calcified annulus has been reported several times [6,7]. Despite these techniques showed an acceptable operative mortality rate, they do not ensure good results in term of freedom from recurrence from regurgitation in the long-term.

Regarding the techniques involving the decalcification of the mitral annulus, although they seems to guarantee a satisfactory long-term freedom from re-operation [8], they are technical demanding and, giving that calcification may extend deep into the left ventricle, not always applicable. Even in these cases, dramatic complication,

such as left ventricular wall rupture, may occur.

In view of the foregoing, considering the intrinsic high risk profile of our patient and excluding the possibility of percutaneous repair due to the characteristic of the lesion, we decided to perform a “lowimpact” approach with the purpose to minimize the usual triggers for a complicated post-operative course.

Once opened the atrium, the valve inspection highlighted a massive calcification of the posterior annulus except for the portion overlooking the antero-lateral commissure and P1 segment plus parcellary calcification of both leaflets.

The procedure consisted in correcting the leaflets prolapse using the well-known edge-to-edge technique: considering the length of the lesion, we had to make a large approximation of the anterior and posterior leaflets, extended for more than two-thirds of the valve, leaving an orifice adequate for the patient.

An annuloplasty with a flexible ring implanted only on the non calcified portion of the posterior annulus, completed the procedure.

The purpose of this approach was not only to obtain a competent valve, but also to avoid injury to the fragile heart structures of the patient.

Moreover, the follow-up was free from hospital re-admission for cardiovascular events and from recurrence of the mitral regurgitation.

In conclusion, owing that patients presenting with mitral valve regurgitation and massive annular calcification are often elderly with high risk profile, we believe that, when feasible, the approach here described, represents a simple and effective low risk alternative to repair the mitral valve.

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