

CASE REPORT

Mitral valve replacement with bioprosthesis plus left atrial resection: A good alternative when Cox-maze procedure is not an option.

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We present herein one case of rheumatic calcified mitral valve disease and concomitant long-standing persistent atrial fibrillation. Since this patient was not a good candidate for mitral valve repair nor Cox-maze procedure, she was treated by means of a biological mitral valve replacement in conjunction with left atrial appendage resection. After three months, the patient continues in atrial fibrillation, with no oral anticoagulation regime. We present this case as an excellent alternative when Cox-maze procedure is not feasible for whatever reason. Left atrial appendage resection represents one step towards stroke prevention.

Key words: Atrial fibrillation; Cardiac bioprosthesis; Cox-maze procedure; Mitral valve disease; Stroke.

Presentamos el caso de enfermedad mitral reumática con calcificación de la válvula mitral y fibrilación auricular de larga evolución concomitante. Dado que la paciente no era un buen candidato para reparación valvular mitral ni para el procedimiento de Cox-maze, se trató mediante un reemplazo de la válvula mitral con una bioprótesis junto con resección de la orejuela izquierda. Después de tres meses de la operación, la paciente continuaba en fibrilación auricular, sin anticoagulación oral. Presentamos este caso como una excelente alternativa cuando el procedimiento de Cox-maze no puede ser efectuado por la razón que sea. La resección de la orejuela izquierda representa una etapa hacia la prevención del accidente vascular cerebral embólico.

Palabras clave: Bioprótesis valvular cardiaca; procedimiento de Cox-maze; Enfermedad de la válvula mitral; Accidente vascular cerebral embólico.

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Mitral valve disease represents one of the most common forms of cardiovascular disease in Latin America. Even when no official data are available, it occupies the third place, just below coronary artery bypass grafting and aortic valve replacement, in the different surgical series. By large, of all etiologies of mitral disease, the rheumatic one is by far the most frequent in developing countries [1].

The coexistence of atrial fibrillation with rheumatic mitral valve disease is a very well-known fact. In 2001 in Europe, mitral stenosis represented the 9% of the left-sided valve disease. Out of them, 85% had rheumatic etiology [2]. According to several reports coming from percutaneous commissurotomy for mitral stenosis, incidence of concomitant AF can be found from 15% up to 50% [3,4]. Moreover, in my personal experience in México, 48% of cases with mitral valve (MV) disease have AF when cardiac

surgery is indicated [5].

There is a common agreement about MV repair as the first choice for MV regurgitation. In case of MV regurgitation and stenosis, where MV repair is not feasible, MV replacement is a reliable option [6,7].

Atrial fibrillation itself is a current indication for surgical ablation of AF. The 2017 STS guidelines for the management for surgical ablation of AF, indicates as a recommendation Class I, level of Evidence A, for all cases undergoing mitral valve surgery [8]. As a matter of fact, in a report from the STS database, the highest rate for surgical ablation was observed in the group with concomitant mitral valve disease [9].

Left atrial appendage is the most common site for thrombus formation in patients with AF up to 90% of cases [10,11]. Thus, this fact renders the stroke risk 5-fold increased when comparing to general population [12]. However, based upon the aforementioned, as well as in the results from the

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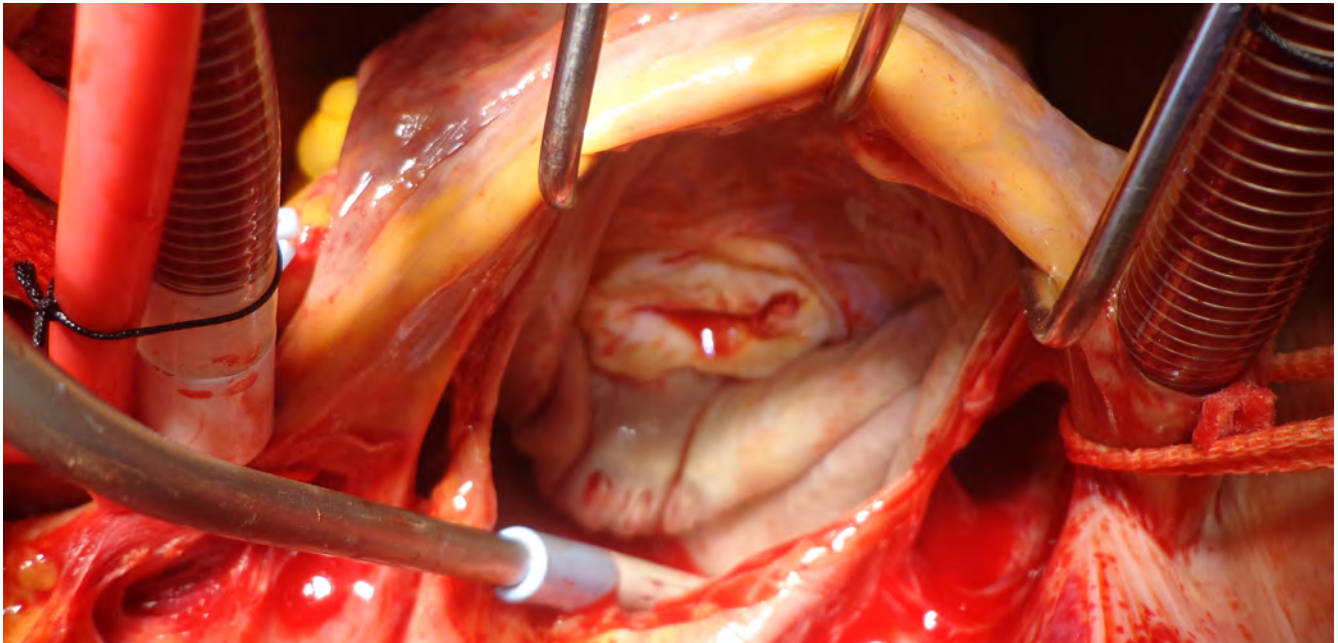


Figure 1. Mitral valve surgery approach through the left atrium, by means of an incision parallel to the atrial septum, and in front of the right pulmonary veins.

LAAOSIII trial [13], left atrial appendage resection or exclusion seems to be a reasonable choice for cases undergoing cardiac surgery with no chance for applying the full Cox-maze procedure. LAA exclusion was associated with fewer cerebrovascular events. Indeed, García-Villarreal et al. have previously demonstrated this procedure could be beneficial for such special cases with MV disease and concomitant AF [14].

CLINICAL CASE

A 64-year-old female patient with diagnosis of rheumatic mitral valve disease and long-standing persistent AF was admitted at our institution to elective cardiac surgery. Echo findings in the preoperative period showed both leaflets thickened, with restricted mobility, opening in dome coexisting associated to mitral stenosis. Commissural fusion and thickening. Left atrium and left ventricle were rather enlarged. EROA was 0.42cm², Regurgitant volume

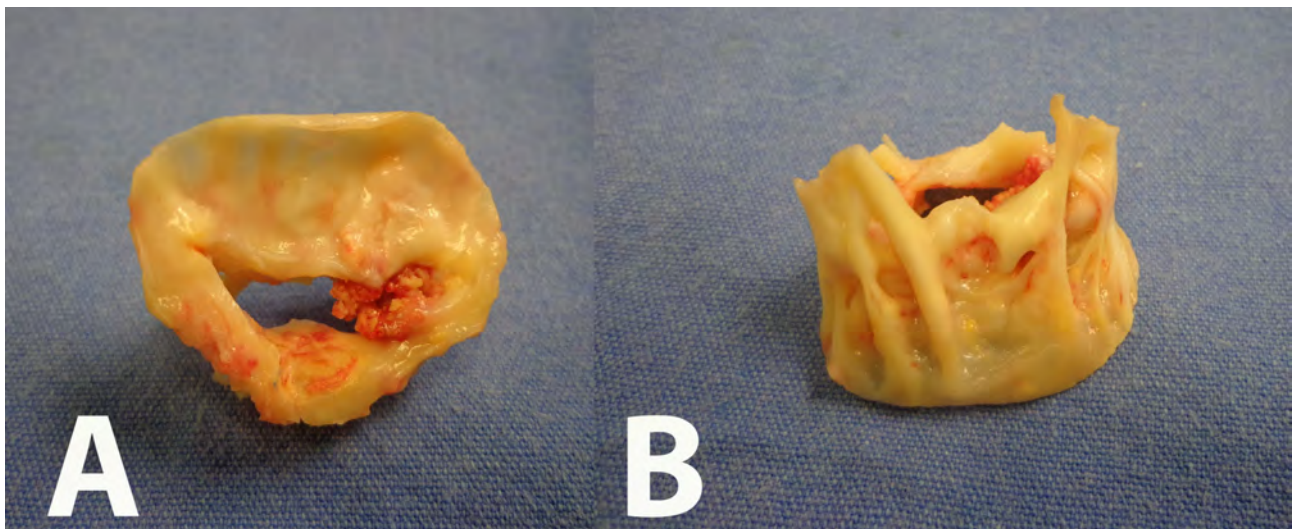


Figure 2. Mitral valve with typical findings of rheumatic etiology. Leaflet thickening, chordal shortening and fused, with both poorly mobile leaflets, including some calcified areas. A: anterior view; B: posterior view of the excised mitral valve.

was 66 mL, Regurgitant fraction not calculated. LVEF was calculated as 50%, and PSAP was 50 mmHg, and MV area of 2.0 cm². The maximum left atrial size by echo was 8 cm. The left atrial appendage was free from thrombus. Accessory studies such as coronary angiography was normal without coronary artery lesions, LVEF around 50%, PSAP 55 mmHg. MV area was calculated in 1.8 cm². AF was catalogued as long-standing persistent with more than 4 years of having installed in a continuous way. She was in NYHA functional class II.

Patient underwent MV surgery through a conventional median sternotomy, and using normothermic cardiopulmonary bypass and aortic cross-clamping. The approach for MV surgery was through the atrium parallel and in front of the right pulmonary veins (Fig. 1). Another good alternative is the superior septal approach for cases with small left atrium [15,16]. After careful evaluation, MV was found as unsuitable for MV repair. Chordal shortening and thickening, with both poorly mobile and thickened leaflets with some calcified areas were the most remarkable surgical findings of the MV (Fig. 2). At the same time, a large left atrium with a quite thickened muscular wall was noted. Some calcified areas of LA tissue were also observed. A large left atrial appendage hole was seen from inside the LA. Previous to the installation of the MV bioprosthesis, the heart was left in situ; thereafter, the base of the LAA was exposed from outside the heart by twisting and pulling up the heart, and the LAA was fully resected, leaving only less than 1 cm from its base (Fig 3). Then, the remainder tissue was sutured using 3/0 polypropylene double running suture [17]. Thereafter, the MV was replaced by a 29 mm mitral bioprosthesis with interrupted and individual 2/0 polyester pledgeted sutures (Fig. 4). The posterior subvalvular apparatus was preserved within the bounds of possibility. Once the biological prosthesis installed, the surgical incision was properly closed with 3/0 polypropylene double running suture. The aortic-cross clamp was re-

leased and the remainder of the operations was done as usual. Patient's cardiac rhythm was atrial fibrillation in the operating room. Postoperative course was uneventful. In-hospital discharge was at fifth postoperative day. Warfarin therapy was administered for the three first months after operation, targeting INR between 2.0 and 3.0. Afterwards, it was suspended. At the last visit to the outpatient clinic, she was in NYHA functional class I, in AF, under treatment for heart rate control, with no oral anticoagulation. No evidence of stroke or any other vascular embolism has been observed. The last echo study showed no evidence of prosthetic heart valve deterioration, with normal LVEF, PSAP of 32 mmHg, left atrial dimension of 6 cm as maximum diameter. No evidence of thrombus inside the heart was observed.

COMMENT

There are several situations we have to remark in this case description. Firstly, biological prostheses offer an excellent alternative when MV repair is not feasible, especially in older patients, such as this our case. There is no rule to choose the type of prosthesis, as mechanical or biological. However, as a general recommendation by the ACC/AHA guidelines for VHD, for cases of MV surgery, bioprostheses can be preferable over mechanical prostheses in patients older than 65 years-old, as a recommendation Class 2a [6]. However, it is worth highlighting that these guidelines directly quote "for patients of any age requiring valve replacement for whom anticoagulant therapy is contraindicated, cannot be managed appropriately, or is not desired, a bioprosthetic valve is recommended", as a recommendation Class 1 [6]. Therefore, the first objective was accomplished, according to the current guidelines.

The second point to emphasize is regarding the surgical ablation for AF by means of the Cox-maze procedure. Consistent with the current guidelines for the surgical management of AF, our case corresponded to a MV disease with concomitant AP. Thus, the indication to treat AF is Class I [8]. Nonetheless, although it is not specified into these clinic guidelines, certain situations must be taken on board affecting the final outcome of the Cox-maze procedure. Left atrial diameter >6.5 cm, AF preoperative duration longer than 10 years, amount of atrial fibrosis, patient age, are only a few preoperative factors affecting the Cox-maze procedure result [18,19]. In this case, we made up our mind by ruling out the full Cox-maze procedure. Some calcified left atrial areas, alongside extremely thickened muscular tissue, in conjunction with the left atrial size of 8 cm tipped the balance towards not performing the Cox-maze procedure. Nevertheless, an alternative procedure was brought to light. Over the years, enough evidence has been cumulated regarding the benefit of excluding the LAA in cardiac surgery. Two observational and retrospective studies were the cornerstone for this statement [10,11]. Moreover, LAA resection is essential and integral part of the Cox-maze procedure [20]. Thus, the Cox-maze procedure is the cardiac surgical procedure with the lower postoperative stroke rate, as low as 0.7% [21,22]. However, despite these good results, we had not been able to discern whether this low incidence of stroke after operation was due to a recovery of the sinus



Figure 3. Left atrial appendage resected during the course of the mitral valve operation. The morphology can be determined as chicken wing.

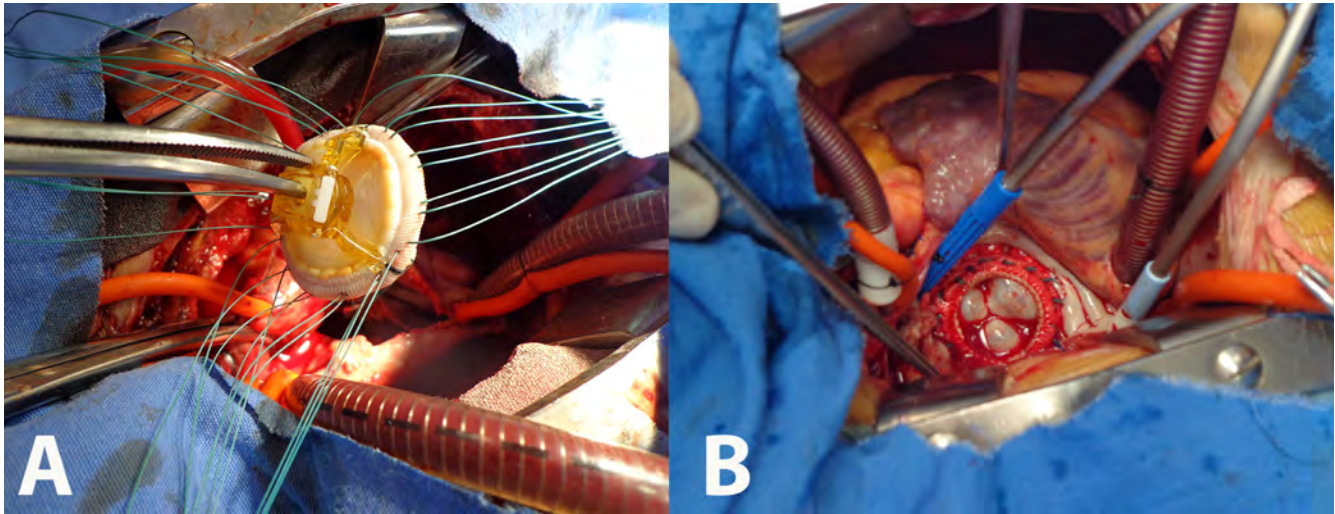


Figure 4. A: Biological mitral valve prosthesis being installed. **B:** The same mitral bioprosthesis already installed.

rhythm, due to the resection of the LAA, or for a combination of both. Certainly, the author has demonstrated that the LAA resection was sufficient to decrease the risk for stroke [14]. The Left Atrial Appendage Occlusion Study (LAAOS) III trial demonstrated that stroke or embolism were present in 4.8% versus 7%, in occlusion and non-occlusion control groups, respectively (HR, 0.67; 95% CI, 0.53 to 0.85; p value = 0.001), with no surgical treatment for the AF [23].

The anticoagulation therapy in these cases after LAA resection but having AF, it is an issue which needs a full overhaul. In a prospective and observational study, García-Villarreal et al., analyzed 29 cases with MV disease and concomitant AF. All of them underwent MV surgery and LAA resection. Warfarin therapy was used in all cases for three months after surgery. No cases but one for transient embolic cerebrovascular event was seen in this group. After three months, anticoagulation therapy was interrupted. There were no cases of stroke after having withdrawn the anticoagulation [14].

With all this information, it can be seen fit that LAA resection as a good option for cases devoid of conviction for the Cox-maze procedure.

Finally, some other additional factors must be considered when performing LAA resection. Several surgical techniques have been described to exclude the LAA. The most effective one has been the external resection by means of cut-and-sew. Special attention must be taken to avoid leaving any remnant stump, as no larger than 1 cm in height. Stumps larger than 1 cm can be the origin for thrombus formation after LAA resection [24]. The surgical technique for LAA external resection has been previously published by the author [25].

In conclusion, this case described herein is a very good case in point about how LAA resection can be a reliable alternative when the Cox-maze procedure is not an option for whatever reason. Needless to say, much more data by RCT are absolutely needed to get strong conclusions in this regard.

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