Isolation Of The Pulmonary Veins For Chronic Atrial Fibrillation With Electrocautery

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Citation

Abstract
The isolation of the pulmonary veins is the fundamental part in the surgery for the elimination of the chronic atrial fibrillation. Traditionally, we have made this surgical technique by means of cutting and sewing around the chamber that contains the four pulmonary veins. The use of electrocautery allows simplifying this procedure. We report here our four cases operated on successfully consistent of mitral valve surgery and isolation of the pulmonary veins in order to eliminate the chronic atrial fibrillation by means of the use of electrocautery.

INTRODUCTION
The isolation of the pulmonary veins is the most crucial step in the surgical cure of the chronic atrial fibrillation (AF). The original idea of this technique was the left atrial reduction (LAR) 
1, 2 for the cases of mitral valve (MV) surgery associated with chronic AF. The handling of a double concept by means of the use of LAR quickly gained popularity. On the one hand, the isolation of the pulmonary veins (PV) as more frequent anatomical site of the origin of the electrical stimuli that generate AF 
3, 4; on the other hand, the elimination of the left atrial (LA) tissue as reduction of “critical mass”, which is necessary for the re-entrant activity of AF. Nevertheless, the key for elimination of the AF in this type of surgery is represented by the isolation of the VP 
1, 2, 3, 4.

The use of electrocautery producing colliquative necrosis by means of a traditional LA incision parallel to the interatrial groove. Once the MV surgery was performed, this last incision was prolonged upwards and downwards in the LA (Fig 1). A partial isolation of the PV was obtained

SURGICAL TECHNIQUE
All the four patients were operated on by median sternotomy. Standard aortic and bicaval cannulation were employed. Conventional cardiopulmonary bypass at 28°C was used. Retrograde, cold, sanguineous, hiperkalemic cardioplegic solution through the coronary sinus was delivered in an intermittent way. MV surgery was performed
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Figure 1

Figure 1: This illustration shows the burned area with the electrocautery (dotted line) in the back of the left atrium. LAA= Left atrial appendage, MP= Mitral prosthesis, PV= Pulmonary veins.

The remaining non-cut site in the back of LA was treated by means of electrocautery. A straight line was performed with electrocautery between both ends of the LA incision (Fig 1). Electrocautery pencil was mobilized approximately at a speed of 5 mm per second, until reaching a whitish color in the burned area. Cautery pencil was connected to a diathermy machine (Valleylab, Inc., CO) set at 40 watts, coagulation mode-spray setting. Finally, the LA appendage was resected from the inner of the LA. The LA incision was closed with a 3/0 polypropylene running suture. The aortic-cross clamp was removed, and the normal sinus rate recovered immediately.

RESULTS

We have applied this surgical technique in 4 patients with rheumatic MV disease, 1 male and 3 female, with a mean age of 45.7 ± 11.4 years at operation. AF was present in all cases, with a mean duration of 5.6 ± 3.4 years prior to surgery. All patients were in New York Heart Association (NYHA) class III. Mean preoperative antiarrhythmic drugs per patient were 1.8 ± 0.8 (range, 1 to 3). MV replacement was performed in 3 cases, and MV repair in one. Mean cardiopulmonary bypass time and aortic-cross clamping time were 83 ± 10.2 minutes and 60.2 ± 14.7 minutes, respectively.

Normal sinus rhythm was restored quickly after removal of the aortic-cross clamp in all cases. There were no hospital mortality or reoperations for chest bleeding. Postoperative course was uneventful in all cases. Early extubation within the first 6 postoperative for all cases was possible. Mean stay at ICU was 1.6 ± 0.6 days. Mean postoperative hospital stay was 6.7 ± 0.8 days. Antiarrhythmic medical therapy was discontinued 6 weeks after surgery. At a follow-up period of 4 to 12 months, all patients are in NYHA class I and exhibit a normal sinus rhythm.

DISCUSSION

Chronic AF commonly accompanies to MV disease. Haïsaguerre and coworkers [4, 5] have demonstrated that the origin of the electrical stimuli which produce and maintain the AF is into the VP up to 96% of the cases, and of these, into the superior PV up to 75%. This way, isolation of the VP is an effective alternative in the surgical treatment of the AF [7]. Maze procedure has been considered as the golden choice in order to eliminate the chronic AF. However, this technique is not widely accepted because it is hard to do, time-consuming, and the use of cryolesion or radio frequency.

LAR procedure has been used as an alternative for the surgical elimination of the AF [1, 2, 8]. Nevertheless, this technique also consumes time, especially when it is used simultaneously with a MV procedure such a complex mitral valve repair [2]. Shimma [5] has demonstrated the usefulness of the electrocautery in the maze procedure, avoiding multiple incisions in both auricles. In such way, surgical time for AF is too shorter than in a conventional cutting and sewing technique. We have adapted the use of electrocautery to isolate the PV.

We have found that the use of electrocautery represents an important simplification in the surgery for isolation of the PV in order to eliminate the chronic AF. The time used in making the burn around the PV has been less than 5 minutes. At the same time, the morbidity caused by the incisions in the back of the LA, as well as the risk of postoperative surgical bleeding diminishes.

CONCLUSIONS

In conclusion, although nowadays we have in process histopathologic studies about the depth of the burn in the atrial myocardium, a priori, this technique seems to simplify
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importantly the procedure of isolation of the PV in the surgery of AF during the course of a simultaneous mitral valve intervention. This reduces the surgical time and the morbidity caused by the incisions in the LA

References


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