Partial cardiac autotransplantation with a concomitant mitral valve, aortic valve replacement and tricuspid plasty

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Received 8 March 2013; received in revised form 8 May 2013; accepted 28 May 2013

Abstract

We describe a case with left atrial volume reduction of a giant left atrium, treated successfully by partial cardiac autotransplantation, concomitant mitral and aortic valve replacement, and tricuspid valve plasty. We obtained good results at the 1-year follow-up.

Keywords: Cardiac autotransplantation • Mitral valve • Aortic valve • Surgery

INTRODUCTION

A giant left atrium (GLA) can cause severe oppression of its surrounding tissues and organs such as the trachea, bronchus, lung and left ventricle. Because GLA can increase the risk of sudden death, its existence merits careful evaluation and surgical intervention when needed [1, 2]. Cardiac autotransplantation has been recommended to achieve left atrium volume reduction and relief of compressive symptoms after surgery [3, 4]. We describe here a patient with a GLA who had successful surgical correction by partial heart autotransplantation. The mitral and aortic valves were replaced by mechanical prostheses, and a tricuspid valve annuloplasty was also performed.

CASE REPORT

The patient was a 46-year old female with a 20-year history of dyspnoea, worsening chest discomfort and a history of more than 15 years of persistent atrial fibrillation. Preoperative transthoracic echocardiography revealed severe mitral and aortic valve stenosis, severe tricuspid valve regurgitation, an ejection fraction of 42%, left atrium dimensions of 10.7 × 8.3 cm and an atrial volume of 789 ml. The left ventricular diastolic diameter was 6.4 cm and systolic diameter was 5.1 cm. The patient was classified as New York Heart Association Class IV. Computed tomography showed midoesophageal and bilateral pulmonary compression from the left atrium. Preoperative coronary angiography showed no coronary artery stenosis.

Standard midline sternotomy with aortic and bicaval cannulation was used. The superior vena cava (SVC) was cannulated 3 cm above the junction between the right atrium and the SVC using an L-shaped cannula. Retrograde cold blood cardioplegia was administered every 20 min for myocardial protection. After aortic cross-clamping, the SVC, aorta and pulmonary artery were transected in the same way as in heart transplantation. The inferior vena cava was left intact. The left atrium was resected except for its base, conserving the left and right pulmonary vein orifices. The lateral wall, atrial appendage, atrial roof and the region between the pulmonary veins and the mitral annulus were resected, leaving enough area for suturing. The mitral and aortic valves were replaced with St. Jude mechanical valves (St. Jude Medical, Inc., St. Paul, MN, USA). Then, the left atrium was closed using running 5-0 polypropylene sutures (Fig. 1) [3]. Finally, through a vertical right atriotomy, a tricuspid annuloplasty was performed with an Edwards MC³ tricuspid annuloplasty ring (Edwards Lifesciences, Irvine, CA, USA). Cardiopulmonary bypass and cross-clamp time were 320 and 250 min, respectively.

The patient was discharged 15 days after surgery. The 1-year follow-up echocardiography revealed a well-functioning prosthetic mitral and aortic valve, trace tricuspid insufficiency, an ejection fraction of 55% and a left atrial volume of 116 ml. The left ventricular diastolic diameter was 4.86 cm and systolic diameter was 3.65 cm (Fig. 2A and B).

DISCUSSION

Currently, there is no consensus regarding the management of GLA during mitral valve surgery [5]. Risk of excessive bleeding, increased cardiopulmonary times and unclear surgical efficacies raise many questions about the optimal approach to GLA reduction. The conventional technique is partial plication. The classic plication technique involves occluding the left atrial appendage and plicating just the inferior wall of the left atrium. This technique results in a modest left atrial volume reduction and may leave a potentially thrombogenic surface within the left atrium. Lessana et al. [4] presented a case in which GLA was...
reduced by means of partial autotransplantation, with excel-
lent results. In the present case, we successfully used this tech-
nique to reduce the volume of GLA that was associated 
mitral and aortic valve operations.

The biggest advantage of this technique was an extensive 
reduction of the left atrial volume. The intended bene-
fits of reducing a GLA included alleviating the pressure effects to the left 
ventricle, bronchus and lung parenchyma and reducing the early 
postoperative complications related to low cardiac output syn-
drome and respiratory complications [2]. Also, this technique may 

have benefits in chronic atrial fibrillation in the context of mitral 
valve disease as left atrium size is an important factor in the suc-
cessful treatment of chronic atrial fibrillation. However, a potential 
disadvantage of this technique is a risk of bleeding along the ex-
tensive suture lines and increased surgical time.

Conflict of interest: none declared.

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eComment. Mini-partial heart autotransplantation for atrial fibrillation and mitral 
valve surgery

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doi: 10.1093/icvts/ivt377
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It is very exciting to discuss this beautiful article by Pan et al. [1]. There is consider-
able documentation in the literature about the use of partial heart autotransplanta-
tion for a variety of purposes. My teacher, Arrigo Lessana in Aubervilliers, France, had 
begun to use partial cardiac autotransplantation in the spring of 1998 [2] for adequate 
visualization to reduce the size of the left atrium (LA). Later, when I came back to 
Mexico, I operated on three cases of mitral valve disease and chronic atrial fibrillation 
(AF) with giant LA from 2000 to 2001 [3]. All three cases had a spectacular outcome. 
After this very nice experience, I promptly realized that by sectioning only the super-
or vena cava (SVC) one can get an effective access to the whole LA. So I performed 
about 100 cases of surgical isolation of the pulmonary veins to treat AF in mitral valve 
disease [4]. But it is clear that this was not a left-sided maze, and the sinus rhythm 
conversion rate was lower than those reported by Cox et al. [5]. With all this