

Left Atrial Plication for Heart Transplantation in Patients with Giant Left Atrium

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ABSTRACT

Giant left atrium occasionally occurs in patients undergoing heart transplantation and causes a technical challenge for the surgeon because of the substantial discrepancy in size between the left atrial cuffs of the recipient and donor. We describe a left atrial plication technique that substantially reduces this discrepancy and allows for a standard left atrial anastomosis to be performed without any other modifications in technique.

INTRODUCTION

Heart transplantation remains the gold standard treatment for end-stage heart failure. The surgical technique for heart transplantation has not changed dramatically since its original description by Lower and Shumway [1960]. The major modification to their technique has been the introduction of bicaval anastomoses instead of the single right atrial anastomosis initially described [Sievers 1991]. The majority of transplantation centers now use either biatrial or bicaval right atrial anastomoses with standard left atrial, pulmonary artery, and aortic anastomoses.

Occasionally, patients presenting for heart transplantation, especially those with chronic mitral valve disorders, have a giant left atrium (Figure 1) [Di Eusanio 1988]. This anatomic feature leads to a very large size disparity between the left atrial cuffs of the recipient and the donor. Some degree of size mismatch between these 2 structures is quite common and is typically accommodated by trimming the cuffs appropriately and adjusting the travel of the stitches on either side of the left atrial anastomosis. In patients with a giant left atrium, however, the circumference of the recipient's left atrial cuff may be more than twice that of the donor (Figure 2A). Performing a standard left atrial anastomosis in this setting may lead to anastomotic bleeding, which is difficult to expose and control, and it may lead to distortion and dysfunction of the donor heart

mitral valve. In this situation, we have used a technique of left atrial plication to reduce the circumference of the recipient's left atrial cuff substantially and allow the left atrial anastomosis to be performed without such a mismatch in size.

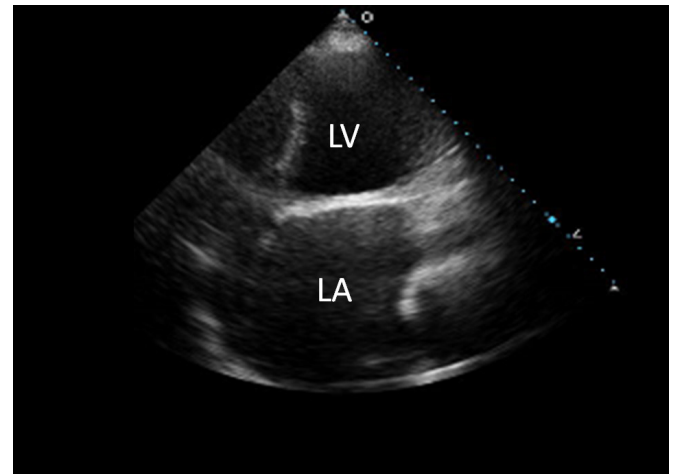


Figure 1. Apical 2-chamber view of a heart transplantation candidate demonstrating a giant left atrium (LA). The LA diameter measured in this patient was 15 cm, with a corresponding circumference >45 cm. LV indicates left ventricle.

TECHNIQUE

The native recipient heart is resected in the standard fashion. If a large mismatch in the sizes of the left atrial cuffs is anticipated, the right atrium is not resected completely. Instead, a right atrial cuff is prepared for possible biatrial anastomosis. The left atrial cuffs of the recipient and donor then are assessed. If a substantial mismatch in size makes a standard left atrial anastomosis hazardous, a left atrial plication is performed.

The inferior border of the recipient's left atrial cuff is plicated to the inferior portion of the interatrial septum with a running suture (Figure 2B). In this fashion, up to 15 cm of the free edge of the left atrial cuff is excluded from the anastomosis, and the mismatch in size between the recipient and donor is reduced by this amount. Care must be taken not to obstruct the venous return from the right pulmonary veins when the plication is carried out. A standard left atrial anastomosis is then performed.

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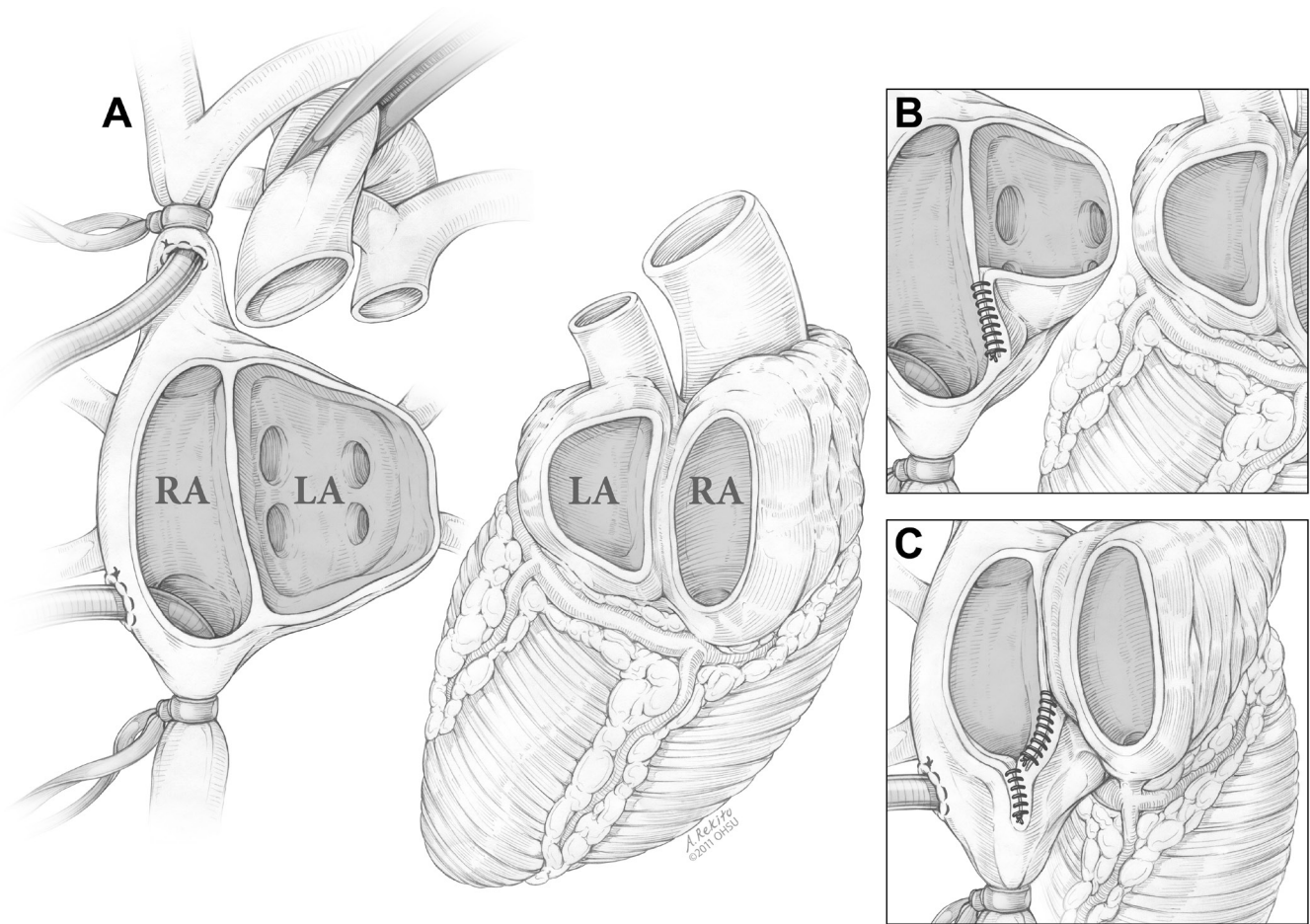


Figure 2. A, Discrepancy in left atrium (LA) size encountered at the time of heart transplantation in a recipient with a giant LA. RA indicates right atrium. B, Plication of the inferior portion of the recipient's LA to the inferior interatrial septum. This maneuver substantially reduces the size mismatch between the atrial cuffs of the recipient and donor. C, Plication of the inferior portion of the recipient's RA cuff. This procedure decreases the size of the RA anastomosis and reduces donor tricuspid valve distortion and dysfunction that may occur with the use of a biatrial technique.

After performing this procedure, we have noted that the donor's right atrium is displaced superiorly, because the left atrial plication has excluded the inferior portion of the interatrial septum from the left atrial anastomosis. This superior displacement of the donor's right atrium usually makes a bicaval anastomosis impossible because of the distance between the inferior vena cavae of the recipient and donor. A biatrial anastomosis is therefore carried out. To reduce the size of the right atrial anastomosis, we also typically perform a plication of the inferior portion of the recipient's right atrial cuff with a running suture (Figure 2C). This step decreases the length of the donor heart right atriotomy that is necessary and reduces the degree of donor tricuspid valve distortion and dysfunction that may occur with a biatrial technique.

COMMENT

Giant left atrium occurs occasionally in heart failure patients with chronic mitral valve disorders and can lead to a dramatic mismatch in size between the left atria of the recipient and donor at the time of heart transplantation. Complete

resection of the recipient's left atrium with separate left and right pulmonary vein anastomoses has been described to address this scenario; however, this introduces significant complexity and technical difficulty to the procedure [Dreyfus 1991; Liao 2004]. It also requires the donor heart to have an intact left atrium, which is not typically available when lungs are procured from the same donor. A mismatch in the sizes of the left atria would therefore have to be anticipated preoperatively so that a donor heart without concomitant lung procurement could be selected for transplantation into a recipient with a giant left atrium.

We have described a simple technique of left atrial plication to reduce the mismatch in left atrial size in the setting of giant left atrium. An advantage of this technique is that it is simple and allows completion of the left atrial anastomosis in the standard fashion. It can be performed spontaneously when a large size mismatch is encountered, without requiring a preoperative diagnosis and the special selection of donors. The major technical consideration is to avoid obstructing the right pulmonary venous return with the left atrial plication stitch. Bicaval anastomoses are usually not feasible when

a large left atrial plication is performed because of the superior displacement of the donor's right atrium. Plication of the recipient's right atrial cuff facilitates creation of a right atrial anastomosis.

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