

Case Reports

# Heart Transplantation in a Patient With Rheumatic Heart Disease and Severe Left Atrial Calcification

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## Abstract

A 62-year-old woman who had undergone mitral valve replacement 24 years ago was admitted to the hospital with congestive heart failure. She needed heart transplantation for stage D heart failure. Preoperative cardiac computed tomographic scans showed a severely calcified left atrium and a large right atrium. Given that the left atrium's calcification was too severe to suture, the calcified left atrial wall was broadly resected, and the resected left atrial wall was reconstructed with a bovine pericardial patch for anastomosis with the donor's left atrial wall. The operation was completed without heavy bleeding, and the patient was discharged from the hospital with no complications.

**Keywords:** Heart transplantation; rheumatic heart disease; shock, cardiogenic

## Case Report

### Presentation and Physical Examination

A 62-year-old woman was admitted to a medical center with dyspnea and oliguria. She had been receiving diuretics and dobutamine continuously to manage her heart failure, but her condition could not be controlled. Her clinicians therefore decided to register her for the Center for Korean Network for Organ Sharing's heart transplantation list.

Transthoracic echocardiography showed right ventricular hypokinesia and left ventricular dysfunction (ejection fraction, 35%), with a severely dilated left atrium (LA) and right atrium (RA) (LA volume, 473.6 mL; LA volume index, 317.85 mL/m<sup>2</sup>; LA diameter, 7.77 cm; RA volume, 483.1 mL; RA volume index, 324.23 mL/m<sup>2</sup>; RA diameter, 7.1 cm at the minor axis and 11.2 cm at the major axis). She had severe tricuspid valve regurgitation. Her pulmonary artery systolic pressure was 6.5 kPa (49 mm Hg), but she had normal prosthetic mitral valve function. Cardiac computed tomographic scans showed a dilated RA and LA and a severely calcified LA wall, especially the posterior and upper portions of the wall (Fig. 1A and Fig. 1B). Performing anastomosis between the recipient's severely calcified LA wall and the donor's LA was believed to be impossible because of the severity of the recipient's LA wall calcification. The clinicians therefore planned to resect the recipient's severely calcified LA wall and replace the area of the resected LA wall with a bovine pericardial patch to make a neo-LA wall. The neo-LA wall was made to reduce the anastomosis area and size mismatch between the patient's LA and the donor's LA.

### Medical History

The patient had undergone mitral valve replacement with a mechanical valve for mitral valve stenosis and comorbid rheumatic heart disease 24 years ago.

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## Technique

A suitable donor was identified 1 month after the patient had been registered on the heart transplantation waiting list. The heart was accepted for transplantation, and the heart transplantation operation was performed. After sternotomy, adhesiolysis was performed using electrocoagulation. The RA wall was large and thin, and the LA wall was severely calcified (Fig. 1C and Fig. 1D). Cannulations of the ascending aortic, superior vena cava, and right femoral veins were performed for cardiopulmonary bypass. After aortic cross-clamping, cardiectomy was performed. The recipient's calcified LA wall was thick, and the severely calcified portions of the LA wall were resected until the suturable portions of the LA wall were exposed. After debriding the severely calcified LA wall, 2 bovine pericardial patches were sutured to both edges of the recipient's LA to cover the pulmonary vein's orifice (Fig. 2A and Fig. 2B). By making a neo-LA wall for the recipient, the anastomosis area and size mismatch between the recipient's and donor's LAs were reduced. After covering both sides of the LA wall using a bovine pericardial patch (Fig. 2B), anastomosis of the donor's LA wall to the neo-LA wall (bovine pericardium and the remnants of the recipient's LA wall) was performed (Fig. 2C and Fig. 2D).

After completing the LA anastomosis, anastomoses of the pulmonary artery, ascending aorta, and inferior vena cava were performed. After releasing the aortic cross-clamp, superior vena cava anastomosis was performed.

## Outcome

Weaning from cardiopulmonary bypass was performed using a low dose of intravenous epinephrine and norepi-

## Key Points

- A severely calcified LA wall in a patient with rheumatic heart disease is rare, and performing heart transplantation in such patients is challenging.
- Severe calcification in the recipient's LA wall is a considerable risk factor for bleeding during heart transplantation, but resection of the calcified LA causes size mismatching between the donor's LA and the recipient's LA.
- In this situation, resection of the calcified LA and reconstruction of the resected LA with a bovine pericardial patch is a feasible option for LA anastomosis without marked bleeding or size mismatch.

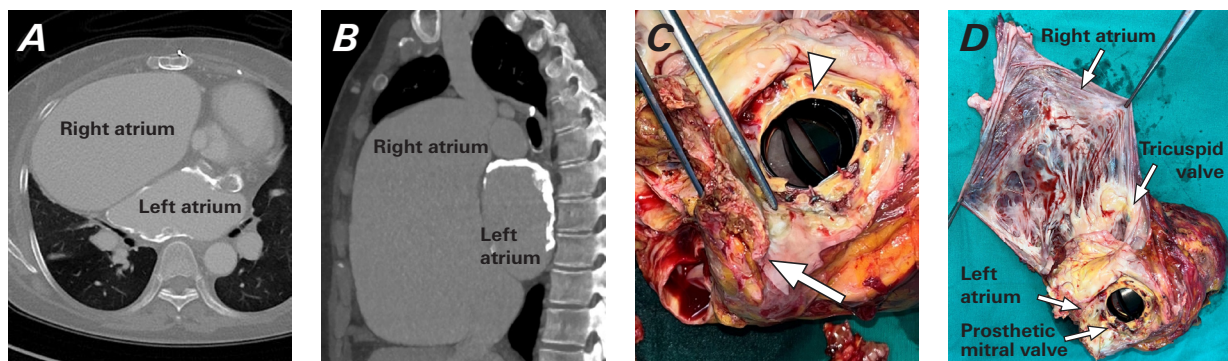
## Abbreviations and Acronyms

LA	left atrium; left atrial
RA	right atrium; right atrial

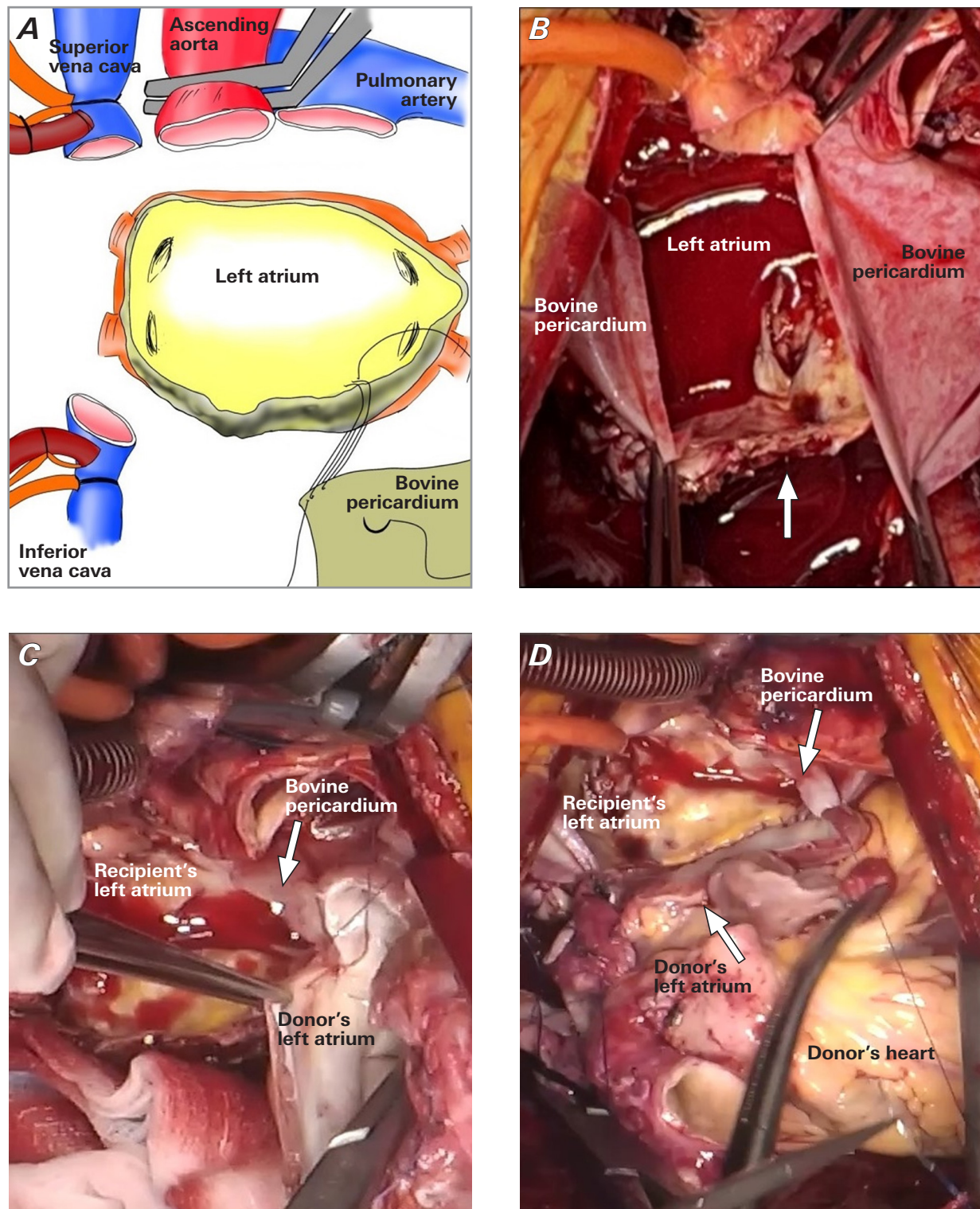
nephrine with no problems. The total ischemic time of the donor's heart was 233 minutes (cold ischemic time, 127 min; warm ischemic time, 106 min). After heparin reversal by protamine infusion, there was no marked bleeding at the LA anastomosis site. The patient was weaned from mechanical ventilation on postoperative day 6 and transferred to the general ward on postoperative day 12.

## Latest Follow-Up

Postoperative transthoracic echocardiographs and coronary angiograms showed normal findings, and the patient was discharged from the hospital on postoperative day 38 with no complications. Her immunosuppressive induction therapy included 2 doses of 500 mg methylprednisolone. Maintenance therapy included 250 mg



**Fig. 1** **A)** The axial plane of a preoperative computed tomographic scan shows that the recipient's right atrium was enlarged and that there was severe left atrial wall calcification combined with rheumatic heart disease. **B)** The sagittal plane of a preoperative computed tomographic scan shows that left atrial calcification was especially severe at the posterior and upper left atrial walls. **C)** A gross specimen of the recipient's heart following cardiectomy shows that the recipient's left atrial wall had thick calcification (bottom arrow: recipient's left atrial wall; top arrow: mitral valve annular calcification). **D)** A gross specimen of the recipient's heart following cardiectomy shows that the recipient's right atrium was enlarged and the right atrial wall was thin.



**Fig. 2** Operative technique. **A**) A surgical diagram shows that following cardiectomy and debridement of the severely calcified LA wall of the recipient's heart, 2 bovine pericardial patches were sutured to both edges of the recipient's LA (arrow: remaining LA wall calcification after debridement of severely calcified LA wall). **B**) A neo-LA wall was made by covering both edges of the recipient's LA with bovine pericardium (arrow: remaining LA wall calcification after debridement of the severely calcified LA wall). **C**) After covering both edges of the recipient's LA with bovine pericardium, as shown, **(D)** anastomosis of the donor's LA wall to the bovine pericardium and the remnants of the recipient's LA wall was performed.

LA, left atrium.

mycophenolate mofetil every 12 hours; 5 mg prednisone every 12 hours; and 1 mg tacrolimus every 12 hours.

## Discussion

Rheumatic heart disease is an autoimmune-mediated disease accompanied by pericarditis, myocarditis, and valvulitis<sup>1</sup> that cause progressive valvular damage and heart failure. Eventually, many patients with rheumatic heart disease require heart valve surgery, but cardiac wall calcification and heart dysfunction continue to develop after heart valve surgery in these patients.<sup>2</sup> These symptoms occur because rheumatic heart disease is a chronic inflammatory disease,<sup>1,3,4</sup> and many patients with rheumatic heart disease undergo heart transplantation after heart valve surgery. The mean (SD) interval from first valve surgery to transplantation has been reported as 14.62 (6.69) years,<sup>4</sup> and the survival rate for patients who undergo heart transplantation for rheumatic heart disease is substantially lower than the survival rate for patients who undergo heart transplantation for dilated cardiomyopathy.<sup>4,5</sup>

In patients with rheumatic heart disease, cardiac wall calcification can also be present, especially severe LA wall calcification, which makes LA anastomosis challenging to perform because the calcified LA wall is difficult to suture and because calcification increases the risk of bleeding. For patients with stage D heart failure combined with severe LA wall calcification who need heart transplantation, a left ventricular assist device is another option, but heart transplantation has better long-term outcomes than left ventricular assist devices.<sup>6,7</sup> It was therefore decided that this patient would undergo heart transplantation rather than a left ventricular assist device. During heart transplantation, the calcified LA wall was resected and replaced with a bovine pericardial patch to reduce size mismatch between the donor's LA and the recipient's LA. The operation was completed without considerable bleeding at the LA anastomosis site. A bovine pericardial patch was used rather than a Dacron patch because the textile-based Dacron patch has a higher risk of bleeding.

Resecting the calcified LA wall and replacing it with a bovine pericardial patch is a feasible option when performing heart transplantation in patients with rheumatic heart disease who have a severely calcified LA wall.

## Article Information

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