

Acquired Left Ventricular-Right Atrial Communication After Mitral Valve Replacement and Tricuspid Annuloplasty

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Abstract

A 77-year-old woman underwent mitral valve replacement and tricuspid annuloplasty for severe mitral stenosis and tricuspid regurgitation with pulmonary hypertension. Two months later, the patient was readmitted because of marked edema. A new harsh pansystolic murmur was auscultated, and echocardiography revealed a jet from the left ventricle to the right atrium but no perivalvular leakage was detected at the mitral valve position. At operation, a 6mm defect adjacent to the tricuspid annulus in the interatrial septum and detachment of the anterior edge of the tricuspid ring were detected. The defect was closed using a pericardial patch. An inadequate stitch at the antero-septal commissure in the previous operation led to left ventricular-right atrial communication.

Introduction

Acquired left ventricular-right atrial (LV-RA) communication is a rare complication after cardiac surgeries, which may be caused by valvular surgeries associated with severely calcified aortic or mitral valves. Sudden left-to-right shunt leads to congestive heart failure. Here, we report here a case in which an inadequate of tricuspid annuloplasty suture was responsible for LV-RA communication.

Case report

A 77-year-old woman underwent mitral valve replacement (MVR) and tricuspid annuloplasty (TAP) for severe mitral valve stenosis and severe tricuspid regurgitation complicated with pulmonary hypertension and atrial fibrillation. Atrial fibrillation was not corrected because of severe dilation of both atria and disappearance of the f-wave on the electrocardiogram. Mitral annular calcification at the posteromedial site was debrided using an ultrasound aspirator. A bioprosthesis and a rigid prosthetic ring were used for the MVR and TAP, respectively. The patient was discharged without adverse events. Three months after the operation, the patient suddenly complained of shortness of breath on exertion and severe peripheral edema. A new harsh pansystolic murmur was auscultated at the 4th left sternal border. Although there was an interventricular shunt on the transthoracic echocardiogram, transesophageal echocardiography revealed that the jet was not an interventricular shunt but from the LV to the RA (Fig.1). The bioprosthesis valve functioned normally and no paravalvular leakage was detected. After intensive medical treatment for congestive heart failure, the LV-RA communication was repaired. A defect, 6mm in diameter, was located just cephalad to the antero-septal commissure of the tricuspid valve. The lower margin of the defect was bordered by the annulus of the tricuspid valve (Fig.2). The anterior edge of the rigid prosthetic ring was detached to achieve single stitch width. Close inspection of the tricuspid valve revealed no interventricular communication. 15mm of the anterior edge of the rigid prosthetic ring was resected, because that part of the ring interfered with defect repair. The defect was closed using a xenopericardial patch with five pledget mattress sutures. The inferior part of the patch was fixed using two mattress sutures, that were anchored to the interventricular septum and then passed through the annulus of the tricuspid valve to avoid the

conduction system. No intracardiac shunt was detected on transesophageal echocardiography after repair. The patient recovered uneventfully and has been doing well with no signs of congestive heart failure after discharge.

Discussion

Acquired LV-RA communication is a rare condition, that results from endocarditis, blunt trauma, myocardial infarction, or complication of cardiac surgery (1-7). The most common cause of acquired LV-RA communication is previous cardiac surgery, such as aortic or mitral valve replacement (6,7). In valve replacement surgery, excessive debridement of annular calcification leads to paravalvular leakage, left ventricular rupture, or intracardiac shunts. However, TAP with a prosthetic ring is uncommon cause of this complication. In our case, although debridement of annular calcification at the posteromedial site was performed in the previous MVR, the location of the defect did not match that site. Anatomically, a septum between the LV and RA is created by a more apical displacement of the tricuspid annulus than the mitral valve, posterior to the membranous septum and separated from the interventricular part by the attachment line of the tricuspid valve (8). If the sutures for TAP are placed incorrectly on this atrioventricular membranous portion at the anteroseptal commissure, dehiscence of the prosthetic ring may occur, leading to LV-RA communication. An inadequate suture was presumed to be the main cause of the LV-RA communication in our case, because the annulus of the anteroseptal commissure was intact. Additionally, if excessive removal of the calcification of the mitral annulus leads to LV-RA communication, the defect should be more cephalad and rightward due to the difference in annulus levels between the mitral and tricuspid valves. Aggressive correction of a markedly dilated tricuspid annulus is speculated to be another factor contributing to this complication. This causes excessive tension at the suture sites, especially when a rigid prosthetic ring is used.

The defects are basically formed as a result of laceration of fragile tissue, by conditions such as endocarditis, myocardial infarction, or excessive decalcification; therefore, patch closure of the defect is recommended for surgical repair of LV-RA communication, with repair sutures placed outside the involved tissue. As the defect locates more cephalad in the case of excessive decalcification for MVR, stitches for closure are placed simply around the defect. However, in our case, as the lower margin of the defect was bordered by the annulus of the tricuspid valve, interrupted stitches for the caudal part were placed on the interventricular septum to avoid the conduction system. We had to resect the anterior edge of the prosthetic ring during this procedure, which interfered with defect closure.

Although surgical repair of the LV-RA communication is standard, it is technically risky and demanding, after the cardiac surgery. Some studies have reported using transcatheter repair for this (9), and this could be further developed using advanced three-dimensional diagnostic ware and by improving closure devices in the future.

Conclusion

Acquired LV-RA communication after cardiac surgeries is rare. However, it can occur during valve replacement of severely calcified aortic or mitral valves, as well as during TAP with inadequate sutures of the prosthesis. In such cases, care must be taken to avoid damaging the conduction system during closure of the defect.

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Figure Legends

(Fig. 1) Transesophageal echocardiography shows an abnormal jet between the LV and the RA.

LA: left atrium, LV: left ventricle, RA: right atrium

(Fig. 2) Operative view.

A defect of 6mm in diameter (arrow head) bordered on the annulus of the tricuspid valve (arrows). Anterior edge of the prosthetic ring was detached from the annulus.

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