Case report

Repair of late left ventricular rupture after repeat mitral valve replacement

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Abstract

Late rupture of the left ventricle after repeat MVR was successfully repaired by patch closure through the right atrium. We recommend early elective repair of such lesions before cardiac function is compromised. © 1997 Elsevier Science B.V.

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1. Introduction

Left ventricular (LV) rupture is a well-described, lethal complication following mitral valve replacement (MVR). Procedures for treating this complication are well established [1]. However, incomplete, or late, LV rupture, accompanied by pseudoaneurysm formation, is a very rare complication which occurs days to years after surgery. There have been few reports addressing this problem, especially after repeat MVR. Spellberg and O’Reilly [4] first reported late rupture after MVR which was diagnosed by left ventriculography. Using color Doppler echocardiography, it is possible to detect pseudoaneurysm formation as well as determine flow into the pseudoaneurysm. It is therefore easy to diagnose pseudoaneurysm formation early in the postoperative period. Moreover, operative mortality can be reduced if this unusual complication is detected before any other complications develop. In this case report, we describe the successful repair of a late LV rupture following repeat MVR.

2. Case report

A 60-year-old woman had MVR with a 5-T Kay Shiley disk valve and tricuspid annuloplasty at the age of 36 for rheumatic mitral and aortic valvular disease. In addition, the patient had an atrial septal defect. She gradually developed symptoms of easy fatigability and exertional dyspnea. Echocardiography revealed mechanical mitral valve stenosis due to punnus formation (mitral valve area: 1.16 cm² by pressure half-time measurements) and mild aortic regurgitation. Disk valve movement was not severely restricted, however, the effective valve area calculated by the Gorlin method during cardiac catheterization was 1.4 cm².

Repeat MVR was performed using a trans-septal approach. The valve was replaced with a Carbomedics mitral valve ( # 29) with everti mattress sutures and left atrial plication. The patient was successfully weaned from cardiopulmonary bypass and had an uneventful postoperative course until routine echocardiography was performed on the 25th postoperative day. The echocardiogram revealed a pulsatile mass in the right atrium (see Fig. 1, white arrows) which communicated with the LV through a relatively large orifice (6 mm in diameter, Fig. 1(a)). Subsequent echocardiogra-

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phy demonstrated no change in the size of the pseudoaneurysm, which was located in the atrioventricular groove between the epicardium and endocardium close to the coronary sinus. Left ventriculography demonstrated clear bulging from the LV into the right atrium (Fig. 1(b)).

Surgery was performed through the right atrium in order to localize the large bulging mass (4 cm in diameter). After arresting the heart, the mass was incised to reveal fresh blood and a relatively large orifice (10 mm in diameter) through which the mitral valve could be seen. Because the sutures for the mitral valve were secure, closure of the orifice with Gore-Tex patch was performed with buttressed mattress sutures through the right atrium. The right atrial endocardium was closed with continuous sutures to exclude the pseudoaneurysm. No detectable bulging mass was observed in right atrial cavity following surgery. In addition, no shunt flow across the patch was noted with transesophageal echocardiography. The patient had an uneventful postoperative course. Complete closure of the orifice and a very small mass next to the right atrium, which was a remnant of the pseudoaneurysm, was confirmed by echocardiography, but no bulging mass was detected by left ventriculography at the early postoperative period (Fig. 2). Echocardiography performed at 7 months after the operation did not detect the mass (Fig. 3).

3. Comments

Left ventricular rupture can be classified according to either location or timing of rupture. First, there are three types of rupture based on location: type 1, a tear in the atrioventricular groove; type 2, a wound at the base of the excised papillary muscle; and type 3, a defect between the atrioventricular groove and the base of the papillary muscle [5]. Second, the presentation can occur during three distinct time periods: early, delayed and late rupture. Early rupture is defined as occurring in the operating room anytime after discontinuation of
cardiopulmonary bypass. Delayed rupture refers to ruptures in which the first manifestation is noted in the recovery room, usually hours to days postoperatively. Late rupture of the left ventricle occurs days to years after valve replacement and presents as a false aneurysm of the left ventricle [3,4].

Late ventricular rupture with pseudoaneurysm formation after repeat MVR is extremely rare; even late rupture after the first MVR is rare [2]. This is the first case report of repair via the right atrium. Factors influencing the occurrence of left ventricular tear include: (1) retraction of the ventricle when the left atrium is fixed by adhesions from a previous surgery; (2) forceful retraction and inadvertent laceration of the mitral annulus; (3) insertion of an oversized prosthesis; (4) deeply placed myocardial sutures; (5) accidental mechanical trauma to the myocardium during valve replacement; and (6) untethering of the fibrous ring structure of the left ventricle during resection of the mitral leaflets [6]. In the present case, excessive debridement of calcium from the mitral annulus and the chordae may have caused the late type 1 rupture.

Expansion of a left ventricular pseudoaneurysm can compromise the lumen of the circumflex coronary artery and produce a myocardial infarction. This could result in shock or cardiac arrest. Based on the present case report, successful repair of this unusual complication via the right atrium can be performed with a low operative mortality if the lesion is detected before the development of acute myocardial ischemia [6].

References