Case Report

Late Diagnosis of Large Left Ventricular Pseudoaneurysm after Mitral Valve Replacement and Coronary Artery Bypass Surgery by Real-Time Three-Dimensional Echocardiography

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Abstract

One of the most serious complications of mitral valve replacement is left ventricular rupture and pseudoaneurysm formation, which is rare but potentially lethal. We herein present a late type of post mitral valve replacement and coronary artery bypass surgery pseudoaneurysm in a 74-year-old female, who was admitted to our hospital with a recent history of exertional dyspnea. She had the above-mentioned operation 10 months before. The diagnosis was made via two-dimensional and real-time three-dimensional transthoracic echocardiography. The prosthetic mitral valve was removed, and the large orifice of the pseudoaneurysm was closed by surgery. At one year's follow-up, the patient was in good condition.

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Introduction

One of the most serious complications of mitral valve replacement (MVR) is the left ventricular (LV) rupture and pseudoaneurysm formation, which is rare but potentially lethal.[1-4] According to the time of the LV rupture, it is classified into three categories: early; delayed; and late ruptures. Early types are those that happen in the operating room after cardiopulmonary bypass discontinuation, delayed types are events which occur several hours or days after surgery, and late ruptures are cases that happen days to years after MVR.[1, 2] Because of the high propensity of the pseudoaneurysm to enlargement and rupture, immediate surgical management is inevitable.[3-5] We report a case with a late diagnosis of the LV pseudoaneurysm following previous MVR and coronary artery bypass graft surgery (CABG), which was diagnosed via two-dimensional and real-time three-dimensional transthoracic echocardiography (RT 3D TTE).

Case Report

A 74-year-old female with a history of coronary artery

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disease was admitted to our hospital with a history of exertional dyspnea (function class II) during recent months. She had a past history of CABG and MVR surgery approximately 10 months prior to her admission.

The postoperative echocardiography, performed one week after surgery, showed mild LV hypertrophy with an ejection fraction of 50%, a prosthetic MV with an acceptable gradient, and a normal right ventricle size with a good systolic function.

On present admission, the patient's pulse rate was 90 per minute and regular, and her blood pressure was 130/70 mm Hg. The patient had 1+ edema in her lower limbs. Auscultation revealed fine crackles in both lung bases and III/VI systolic murmur. An electrocardiogram (ECG) showed left bundle branch block and inverted T wave in V5-V6 leads.

TTE showed a large echolucent space with a narrow neck (about 1.8 - 2 cm in diameter) on the basal posterolateral portion of the LV (near the prosthetic MV) and the diameter of the cavity was about 70 mm, suggestive of a large pseudoaneurysm in the basal posterolateral portion of the LV with a to-and-fro flow on color Doppler (Figures 1 and 2). RT 3D TTE (Vivid 7 / GE / RT 3D probe) was performed in order to better reveal the spatial relations between the pseudoaneurysm and the adjacent cardiovascular and thoracic structures and to better delineate the pseudoaneurysm borders before surgery. RT 3D TTE showed a large pseudoaneurysm (80 × 52 mm), parallel to the free wall of the LV (Figure 3). Its orifice was about 20 mm and was very close to the MV annulus.

Figure 1. Two-dimensional echocardiography, showing the orifice of the pseudoaneurysm near the mitral valve sewing ring (arrow) and the pseudoaneurysm (asterisk)

The patient underwent urgent surgery through median sternotomy using cardiopulmonary bypass. After mid sternotomy and moderate hypothermia (28 °C), the left atrium was opened. The prosthetic MV (St Jude # 27) remained intact, but the orifice of the LV pseudoaneurysm was unclear when visualized through the St Jude valve. The prosthetic MV was removed. In the posterolateral aspect of the LV just below the annulus of the MV, the large orifice of the pseudoaneurysm (about 20 mm in diameter) was found, which was closed with a pericardial patch (Figure 4). After the closure of the defect, MVR with a bileaflet mechanical valve (St. Jude # 27) was performed and the patient was weaned from CPB without problems. Post-pump intraoperative transesophageal echocardiography confirmed the complete closure of the orifice of the pseudoaneurysm without a flow. The postoperative course was acceptable and the patient was discharged on 10th postoperative day. TTE was performed before discharge and showed the prosthetic MV with an acceptable gradient, without paravalvular leak and a large echomixed cavity (7 × 3.8 cm) due to a previous pseudoaneurysm posterolateral to the LV, which was filled by a clot. At one year's follow-up, the patient was in good condition and was taking oral medications.

Figure 2. Two-dimensional color Doppler echocardiography, showing a turbulent flow on the orifice of the pseudoaneurysm (arrow) and the pseudoaneurysm (asterisk)

Figure 3. Three-dimensional echocardiography, showing the orifice of the pseudoaneurysm (arrow) and the pseudoaneurysm (asterisk)

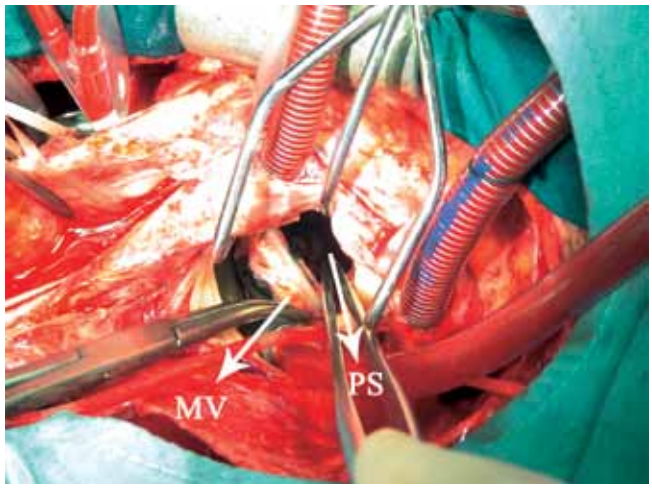

Figure 4. The operation site. The black arrow points to the pseudoaneurysm orifice (PS) and the white arrow to the prosthetic mitral valve (MV)

Discussion

Rupture of the LV wall after MVR, albeit infrequent, is a fatal complication, especially in the delayed class.[4, 6, 7] The most frequent cause of the LV pseudoaneurysm is myocardial infarction secondary to atherosclerotic coronary artery disease, but many other causes may be responsible for the LV pseudoaneurysm such as trauma, infective endocarditis, inflammation, and cardiac surgery.[8] Congestive heart failure is the most common clinical presentation of the LV pseudoaneurysm but the rate of asymptomatic patients is more than 10%.[9] For the first time, Spellberg and O'Reilly reported post-MVR pseudoaneurysm, which was diagnosed via left ventriculography.[10] Two third of the LV ruptures are the early type, and the mortality rate of this category reaches near 50% despite early management.[10] Classification of the post-MVR pseudoaneurysm may be based on the time and location of the rupture.[1] Miller and co-workers also classified the LV pseudoaneurysm based on the location of the LV rupture and its relative location to the MV annulus.[10] In patients with congestive heart failure symptoms, the mortality rate is high, particularly without surgery. One of the previous case series study reported 11 deaths in 35 patients in non-operated cases with pseudoaneurysms.[9]

The initial technique for the diagnosis of postoperative complications is TTE.[1] Proper anatomic delineation is essential in order to plan appropriate therapy. Contrary to the post-myocardial infarction cases, these aneurysms following MVR tend to be sub-annular in location.[11] Previously, pseudoaneurysm diagnosis was made by left ventriculography, while echocardiography and Cardiac Computed Tomography (CT) can be the other diagnostic approaches for these cases.[11]

The usage of RT 3D TTE in this case conferred better delineation of the pseudoaneurysm territory, which is important for the operative approach plan.

Conclusion

The LV pseudoaneurysm is an important complication that may occur late after MVR and thus necessitates due heed on the part of cardiologists and cardiac surgeons.

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