Internal repair of left ventricular pseudoaneurysm late after mitral valve replacement[†]

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Abstract

Late left ventricular pseudoaneurysm is a rare complication after mitral valve replacement. Most investigators have recommended surgical repair to treat left ventricular pseudoaneurysm, since untreated left ventricular pseudoaneurysm have a high risk of rupture. Here, we report a case of a 57-year old man with left ventricular pseudoaneurysm. He had two prior mitral valve replacements 16 and 19 years ago, as well as mitral and aortic valve endocarditis causing mitral valve perivalvular leak and perforation of the aortic valve. The mitral and aortic valves were replaced with bovine pericardial valves. Left ventricular pseudoaneurysm was successfully repaired internally in our case because the internal wall at the level of the left ventricle was very fibrotic and matured.

Keywords: Pseudoaneurysm • Mitral valve replacement • Complication • Reoperation

INTRODUCTION

Late left ventricular (LV) pseudoaneurysm is a rare complication after mitral valve (MV) replacement. Three surgical methods have been reported to repair late LV pseudoaneurysm: internally through the LV cavity [1], externally by resecting the pseudoaneurysm sac [2] or by a combination [3]. We report an internal repair of late LV pseudoaneurysm, including surgical video of the repair.

CASE REPORT

A 57-year old male with diabetes was referred with fatigue and progressive dyspnoea on exertion. He had had rheumatic fever as a child, and in 1993 underwent a 33 mm St. Jude Medical (Little Canada, MN, USA) mechanical MV replacement for endocarditis. He needed a reoperation in 1996 using a 31 mm St. Jude mechanical MV for recurrent endocarditis and perivalvular leak. He began to develop paroxysmal atrial fibrillation (AF) in 2002, and had had two strokes in the past. In 2012, he was thought to have a new perivalvular leak, moderate aortic insufficiency (AI) and a possible LV pseudoaneurysm. These were confirmed with transoesophageal echocardiogram, cardiac computed tomography (CT), cardiac magnetic resonance imaging (MRI) and cardiac catheterization disclosing 2-3+ perivalvular mitral regurgitation (Fig. 1), 2-3+ AI and an irregular 28 mm × 28 mm LV pseudoaneurysm in the atrioventricular groove (Fig. 2). His preoperative ejection fraction was 55%.

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At his third operation, via sternotomy, we found a 5 mm circular healed perforation of the aortic valve (AV) non-coronary cusp (NCC) that had no evidence of active infection, and a localized dehiscence of the MV prosthesis near the lateral commissure and base of the A1 segment (near the NCC perforation). After removing the MV prosthesis, the large LV pseudoaneurysm was identified in the region of P3. There was thrombus in the base of the pseudoaneurysm, and the wall at the level of the LV was very fibrotic with scattered calcium. We were able to securely close the pseudoaneurysm with multiple interrupted 3-0 pledgeted polypropylene sutures, and it was oversewn in two layers with a 3-0 polypropylene suture (Supplementary Video S1). A left atrial maze procedure was performed. The MV was replaced with a 29 mm bovine pericardial MV, and the AV was replaced with a 27 mm bovine pericardial AV. He was discharged on the sixth postoperative day. He received a pacemaker 4 months after surgery for sick sinus syndrome. Six months after surgery, he was New York Heart Association functional class I, off anticoagulation and antiarrhythmics, with normal-functioning prosthetic valves and no residual pseudoaneurysm by echocardiogram and no AF per pacemaker interrogation.

COMMENT

LV pseudoaneurysm is a consequence of ventricular wall rupture contained by adhesion and pericardium. The aetiology of LV pseudoaneurysm or LV wall rupture may be unclear; however, several predisposing factors for LV pseudoaneurysm have been reported [4]. The most common aetiology of LV pseudoaneurysm was myocardial infarction (MI), followed by surgery, trauma and

Figure 1: Transoesophageal echocardiogram showing severe paravalvular mitral regurgitation originating at the lateral commissure.

Figure 2: Cardiac CT showing a 28 mm x 28 mm pseudoaneurysm arising from the basal inferior wall of the left ventricle.

infection. The most common location was inferior wall after MI. LV pseudoaneurysm occurs days to years after MV replacement. Medically treated LV pseudoaneurysm has a 48% risk of rupture [4]. Our case had two prior MV replacements 16 and 19 years ago, as well as mitral and aortic valve endocarditis causing MV perivalvular leak and perforation of the AV NCC.

Cardiac CT and MRI have a high diagnostic yield in addition to echocardiogram. Cardiac CT shows the pseudoaneurysm itself as well as surrounding structures such as the circumflex coronary artery and the coronary sinus. Cardiac CT was helpful to decide the repair technique. Cardiac MRI can also distinguish a pseudoaneurysm from a true aneurysm. MRI is the best preoperative imaging study to characterize the tissue of the aneurysm wall. The video demonstrates that internal repair was successfully achieved in our case due to the mature fibrotic scar. To our knowledge, ours is the first surgical video of a LV pseudoaneurysm repair.

SUPPLEMENTARY MATERIAL

Supplementary material is available at *ICVTS* online.

Conflict of interest: none declared.

Supplementary video 1: Intraoperative video clip showing a 5 mm circular healed old perforation of the aortic valve non-coronary cusp and the orifice of the left ventricular (LV) pseudoaneurysm that had a very fibrotic scar with scattered calcium. The LV pseudoaneurysm was closed with multiple interrupted 3-0 pledgeted polypropylene sutures, and then oversewn in two layers with a 3-0 polypropylene suture.

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eComment. Left ventricular pseudoaneurysm: an attempt of guidelines for the surgical treatment

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The case described by Ikegami and McCarthy [1] exemplifies one of the rarest complications after mitral prosthetic implantation. It is difficult to know which of the conditions described here, such as perforation of the aortic valve, mitral periprosthetic leak, left ventricular (LV) pseudoaneurysm, or the amount of all of them was the cause of the patient's symptoms. Left ventricular rupture after mitral valve replacement is a rare but dreaded and potentially lethal complication of mitral valve surgery, with an incidence up to 1%. Predisposing factors include non-sparing subvalvular structures of the posterior leaflet, extensive annular decalcification, insertion of an oversized prosthesis, redo mitral valve replacement, a stented bioprosthesis implanted in a small LV cavity, and infective endocarditis. Sometimes, this rupture is incomplete and may be noticed only as a small hematoma on the posterolateral wall of the LV. Theoretically, LV pseudoaneurysm can develop at the site of a previous rupture, contained by the surrounding pericardium or extracardiac tissue [2]. Nowadays, the wide use of echocardiography allows detection of acute pseudoaneurysms. Chronic pseudoaneurysms are generally detected during investigation of cardiac failure, and up to 10% to 20% incidentally [3]. The presence of a neck smaller than the aneurysmal cavity is strongly suggestive of a pseudoaneurysm, especially if colour Doppler shows a turbulent flow at the neck [4]. The decision to operate is given taking into account the presence of congestive heart failure, and the size of the pseudoaneurysm (>3 cm in diameter). Otherwise, surveillance with echocardiographic control is indicated [5].