
Negative results - Valves

Aortoventricular disruption after aortic valve replacement: a rare complication

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Abstract

Aortoventricular disruption after aortic valve replacement is extremely rare. A case of aortoventricular disruption following aortic valve replacement is described in detail, and related case reports are reviewed. A 76-year-old male underwent aortic valve replacement with a tissue valve using everting mattress sutures, repair of the ascending aortic aneurysm, and mitral valve repair. After cardiopulmonary bypass was terminated, pulsatile bleeding behind the aortic root was observed, which required cardiopulmonary bypass. The ventricular rupture was located just below the left coronary annulus, and appeared secondary to a tear through the ventricular myocardium by the valve sutures. The tear was internally repaired by pledgeted sutures and Dacron patch reinforcement. The patient recovered and was discharged without major complications. Although this serious complication is extremely rare, surgeons should be aware that deep everting stitches on the left coronary annulus potentially causes aortoventricular disruption. Overstretching the posterior aortoventricular junction may contribute to this type of injury.

1. Introduction

Left ventricular rupture is well documented as a critical complication of valve surgery, exclusively so in mitral valve replacement [1, 2]. In contrast, aortoventricular disruption is extremely rare after valve surgery. We experienced a rare case of aortoventricular disruption after aortic valve replacement, which was successfully repaired by pledgeted sutures, and Dacron patch reinforcement, with re-implantation of the aortic prosthesis.

2. Case report

A 76-year-old male without cardiac history was referred to our clinic for congestive heart failure due to valvular disease. His symptoms were consistent with the New York Heart Association (NYHA) class III. Chest roentgenogram showed cardiomegaly, pulmonary congestion and mediastinal widening. Echocardiography demonstrated severe aortic and mitral regurgitation with left ventricular dysfunction. Left ventricular systolic and diastolic dimensions were 83 mm and 73 mm, respectively, and the ejection fraction was 25%. The posterior left ventricular wall thickness and the interventricular thickness were 6 mm and 7 mm, respectively. The estimated left ventricular mass index was 325 g/m². Computed tomographic scan demonstrated a 70-mm aneurysm in the ascending aorta. Coronary angio-

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3. Discussion

There are few previous reports of aortoventricular disruption following aortic valve replacement [3, 4]. Iida and coworkers [3] reported that the rupture occurred 6 h after the operation, and the cause of the rupture was an inadvertent injury to the left ventricular wall just below the left coronary annulus. Mediratta and coworkers [4] described two cases of aortoventricular disruption after stentless bioprosthesis implantation. In these cases, the injury was attributed to extensive debridement of the calcified aortic valve. Although the mechanisms of the injuries are different, the location of these previous case reports is similar to ours, which is the posterior aortoventricular territory adjacent to the roof of the left atrium [3, 4]. Aortoventricular disruption is clearly distinguished from ‘left ventricular rupture’, which is classified into three types according to the location, i.e. type I (along the posterior aortoventricular groove), type II (at the base of the papillary muscle) and type III (anywhere between type I and type II) [1]. These types of rupture usually occur after mitral valve replacement [1, 2]. In our case, it is likely that the catastrophic bleeding was a consequence of a myocardial tear by pulling on evertting valve sutures too much.

In this particular case, we are aware that some of the sutures on the left coronary annulus may have passed the posterior ventricular myocardium, which potentially caused a myocardial tear. Although the employed suture technique was most likely responsible for this complication, it may also be relevant that the left ventricle was extremely dilated and the wall thickness was thin (approx. 6 mm). Moreover, mechanical stretch on the aortoventricular continuity during manual hemostatic compression may have expanded the initial small tear in the endocardium, which finally perforated the whole thickness of the ventricular muscle. From the anatomical standpoint, the injured portion was the part of the parietal myocardium below the aortic valve, which separates the ventricular outflow tract and the transverse sinus [5]. Therefore, deep everting stitches in this area potentially cause the inadvertent myocardial penetration. Although we did not obtain a myocardial tissue sample in this case, it would have been interesting to examine any cardiomyopathic features by utilizing immunohistological staining.

Based on the experience described herein, we have changed our practice, and now we always use non-everting mattress sutures (pledgets on the subannular tissue and the ventricular wall) in aortic valve replacement. We also take extreme care to avoid overstretching the posterior aortic root during hemostasis. Should the rupture occur, we believe that this type of injury is not simply repaired by sealing, and suture repair with annular reconstruction is the best option as an emergent procedure. Needless to say, it is of utmost importance to avoid the left coronary artery during the repair.

References