A Case of Acute Aortic Dissection with Intimal Tear Found at 1 cm Above Previous Aortotomy

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Although it is rare, acute aortic dissection after cardiac surgery predisposes patients to critical condition such as rupture, tamponade and death. Prompt diagnosis and treatment is mandatory for this fatal complication. We present our case in which acute aortic dissection occurred 7 years after aortic valve replacement.

Keywords: acute aortic dissection, aortic valve replacement

INTRODUCTION

Acute aortic dissection after cardiac surgery causes cardiac tamponade, rupture and death. Although it is rare, its mortality and morbidity are still high. We present a case in which acute aortic dissection occurred seven years after aortic valve replacement (AVR).

CASE REPORT

A 66-year-old woman underwent AVR at our institution because of aortic regurgitation seven years ago. Her aortic valve was tricuspid, and a 23 mm CarboMedics mechanical valve (Sulzer CarboMedics, Austin, TX) was implanted. At that time, preoperative computed tomography showed a mildly dilated ascending aorta (45 mm), for which surgical intervention was not performed. The postoperative course was uneventful, and she was discharged home on postoperative day 14. She was followed in the outpatient clinic.

Seven years later, she was transferred to our institution with severe chest and back pain. Enhanced computed tomography showed an acute type A aortic dissection (Fig. 1). An intimal flap was found in the ascending aorta. The diameter of the ascending aorta was 50 mm. Transthoracic echocardiography revealed normal prosthetic valve function with preserved left ventricular function.

The patient was transferred to the operating theater, and emergency operation was performed. The left femoral artery was exposed for arterial return. Redo median sternotomy was performed. Adhesions were divided. Cardiopulmonary bypass was instituted with right atrial drainage and femoral arterial return. Myocardial protection was achieved using both antegrade and retrograde cardioplegia. The patient was cooled to 25°C. Circulatory arrest was induced. Aortotomy was performed. Intimal tear was started at 1 cm above the previous aortotomy (Fig. 2). The sinus of Valsalva was not affected. Selective cerebral perfusion was commenced at a flow rate of 10 ml/kg/min. The false lumen of the proximal aortic arch was closed, and the aortic wall was reconstructed with inside and outside Teflon felt strips. A 26 mm J Graft SHIELD NEO (JUNKEN MEDICAL, Co., Ltd., Tokyo, Japan) was anastomosed to the proximal aortic arch using 4/0 prolene (Ethicon Ltd., Edinburgh, Scotland, UK). Circulation was restored and the patient was rewarmed. Aorta was transected at 5 mm below the intimal tear site. Proximal anastomosis was performed at this site in the same manner as for the distal anastomosis. Weaning
from cardiopulmonary bypass was performed without difficulty with inotropic support. On postoperative day 14, she complained of back pain. Enhanced CT showed a new ulcer-like projection distal to the left subclavian artery, which was treated with anti-impulse therapy. Thereafter, the patient was discharged home without any events on postoperative day 45 and followed in the outpatient clinic.

**DISCUSSION**

Acute aortic dissection after AVR has been reported at a rate of 0.6–2.3%.\(^1,2\) The interval from initial surgery to dissection ranges from several days to over 10 years.\(^3,4\) It occurs in all patients whose aorta is manipulated during cardiovascular surgery. The intimal tear of the dissection can start at previously manipulated site such as aortic perfusion, cardioplegia infusion, crossclamping or aortotomy site. The patients with hypertension and severe atherosclerosis are at increased risk of dissection. It is important to carefully close the aorta, which seems fragile, at the initial surgery. In our case, the intimal tear was recognized 1 cm above the previous aortotomy. Although the entry site was separate from the previous aortotomy, the wall stress to the fragile aorta may have caused the intimal tear in our patient.

When the patient has a markedly enlarged aorta (>50 mm) at initial AVR, ascending aortic replacement is the gold standard. However, it is matter of debate whether a mildly dilated aorta (40–50 mm) should be surgically treated. Tsutsumi, et al. reported that aortic regurgitation combined with systemic hypertension, male sex, and a thinned or fragile aorta with mild dilation (>45 mm) at initial AVR may be risk factors for late aortic complications.\(^5\) However there is no consensus concerning the management of a dilated aorta in a patient referred for AVR. If surgical intervention is not performed, blood pressure should be strictly controlled. Moreover, echocardiography or computed tomography should be performed at regular intervals in order to detect progression of aortic dilatation or asymptomatic dissection. In our case, the ascending aorta had already enlarged to 45 mm at the initial operation. Moreover, patients with AR have a thin and fragile aortic wall, which was the case in our patient. Considering the potential risk of dissection of the aorta in the future, ascending aortic replacement should have been performed at the initial operation in our case.

However, surgeons often hesitate to perform ascending aortic replacement in elderly patients or those with left ventricular dysfunction, because prolonged extracorporeal circulation may lead to fluid retention with resulting cerebral edema, respiratory dysfunction, acute renal failure and myocardial damage, which can increase morbidity and mortality. To avoid a prolonged extracorporeal circulation time, reduction aortoplasty may be the procedure of choice at the initial operation.\(^6\) As an oval segment of the anterior ascending aortic wall is excised in an axial direction, the diameter of the aorta is reduced to a normal level. This operation has some attractions. As the ascending aorta is longitudinally incised, surgeons obtain a clear view of the aortic valve and can more easily perform AVR. However, its durability is questionable. As thin and fragile aorta is left in situ, it has the potential for re-dilation. Moreover, reduction aortoplasty cannot prevent future dissection of the aorta. However, some investigators report...
acceptable results with this procedure.\textsuperscript{7,8} Accumulation of data is necessary to conclude whether it can be an alternative to aortic replacement in this cohort of patients and contribute to prevention of future dissection.

The operative procedures used for this cohort of patients are root replacement, ascending aortic replacement and total arch replacement.\textsuperscript{9} Ascending aortic replacement is usually performed when an intimal tear is found in the ascending aorta. Yoshikai et al. recommend aortic root replacement in order to avoid leaving fragile diseased aortic wall including the sinus of Valsalva.\textsuperscript{9} They performed root replacement even if the intimal tear was located in the anterior wall of the aorta, and not in the sinus of Valsalva. Although this aggressive approach definitely eliminates fragile tissue from the aortic root, it is technically demanding, and can increase bleeding from the suture line, which may increase morbidity and mortality.

In conclusion, acute dissection after AVR is a rare and life-threatening complication. Blood pressure should be strictly controlled after AVR. A mildly dilated aorta exceeding 45 mm at initial AVR should be considered for concomitant aortic replacement or reduction aortoplasty.

**Conclusion**

Acute dissection after AVR is a rare and life-threatening complication. Intimal tear can start from any site as well as previous aortotomy and manipulating site. A mildly dilated aorta exceeding 45 mm at initial AVR should be considered for concomitant aortic replacement or reduction aortoplasty.

**Disclosure Statement**

We declare that we have no conflict of interest in connection with this paper.

**References**