

Pseudoaneurysm of the Ascending Aorta Combined with Aortic Valve Infective Endocarditis following Cardiac Operations

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ABSTRACT

Background and Objective: Aortic pseudoaneurysms are rare but life-threatening complications of aortic procedures. Operation on the femorofemoral bypass with hypothermic circulatory arrest has been the method of choice. Iatrogenic ascending aorta pseudoaneurysm combined with infective endocarditis of the aortic valve has never been reported.

Materials and Methods: We describe a case of a pseudoaneurysm of the ascending aorta at the site of an aortotomy site concomitant with infective endocarditis of the aortic valve. A contrast computed tomographic scan was the investigation technology of choice.

Results: The operation was performed on femorofemoral bypass without hypothermic circulatory arrest, which provided safe re-entry and an opportunity to replace the infected aortic valve with a mechanical prosthesis and to repair the aortic defect with a patch.

Conclusions: The ascending aorta pseudoaneurysm can be safely operated on with femorofemoral bypass without hypothermic cardiac arrest.

INTRODUCTION

Aortic pseudoaneurysms are rare but life-threatening complications of aortic procedures [Sabri 1991; Sullivan 1998]. Predisposing factors are the dissection of the native aorta, infection, connective tissue disorders, preoperative chronic hypertension, aortic calcification, and blowout of the aortotomy site [Sabri 1991].

Pseudoaneurysm of the ascending aorta can present as a pulsatile, rapidly growing mass, chest pain caused by local erosion, dysphagia from esophagus compression, or stridor [Sullivan 1998]. Infective endocarditis is usually secondary to previous medical procedures and is relatively common after cardiac surgery. If it happens in the aortic valve, besides

the appearance of bacteremia it can present as valvular vegetation in combination with valvular perforation or valve insufficiency.

We describe the successful management of a patient who experienced pseudoaneurysm of the ascending aorta combined with infective endocarditis of the aortic valve following an operation to repair a congenital ventricular septal defect.

CASE REPORT

We present the case of an 11-year-old boy who had undergone a cardiac operation for congenital heart disease in another hospital. During the previous operation, a patch was used to repair the congenital subarterial ventricular defect, and an aortotomy was made to explore the mild-to-moderate prolapse of the right coronary cusp of the aortic valve. The patient was admitted to our hospital 2 months later with an intermittently high fever accompanying stridor and dizziness of nearly 1 month. An echocardiogram showed masses in the prolapsed right coronary cusp of the aortic valve, a signal indicative of severe aortic regurgitation (Figure 1).

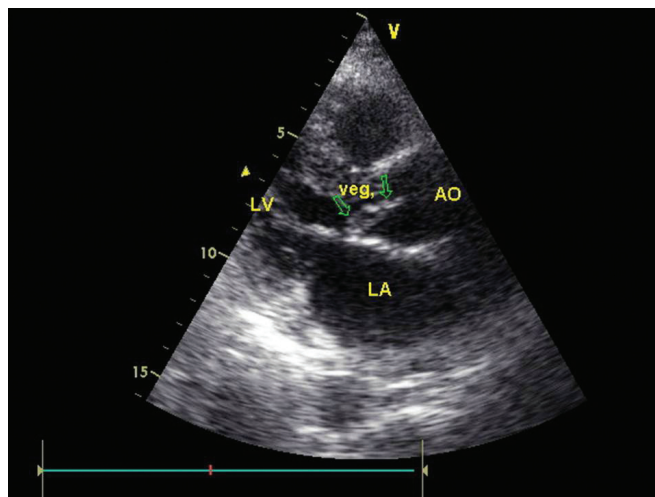


Figure 1. Preoperative echocardiographic view of vegetation in the right coronary cusp of the aortic valve. LA indicates left atrium; LV, left ventricle; AO, aorta; veg., vegetation.

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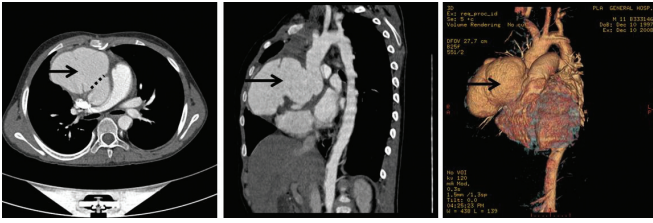


Figure 2. Preoperative computed tomographic scan of the patient. The dotted line shows the defect in the anterior wall of the ascending aorta. Arrows show the pseudoaneurysm arising from the right anterior wall of the ascending aorta.

Staphylococcus aureus was cultured from the blood. A contrast computed tomography (CT) scan showed a defect in the right anterior wall of the ascending aorta 1.5 cm above the aortic valve, from which a pseudoaneurysm measuring 4.2×5.2 cm arose (Figure 2). Besides the ascending aorta pseudoaneurysm, aortic valvular infective endocarditis was diagnosed definitively according to the Duke criteria.

Intravenous antibiotics were administered in accordance with the results of the in vitro susceptibility tests and were continued for 2 more weeks. The bacteremia was controlled, but a CT scan revealed an increase in the pseudoaneurysm size to 5.8×5.7 cm. The decision was made to take the patient to the operation room immediately.

In consideration of retrosternal adhesion and the proximity of the aortic pseudoaneurysm to the sternum, we cannulated the right common femoral artery and vein. The chest was opened through the previous scar. After the institution of femorofemoral bypass, the patient was cooled to 32°C , and the heart was mostly emptied. A sternotomy was then performed. Adhesions over the ascending aorta pseudoaneurysm and right ventricle were released uneventfully, and both pleura were opened. The aorta was clamped at 28°C and was opened through the pseudoaneurysm, which was now approximately $8 \times 7 \times 5$ cm in size. We found the defect, which measured 2.5×2.5 cm, at the previous aortotomy site. Cardioplegic solution was administered directly, and the aortic valve was inspected. A vegetation of $1 \times 0.6 \times 0.3$ cm was found in the right coronary cusp, which had been damaged by perforation. The native aortic valve was replaced with a 21-mm mechanical prosthesis (St. Jude Medical, St. Paul, MN, USA). The native aorta was inspected, and it appeared healthy. The defect was closed with a 5×3 cm polytetrafluoroethylene patch and 4-0 Prolene suture. The patient was weaned from cardiopulmonary bypass uneventfully. The postoperative course was uncomplicated. No special treatment was given except for continuing intravenous antibiotics for another 4 weeks and oral warfarin administration.

Although the infective endocarditis of the aortic valve was clear, the cause of the pseudoaneurysm appeared to be a blowout at the previous aortotomy site, because there was no intraoperative evidence of aortic wall infection and a histologic examination and cultures taken from the pseudoaneurysm did not indicate infection.

The patient was discharged 4 weeks later. During the subsequent 20 months of follow-up, the patient's prosthetic valve

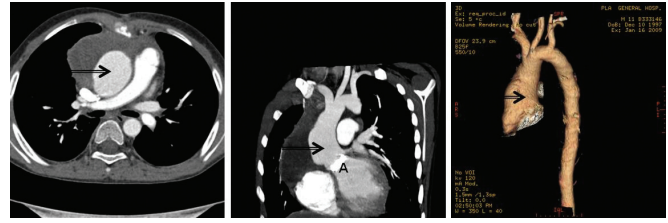


Figure 3. Postoperative computed tomographic scan of the patient. Arrows show the repaired ascending aorta, which has an almost normal anatomic form. The replaced aortic valvular prosthesis is indicated (A).

and heart function appeared normal, and a CT scan showed no abnormality (Figure 3).

DISCUSSION

The most frequent cause of aortic pseudoaneurysm is previous cardiac surgery [Sullivan 1998]. Pseudoaneurysm occurs in $<0.5\%$ of all cardiac surgical cases [Katsumata 2000]. Ascending aorta pseudoaneurysm after aortic procedures usually occurs at aortotomy, aortic cannulation, or aortic-needle puncture sites. Most pseudoaneurysms have infective factors, but a lack of infection has been demonstrated in a few patients [Sabri 1991; Apaydin 2003]. In our case, although the patient had aortic valvular infective endocarditis, we found no evidence to suggest that the concomitant aortic pseudoaneurysm was correlated with the valvular infection. If the diagnosis of aortic pseudoaneurysm is clear, surgical repair is mandatory.

Surgical management of ascending aorta pseudoaneurysm remains a challenge. The mortality rate ranges from 29% to 46% [Emaminia 2009], and death is most frequently due to hemorrhage caused by rupture of the pseudoaneurysm during sternal re-entry or surgical maneuvers for its repair [Sullivan 1998; Emaminia 2009]. A median sternotomy with the use of femorofemoral bypass and hypothermic circulatory arrest has been the method of choice [Katsumata 2000; Apaydin 2003].

In this case, we reopened the sternum and released the adhesions while the patient was on pump, when the heart and the aorta were relatively collapsed. This step minimized the risk of catastrophic hemorrhage at the time of sternotomy and mediastinal dissection.

Several reports in the literature have described cases of ascending aorta pseudoaneurysm, and cases of infective endocarditis after cardiac surgery have occasionally been reported. To the best of our knowledge, this report is the first of pseudoaneurysm of the ascending aorta combined with infective endocarditis of the aortic valve.

In conclusion, we have described a case of ascending aorta pseudoaneurysm at the aortotomy site concomitant with infective endocarditis of the aortic valve. The pathogenicities of these 2 illnesses are not correlated. The surgical management of this patient was successful, although it carried a high risk. Care should be taken to prevent such complications in the cardiac operations, especially during the aortic procedures.

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