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Pseudoaneurysm Fistulated into the Right Atrium after Double Valve Replacement

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ABSTRACT

We discuss a rare case of an ascending aorta pseudoaneurysm fistulating into the right atrium following prior aortic and mitral valve replacement. Transthoracic echocardiography and computed tomography revealed a pseudoaneurysm of the ascending aorta attached to the right atrium with fistulous communication. The pseudoaneurysm arose from the center of the former aortotomy. Emergency remedian sternotomy was performed without aneurysmal injury and with exposure of the left femoral artery and femoral vein. Aneurysmal resection and ascending aorta repair were performed without complication. Exposing peripheral vessels, and initiating cardiopulmonary bypass only after reentry, might be effective in resternotomy to approach ascending aorta pseudoaneurysms.

CASE REPORT

The patient was an 80-year-old man who had undergone aortic and mitral valve replacement eight years earlier. The aortic valve was replaced with a 23-mm and the mitral valve with a 29-mm Carpentier–Edwards Perimount bioprosthesis (CEP, Edwards Lifesciences, Irvine, CA, USA). The patient was admitted to our hospital because of shock status with systolic blood pressure of 70 mmHg. His skin was cold and clammy, and a continuous murmur was heard over the precordium. The day before admission, he presented with posterior cervical pain and general fatigue after gardening. Blood chemistry showed increased creatinine at 3.65 mg/dL (range, 0.7-1.2 mg/dL). Chest X-ray revealed right atelectasis, and transthoracic echocardiography revealed a pseudoaneurysm of the ascending aorta attached to the right atrium, severe tricuspid regurgitation, and abnormal flow into the right atrium from the aneurysm, suggesting aorto-right atrial fistula. Computed tomography showed a pseudoaneurysm on the anterior wall of the ascending aorta (Figure 1) and fistulous communication with the right atrium. An emergency operation was performed via remedian sternotomy using the same skin incision as the prior surgery without aneurysmal injury and with exposure of the right axial artery, left femoral artery, and femoral vein. The pseudoaneurysm was located in front of the aortic root and right atrial appendage, and the diameter was 8 × 6 cm (Figure 2). The ascending aorta and superior vena cava were carefully exposed and cardiopulmonary bypass was established by cannulation of the femoral artery, femoral vein, and superior vena cava. The aneurysm was opened after the ascending aorta was clamped above the aneurysm and cardiac arrest was achieved with antegrade infusion of cardioplegic solution. The pseudoaneurysm arose from the center of the former aortotomy and an organized hematoma was found with 5 cm diameter overlapping the right atrial appendage. The right atrial appendage wall was fenestrated beneath the hematoma and a circular defect of the ascending aorta wall was observed with 8 mm of diameter on the center of the aortotomy line (Figure 3). There were no signs of infection inside the aneurysm or around the aorta. The defects in the ascending aorta and the right atrial appendage were repaired in two layers with 4-0 polyethylene sutures with felt pledgets. Cardiopulmonary bypass was then gradually tapered. The postoperative course was uneventful and renal function normalized on postoperative day 5. The patient was discharged from the hospital 20 days after the emergency surgery. Postoperative echocardiography showed negligible tricuspid regurgitation, and computed tomography showed no aneurysm around the ascending aorta (Figure 4).

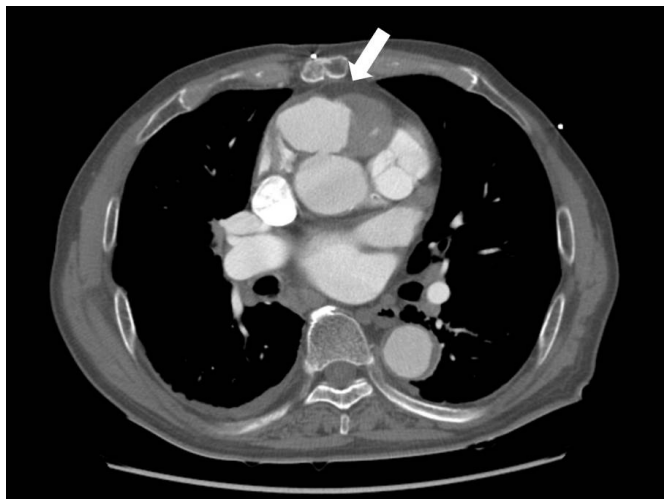

Figure 1. Computed tomography showing a pseudoaneurysm (white arrow) in front of the ascending aorta adjacent to the right atrial appendage.

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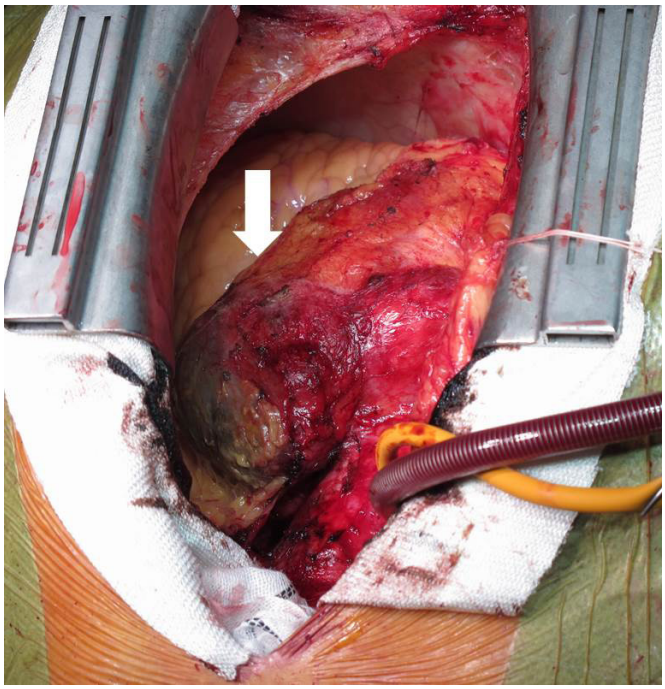

Figure 2. Intraoperative image showing the pseudoaneurysm (white arrow) in front of the ascending aorta.

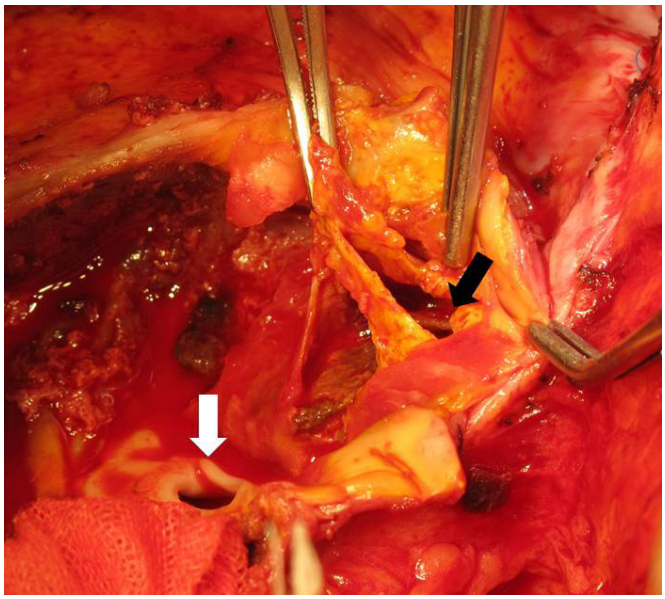

Figure 3. Intraoperative image showing the fistula between the ascending aorta (white arrow) and right atrial appendage (black arrow).

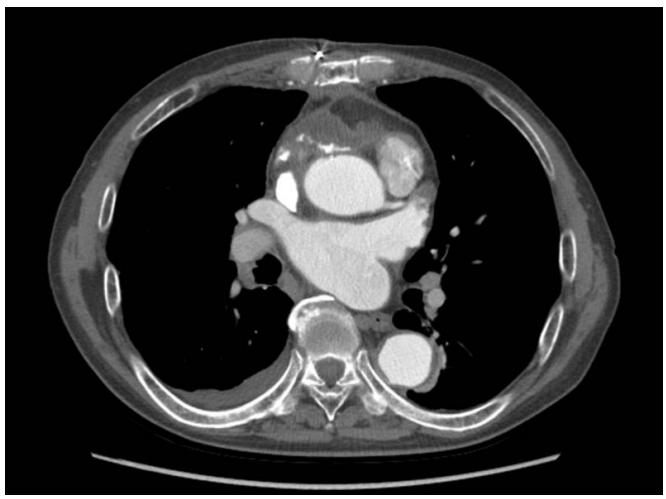

Figure 4. Postoperative computed tomography image showing that the pseudoaneurysm was successfully removed.

Our local institutional review board approved this case study and written informed consent was obtained from the patient to publish the details of his case.

DISCUSSION

Postoperative pseudoaneurysm of the ascending aorta fistulating into the right atrium is an extremely rare complication, with only two known previous reports [Photiou 1981; Gendi 2013], although ascending aorta pseudoaneurysms after aortic valve replacement arise occasionally from aortic cannulation sites and aortotomy suture lines following aortic valve replacement [Sullivan 1988; Galvin 2010]. In our case, late bleeding from the ascending aorta suture line occurred and a hematoma formed over the right atrial appendage. We believe that communication between the aorta and right atrium developed by mechanisms similar to previous reports [Photiou 1981] because there were no signs of infection and the organized hematoma was located on the suture line of the ascending aorta.

The ideal circulatory support for the approach to a pseudoaneurysm of the ascending aorta on sternotomy remains undetermined. Elective peripheral cannulation, limited cardiopulmonary bypass, and circulatory arrest under deep hypothermia have been reported [El Oumeiri 2011]. However, the arrest time required for sternal reentry, dissection, and controlling the aorta is unpredictable. Reyes et al [Reyes 2009] reported that the port access EndoCPB system could eliminate the need for circulatory arrest. However, they reported certain risks: the endoclamp can migrate and occlude the innominate artery; tears or disruption of the fragile aorta can occur; and oscillating saws may deflate the balloon at sternotomy [El Oumeiri 2011]. We exposed the peripheral vessels, but did not start cardiopulmonary bypass before sternal reentry. Initiating cardiopulmonary bypass before resternotomy allows for easier bleeding management, but heparin therapy adversely affects hemostasis, and hypothermia worsens this issue. Kawahara et al [Kawahara 2013] reported resternotomy to address a giant pseudoaneurysm of the ascending aorta using the same method as in our case, with good outcomes.

Endovascular therapy has recently become widely used with reports of thoracic endovascular aneurysm repair [Gomibuchi 2014] and Amplatzer occluders [Gendi 2013] for ascending aorta pseudoaneurysms. In our case, the ascending

aorta perforation was at the level of the left coronary artery ostium, so we selected open surgery.

In conclusion, we experienced an extremely rare case of pseudoaneurysm fistulating into the right atrium after aortic and mitral valve replacement. Aneurysmal resection and ascending aorta repair was performed without complication. Exposing peripheral vessels, but not initiating cardiopulmonary bypass until after reentry might be effective in resternotomy to approach ascending aorta pseudoaneurysms.

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