

Pseudoaneurysm arising from a side branch of a graft for ascending aortic replacement



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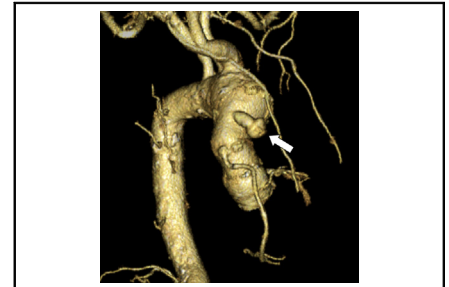
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Pseudoaneurysm arising from the side branch 18 years after ascending aortic replacement.

CENTRAL MESSAGE

We report a rare case of pseudoaneurysm arising from a side branch of a graft for ascending aortic replacement 18 years ago.

▶ Video clip is available online.

A pseudoaneurysm arising from a side branch of a graft is extremely rare and it is a potentially devastating complication. Although the method differs depending on surgeons or facilities, side branch is ligated using silk strings or using a surgical stapling device after weaning from the cardiopulmonary bypass and sometimes added polypropylene sutures. We report a successful surgical repair of the side branch pseudoaneurysm in a 72-year-old man, 18 years after ascending aortic replacement. Ethics review is not required for case report implementation in our institution. Written informed consent was obtained from the patient for publication of the study data.

CASE REPORT

A 72-year-old man had a history of mechanical aortic valve replacement and ascending aortic replacement in our institution for bicuspid aortic valve stenosis and ascending aorta aneurysm. He was on daily warfarin for

the mechanical valve. Seventeen years after the initial surgery, a protrusion from the ascending aortic graft was incidentally discovered on computed tomography (CT). The protrusion was rod shaped, 10 mm in diameter and 20 mm in length. Follow-up CT revealed that the protrusion was gradually growing larger and became mushroom shaped (Figure 1, A and B). It was strongly suspected to be a pseudoaneurysm from the graft for ascending aorta. There were no signs of infections, such as fever or an increased inflammatory response.

In anticipation of possible massive bleeding from the pseudoaneurysm, we set up cardiopulmonary bypass with right femoral arterial and venous cannulation in advance. Upon re-sternotomy, we carefully dissected dense adhesion. A 30 × 30 mm sized pseudoaneurysm was found on the anterior wall of the ascending aortic graft (Figure 2, A). We incised the pseudoaneurysm and removed the clot inside. Soon after that, blood spurted from the hole and we attempted to stop the bleeding by fingers. Because we couldn't control the bleeding completely and identify the hemorrhage point, we started cardiopulmonary bypass and cooled down the patient's temperature to 20 °C for deep hypothermic circulatory arrest. During a brief circulatory arrest, bleeding from the side branch of the graft was identified and it was 10 mm in length and fully

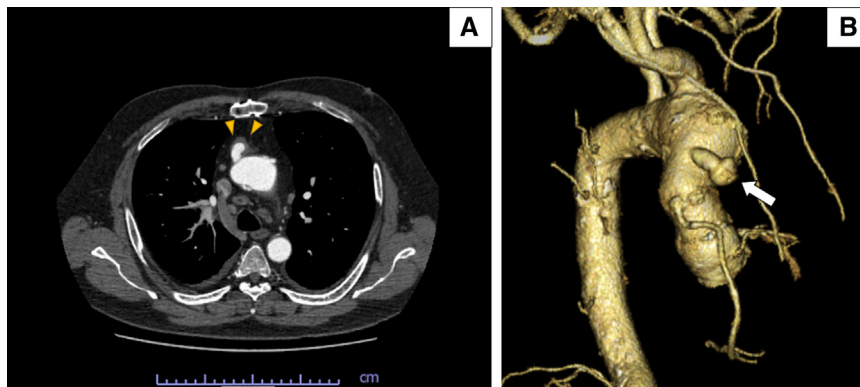


FIGURE 1. A, Preoperative contrast-enhanced computed tomography (CT) shows the protrusion (yellow arrowhead) from the ascending aortic graft. B, Preoperative 3-dimensional CT of the aorta shows the mushroom-shaped protrusion (white arrow).

opened. No traces of direct closure and no strings for ligation were found. We clamped the branch, restarted the circulation and rewarmed. We closed the branch with 3-0 braided polyester horizontal and continuous sutures and added pledgeted 4-0 polypropylene horizontal and continuous sutures (Figure 2, B). Finally, we added pledgeted 4-0 polypropylene U-stay to strengthen the closure and confirmed the hemostasis (Video 1).

The patient's postoperative course was uneventful. The post-operative enhanced CT revealed no residual pseudoaneurysm. The patient was discharged home on foot.

DISCUSSION

Pseudoaneurysm after cardiac surgery is frequently encountered and known to be life-threatening complication. Atik and colleagues reported 50 cases of postoperative pseudoaneurysm from the thoracic aorta.¹ Sixty-percent of them arose from proximal or distal aortic graft anastomosis. Additionally, pseudoaneurysms from

the cannulation site, the aortotomy site, and the proximal anastomosis of the coronary artery bypass graft were reported as well. To our knowledge, there are only three cases of pseudoaneurysms arising from side branches of the graft reported previously.^{2,3} All of them employed endovascular repair. But we carried out surgical repair because in our present case it was anatomically difficult for the endovascular ascending aortic treatment and open surgery could repair completely.

The cause of the pseudoaneurysm was not determined in the three prior cases because of the endovascular treatment.^{2,3} In contrast, our present case proved that the side branch was fully opened. Judging from the intraoperative findings and routine silk ligations in our institution, it is likely that the silk ligations deteriorated and got loosen over time, which allowed the occurrence of pseudoaneurysm. However, it is impossible to prove it because there were no details about the closure in the previous operation record. Greenwald and colleagues reported that

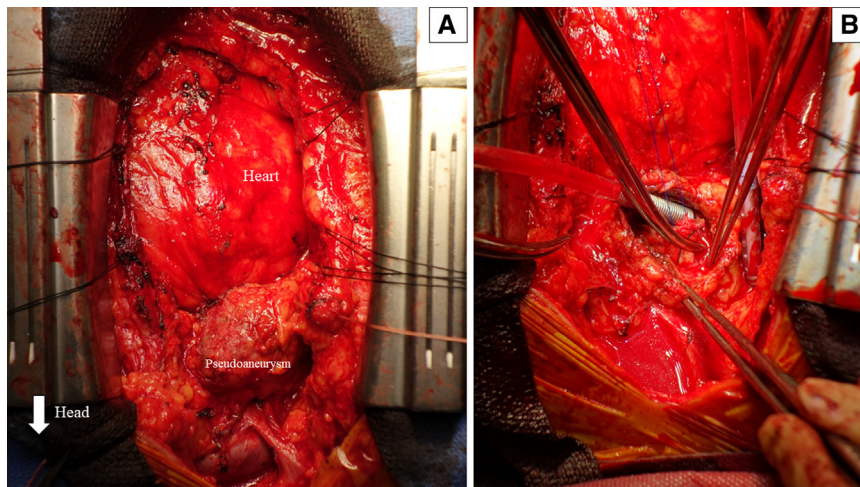
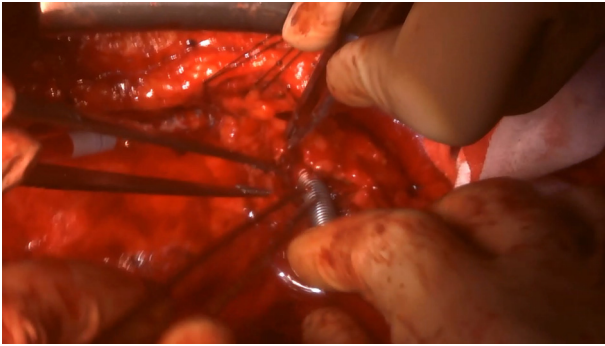


FIGURE 2. A, A 30 × 30 mm pseudoaneurysm was found on the anterior wall of ascending aortic graft. B, The side branch was clamped and closed by braided polyester and polypropylene sutures.



VIDEO 1. Head camera video from the left side of the patient. We found the side branch of the graft fully opened, and closed it using polypropylene sutures. Video available at: [https://www.jtcvs.org/article/S2666-2507\(23\)00219-5/fulltext](https://www.jtcvs.org/article/S2666-2507(23)00219-5/fulltext).

nonabsorbable sutures including silk changed in mechanical behavior after 6 weeks in vivo: strength, toughness, and strain were all lowered.⁴ The silk ligation is thought to be insufficient, so that we need a secure closure for the graft side branch. We currently ligate triply by using silk sutures after weaning from cardiopulmonary bypass. After

cutting down the side branch, we add 4-0 polypropylene continuous and horizontal sutures to the stump of the prosthesis.

We experienced an extremely rare case of pseudoaneurysm arising from a side branch of a graft, presumably caused by deterioration of silk ligations, which reminds us the importance of secure closure and regularly check-up. Surgeons should be aware of this late complication.

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