

Case report

False aortic aneurysm due to proximal and distal tears after aortic replacement

Running title: Entry-exit-type false aneurysm

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Abstract

A 68-year-old woman who had been well for 2 years after ascending aortic graft replacement experienced sudden chest pain. Computed tomography showed a large false aortic aneurysm around the prosthesis. However, the patient was hemodynamically stable and did not have anemia. Emergency surgery under hypothermic circulatory arrest revealed tears at both the proximal and distal anastomotic sites and blood circulating from the proximal (exit) to the distal (entry) tears underneath the pericardium. To our knowledge, the present case represents a previously unreported pathology that will be of great interest to cardiologists and cardiac surgeons.

Introduction

False aortic aneurysm after replacement of the ascending aorta with a vascular prosthesis is a rare complication of this type of surgery. As with other aneurysms, false aortic aneurysms show a marked increase in diameter and are associated with life-threatening complications, such as rupture, fistula formation, compression of adjacent organs, and thrombosis.¹ The etiology of such aneurysms is not clear, but they are considered to be due to infection or incomplete suture of the artificial blood vessel anastomosis.²

Here, we describe a patient with a tear at each anastomotic site. We found no evidence for an infection. Although most anastomotic tears are at either the proximal or the distal site, this patient showed tears at both ends of the anastomosis. To our knowledge, the case represents a previously unreported pathology.

Case report

We report on a 68-year-old woman who had undergone aortic graft replacement for an ascending aortic aneurysm 2 years previously. No problems occurred postoperatively. However, 1 month before being treated at our facility, she developed sudden chest pain. She did not seek medical advice, but a chest computed tomography (CT) examination performed at a regular outpatient visit showed a large false aneurysm of the ascending aorta around the graft (Figure 1). The aneurysm was 88 mm × 75 mm and involved both the proximal and the distal graft suture lines. It was covered by the pericardium that had been wrapped around the artificial graft in the previous operation and was touching the sternum. A transthoracic echocardiogram showed that the false aneurysm was immediately after the sinotubular junction and was about 80 mm in diameter. Cardiac function was preserved. A blood test showed no signs of infection and no progression of anemia.

The patient was admitted to our hospital and underwent a semi-urgent surgical procedure to repair the aneurysm. Initially, we placed the patient on cardiopulmonary bypass by cannulating the right femoral artery and right femoral vein. We used the median sternotomy approach. When we opened the

pericardium, we found tears at both the proximal and the distal anastomosis of the graft, which were causing massive bleeding (Figure2). Immediately, cooling was started, and the proximal anastomosis was transected. Selective cardioplegia was performed, resulting in cardiac asystole. We arrested circulation at 25°C and repaired the tear in the distal anastomosis with 4-0 nylon. The proximal side was then anastomosed with the previous graft. The patient was successfully removed from the cardiopulmonary bypass without major bleeding. After confirming hemostasis, we closed the chest and completed the operation.

Comment

Although the technology of stent grafting has advanced, open surgery, such as replacement of the ascending aorta, continues to be a major, established surgical technique for treating thoracic aortic aneurysms and dissecting the ascending aorta. All of the known complications of this procedure, such as cerebral infarction, infections, and anastomotic insufficiency, can be life threatening. In particular, rupture of the anastomosis is a serious event that generally leads to death.

False aortic aneurysm is a rare but serious complication of ascending aorta and/or aortic root prosthetic replacement. The incidence and risk factors are not clear. Mohammadi et al. reported that the incidence of false aortic aneurysm appears to be high in cases of aortic dissection, probably because of increased tissue fragility in the suture line of these patients.⁵ Other risk factors are known to increase the risk of false aortic aneurysm, including mediastinal infection after cardiac surgery and Takayasu's arteritis.²⁻⁴ Postoperative false aortic aneurysm is a late complication after aortic surgery. The time interval between the initial procedure and the occurrence of false aortic aneurysm is variable but can be up to a maximum of 17 years.⁴

The case presented here is noteworthy because of the underlying disease (true aneurysm), lack of infection and pathological abnormalities, and in particular because it was a rare exit/entry type false aneurysm. We found one other report of a false aneurysm due to tears at both the proximal and distal graft suture lines, but the aneurysm was not of the exit/entry type, and the original operation was due to an

injury after a traffic accident, not a true aneurysm.⁵ A previous case report described a pseudo-aortic aneurysm that formed a fistula to the right atrium,⁶ and other reports presented cases of rupture at the site of aortotomy, proximal vein graft anastomosis, aortic cannulation, and distal anastomosis of ascending aortic graft replacement.^{7,8}

We hypothesize that in our patient the tear of the proximal anastomosis was caused by hypertension, and we assume that the patient's sudden chest pain approximately 2 years after the initial surgery was due to this initial tear. The pericardium did not tear because it was thickened and strong as a result of postoperative adhesions; therefore, the high pressure on the fragile suture site led to the distal tear, and the pericardium became the aneurysm wall of the pseudoaneurysm. The patient was lucky because the re-entry of blood at the distal site meant that she had no problems with hemodynamics and no progression of anemia. To our knowledge, this is the first report of a false aneurysm of the entry/exit type due to both proximal and distal suture dehiscence after aortic replacement.

Author contributions:

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