Negative results - Vascular thoracic

Aortic stenosis caused by the felt strip used in repair for acute aortic dissection

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Abstract

Objective: We report a rare complication—stenosis of the proximal anastomotic site caused by an inside felt strip—in surgery for acute type A aortic dissection. Methods: Eight weeks after the emergent repair, the patient suffered from anemia and persistent high-grade fever. Computed tomography and transesophageal echocardiography revealed considerable aortic stenosis, while laboratory data showed hemolytic anemia associated with some inflammatory changes. Results: After surgical relief of the aortic stenosis, inflammatory change improved and anemia also disappeared. Conclusion: It is evident that the inner felt strip used for reinforcement of the proximal anastomosis can cause remarkable stenosis, resulting in hemolytic anemia and inflammatory changes.

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1. Introduction

Emergency repair of acute type A aortic dissection entails technical difficulties due to the fragility of the dissected aortic wall. Thus, reinforcement of the dissected aortic wall at the sites of anastomosis is essential [1,2]. Various techniques have therefore been contrived and contributed in pursuit of a favorable outcome [3,4]. We report a rare complication of proximal anastomotic stenosis caused by the inner reinforcing felt strip.

2. Patient and technique

A 49-year-old male with a height of 178 cm and a body weight of 90 kg had undergone emergent ascending aorta to total arch replacement using a 24-mm woven Dacron quadrifurcated graft for acute type A aortic dissection. The aortic dissection was a retrograde one of DeBakey type III with the entry, which was only a 2-cm intimal tear, located just distal to the left subclavian artery. The retrograde dissection extended proximally to the right- and non-coronary sinuses. The aortic root was mostly retained except for the commissure between the right and non-coronary cusps. Therefore, the aortic valve was re-suspended at this commissure by fixation with mattress sutures. The true lumen was relatively narrow (24 mm) and the dissected portion extended only half-way around; however, we decided to employ the common method of reinforcement of the proximal dissecting layers because the dissecting wall was very fragile. Specifically, reinforcement of the dissecting aortic wall was performed using the so-called sandwich technique with two layers of Teflon felt strip and GRF glue. At the distal anastomosis, an elephant trunk procedure was employed for reinforcement of the anastomosis and for closure of the false channel in the descending aorta. The postoperative course was uneventful; however, 1 month after the repair the patient developed spiky high-grade fever and anemia with ejection systolic murmur. The laboratory data showed low hemoglobin (7.5), high LDH (709), and high C-reactive protein (5.68) levels. Trans-esophageal echocardiography and three-dimensional reconstructed computed tomography (3D-CT) showed a severe stenosis of the proximal anastomosis. The peak pressure gradient as measured by echocardiography was 105 mmHg. Subsequent aortography demonstrated a severe aortic stenosis with a jet shadow; the pressure gradient across it was 60 mmHg at systole (Fig. 1). The diameter of the most stenotic site was measured to be 10 mm in the vertical view and...
11 mm × 16 mm in the coronary view (Fig. 2). Gallium scintigraphy did not disclose any inflammation. Despite administration of antibiotics, anti-inflammatory drugs and discontinuous blood transfusion, high-grade fever continued and anemia did not improve, necessitating follow-up surgical intervention. After the proximal anastomosis site was opened it was apparent that the inside felt strip—especially the part around the right- and non-coronary sinuses—was turned up and stiffened, causing the aortic stenosis. The diameter of the most stenotic lesion was 13 mm. No infectious sign was found. The inside felt strip was completely removed and the diameter of the anastomotic site was enlarged to 23 mm. The aortic wall between the right- and non-coronary sinuses was so fragile due to dissection that it was closed using a strip of autopericardium, from the inside. Finally, the previous proximal anastomosis was reattached. After this operation, systemic inflammation improved and hemolytic anemia completely disappeared. The pathophysiological findings of the inner felt strip showed deposits of fibrin thrombosis, foreign body giant polykaryocytes, and cellular infiltration of inflammatory cells such as lymphocytes, macrophages, and eosinophilic lymphocytes. The 3D-CT showed favorable release of the stenosis of the proximal anastomosis.

3. Discussion

The present patient developed hemolytic anemia due to stenosis of the proximal anastomosis originating from a stiffened inner felt strip after repair for acute aortic dissection. It was also inferred that hemolysis due to this stenosis at the proximal anastomosis produced the observed inflammatory response with high fever. Systemic inflammation and anemia had already been found in the early
The postoperative stage before discharge: these were the first signs of the aortic stenosis.

This case demonstrates two interesting issues related to the iatrogenic aortic stenosis. The first one is systemic inflammatory reaction. The patient had suffered from high fever during the postoperative period immediately after the first operation. This had been thought due to ordinary inflammatory reaction to the implanted vascular prosthesis. However, it had not improved even with antibiotics and NSAIDs before the second operation. It eventually disappeared after the aortic stenosis was relieved. Consequently, the stenosis of the proximal anastomosis or the subsequent hemolysis appears to have caused systemic inflammation. Furthermore, the inner felt could have caused some inflammatory reaction, as revealed in the pathological examination, which showed lymphocytes, macrophages, and eosinophilic lymphocytes.

The second issue concerns anastomosis techniques in repair for acute aortic dissection. Reinforcement of the dissecting aortic wall has been a major concern with regard to preventing residual dissection and serious hemorrhage [1,2]. In this decade we have used two layers of Teflon felt strips for reinforcing the anastomosis, and have closed false channels using a biological glue composed of gelatin, resorcin, and formaldehyde (GRF-glue) [5,6]. However, the patient had a comparatively narrow native aorta, given his large body size, resulting in some relative stenosis at the anastomosis site. The countermeasure to avoid this type of aortic stenosis is to eliminate the inner reinforcing felt. (Floten et al. have reported a new method for folding the adventitia outside-in so as to reinforce the intima [4].) Re-dissection or intimal necrosis caused by biologic glue has also been reported [7]. Eversion of the inside felt strip, which can produce some stenosis, was found at the second operation. It is important to use either a narrow felt strip or to apply it only to the dissecting portion (not about the entire circumference) and to place the stitches as proximally as possible, in order to prevent turning up of the inner felt.

4. Conclusion

We encountered a rare complication of proximal anastomotic stenosis caused by the inside felt strip in an operation for acute type A aortic dissection. The first clinical signs were only hemolytic anemia and inflammatory change with fever. This demonstrates a potential pitfall in the repair for acute aortic dissection—that reinforcement by felt strips might produce aortic stenosis at the anastomotic site.

References