

Hemolytic Anemia Case Caused by an Inverted Inner Felt after Bentall Operation

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Received: 26 February 2013
Accepted: 3 June 2013

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A 26-yr-old male patient reported worsened dyspnea, dizziness one year after an emergency Bentall operation for type A aortic dissection. There was evidence of hemolytic anemia and aortogram revealed a significant stenosis at the distal anastomosis site. During the reoperation, we found the inner felt at the distal anastomosis was inverted causing a significant stenosis. The reoperation successfully resolved this problem. Here, we report a rare case of hemolytic anemia caused by an inverted inner felt after Bentall operation.

Key Words: Anemia, Hemolytic; Aortic Dissection; Inverted Felt

INTRODUCTION

In cases of acute aortic dissection, reinforcing the aorta with a felt strip is helpful for hemostasis. Teflon felt strips have been widely used for this purpose although several complications [infection, distal embolism (1, 2) and hemolytic anemia (3-6)] related to its use have been described. Among those complications, hemolysis associated with an inverted felt strip inversion is a rare surgical complication (3, 5, 6). We experienced a case of gradually developed hemolytic anemia caused by an inverted inner felt used at the distal anastomosis site of Bentall operation.

CASE DESCRIPTION

A 26-yr-old male patient presented to our emergency room with acute chest pain on April 8, 2010. He was diagnosed with type A aortic dissection and underwent an emergency Bentall operation. We reinforced the proximal and the distal anastomoses using inner and outer felt strips. Computed tomography taken two days after the operation to evaluate postoperative mediastinal widening showed no anastomosis site stenosis (Fig. 1). The patient's postoperative course was uneventful.

Three months after the operation, he developed mild dyspnea on exertion and carotid bruit was audible. An echocardiogram showed normal mechanical aortic valve function. One year after the operation, the patient reported dyspnea and dizziness with exertion and the carotid bruit worsened. There was

evidence of hemolytic anemia (hemoglobin 7.8 g/dL, total bilirubin 1.8 mg/dL, direct bilirubin 0.6 mg/dL, lactate dehydrogenase 897 IU/L, schistocytes in peripheral blood). A treadmill test was positive at stage II. Echocardiogram again showed normal mechanical aortic valve function. Coronary angiogram was performed to rule out coronary button anastomosis site stenosis. There was no coronary stenosis however, there was significant stenosis between the graft and the aorta anastomosis and the diameter of stenotic site was about 13 mm (Fig. 2).

During the reoperation, we found the inner felt at the distal anastomosis was stiff and inverted from the 6- to 12-hr direction. The most significant inversion was about 100 degrees (Fig. 3). The inversion was the cause of the stenosis. The luminal diameter of the anastomosis site was 13 mm which was same as measured with the aortogram. The anastomosis site was excised at a 1-cm width including the inner and outer felts used for reinforcement. Reanastomosis between the aorta and the graft was completed without felt reinforcement. Dyspnea, carotid bruit and hemolysis disappeared (Hb 14.2 g/dL) after the reoperation. The patient is still doing well and continuing with regular follow up.

DISCUSSION

Causes of Anemia are classified into three groups: decreased production of red cells, increased destruction of red cells and acute blood loss. Hemolytic anemia is anemia due to increased destruction of red cell and it may be hereditary and acquired.

Mechanical destruction of red cell is one of acquired causes of the hemolytic anemia. It is well known that prosthetic heart valve, especially when paravalvular leakage is present, is related with hemolytic anemia (7). However, there have been only a few reports on inner felt related hemolytic anemia (3-6).

Hemolysis associated with an inverted inner felt develops gradually (3) from within a month to years after surgery (3, 5, 6). It is unknown whether felt strip inversion occurs gradually or hemolysis develops gradually even with an inverted felt. In this case, we clearly observed a gradual development of signs and symptoms from the stenosis such as carotid bruit, dyspnea and dizziness along with hemolysis. This suggests gradual development of stenosis.

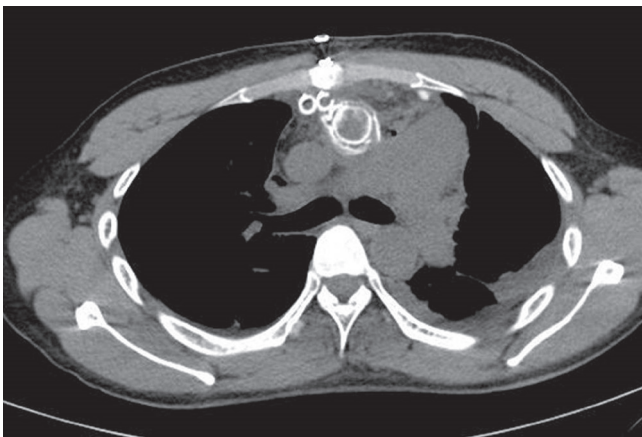


Fig. 1. CT taken two days after the surgery. No significant stenosis at the distal anastomosis site.

In this case, early postoperative CT imaging did not show anastomosis stenosis but the aortogram taken a year after the surgery showed significant stenosis. This also suggests that felts can invert gradually. However, there is possibility that the CT failed to reveal the stenosis.

Clinical suspicion is very important in diagnosing this complication. Important clinical clues are bruit, ejection murmur,

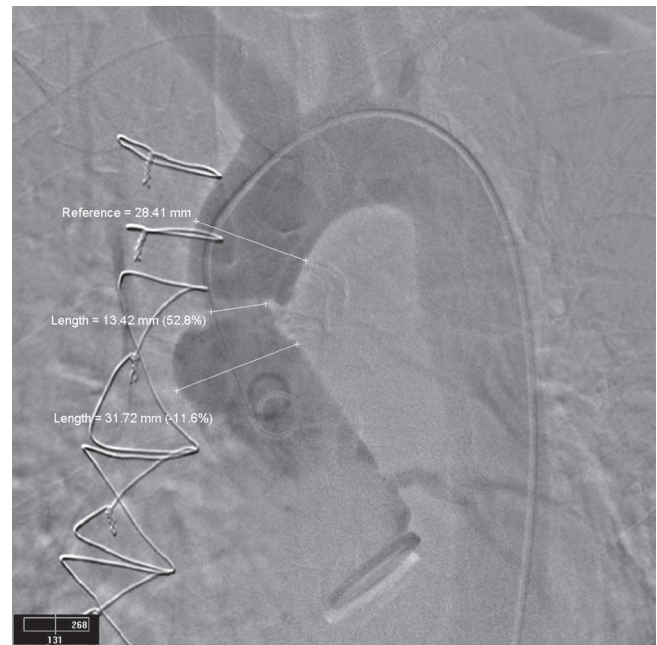


Fig. 2. Aortogram taken one year after surgery. Narrowing of the aorta anastomosis site.

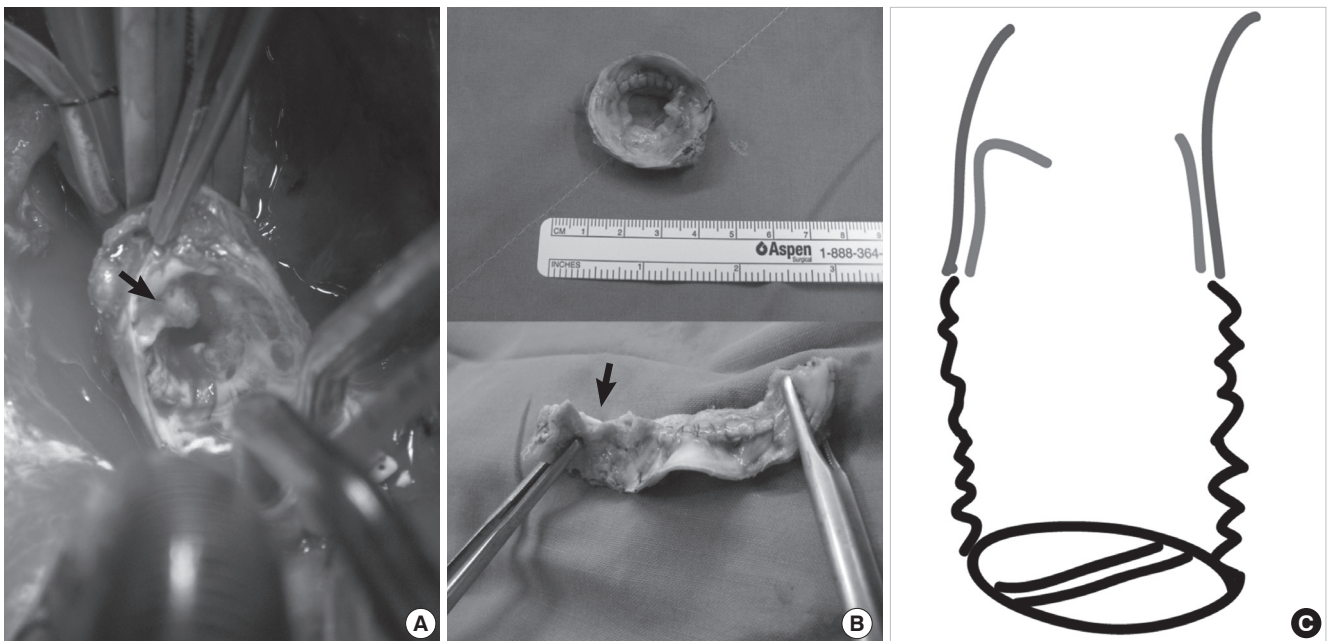


Fig. 3. Inverted inner felt (arrows indicate the most significant inversion). (A) Operative field after the aorta transection. (B) Resected felt strips. (C) Schematic view.

dyspnea and dizziness. Laboratory findings, including anemia and elevated levels of lactate dehydrogenase, reticulocytes and schistocytes, are compatible with hemolysis (5). Helpful imaging studies for diagnosis include CT, MRI, echocardiography and aortography. Transesophageal echocardiography and MRI have been reported as effective tools to detect this complication in some studies (5, 8, 9).

Felt strips that are too wide should be avoided to prevent this complication. Narrowing the anastomosis by excessively tightening the purse string sutures with felt reinforcement should also be avoided.

In this case, we treated this complication successfully with surgical revision. During the reoperation, we found that the inner felt was too stiff to be treated with endovascular intervention such as stent insertion. In the previous papers, all authors treated this complication with surgical revision, too (3, 5, 6). However, we assume that this complication might be treated with stent insertion when this complication happens in very early postoperative period before the inner felt strip becomes too stiff.

In summary, surgeons should keep in mind that inner felts used for reinforcement might gradually become inverted and cause clinically significant hemolysis. Clinical suspicion, laboratory findings and imaging studies are important for appropriate diagnosis. Attention should be paid to avoid using excessively wide felt strips and/or excessively tight purse string sutures. Once diagnosed, this complication should be corrected surgically.

REFERENCES

1. Bedetti CD, Siewers RD, Dunsford HA. *Teflon felt embolism of coronary arteries after cardiac surgery: a case report. Am Heart J* 1978; 96: 802-5.
2. Sogawa M, Moro H, Namura O, Ishiyama T, Hayashi J. *Thrombus on the intraluminal felt strip: a possible cause of postoperative stroke. Jpn J Thorac Cardiovasc Surg* 2001; 49: 333-5.
3. Hata M, Yoshitake I, Wakui S, Unosawa S, Hata H, Shiono M. *Postoperative early hemolytic anemia due to inverted teflon felt strip after emergency repair for type A dissection. Thorac Cardiovasc Surg* 2011; 60: 482-4.
4. Izumi S, Tano K, Horike K, Kaihotsu N. *Repeat surgery for hemolysis 6 years after replacement of the ascending aorta for acute aortic dissection. Jpn J Thorac Cardiovasc Surg* 2003; 51: 459-61.
5. Nakamura Y, Ogino H, Matsuda H, Minatoya K, Sasaki H, Kitamura S. *Hemolytic anemia after operation for aortic dissection using teflon felt strips. Ann Thorac Surg* 2008; 85: 1784-7.
6. Shingu Y, Aoki H, Ebuoka N, Eya K, Takigami K, Oba J, Chiba K, Fukuhara T. *A surgical case for hemolytic anemia after ascending and total arch replacement. Ann Thorac Cardiovasc Surg* 2005; 11: 416-8.
7. Luzzatto L. *Hemolytic anemias and anemia due to acute blood loss. In: Longo D, Fauci A, Kasper D, Hauser S, Jameson J, Loscalzo J, editors. Harrison's principle of internal medicine. 18th ed. New York: McGraw-Hill, 2012, p872-86.*
8. Cesare ED, Giordano AV, Cerone G, De Remigis F, Deusanio G, Masciocchi C. *Comparative evaluation of TEE, conventional MRI and contrast-enhanced 3D breath-hold MRA in the post-operative follow-up of dissecting aneurysms. Int J Card Imaging* 2000; 16: 135-47.
9. García A, Ferreirós J, Santamaría M, Bustos A, Abades JL, Santamaría N. *MR angiographic evaluation of complications in surgically treated type A aortic dissection. Radiographics* 2006; 26: 981-92.