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Iatrogenic supravalvular aortic stenosis

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Conflicts of interest: none declared

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Abstract: We describe a case of haemolytic anaemia and proximal anastomotic site stenosis following emergency repair of Type A aortic dissection. This rare complication led to a reoperation to correct the iatrogenic aortic stenosis and cure the consequent haemolysis. A “sandwich” technique (with two Teflon strips on the outside and inside of the aortic wall) was used in the initial repair in order to reinforce the suture line and prevent bleeding from the aortic anastomoses. At the time of re-operation the inner Teflon strip at the proximal aortic anastomosis was found to have inverted into the aortic lumen, as suggested by the preoperative magnetic resonance. Surgical treatment consisted in resecting the portion of inner Teflon that had turned in and tacking the remaining part back onto the aortic wall. The observed haemolysis was likely due to the turbulent flow associated to the supra-aortic stenosis and the collision of red cells with the internal Teflon strip. The patient made an uncomplicated recovery with no further haemolysis and was discharged on the 8th postoperative day.

Key words: aortic dissection; haemolysis; Teflon strip; sandwich technique
Introduction

Type A aortic dissection represents a true surgical emergency. As a consequence of the progress in aortic surgery developed in the last two decades, including surgical technique, brain protection and perfusion technique[1][2], morbidity and mortality related to this condition have improved but remain substantial[3]. We report a case of successful treatment of haemolytic anaemia and severe stenosis of the proximal aortic anastomosis resulting from the surgical repair of acute type A aortic dissection.

Case report

A 64-year-old woman was admitted to our hospital with type A aortic dissection. She underwent emergency ascending and proximal arch replacement using a 32mm Hemashield graft. Bypass was by right axillo-atrial cannulation. The ascending aorta was excised and the proximal edge sandwiched between two layers of Teflon. The proximal anastomosis was then completed with continuous 3-0 prolene. Under deep hypothermic circulatory arrest with unilateral cerebral perfusion via the right axillary artery, the distal anastomosis was completed using a sandwich technique similar to the proximal anastomosis with two layers of Teflon and a running 3-0 prolene. Bypass was discontinued easily without inotropes. The patient was discharged to the ward in stable condition on postoperative day 2. Her haemoglobin was 103 g/L. During the following week we observed progressive anaemisation, which eventually led to transfusion on postoperative day 8 when the
haemoglobin was reported to be as low as 72g/L. On examination there was evidence of systolic murmur of Levine III/VI at the right sternal border of second intercostal space and no other abnormal findings. Haemolysis was suspected and eventually confirmed on blood film, which showed occasional schistocytes with helmet cells, slight roloux and mild uniform thrombocytosis. Haemolysis markers were raised (LDH 2018U/L; bilirubin 23 µmol/L).

Echocardiography showed no valve lesion while the ascending aorta was not well visualised. Computed tomography was non-diagnostic. Magnetic resonance imaging (SSFP cine images acquired on a Siemens Avanto 1.5T MRI system using a 32 channel surface coil) showed a high velocity central jet at the level of the proximal graft anastomosis with the residual orifice measuring approximately 8 mm in diameter and significant degree of turbulence across the stenosis, with a peak gradient to 67mHg (Fig. 1, Fig. 2).

The only conceivable explanation was that the proximal edge of the internal strip of Teflon had been lifted into the centre of the aortic lumen by the blood flow. At redo surgery, the graft was opened immediately distal to the anastomosis and redundant Teflon was partly trimmed and partly tacked back onto the aortic wall with 4-0 prolene sutures (Fig. 3 and 4).

The patient made an uncomplicated recovery with no further haemolysis and was discharged on the 8th postoperative day. She remained well at follow-up 10 weeks later and blood test showed normal haemoglobin (116 g/dl).
Discussion

Haemolytic anaemia and stenosis of the anastomotic site are extremely rare complication and there are few reports describing this unfortunate event[4][5][6][7][8].

The main cause appears to be the inverted and stiffened internal felt strip. The use of an internal felt strip as part of the sandwich technique for the treatment of type A aortic dissection is not unusual. The aim of this approach is to reinforce the fragile and dissected aortic wall and prevent or minimise bleeding from the anastomotic site.

The risk of complication such as clot formation, haemolysis and stenosis of the anastomotic site should be therefore carefully considered and balanced with the benefits provided by this technique. To minimise risk, the strip should be narrow and the sutures should be passed as close as possible to its proximal edge. The presence of a systolic murmur on examination and laboratory evidence of haemolysis should raise suspicion of this rare complication. Further imaging including echocardiography, CT scan and/or MRI are mandatory in order to confirm the diagnosis and plan a surgical correction.

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Figure 1: Lateral view of the MRI scans showing the turbulent flow across the stenotic proximal anastomosis and true and false lumen in the arch and descending aorta.

Figure 2: Frontal view showing the same pathologic feature.
Figure 3: Graft opened, before refashioning.
Figure 4: After refashioning, the aortic lumen is clearly patent with a significant increase in diameter.