Late Survival After Endovascular Repair of an Aortobronchial Fistula

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Submitted 2 August 2009; accepted 22 November 2009

Abstract We present an interesting case of a patient who underwent initial open repair of a descending thoracic aortic aneurysm in 1996, who subsequently had a pseudo-aneurysm that arose from his prosthetic graft, which was repaired with open surgery in 1998. He then developed a second pseudo-aneurysm with an aortobronchial fistula. This was successfully treated with an endovascular stent graft in 1999. The patient has survived 10 years after this procedure.

Introduction Aortobronchial fistula (ABF) is a rare complication of thoracic aortic replacement surgery. Without surgery, mortality is almost 100%. The main causes are previous thoracic vascular surgery (of which aneurysm repair is the main culprit), infection, atherosclerosis and trauma.

The physician must have a high diagnostic suspicion of ABF in a patient with haemoptysis and previous thoracic aortic surgery. We present an interesting case of a ruptured pseudo-aneurysm and an ABF successfully managed with endoluminal stent grafting.

Report A 66-year-old man presented with a significant medical history of hypertension, smoking and intolerance to aspirin. In 1986, he underwent open repair of a ruptured saccular aneurysm (6 × 5 cm) of the right internal carotid artery. This was of unknown aetiology.

The patient was initially referred to our hospital in 1996 (at the age of 53) for evaluation of increasing abdominal pain. Preoperative imaging revealed a true saccular aneurysm measuring 60 mm in diameter in the descending thoracic aorta. He underwent open repair surgery via left thoracotomy. Aneurysmorrhaphy was performed using an aortic Dacron patch reconstruction. Patch aortoplasty was performed rather than graft replacement because of the small diameter and length of the aneurysm and also to minimise the cross-clamping timing, trying to avoid a higher risk of paraplegia. He was discharged on the seventh postoperative day.
In 1998, the patient attended a different hospital for evaluation of intermittent haemoptysis. Chest radiography revealed an aortic mass and condensation in the left thorax. Bronchoscopy revealed the presence of blood in the right superior lobe. The patient became haemodynamically unstable, with progressive anaemisation (haemoglobin level of up to 5.0 g dl\(^{-1}\) with 16% haematocrit), which led to a haemorrhagic shock condition. Urgent computed tomography (CT) revealed a ruptured pseudo-aneurysm measuring 20 mm in diameter in the descending thoracic aorta (Fig. 1A).

He was immediately transferred to the operating room and he underwent open surgery via left thoracotomy. With aortic cannulation and a shunt in place, the ruptured pseudo-aneurysm was repaired with resection and an aortic polytetrafluoroethylene (PTFE) patch, with evacuation of the haematoma. Serologic and cultural studies were negative.

After prolonged intubation, the patient was discharged 45 days after surgery. Long-term antibiotic regimen was implemented using rifampicin at a dose of 600 mg and co-trimoxazole (trimethoprim–sulphamethoxazole) at a dose of 800 mg of sulphamethoxazole and 160 mg of trimethoprim, orally, once a day, for 12 weeks.

In July 1999, the patient was referred to our hospital for evaluation of intermittent haemoptysis that had developed over several hours. Laboratory values, blood culture and bronchoscopy results were all within normal limits. No collagen or other immunologic disorders were found. Chest radiography revealed a left haemothorax. CT with intravenous contrast revealed a ruptured para-anastomotic pseudo-aneurysm in the descending thoracic aorta (Fig. 1B).

After careful review of the surgical options, the patient refused open surgery and elected to undergo an endovascular intervention.

Intra-operative angiography confirmed the presence of an ABF at the site of a pseudo-aneurysm in the descending thoracic aorta (Fig. 2). The procedure was performed under general anaesthesia.

A prophylactic intravenous dose of cefazolin was given. Through a right retroperitoneal approach, an 8-mm PTFE conduit was anastomosed to the right common iliac artery.

**Figure 1** (A) Chest CT in 1998 revealing a 20-mm ruptured descending thoracic pseudo-aneurysm with left haemothorax. CT, computed tomographic scan. (B) Chest CT in July 1999 revealing a ruptured descending thoracic pseudo-aneurysm. CT, computed tomographic scan.

**Figure 2** Angiography demonstrating an ABF (arrow) from the left side of the descending thoracic aorta (A). CT scanning in January 2009 confirming accurate placement of the endoprosthesis, successful exclusion of the ABF and pseudo-aneurysm (B). ABF, aortobronchial fistula.
The stent graft was deployed using this PTFE conduit owing to the tortuosity and the limited size of both external iliac arteries. The patient was given 5000 units of intravenous heparin.

The device was inserted into a 24F sheath. Temporary hypotension was induced with nitroglycerin. Using fluoroscopy and trans-oesophageal echocardiography (TEE), a Talent™ covered endoprosthesis (Medtronic Vascular, Santa Rosa, CA, USA), 30 mm proximal and distal diameters by 130 mm long, was successfully delivered and deployed. Completion arteriography was performed to assess accurate placement.

The patient was discharged 10 days after the procedure. Antibiotics were administered for 6 weeks.

During the follow-up there were no complications, no recurrent haemoptysis nor other pulmonary alterations. Follow-up was scheduled at 1, 6 and 12 months and yearly thereafter, with physical examination and CT scanning.

A CT scan performed in January 2009 revealed no leaks or other abnormalities, with proximal landing 30 mm from the left subclavian artery and distal landing 50 mm from the coeliac trunk. The results of the vascular physical examination are normal.

Discussion

Diagnosis of ABF is facilitated by imaging techniques such as chest radiograph, bronchoscopy, magnetic resonance, chest CT with intravenous contrast and contrast aortography.

We used TEE and intravascular ultrasound (IVUS) for intra-operative visualisation and localisation of the ABF. IVUS demonstrated the disruption in the aorta, the formation of a pseudo-aneurysm and a fistulous tract (i.e., a small break in the intima of the thoracic aorta). An important advantage of IVUS was that the accurate length of aorta to be excluded, as well as sizing of the aorta and of the proximal and distal landing zones, was precisely determined.

Aortography, CT angiography and TEE appear to be the most sensitive tests.²³ Once the diagnosis is established, surgery must be immediate.

Open surgery entails high morbidity and mortality. According to the different series, mortality rates vary from 25% to 60%.⁴

Postoperative morbidity is substantial, with potential serious complications such as prosthetic graft infection, spinal cord ischaemia and respiratory and renal failure.

Endovascular interventions emerged in 1996 as an alternative to traditional open surgery for the treatment of ABF. A review of the literature revealed 55 cases of ABF treated using endovascular repair. These were all from small series.²⁵

A 2007 meta-analysis demonstrated a cumulative 30-day mortality of 8.3%, with most of the cases reporting successful 1-year survival.³ Larger series with longer-term follow-up are still required.

In conclusion, we present a patient who, after three thoracic aortic procedures, has survived 10 years after successful endovascular stent grafting of an aortobronchial fistula.

Conflict of Interest/Funding

None

References