Endovascular Repair of an Acute, Mycotic, Ascending Aortic Pseudoaneurysm

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Abstract This report describes endovascular stenting of an acute mycotic ascending aortic aneurysm.

An eighty-three year old lady presented nine weeks after aortic valve surgery and subsequent thyroidectomy with sternal pain secondary to a mycotic ascending aortic pseudoaneurysm. The pseudoaneurysm was visible through the unhealed sternum. Open repair was considered too high a mortality risk. Endovascular stenting was performed using two covered infrarenal proximal extension devices (GORE Excluder Aortic Extender®, W. L. Gore & Associates, Flagstaff, Arizona, USA) deployed from a right axillary approach utilising overdrive cardiac pacing. Post procedure imaging revealed shrinkage of the pseudoaneurysm sac.

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Introduction

We report a case of an acute, life threatening, mycotic pseudoaneurysm of the ascending aorta following aortic valve replacement, treated successfully by endovascular stent graft placement.

Case Report

An eighty-three year old lady underwent elective aortic valve replacement. Her co-morbidities included medicated hypertension, hyperlipidaemia, non insulin dependent diabetes and hyperthyroidism. On extubation following surgery, she developed respiratory compromise and suffered
a cardiorespiratory arrest requiring cardiac massage and reintubation. After seven days, she underwent percutaneous tracheostomy formation. Five weeks, several decannulation attempts had failed, thought to be due to a retrosternal goitre causing airway compromise. She underwent total thyroidectomy facilitating successful decannulation seven weeks post procedure.

Over the next two weeks she complained of sternal pain, developing an 8 × 6 cm, tender, pulsatile swelling underneath her sternotomy scar (Fig. 1). Blood cultures grew *Staphylococcus aureus* treated with Rifampicin, Doxycycline and Vancomycin.

Computed Tomography (CT) Angiography demonstrated a 10 cm pseudoaneurysm arising from the ascending aorta, 2 cm distal to the coronary vessels, with a patent lumen. It extended through partially disrupted sternal wires with sternal non-union (Fig. 2).

Open repair was considered but she was deemed unlikely to survive this and was therefore transferred to our unit for endovascular treatment. The pseudoaneurysm was imaged via a catheter in the right brachial artery showing flow into the sac from a defect distal to the coronary orifices. With no identifiable single defect in the aortic wall and a defect too extensive for a patent foramen ovale closure device, stent graft placement was planned. Via an open right axillary artery approach, two 26 mm covered infrarenal proximal extension devices (GORE Excluder Aortic Extender®, W. L. Gore & Associates, Flagstaff, Arizona, USA) were deployed in the ascending aorta, through an 18F sheath, covering the origin of the pseudoaneurysm, confirmed on angiography (Fig. 3). Coronary and brachiocephalic flow was preserved. Overdrive cardiac pacing dropped the systolic pressure to 40 mmHg, enabling accurate stent graft placement. The device is designed for abdominal aortic placement and hence the delivery device length would not allow a femoral approach.

She was extubated 24 h later and made an uneventful recovery. CT imaging at 48 h confirmed exclusion of the pseudoaneurysm, with no contrast extravasation (Fig. 4). Her sternal swelling settled within one month (Fig. 5). She remained on life-long Rifampicin and Doxycycline given the mycotic element of the pseudoaneurysm and risk of life threatening graft infection and was well four weeks post discharge.

Figure 1  Pseudoaneurysm presenting as a tender, pulsatile mass beneath her sternotomy scar.

Figure 2  Transverse and sagittal sections of the computed tomography scan demonstrating the pseudoaneurysm (small white arrow) originating from the ascending aorta (A) with its surrounding haematoma causing disruption of the sternal wires (large white arrow).
Pseudoaneurysms are a rare life threatening complication following aortic valve surgery. Chest pain, fever and heart failure are common presentations but the pathology may only be detected incidentally.

Reports describe similar cases presenting with a pulsatile sternal swelling but this is rare.

We believe the likely aetiology in this case is infection of the sutured aortotomy of the aortic valve replacement, related to either thyroidectomy or tracheostomy.

Traditionally, ascending aortic pseudoaneurysms are repaired via a sternotomy, associated with high levels of morbidity and mortality. This requires cardiopulmonary bypass and deep hypothermic circulatory arrest. The thirty day survival rate of open aortic pseudoaneurysm repair has, in some reports, been encouraging, with survival rates of up to 94% in one study of sixty patients. Other reviews of selected series of patients describe mortality rates up to 16.5%, with stroke rates of 2–18%.

Endovascular methods are not without risk. There are embolisation and stent graft infection risks and techniques can be limited due to aortic arch anatomy. However, endovascular repair may still be preferable to open repair to avoid the inherent risks of a major surgical procedure. We selected a GORE proximal extension device with its short nose cone reducing trauma to the aortic valve during placement. It can be rapidly deployed during overdrive pacing.

Figure 3  Pre and post stenting digital subtraction angiography images showing contrast extravasation in the pseudoaneurysm (white arrow) and subsequent stent (black arrow) positioning with exclusion of the pseudoaneurysm.

Figure 4  Transverse and sagittal sections of the computed tomography scan showing correct stent position in the ascending aorta (A) with exclusion of the pseudoaneurysm and resultant haematoma (H).
Many consider endovascular stenting of the ascending aorta experimental. Two reports describe endovascular stenting of mycotic ascending aortic pseudoaneurysms\textsuperscript{4,5} but at fifteen and twelve months post procedure respectively, not in the acute setting. Heye et al describe the most recent case post coronary artery bypass grafting, presenting with haemoptysis.\textsuperscript{4} A 7 cm pseudoaneurysm arose from a cannulation site of the aorta and blood cultures grew \textit{S. aureus}. As in our case, a GORE Excluder Aortic Extender\textsuperscript{®} device was used.

**Conclusion**

This endovascular procedure treated a rapidly expanding, life threatening, acute, mycotic pseudoaneurysm, avoiding a high-risk open procedure. Advances in technology offer less invasive procedures for aortic pathologies. Where the anatomy is suitable, endovascular management of pseudoaneurysms of the ascending aorta may be an acceptable alternative to open repair due to its reduced associated risks.

**Conflict of interest**

None.

**References**