Proposal for bail-out procedures - Vascular thoracic

Use of the right brachio-femoral wire approach to manage a thoracic aortic aneurysm in an extremely angulated and tortuous aorta with an endoluminal stent graft

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Abstract

The presence of a tortuous, elongated thoracic aorta and an angulated arch poses a technical challenge for the delivery of an endoluminal graft to the target site to exclude management of a thoracic aortic aneurysm. Despite the availability of a flexible delivery sheath system, adjunct techniques are necessary to deal with extremely tortuous thoracic aortas. The use of a brachio-femoral wire with tension applied at both ends is a useful technique to deliver an endoluminal graft in an angulated thoracic arch. We describe the use of a right brachio-femoral wire approach to treat a thoracic aortic aneurysm in a 75-year-old man with an elongated, tortuous and angulated arch aorta.

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1. Introduction

Endovascular management of thoracic aortic aneurysms are associated with decreased morbidity and mortality compared to open surgical techniques. The tortuous, elongated and angulated arch may make it difficult to advance an endoluminal graft to its target site. We describe a technique that can safely be used to advance an endoluminal graft up the hostile and tortuous arch.

A 75-year-old man with a past medical history significant for hypertension, hyperlipidemia, coronary artery disease, chronic obstructive lung disease, and prostate cancer post radiation therapy was found to have a 7.0 cm thoracic aortic aneurysm (Fig. 1a) for symptoms of back pain. He was considered high risk for open surgical repair and offered an endovascular approach to manage the aneurysm.

2. Endovascular technique

Placement of bilateral arterial radial arterial lines, open retrograde of the right common femoral artery with placement of a 9F sheath and percutaneous retrograde access of the left common femoral artery with a 5F sheath were performed. 5000 units of heparin was given and iliac angiogram performed demonstrated diffuse stenosis and calcification of both common and external iliac arteries which was successfully managed with balloon angioplasty. An oblique thoracic aortogram performed through a 5F angio-

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Fig. 1. (a) CT scan of the chest demonstrating a thoracic aortic aneurysm with a diameter of 7.0 cm. (b) Postoperative CT scan demonstrating exclusion of thoracic aortic aneurysm with no visualized endoleak.

partially covering the left subclavian artery (Fig. 2c). A 31 mm × 15 cm Gore–TAG device was subsequently deployed distally just above the celiac trunk after an aortogram had been performed to demarcate the distal landing zone on the road map. A third device, 34 mm × 15 cm Gore TAG device, was necessary to cover the area of overlap between the proximal and distal endografts. A completion angiogram demonstrated successful exclusion of the thoracic aortic aneurysm with no endoleak (Fig. 2d). The 22F sheath was then exchanged to a 9F sheath and bilateral iliac angiograms demonstrated no extravasation of contrast. Bilateral 10 mm × 37 mm self-expandable stents were subsequently deployed at the area of previous iliac artery balloon angioplasty. Completion angiogram demonstrated satisfactory angiographic pictures with brisk flow through the iliac vessels and no pressure gradient. The patient was extubated and transferred to the recovery room. A postoperative CT scan (Fig. 1b) demonstrated no endoleak with exclusion of thoracic aortic aneurysm.

3. Discussion

Despite improved surgical techniques, the operative mortality with open surgical repair of descending thoracic aortic aneurysms is between 4.8% and 20% [1, 2]. Many authors [3, 4] have confirmed the decreased morbidity and mortality with thoracic stent grafts to treat thoracic aortic aneurysms. An angulated arch and a tortuous aorta is a relative contraindication for deployment of an endoluminal graft. The use of a super stiff wire may not be sufficient to allow the sheath or the endograft to track proximally into the angulated arch.

Fig. 2. (a, b) Angiogram and illustration demonstrating an extremely angulated arch with a large thoracic aortic aneurysm and a brachio-femoral wire. (c) Illustration of endoluminal graft deployed using a brachio-femoral wire. (d) Completion angiogram demonstrating exclusion of thoracic aortic aneurysm with no demonstrable endoleak.

Use of brachio-femoral access wires can help straighten the most angulated and tortuous aorta. The technique requires that a protective guiding catheter be placed to protect the subclavian artery from injury. It is important to have at least a 260-cm long wire and constant tension must be placed on both ends of the wire as the graft is advanced through the delivery sheath into the aorta. When applying this technique the prudent surgeon must always ensure that a guidewire remains in the aorta upon removal of a delivery sheath and an aortic occlusion balloon should always be available in the operating room in case of a suspected rupture.

In conclusion, proper preparation with adequate imaging should allow successful and safe endovascular repair of the tortuous and angulated thoracic aorta even in difficult access situations. The technique of a brachio-femoral wire should be used with a guiding sheath protecting the subclavian vessels to prevent shearing the vessel when traction on the wire is exerted and finally this technique does pose an inherent risk of thromboembolism from the arch vessels and should not be performed if imaging demonstrates atheroemboli in the arch vessels for fear of atheroemboli to the brain.
References


