
Antegrade Deployment of a Thoracic Endograft Using a Minithoracotomy
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We report a case of a woman who presented with a symptomatic penetrating aortic ulcer of the descending aorta and prohibitive aortoiliac occlusive disease. The thoracic stent graft was delivered using surgical exposure of the ascending aorta.

Thoracic endovascular repair offers a reasonable and potentially preferable alternative to repair diseases of the thoracic aorta. One of the primary limitations is the physical ability to deliver the endograft, which typically requires 18F to 24F sheaths. For patients with significant aortoiliac occlusive disease, alternate delivery techniques include retroperitoneal aortic or iliac conduits, but these access procedures are associated with increased blood loss, operative time, and morbidity [1]. Experience with transcatheter aortic valve replacement has shown the ascending aorta to be an acceptable site for device delivery [2].

A 67-year-old woman was admitted to our institution with a 1-day history of chest pain and dyspnea that had resolved by the time of surgical evaluation. She had a notable history of coronary artery disease, peripheral vascular occlusive disease, hypertension, and hyperlipidemia. Her peripheral vascular occlusive disease had been treated at the referring institution with endovascular stent placement throughout her iliac and femoral arteries bilaterally. On physical examination, she was hemodynamically stable and resting comfortably. She had palpable but weak femoral pulses. Her computed tomographic scan showed a focal penetrating ulcer in the midthoracic aorta (Fig 1). Her iliac arteries showed radiographic evidence of severe peripheral vascular occlusive disease and prior endovascular stenting (Fig 2).

Analysis of a three-dimensional reconstruction of the computed tomographic scan confirmed that the iliac arteries were prohibitively small, with luminal diameters as small as 3 mm. Moreover, the amount of calcium in the native aorta made the option of an aortic conduit less desirable. The subclavian arteries were also found to be prohibitively small. Therefore, the decision was made to perform an antegrade thoracic endovascular repair from the ascending aorta.

With the patient under general anesthesia, the left common femoral artery was accessed with a 5F sheath (Terumo, Somerset, NJ) through which a pigtail flush catheter (Cook Medical, Bloomington, IN) was placed. A right anterior minithoracotomy was made, and the costosternal junction of the second rib was transected, allowing mobility of the rib to expose the right pleura, which was incised sharply. With the lung gently retracted, the mediastinum was entered, and pericardial fat was removed to expose the ascending aorta (Fig 3). Two 3-0 Tevdek (Teleflex Medical, Gurnee, IL) pursestring sutures were placed around an area free of palpable calcific plaque, and after systemic anticoagulation with heparin, a micropuncture needle was used to access the ascending aorta. Through this, a 0.035 STORQ wire (Cordis Corp, Bridgewater, NJ) was placed and under...
fluoroscopic guidance was advanced to the abdominal aorta. This was exchanged for a stiff Lunderquist wire (Cook Medical). Over this, a Cook Zenith TX2 28x80 (Cook Medical) proximal extension piece was placed. Interval angiography confirmed the location of the penetrating aortic ulcer, and the stent graft was deployed without difficulty (Fig 4). Completion angiography showed excellent apposition of the stent without any filling of the penetrating aortic ulcer. A small chest tube was placed, and the thoracotomy was closed.

Postoperatively, the patient did very well and had no adverse neurologic symptoms. Her incisional pain was controlled, the chest tube was removed, and she was discharged on postoperative day 7.

Comment

The delivery of an endograft remains one of the significant challenges for endovascular repair of thoracic aortic disease. Although there appears to be a declining rate of conduit usage with time, the creation of a conduit is associated with higher intraoperative blood loss, overall morbidity [1], and even mortality [1]. The patient presented here posed a significant and likely prohibitive challenge for transfemoral or even transiliac delivery of the endograft.

Increasing experience with transcatheter aortic valve replacement has shown the subclavian arteries and ascending aorta to be suitable for device delivery [2]. Antegrade deployment of thoracic endografts has also been reported and often serves as a bailout maneuver.
for thoracic aortic reconstruction. However, in contrast to many of these cases, our patient was not undergoing open aortic surgery, and therefore we sought a minimally invasive solution based on experience with transcatheter aortic valve replacement.

Deployment of the thoracic endovascular repair device in this manner necessitates placement of the device backward, wherein the designed proximal end lands distally. The TX2 device has active fixation bars, and these therefore are likely to be of little value in this setting as the barb orientation does not oppose any migratory forces owing to active blood flow. To our knowledge, there have been no untoward events to placement of the device in this manner. In our case, the thoracic endograft was easily deployed using this approach. She experienced relief of her symptoms, and ultimately was discharged home with excellent coverage of her penetrating ulcer.

References

Endovascular Stent-Graft Repair of Ascending Aortic Dissection With a Commercially Available Thoracic Endograft
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We describe the endovascular treatment of a type A thoracic aortic dissection (TAAD) in a patient deemed unfit for surgical repair with a commercially available thoracic endograft. A patient with a symptomatic acute TAAD, multiple medical comorbidities, and ascending thoracic aortic and arch dilation underwent successful endovascular repair with the use of a commercially available stent graft, resulting in complete resolution of his symptoms despite slight but persistent peri-graft false lumen perfusion. Although surgical repair remains the gold standard, endografting has promise and may have a positive impact on the current treatment algorithm for TAAD. Advances must occur in graft manufacturing, and further data will be required before wider application is appropriate.


Accounting for approximately 60% of aortic dissection cases, Stanford type A aortic dissection (TAAD) remains a disease with poor prognosis, high perioperative open surgical mortality, and a significant surgical refusal rate as high as 40% [1]. Medically treated patients with TAAD do poorly; their in-hospital mortality rate is 60% [2].

Endovascular repair has grown into an established treatment option for traumatic descending thoracic aortic injuries and aneurysmal diseases of the descending aorta. Trials are ongoing to assess the endograft treatment of Stanford type B dissection. Endovascular stent-grafting may emerge as a promising treatment for acute TAAD, particularly for patients unable to undergo open surgical repair. We report a case of endovascular repair with a commercially available stent graft for treatment of an acute TAAD.

A 79-year-old man came to the Tulane University Medical Center with a 1-week history of progressively worsening subscapular back pain and shortness of breath. Computed tomographic angiography (CTA) revealed dilation of the ascending thoracic aorta with a maximum diameter of 5.7 centimeters, and an intimal tear arising from the right coronary sinus distal to the right coronary artery origin with extension to the junction of the ascending thoracic aorta and proximal arch. The diameter of the proximal aortic at the sinotubular junction was 4.2 centimeters. A transthoracic echocardiogram showed an ejection fraction of 10% and mild aortic valve regurgitation.

Owing to the patient’s advanced age and severe comorbidities, he was deemed unfit for open surgical repair. We performed a thoracic aortogram to assess his candidacy for thoracic endografting, particularly the distance from the highest coronary orifice to the origin of the innominate artery. These findings revealed a coronary-innominate distance below 12 cm (Fig 1).

The patient was brought to the endovascular operating suite and was given spinal anesthesia. Surgical exposure was performed of the left common femoral artery and right brachial arteries. Percutaneous access of the right femoral artery was obtained, with placement of a 5F sheath. From the percutaneous femoral access site, a curved catheter was used to navigate a stiff angled 0.035 Glidewire (Terumo) across the aortic arch dissection. Angiography was performed from the left ventricle to ensure intraluminal placement. Retrograde canulation of the brachial artery with a 7F sheath was performed, and a curved catheter allowed navigation of a second stiff angled 0.035 Glidewire across the arch into the descending thoracic aorta. Access of the left femoral artery was obtained with a 5F sheath, through which we placed a third Glidewire and used the buddy wire technique to cross the dissection with placement of the wire tip into the left ventricle. The patient was given heparin, and an angiogram was performed, revealing the locations of the aortic valve and the ostia of the left main and the right coronary arteries. We then exchanged the Glidewire through the left femoral artery for an Archer wire.