Percutaneous Repair of a Giant Chronic TAAA Dissection

An endovascular approach utilizing a combination of stent graft and covered stents is feasible in thoracoabdominal aortic aneurysm repair.

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The gold standard surgical treatment for chronic aneurysmal aortic dissection (CAAD) is open surgical repair. Most dissecting aneurysms involve the visceral arteries. Despite significant improvements in surgical techniques and perioperative management, the morbidity and mortality rates of open repair for such patients are unsatisfactory. Endovascular exclusion with visceral revascularization for thoracoabdominal aortic aneurysm (TAAA) repair is an alternative to open repair, but its application for CAAD has been limited. Endovascular repair of CAAD is particularly challenging because of aortic wall weakness, as well as the complex nature of the disease, including the presence of multiple connections (entries and re-entries) between the true and false lumens. We present a case of a patient who underwent successful endovascular repair of a large CAAD.

CASE REPORT

The patient was a 63-year-old woman with a medical history significant for aortic disease and hypertension. Her chief complaint included a symptomatic giant CAAD. She had undergone open repair of an abdominal aortic aneurysm in 1991 at another facility. She had been well until 2001, when she underwent emergent open repair for proximal anastomotic site dehiscence and subsequent rupture, both of which developed secondary to acute type B aortic dissection. At that time, repair and reinforcement of the rupture and dissecting site were performed with direct suture using felt strips. Unfortunately, the patient had complete paraplegia after this second operation. Her surgical history also included radical hysterectomy for endometrial carcinoma in 2004 and total replacement of the aortic arch for type A aortic dissection in 2005. When she underwent total arch replacement, a CT scan revealed a CAAD involving all four visceral arteries. However, it was thought that open repair for this CAAD was impossible due to the multiple thoracotomies and laparotomies previously performed. Thus, conservative management, including blood pressure control was undertaken. Unfortunately, the CAAD rapidly expanded to 9 cm and became symptomatic. The patient was transferred to our hospital for possible endovascular repair. Chest and abdominal CT scans showed a 9-cm X 5.5-cm CAAD extending from the level of the celiac artery to the bifurcation (Figure 1). The celiac artery, superior mesenteric artery, and bilateral renal arteries (RAs) were mainly supplied via the true lumen. The site of the entry communicating to the true lumen and the false lumen appeared to be present immediately distal to the left RA. Another communication seemed to be present within the right RA. Our treatment strategy...
included placement of a stent graft to close the main entry site, as well as the use of a covered stent to seal the communications present within the RAs (white arrows) (C).

**PROCEDURE**

The patient was taken to an operating suite equipped with a Flat Panel Detector (Innova 4100 GE Healthcare, Waukesha, WI). The procedure was performed under epidural anesthesia. Bilateral femoral accesses were established percutaneously using a 5-F introducer sheath. The technique involved deployment of two ProStar XL closure devices (Abbott Vascular, Santa Clara, CA) before insertion of the large sheaths with the sutures left extracorporeally for closure after the removal of the sheaths (preclose technique). Aortography revealed a CAAD with a large entry at the abdominal aorta (Figure 2A).

The false lumen was easily cannulated selectively through this entry site (Figure 2B). The bilateral RAs were perfused via the true lumen but also showed signs of minor re-entries. The interventionist decided to close the large entry using the Excluder AAA endoprosthesis (Gore & Associates, Flagstaff, AZ) to seal the main entry site. Note the resolution of the large entry site, but the unsealed communication channel within the RAs (white arrows) (C).

Figure 2. Aortography revealed a CAAD with a large entry at the abdominal aorta. The bilateral RAs were perfused via the true lumen but also showed signs of minor re-entries (A). The false lumen was easily cannulated through this entry site (B). Angiography after deployment of the Excluder AAA endoprosthesis (Gore & Associates, Flagstaff, AZ) to seal the main entry site. Note the resolution of the large entry site, but the unsealed communication channel within the RAs (white arrows) (C).

**DISCUSSION**

The goal of treating CAAD is to abolish the blood flow into the false lumen and/or the aneurysm while maintain-
ing flow to the visceral organs. At present, the first-line treatment of CAAD is open repair. However, despite improvement of surgical techniques and perioperative management, complication rates after open repair for CAAD are still high and unsatisfactory. The fact that open repair for CAAD is often the second or the third operation makes the surgical procedure difficult, if not impossible. In addition, the presence of multiple entry and re-entries sites that are difficult to identify during open surgical repair further complicates the procedure. Endovascular treatment seemed to be the only realistic option in this patient, who had history of repeated laparotomies. Although the use of fenestrated/branched EVAR has been reported for the treatment of TAAA, because each entry/re-entry site was isolated from the other, the use of individual stent grafts/covered stents seemed to be a better option for our patient mainly due to the simplicity of the procedure compared with that of fenestrated and/or branched EVAR. We thought that the Excluder was better suited for treating the CAAD because of its flexible nature, as well as the fact that it does not possess a suprarenal stent that could potentially create new intimal tears, as well as retrograde type B dissection. Because partial thrombosis of the false lumen has been shown to be a predictor of poor survival in patients with acute type B dissections, one needs to make a commitment to completely abolish flow to the false lumen. Otherwise, the procedure can do harm by sealing an entry site while leaving another entry/re-entry site untreated.

**CONCLUSION**

An endovascular approach using a combination of stent grafts and covered stents is feasible and may be promising in select cases. A thorough analysis of preoperative imaging and understanding of the complex anatomy accompanying CAAD is of paramount importance. Close and lifelong follow-up are mandatory.

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