Endovascular scissoring in the management of complicated acute aortic dissection involving the infradiaphragmatic aorta

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ABSTRACT

Complicated infrarenal aortic dissection conveys higher morbidity and mortality than proximal dissection. Septum maturation has a significant impact on false lumen modulation. We present two cases of infrarenal aortic aneurysm occurrence after acute dissection. Both cases had a DISSECT score of Sa, Ab, Di, C, PT Ab. Both were managed medically for 14 days, followed by endovascular scissoring, creating a fenestration window that was enhanced with stenting. (J Vasc Surg Cases and Innovative Techniques 2018;4:320-3.)

Keywords: Endovascular scissoring; Aortic dissection; Infradiaphragmatic

Acute infradiaphragmatic abdominal aortic dissection (AIAAD) accounts for 1% to 4% of overall aortic dissections. The International Registry of Acute Aortic Dissection demonstrated an AIAAD incidence of 1.3%. We present two cases managed by endovascular scissoring to allow all visceral vessels to originate from a single lumen, followed by routine endovascular stenting. Both cases were iatrogenic and had a DISSECT score (Disease Duration; location of Intimal tear; dissected aorta Size; aortic involvement Segmental extent; dissection Clinical complications; Thrombus within the aortic false lumen) of Sa, Ab, Di, C, PT Ab.

Both patients consented to the publication of this report.

ENDOVASCULAR SCISSORING TECHNIQUE

On induction of anesthesia, 4000 units of heparin were administered intravenously. Endovascular scissoring using double balloons between the false and true lumens was performed to open the septum and to create a single lumen. Two extrastiff 0.035-inch Lunderquist guidewires (Cook Medical, Bloomington, Ind) were advanced, penetrating the septum, one from the true to the false lumen and one from the false to the true lumen. Subsequently, two Powerflex Pro 12-mm-diameter, 6-cm-length balloons (Cordis, Milpitas, Calif) were inflated at the confluence of the aortic bifurcation, traversing from true to false lumen and vice versa. Traction was maintained downward, releasing the tough fibrotic wall from its attachment, creating a wider fenestration in the septum (Fig 1). Two 12F sheaths (Cook Medical) were then advanced, crossing from one lumen to the other, with a gentle forward push, in a scissoring manner, to equalize the true lumen with the false lumen.

The guidewires and sheaths act as an intravascular scissors that cuts through the dissected flap, thus creating a unilumen up to the level of the celiac artery.

CASE REPORT

Case 1. A 74-year-old woman presented with severe central abdominal pain. One week before, she had undergone cardioversion for sick sinus syndrome. Seven years earlier, she...
underwent endovascular repair of a 5-cm right common iliac artery (CIA) and external iliac artery (EIA) aneurysm using a reverse-mounted Zenith iliac extension (Cook Medical) with retroperitoneal ligation of her internal iliac artery. Two months before her cardioversion, she had routine follow-up computed tomography angiography (CTA) demonstrating normal aorta and left iliac system. On the current admission, CTA showed an AIAAD with aneurysmal dilation (Fig 2, A and B). Medical therapy was implemented for 14 days, allowing maturation of the dissection flap. She then underwent endovascular scissoring as described before, up to the level of the celiac artery. This created an adequate proximal landing zone that could accommodate the main body of an infrarenal endovascular graft (Incraft; Cordis) from the level of the renal arteries to both EIAs. Because of her previous iliac stent, the complexity of the current procedure, and recent cardioversion, no attempt was made to revascularize her hypogastric arteries. No post-deployment ballooning was performed, and satisfactory completion angiography was achieved (Fig 2, C). Follow-up at 3 years showed full modulation of the infrarenal aorta, with no pelvic ischemic symptoms (Fig 3).

**Case 2.** A 77-year-old man was referred with severe chest and abdominal pain that commenced 12 hours after dorsal slit for phimosis. His electrocardiogram and cardiac enzymes were normal. CTA confirmed aortic dissection from the level of T5 down to both EIAs (Fig 4), with an abdominal aortic aneurysm arising infrarenally (measuring 60 mm), a left CIA aneurysm (32 mm), and an ectatic right CIA (21 mm). Initially, he was managed conservatively as he had no signs of organ malperfusion. His blood pressure responded well to antihypertensive medication. Follow-up CTA at 2 weeks revealed partial thrombosis of the false lumen with extension of the dissection to both common femoral arteries.

To reduce the risk of paraplegia, a staged approach to the repair of the dissection and the aneurysm was undertaken. The first stage involved a thoracic endovascular aortic repair to manage the proximal dissection, using a Gore Conformable TAG graft (W. L. Gore & Associates, Flagstaff, Ariz). The patient recovered
uneventfully. Six weeks later, the patient underwent endovascular scissoring of the infradiaphragmatic dissection, by a similar technique to that described before, creating a unilumen to the level of the superior mesenteric artery. Endovascular aneurysm repair was then performed for the infrarenal abdominal aortic aneurysm using a Gore Excluder graft (W. L. Gore & Associates), with uncovered transitional stenting in the visceral part of the aorta that connects between the thoracic endovascular aortic repair and the endovascular aneurysm repair using an E-XL aortic stent (Jotec, Hechingen, Baden-Württember, Germany).

Spinal drainage was performed during the second procedure, as we were covering both internal iliac arteries. The patient recovered well, with no signs of any neurologic deficit. A 3-year follow-up CTA scan showed total occlusion of the false lumen and exclusion of the aneurysm (Fig 5).

**DISCUSSION**

Abdominal aortic dissections are rare. The pathophysiologic mechanism of AIAAD can be traumatic, iatrogenic, or spontaneous, and its clinical presentation is acute severe upper abdominal central pain.

AIAAD patients treated with surgical or endovascular procedures have a lower unadjusted in-hospital and long-term mortality rate compared with medically managed patients. AIAAD differs from acute type B aortic dissections. The International Registry of Acute Aortic Dissection 5-year death rate was 29% for medically managed acute type B dissections. Medically managed AIAAD patients had 50% mortality at 8 years compared with no deaths for those who underwent definitive repair. Furthermore, AIAAD rupture rate is 10%. This justifies a lower threshold for intervention in patients with AIAAD compared with those with classic type B dissection.

Historically, the management of AIAAD was either open intervention or conservative therapy. Recently, endovascular advancements are yielding lower early mortality and morbidity outcomes than with open repair.

The scissoring technique has been published in cases with descending aortic dissection. We favor endovascular scissoring for aortic fenestration because of its simplicity in creating a unilumen, negating the need for visceral branch cannulation. The benefit of this technique is to improve the hypoperfused visceral branches and to equalize the pressure between the false and true lumens.

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