

Challenging TEVAR Access

Use of a carotid approach during thoracic endovascular aortic repair.

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Access to the aorta can occasionally be difficult in thoracic endovascular cases because of the large outer diameter of the necessary devices. Advancement of an endograft via femoral access can be extremely challenging in the face of aortoiliac occlusive disease and impossible in patients with pathologic or iatrogenic interruption of the abdominal aorta. In such cases, alternative accesses for stent graft delivery are required.

CASE REPORT

A 69-year-old man with a symptomatic thoracic aortic aneurysm (TAA) was referred for urgent repair. His past medical history was notable for emergency open repair of a ruptured infrarenal aortic aneurysm complicated with a distal anastomotic pseudoaneurysm that required endovascular treatment, as well as stent grafting of a proximal pseudoaneurysm complicated with an aortoenteric fistula and subsequent excision of an infected aortic graft with concomitant ligation of the infrarenal aorta and axillobifemoral bypass grafting.

While undergoing diagnostic workup as an outpatient, he presented to our emergency department with severe back pain. A preoperative computed tomography (CT) scan demonstrated a 7.2-cm aneurysm at the midportion of the descending thoracic aorta, an occlusion at the level of the infrarenal abdominal aorta, and a single functioning right kidney. In light of the patient's complicated medical history and extremely high surgical risk, we considered endovascular repair of the TAA to be the most viable strategy. Due to the presence of aortic ligation, we chose the left common carotid artery as the alternative access site for the procedure. As dem-

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onstrated on preoperative Doppler scan, the left common and internal carotid arteries were free of significant plaque. The left common carotid artery measured 12 mm in diameter, which could accommodate the 22-F delivery system.

The patient was placed under general endotracheal anesthesia, and spinal fluid drainage was instituted. The left subclavian artery (LSA) and left carotid artery were identified through a small supraclavicular incision. Bypass grafting from the LSA to the distal portion of the left common carotid artery was performed, and the carotid was ligated proximal to the anastomosis. The sleeve of a 10-mm Dacron tube graft was sewn to the proximal portion of the left common carotid artery in an end-to-side fashion to enhance prosthesis trackability. The distal aspect of the conduit was clamped and fixed. After direct conduit puncture, a standard 0.035-inch guidewire was advanced to the distal descending thoracic aorta and exchanged for a Lunderquist extra-stiff wire (Cook Medical, Bloomington, IN). At that point, two 40-mm X 20-cm Gore TAG thoracic endoprostheses (Gore & Associates, Flagstaff, AZ) were deployed, and the TAA was successfully excluded. Notably, the LSA remained patent (Figure 1). After removal of the

delivery system, the carotid conduit was excised. The patient remained stable throughout the procedure. His postoperative course was typical, and he was discharged 5 days after the procedure. At 30-day follow-up, the patient was asymptomatic, and CT confirmed exclusion of the aneurysm.

DISCUSSION

The expanding indications for endovascular repair of aortic aneurysms have brought many challenges to the operators. In patients with TAAs, relatively large dimensions of the introducer sheaths pose a particular impediment to the procedure, particularly in patients with concomitant aortoiliac occlusive disease. The advent of smaller stent grafts with enhanced flexibility and navigability, in addition to the use of very rigid guidewires, has allowed the treatment of patients with highly tortuous iliac arteries. Several ancillary techniques have already been described to facilitate stent graft delivery in the setting of unsuitable iliac anatomy, including the use of a second stiff “buddy” wire, focal or diffuse iliac dilatation, stenting, or grafting.

The present case exemplifies the vexing problem of a patient with prohibitive surgical risk benefitting from a TEVAR procedure in which femoral access was not a viable option. Although direct access to the aortic arch can be successfully achieved via aortotomy, the technique is more aggressive and may require partial aortic clamping or circulatory arrest with extracorporeal circulation. The likelihood of gaining access from the right carotid artery or the right subclavian artery has also been entertained; however, stent graft passage through the entire aortic arch would greatly increase the embolization risk. Tentatively, left subclavian/axillary access may also be an option, but LSA tortuosity could render the procedure difficult and very risky.

We opted for left common carotid artery access because it offered a more direct approach to the descending aorta. Consequently, an LSA-carotid bypass was created to provide cerebral perfusion while occluding the proximal left carotid. Generous proximal and distal sealing zones were planned, while preserving the LSA and lower intercostal arteries, to reduce the spinal cord ischemia risk associated with previous infrarenal

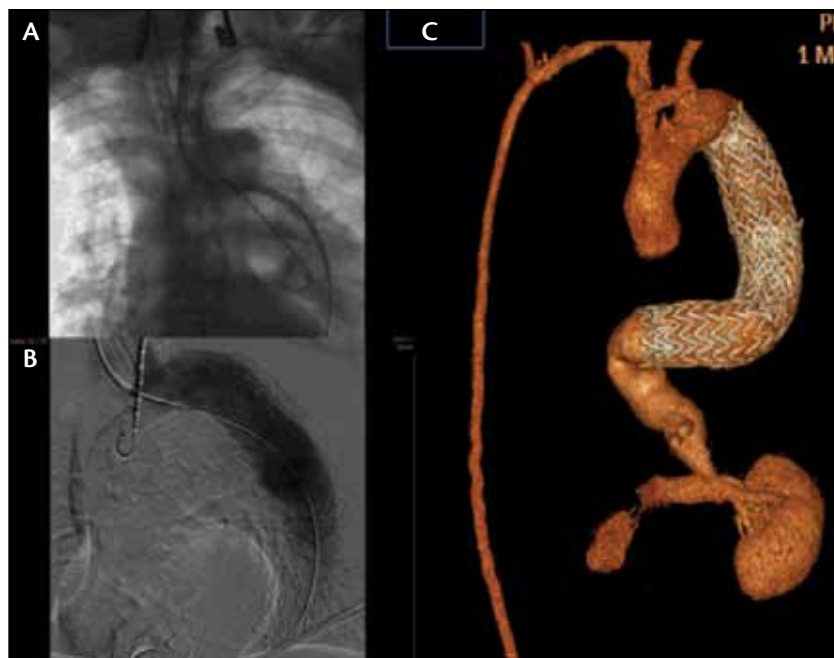


Figure 1. Intraoperative angiography showing left carotid access (A). Note that the sheath is already advanced from the left carotid artery up to the level of the descending aorta. Final angiography demonstrating exclusion of the TAA (B). Three-dimensional CT reconstruction of the entire aorta showing aortic interruption at the level of the renal arteries (C).

aortic surgery. Cerebrovascular complications such as carotid dissection, cerebral embolism, occlusion, or hypoperfusion during the procedure are specific concerns with the carotid approach.¹ Both carotid arteries should be disease-free in order to receive the delivery system. We believe that this technique may provide a valuable alternative access route in carefully selected patients who are unsuitable for iliofemoral or other antegrade access techniques. ■

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