Commentary: Does the risk of paraplegia leave you cold?

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Extensive acute type A aortic dissection illustrated with spinal cord (T8).

Central Message

Patients may benefit from the use of frozen elephant trunk extension in total aortic arch replacement, although it may risk the development of paraplegia.

See Article page 343.

Despite more than a half a century of success, repair of the transverse aortic arch remains highly complex.¹ Repair is performed to treat aortic aneurysm or dissection and ranges from partial replacement (eg, hemiarch repairs) to total arch replacement and may extend beyond the arch into the proximal portion of the descending thoracic aorta (eg, elephant trunk and frozen elephant trunk approaches). Aortic arch repair has substantially changed in recent decades—temperature targets during hypothermic circulatory arrest have risen, the use of antegrade cerebral perfusion is widespread, cannulation sites have shifted away from the femoral artery, debranching techniques for the brachiocephalic arteries have been adopted, and more.²⁻⁵ Although this evolution of approach has reduced the risk of postoperative death and stroke for many patients, it is commonly accepted that both repair in the setting of acute type A aortic dissection and extended repair increase operative risk.^{5,6} To reduce operative risk in the setting of acute type A aortic dissection, many aortic centers tend to limit repair to partial arch replacement; however, the use of frozen elephant trunk approaches holds the promise of a long-term benefit by facilitating remodeling of the false lumen and subsequently reducing the possibility of late dilatation of the chronically dissected distal aorta that often necessitates further repair.⁷⁻¹⁰ But, there may be a downside to the use of frozen elephant trunk approaches as pertains to postoperative spinal cord deficit.^{4,5,11,12} The fact remains that paraplegia after aortic arch replacement is traditionally an uncommon event.^{2,4,5,13,14}

Type A aortic dissection typically originates from a single tear in the ascending aorta (2 cm above the sinotubular junction) but may originate in arch or distal aorta (ie, the descending thoracic, thoracoabdominal, or abdominal aorta) and extend aortopathy in a retrograde fashion.² Of uncertain frequency, the careful assessment of high-quality imaging studies may indicate the presence of multiple tears in extensive type A aortic dissection (ie, DeBakey type I aortic

dissection). The article by Tan and colleagues¹⁵ shares insight into the development of postoperative paraplegia after total aortic arch replacement using a frozen elephant trunk extension in the setting of extensive acute type A aortic dissection. The authors reviewed clinical and imaging findings regarding 110 patients to explore contemporary mechanisms of early postoperative paraplegia, which occurred in 5 patients (4.5%). Notably, the stent-graft portion of repair did not extend beyond the T8 vertebra in any of the 110 patients. In the 5 patients with postoperative paraplegia, a “cutoff phenomena” (comprising a greatly narrowed section of the true lumen, a long section of thrombosis in the false lumen that exceeded 2-vertebra in length, and the absence of contrast medium in the false lumen) was observed in 4 patients via computed tomographic imaging studies. Further, they found that the “cutoff phenomena” was related to the nearby presence of downstream re-entry tears within the untreated distal aorta beyond the 12-cm length of the stent-graft. Although these re-entry tears were present in most patients (64%), it was only when they occurred within 30 to 60 mm of the stent-graft that the risk of paraplegia increased. Additionally, the authors noted that 3 of 5 patients with postoperative paraplegia died within 30 days of repair, and the remaining 2 patients had partial recovery of function after the use of cerebrospinal fluid drainage as a rescue measure.

Without doubt, the use of the frozen elephant trunk approach is a valuable addition to the surgeon's armamentarium in the treatment of acute type A aortic

dissection.^{11,16,17} However, the use of such novel approaches to aortic arch repair tends to increase the risk of postoperative paraplegia in a repair with minimal historical risk of spinal cord deficit.^{2,4,5,12,14} The authors are to be commended for the investigation of related risk factors pertaining to multiple distal entry tears as well as compression of the true lumen and thrombosis of the false lumen—or the “cutoff phenomena” as the authors term it.¹⁵

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