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Commentary: Reducing spinal cord injury following thoracoabdominal aortic aneurysm repair using every practical method possible

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Spinal cord injury (SCI) is a dreaded complication of thoracoabdominal aortic aneurysm (TAAA) repair. The impact of permanent SCI after TAAA repair is devastating and cannot be overstated. In a large series of 1114 extent II open TAAA repairs, patients with transient or persistent SCI experienced a nearly 3-fold increase in operative mortality (23.2% vs 8.4%).¹ Those with permanent SCI had an operative mortality of 36.0%. Permanent SCI was the strongest predictor of late death and was associated with significantly elevated rates of persistent stroke and renal failure requiring dialysis.

In this issue of *JTCVS Techniques*, Kemp and colleagues² offer an overview of the efforts to improve outcomes specifically in reference to this morbid complication. Despite decades of dedication and advances in care, SCI after TAAA repair remains a significant problem. A meta-analysis by Gaudino and colleagues³ included 22,634 patients who underwent either open or endovascular descending thoracic aneurysm or TAAA repair and found a pooled rate of permanent SCI of 4.5%, with no differences between open and endovascular repair when stratified by aneurysm extension. In a series of 3309 open TAAA repairs, Coselli and colleagues⁴ found a permanent rate of paraplegia and paraparesis in 2.9% and 2.4%, respectively. Their rates of permanent paraplegia by extent (I, II, III, and IV) were 1.3%, 4.7%, 4.4%,

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CENTRAL MESSAGE

Successful avoidance of spinal cord injury after thoracoabdominal aortic aneurysm repair requires meticulous attention to the coordination of all aspects of the procedure and perioperative care.

and 0.9%. It is clear that TAAA repair continues to pose significant risk, particularly in extent II repairs, even in experienced hands.

Kemp and colleagues review aspects of intraoperative and postoperative management focused on decreasing the risk of SCI. Efforts to refine technique and management strategy both in and out of the operating room continue, but some of the described adjuncts are better validated or more practical than others. Maintenance of excellent hemodynamics, limiting spinal cord ischemic time, and maximizing spinal cord perfusion pressure are the most important tenets to avoiding SCI with TAAA repair. Notably, approximately one half of all cases of permanent paraplegia occur in a delayed fashion and are most often associated with hypotensive events. These delayed events underscore the imperative nature of hypervigilant postoperative management and the importance of using interventions known to improve spinal cord perfusion pressure once delayed SCI is suspected (eg, cerebrospinal fluid drain insertion or reinsertion, increasing mean arterial pressure).

The choreography of specific management techniques may differ from center to center, but as a whole the dance must evoke protection of spinal cord perfusion. For example, although Kemp and colleagues report intercostal artery reimplantation as a controversial adjunct, its use in

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extent II repair is an independent predictor of substantially lower risk of permanent paraplegia (relative risk ratio, 0.46; $P = .03$) and has been found to be protective against delayed SCI as well.^{1,4} We favor routine intercostal artery reimplantation when possible and do not monitor motor-evoked potentials, which have been noted to be cumbersome.⁴ Irrespective of one's preferred management techniques throughout the intra- and perioperative course, the overarching goal of improving spinal cord protection is a unifying characteristic among experienced aortic surgeons.

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