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Commentary: A conceptual roadmap to spinal cord protection in thoracoabdominal aortic surgery

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Performing a thoracoabdominal aortic aneurysm (TAAA) repair is somewhat like replacing the main fuel line of a car engine while the car is running. Spinal cord ischemia is among the most devastating complications that can occur, but fortunately, its incidence can be reduced by the use of various adjuncts. Many authors have focused on the physiology of the spinal cord vascular supply and blood flow, vascular anatomy, and plasticity of the arterioles in the vascular network to understand how adjuncts and different approaches can ameliorate spinal ischemia.¹⁻³

In this review by the aortic surgery team of the University of Colorado, the authors provide a useful framework of the main points to consider to prevent such a complication or to rescue the patient from it should one occur.⁴

This article is a valuable and succinct bullet point index of what to think about when addressing the spinal cord protection in TAAA repair. The authors provide a list of the concepts that an aortic surgeon should keep in mind when performing the most central and complex “plumbing” operation in the human body.

Over the last 2 decades or so, we have developed an approach to TAAA repairs that seems to provide a very low risk of spinal cord ischemia.⁵ We focus on 4 main concepts: hypothermia, maintenance of spinal cord perfusion pressure, staging of repairs, and neuromonitoring.^{1-3,6,7} The authors, much like other surgical groups, have

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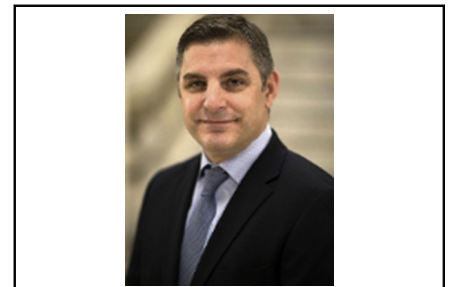
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Principal clinical monitoring techniques and adjuncts to measure appropriate spinal cord perfusion, temperature, and physiological response to aortic replacement.

CENTRAL MESSAGE

Understanding the (patho)physiologic elements of spinal cord perfusion and metabolism and how we can intervene on them is key to preserving neurologic function intraoperatively and postoperatively.

developed an approach to spinal cord preservation. Although we can argue about the nadir of the temperature for organ preservation and the utility of spinal artery reimplantation, ultimately, a well-coordinated plan is vital to neuroprotection.⁵⁻⁷ Hypothermia (31°C-33°C) has a clear benefit in neuroprotection; however, some authors have proposed deep hypothermia as their method of choice. We have elected to avoid spinal artery reimplantation in clinical practice, although we focus a great deal on maintaining spinal cord perfusion through extrasegmental arteries, lowering cerebrospinal fluid pressure, maintaining persistent hypothermia in the early postoperative period, and augmenting mean arterial pressure. These adjuncts and techniques have been developed and maintained in our clinical practice and have resulted in acceptable neurologic outcomes.

Much like the authors, we continue to study this area of aortic surgery with an aspiration of eliminating this deadly complication. We congratulate the authors on their previous studies and organization of ideas on this important topic that continues to intrigue many aortic surgeons.

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