No need to tailor: Paraplegia risk is intrinsic to complex aortic intervention

T. Brett Reece, MD, and Muhammad Aftab, MD

From the Division of Cardiothoracic Surgery, Department of Surgery, University of Colorado, Aurora, Colo.

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Address for reprints: T. Brett Reece, MD, 12631 E 17th Ave, C310, Aurora, CO 80045 (E-mail: brett.reece@ucdenver.edu).

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The report in this issue of the *Journal* from Afifi and colleagues¹ directly addresses the utility of intercostal reimplantation in thoracoabdominal aortic surgery. Although initial review of the data suggests that neuromonitoring is important, because it clearly demonstrates the risk of post-operative neurologic dysfunction, further review demonstrates that tailoring reimplantation to changes in neuromonitoring does not catch all of the at-risk patients. The ligation of T8 to T12 intercostals can result in paraplegia without changes in evoked potentials. The data thus suggest that all those undergoing thoracoabdominal procedures should undergo intercostal reimplantation. Afifi and colleagues¹ did demonstrate some predictive utility to neuromonitoring, because it predicted amplified risk of spinal cord injury.

Paraplegia remains a devastating complication of thoracic and thoracoabdominal aortic intervention. As the Afifi and colleagues¹ suggest, paraplegia rates have decreased with time. Fortunately, much of the decrease in injury has been in the dense paraplegia seen immediately on emergence from anesthesia. This is fortunate, because the injury in this presentation is rarely reversible. On the other hand, the delayed paraplegia rate has become more prominent, but half of these cases can be reversed. The authors conclude that all intercostals should be reimplanted. On some level, we absolutely agree with Afifi and colleagues.¹ We have been convinced for some time, however, that *all* these patients have some neuronal loss after the procedure. We therefore argue that intercostal reimplantation is just the beginning of preventing spinal cord injury in these patients.

As we gained some experience with models of spinal cord injury, we noticed that all spinal cords with ischemia had some loss of motor neurons. We pursued this idea, and we found that the loss of 30% to 40% of motor neurons could be tolerated without demonstrable loss of motor function.² Essentially, aortic crossclamping universally leads to loss of spinal cord motor neurons. This observation is

T. Brett Reece, MD

Central Message

All patients undergoing complex thoracoabdominal aortic intervention are at risk for spinal cord injury, and they should be treated as such.

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corroborated by the findings of the study of Afifi and colleagues,¹ in which enough neurons remain functional, but potentially injured, in the operating room to demonstrate evoked potentials, only to fail the patient later. The prevalence of this injury scares most of us to the point that we should be working toward prophylactic treatment even beyond intercostal reimplantation. We need to define better the role of inducing intercostal collateralization preoperatively and identifying useful adjuncts to prolong the motor neuron tolerance to ischemia. No single focus of treatment will eliminate the paraplegia in our patients.

In conclusion, Afifi and colleagues¹ have demonstrated that reimplantation of intercostals should be performed whenever feasible. We still have a long way to go, however, in eliminating the spinal cord injury caused by even short ischemic times during complex aortic intervention, whether open or endovascular. Intercostal reimplantation for all is a good start, but other adjunctive procedures, such as precollateralization and direct pharmacologic protection of the cord, may still have a role in the multifaceted approach to elimination of spinal cord injury.

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