



Editorial



The Beneficial Effect of Early Surgical Decompression for Acute Spinal Cord Injury: Time Is Spine

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The article by our team (Badhiwala et al.¹) on the impact of early decompression in traumatic spinal cord injury (tSCI) addresses a topic of great interest in the field of tSCI. Without a well accepted, validated neuroprotective agent, decompressive/reconstructive surgery, and hemodynamic interventions remain the main evidence-based treatment options for the management of acute tSCI as summarized by the most recent clinical practice guidelines from the AO Spine group.² However, the evidence for early decompressive surgery (< 24 hours) is mixed and the guidelines provided only conditional recommendations, at the option level, in favor of early decompressive surgery.

In our *Lancet Neurology* publication, our team used an accrued dataset of 1,548 patients from four independent multicentre, prospective data sources aimed to provide strong, quantitative evidence on the efficacy of early decompressive surgery for tSCI. The results conclude surgical decompression within 24 hours is associated with better sensorimotor recovery, with the beneficial impact appearing to plateau at 36 hours. We did extensive sensitivity testing which demonstrated the robustness of the analyses. This study thus provides the strongest evidence for the efficacy of early surgery for the treatment of tSCI.

In our view, this paper, coupled with previous evidence, settles the debate on the efficacy of early surgery for the treatment of tSCI. Trauma medical systems and centers treating tSCI need to ensure that they can facilitate early decompressive surgery for tSCI. The central dogma for the treatment of ischemic stroke has been that “time is brain,” and this has been used to make institutional and systems-based changes to accommodate early treatment. The same thing can now be said for the spine, “time is spine” and centers need to leverage the available evidence and advocate for institutional resources required for early transfer and treatment of tSCI patients.

While the results of the paper show efficacy for early decompression, further work is required to quantify the benefits in motor complete patients. Of particular importance are the motor and sensory complete patients (American Spinal Cord Injury Association Impairment Scale [AIS] A) who are the group with arguably the highest potential for improvement and the greatest medical need for effective and timely intervention. Historically, a sense of pessimism often surrounded the potential for AIS A patients to recover; however, recent data suggest that these patients have higher than expected spontaneous recovery rates.³ In Fig. 1 and S1, Badhiwala et al.¹ demonstrate that motor complete patients undergoing early



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surgery have higher portions of grade conversion. While AIS conversions have been proposed as a surrogate for recovery,⁴ in the absence of a minimally clinically important difference in tSCI,⁵ one has to be cautious in the interpretation of conversions. For example, recovering sensation (AIS A to B) may not be as beneficial to a patient as improving their neurological level of injury and regaining hand function.

Quantifying a meaningful therapeutic impact on the recovery of motor complete patients could further justify aggressive surgical and medical treatment in this group of patients. The challenge lies in defining novel outcome measures unique to motor complete patients. The primary endpoints in this study achieved the goal of demonstrating efficacy in the tSCI population, but separate endpoints unique to motor complete patients could provide further clarity to the role of early decompression in recovery. One approach is to analyze changes in neurological motor levels as opposed to the total motor or sensory scores. This method poses challenges as one must account for the complex ordinal nature of the neurological injury level and account for missing thoracic myotomes.

Several unanswered questions remain in the context of surgical management of tSCI. These include (1) establishing what constitutes an adequate decompression,⁶ (2) the potential role of duroplasty to facilitate cord decompression,⁷ (3) the role of early surgery in patients with mild (AIS D) traumatic central cord injury,⁸ and (4) the role of local intrathecal CSF catheters to measure intraspinal pressures to guide efforts to enhance cord perfusion.⁹

With recent advancements in disease modeling in the era of personalized medicine and machine learning, defining new outcome measures for motor complete patients should be a priority. This would then shed further light on the beneficial impact of early aggressive treatment for motor complete patients. In addition, the opportunity exists for a systems approach to facilitate “time is spine” and to undertake further translational research to enhance the early surgical management of SCI.

CONFLICT OF INTEREST

The authors have nothing to disclose.

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Title: Sunrise over Little Whitefish Lake - Muskoka, Ontario
Year: 2021
Artist: Michael G. Fehlings