

Original articles

Informed Consent for Traumatic Spinal Cord Injury Treatment

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Abstract

During the last four decades, there has been a major shift in management of traumatic spinal cord injury (tSCI) from mostly conservative care to a largely surgical approach that aims to decompress the injured cord and stabilise the spinal column. It has been suggested by the proponents of surgical treatment, although in the absence of high quality evidence^{1,2}, that these changes have improved patient outcomes. However, there have never been properly constructed trials to compare the two approaches that would provide the high quality evidence needed to argue one way or the other.

What would the medico-legal and practical implications be if the assertion that surgery, for this heterogeneous condition, is not supported by the evidence and that surgical outcomes might be worse than those of conservative care?

This review considers recently published information that challenges the widely accepted received wisdom and attempts to answer some of these questions.

Conservative management versus Surgical Treatment for tSCI

tSCI, in its various forms, can lead to profound neurological deficits, including paralysis, sensory loss, and autonomic dysfunction, with significant psychological and socioeconomic impacts. Historically, it was viewed fatalistically, with high mortality rates due to complications such as pressure ulcers, urinary tract infections, and respiratory failure. However, the Guttman school of Active Physiological Conservative Management (APCM) which came to be known as the Stoke

Mandeville System (SMS), that was widely adopted internationally after World War II, revolutionized tSCI care through comprehensive rehabilitation and preventative measures³. With the establishment of specialized SCI units, mirroring the Stoke Mandeville model, which emphasised rehabilitation over mere survival, mortality from secondary complications was much reduced and overall outcomes improved⁴.

In the last two decades of the 20th century and the first quarter of the 21st century, spinal surgical techniques and advanced imaging techniques developed significantly, and this has further transformed management^{3,5}. Imaging introduced more reliable visualisation of the bony and ligamentous spinal column, the contents of the spinal canal and the spinal cord⁶. Non-destabilising decompression of the spinal cord and internal fixation for associated spinal fractures rapidly gained acceptance as a method to reduce the risk of secondary injury to the cord and allow patients with tSCI to more rapidly mobilise and potentially rehabilitate faster³.

However, an intense debate between the benefits of ACPM and surgery has continued to the present. Amongst surgical proponents, there has been a particular focus on the timing of surgical intervention. Does early fixation mitigate secondary cord injury or introduce unnecessary risks? The Surgical Timing in Acute Spinal Cord Injury Study (STACSYS)⁷ claimed the odds of at least a two grade American Spinal Cord Injury Association (ASIA) Impairment Scale (AIS)⁸ improvement were 2.8 times higher amongst those who underwent early surgery (within 24 hours of injury) as compared to those who underwent late surgery (over 24 hours from injury).

Despite this, a systematic review a year after STACSIS was published demonstrated that although “early” surgery showed better motor score improvement compared to “late” surgery, the evidence showed “a profound lack of robustness among pooled estimates” and significant proof of publication bias¹. The authors concluded that “despite the fact that “early” spinal surgery was significantly associated with improved neurological and length of stay outcomes, the evidence supporting “early” spinal surgery after tSCI lacks robustness as a result of different sources of heterogeneity within and between original studies”. They recognised that a randomized controlled trial was an unfeasible undertaking in acute tSCI but cautioned that robust methodological safeguards were needed in future cohort studies.

By 2020, a review by Wilson² asserted that there was a “strong biological rationale to perform early decompression after traumatic spinal cord injury (SCI). With an enlarging clinical evidence base, most spine surgeons internationally now favor early decompression for the majority of SCI patients”. This was based on the *AO Spine Evidence Based Guidelines for the Management of Acute Spinal Cord Injury*⁹ that stated “we suggest that early surgery (24 hours post SCI) be offered as an option for adult acute SCI patients regardless of level. (Grade: Weak Recommendation, Low Evidence).” The committee could not make a strong recommendation for early surgery given the lack of compelling evidence. Despite this, Wilson and co-authors concluded that “Existing international surgical opinion seems to support the principle of early surgery after traumatic SCI.”

The role of early versus late surgery came under intense scrutiny in 2023 when evidence from the Surgical Decompression for Acute Spinal Cord Injury (SCI-POEM) study provided critical evidence questioning the superiority of early fixation¹⁰. This prospective, multicentre observational cohort involved 294 patients across 17 European centres, compared the outcomes of early decompression (<12 hours post-injury) in 159 patients to delayed decompression (>12 hours to <14 days) in 135. The primary outcome was the ASIA Lower Extremity Motor Score at 12 months. Unadjusted analyses suggested minor benefits for early surgery, but after adjustments for baseline imbalances, injury heterogeneity, and loss to follow-up, no statistically significant or clinically meaningful differences emerged. Neurological recovery was comparable between the groups, with no reduction in complications attributable to timing.

The SCI-POEM study highlighted methodological challenges in tSCI research, including patient variability and ethical barriers to randomization. It suggested that acute medical

management (e.g., blood pressure optimization) may be more crucial than timing of surgery. As the largest study of its kind, it provided evidence against routine ultra-early surgery, advocating for flexibility in surgical planning.

An accompanying annotation to the SCI-POEM report emphasised the persistence of equipoise between surgical and conservative approaches, particularly in incomplete injuries with sensory sparing, where spontaneous recovery is common¹¹. The authors noted that APCM had been largely abandoned, despite the lack of properly constructed trials to compare the two treatment approaches. They concluded that in this difficult area of medicine, advanced statistical methods needed to be applied to resolve the difficulty inherent in analysing results from the heterogeneous populations that characterise tSCI research.

New evidence supporting APCM for tSCI treatment

It is true that there has never been a like-for-like comparison of APCM and surgery for tSCI, but there has always existed a great deal of data that describes the outcomes of the two approaches. However, neurological classification of patients after the acute injury and at subsequent follow-up has differed between the two. APCM centres, using the SMS predominantly used the Frankel grading system (Frankel 1989)¹², while in the USA, where almost 80% of tSCI patients undergo surgery¹³, the largest repository of tSCI outcomes data, the Spinal Cord Injury Model Systems (SCIMS) database, uses the ASIA Impairment Scale (AIS)⁸. As a result of the various revisions to the AIS, it has not previously been possible to convert AIS grades accurately to Frankel grades. The problem was resolved in 2020 when Kirshblum and colleagues converted AIS grades to Frankel grades for 804 cases reported in SCIMS database, 23.5% of the total number of cases recorded between 2011 and 2018¹⁴. Following this breakthrough, direct comparison between APCM outcomes and SCIMS, has at last been made by¹⁵ using APCM data from Stoke Mandeville Hospital (SMH) between 1951 and 1968 (608 cases) and Colmar-Mulhouse & Basle (CMB) between 1968 and 1978 (300 cases).

Results of the analysis show stark differences between the modes of treatment. In the APCM treated cohorts, 1.0% of SMH patients (6 cases) and 0% of CMB cases neurologically deteriorated. In comparison, 10.9% of SCIMS patients (88 cases) had neurological deterioration 12 months after admission. The authors estimated that if the SCIMS patients had been treated according to the principles of APCM, between 71 and 87 would not have neurologically deteriorated, between 195 and 330 more patients would have recovered sufficiently to walk than did and between 129 and 264 would

have completely recovered. What makes these results remarkable is that patients treated with the ACPM did not have the benefit of modern medicine in the way the SCIMS patients did. The SMH cohort were treated between 1951 and 1968, the CMB cohort between 1968 and 1978 while the SCIMS patients were treated between 2011 and 2018. Despite the obvious improvements in medicine in the 75 years between the first ACPM patients in the SMH cohort being admitted and the last SCIMS patients being treated, the outcomes markedly deteriorated.

The accompanying editorial¹⁵ calls into question the underlying reasons for the evolution of tSCI management from a system that had excellent outcomes, but might have been more expensive, to one that has poorer outcomes, but might be more cost-effective. By concentrating on surgical stabilisation of the unstable spinal column and subsequent rapid mobilisation, protection of the unstable spinal cord has been compromised, hence the poorer neurological outcomes. The editorial urges that “after surgical stabilisation there should be an SMS approach to management to prevent and/or to identify and treat the consequences of spinal cord instability.”¹⁵

Medico-legal and practical implications for tSCI Treatment

Informed consent to treatment is a keystone of modern medical and surgical practice. The landmark case in 2015, *Montgomery v Lanarkshire Health Board*,¹⁶ established legal rules that must be followed if informed consent is to be properly obtained. These were summarised in a 2019 review¹⁷ and a consent checklist was proposed to help surgeons to be compliant. Six of the recommendations of that checklist were:

1. A description of the pathology requiring treatment should be given to the patient
2. The recommended procedure (including side/level) should be described
3. The natural history of the condition if left untreated
4. The benefits of surgery should be explained
5. The risks of surgery should be described
6. Any alternative(s) to surgery should be discussed

Considering the new information regarding the outcomes of surgery for tSCI according to the results of the SCI-POEM trial or when an SMS approach is not part of rehabilitation, it is evident that surgeons must now adopt a new approach to how they manage patients. By following the items on the checklist, a surgeon will ensure that the Montgomery principles are fulfilled. The first two will not lead to a

behaviour change, but the last four should. It is now not possible to maintain a position that in terms of neurological outcomes, early surgery is better than later surgery, or that no surgery is worse than surgery. Indeed, quite the opposite is indicated by the current evidence.

Impaired decision-making ability in acutely injured tSCI patients who may present with altered consciousness, are in shock or who may have been sedated, means that it is often not possible for the surgeon to directly gain informed consent. As a result, if treatment is considered emergent, proxy consent is required, or “best-interest” decisions must be made. Such situations do not exempt the surgeon from their legal responsibility and the checklist will still apply. The surgeon should provide the patient’s legal representative with the relevant information to allow them to fully informed make decisions on behalf of the patient.

Practical challenges in these situations include defining an “emergency” as there is no universal threshold, providing balanced information to families when they are under emotional stress, and ensuring that surrogates understand equipoise (e.g., from SCI-POEM trial showing no clear benefit from ultra-early timing of surgery)¹⁰. Surgeons should minimise coercion, make sure they complete thorough documentation, and when appropriate seek multidisciplinary advice that might include legal and ethical input.¹⁸

Summary

Evolution of the management of tSCI showed a significant shift from almost universal conservative care to mostly surgical intervention in the past three decades. While surgery aims to decompress the cord and stabilise the spine, with the ambition of preventing secondary spinal cord injury, there has always been a critical lack of high-quality evidence to prove its superiority over ACPM. Recent evidence has now shown that predominantly surgical treatment of patients admitted to SCIMS centres in the US leads to poorer neurological outcomes than ACPM in European centres and ultra-early surgery after tSCI does not have better outcomes than delayed surgery.

This review highlights how this new evidence will necessitate a change in how surgeons approach consent in patients with tSCI as well as highlighting possible changes in the approach to management of such patients. ■

References

1. Van Middendorp JJ, Hosman AJF, Doi SAR. The Effects of the Timing of Spinal Surgery after Traumatic Spinal Cord Injury: A Systematic Review and Meta-Analysis. *Journal of Neurotrauma* 2013;30:1781–1794. DOI: 10.1089/neu.2013.2932
2. Wilson JR, Witiw CD, Badhiwala J, Kwon BK, Fehlings MG, Harrop JS. Early Surgery for Traumatic Spinal Cord Injury: Where Are We Now? *Global Spine Journal* 2020;10(1S):84S–91S
3. Schültke E, Ludwig Guttman: Emerging Concept of Rehabilitation after Spinal Cord Injury. *Journal of the History of the Neurosciences* 2001;10 (3):300–307
4. El Masri(y) WS. Traumatic spinal injury and spinal cord injury: point for active physiological conservative management as compared to surgical management. *Spinal Cord Series and Cases* 2018; 4:14–18 <https://doi.org/10.1038/s41394-018-0045-z>
5. Mensah EO, Chalif JI, Johnston BR, et al. Traumatic spinal cord injury: a review of the current state of art and future directions – what do we know and where are we going? *North American Spine Society Journal (NASSJ)* 2025;22:100601. <https://doi.org/10.1016/j.xnsj.2025.100601>
6. Lee JY, Vaccaro AR, Lim MR, et al. Thoracolumbar injury classification and severity score: a new paradigm for the treatment of thoracolumbar spine trauma. *J Orthop Sci* 2005;10:671–675. DOI 10.1007/s00776-005-0956-y
7. Fehlings MG, Vaccaro AR, Wilson JR et al. Early versus Delayed Decompression for Traumatic Cervical Spinal Cord Injury: Results of the Surgical Timing in Acute Spinal Cord Injury Study (STASCIS). *PLoS ONE* 2012;7(2): e32037. doi:10.1371/journal.pone.0032037
8. American Spinal Injury Association. International Standards for Neurological Classification of Spinal Cord Injury. ASIA: Richmond, VA. 2019
9. Fehlings MG, Tetreault LA, Wilson JR, et al. A clinical practice guideline for the management of patients with acute spinal cord injury and central cord syndrome: recommendations on the timing (24 hours versus >24 hours) of decompressive surgery. *Global Spine J.* 2017;7(3 suppl):195S–202S
10. Hosman AJF, Barbagallo G, the SCI-POEM Study Group, van Middendorp JJ. Neurological recovery after early versus delayed surgical decompression for acute, traumatic spinal cord injury: a Prospective, Observational, European Multicentre (SCIPOEM) cohort study. *Bone Joint J.* 2023;105-B(4):400–411
11. Birch NC, Cheung JPY, Takenaka S, El Masri WS. Which treatment provides the best neurological outcomes in acute spinal cord injury? *Bone Joint J* 2023;105-B(4):347–355
12. Frankel H, Hancock D, Hyslop G, et al. The value of postural reduction in the initial management of closed injuries of the spine with paraplegia and tetraplegia. *Spinal Cord* 1969; 7:179–192 <https://doi.org/10.1038/sc.1969.30>
13. Todd NV, Ross A, Birch NC, Brown M, Gardner A. Care Following Acute Traumatic Spinal Cord Injury. *Bone Joint J* 2026; 108-B(3):
14. Kirshblum S, Botticello A, Benedetto J, et. al. A Comparison of Diagnostic Stability of the ASIA Impairment Scale versus Frankel Classification Systems for Traumatic Spinal Cord Injury. *Archives of Physical Medicine and Rehabilitation* 2020;101:1556–1562
15. El Masri WS et al. Traumatic Spinal Cord & Cauda Equina Injuries: A Comparison of Neurological Outcomes Achieved by a 75 Year-Old System of Management and Modern Care in the USA. *Bone Joint J* 2026; 108-B(3):
16. No authors listed. Montgomery v Lanarkshire Health Board [2015] UKSC 11
17. Todd NV, Birch NC. Informed consent in spinal surgery. *Bone Joint J* 2019;101-B(4):355–360
18. BMA Medical Ethics and Human Rights: Ethics Toolkit. Mental Capacity Act – England and Wales. British Medical Association (bma.org.uk) 2025