

Cervical traumatic spinal cord injury outcome



Injury to the [spine](#) and [spinal cord](#) is one of the common cause of [disability](#) and [death](#). Several factors affect the [outcome](#); but which are these factors (alone and in combination), are determining the outcomes are still unknown.

Based on parameters from the International Standards, [physicians](#) are able to inform patients about the predicted long-term outcomes, including the ability to walk, with high accuracy. In those patients who cannot participate in a reliable physical neurological examination, magnetic resonance imaging and electrophysiological examinations may provide useful diagnostic and prognostic information. As clinical research on this topic continues, the prognostic value of the reviewed diagnostic assessments will become more accurate in the near future. These advances will provide useful information for physicians to counsel tSCI patients and their families during the catastrophic initial phase after the injury ¹⁾.

In cervical [traumatic spinal cord injury](#) (TSCI), the therapeutic effect of timing of surgery on neurological [recovery](#) remains uncertain. Additionally, the relationship between the extent of [decompression](#), imaging [biomarker](#) evidence of injury severity, and the outcome are incompletely understood.

Aarabi et al., investigated the effect of timing of decompression on long-term neurological outcome in patients with complete spinal cord decompression confirmed on postoperative MRI. [AIS](#) grade conversion was determined in 72 AIS grades A, B, and C patients 6 months after confirmed decompression. Thirty-two patients underwent decompressive surgery ultra-early (<12 hours), 25 early (12-24 hours), and 15 late (>24-138.5 hours) after injury. Age, gender, injury mechanism, [intramedullary lesion](#) length (IMLL) on MRI, admission ASIA motor score, and surgical technique were not statistically different between groups. Motor complete patients ($p=0.009$) and those with fracture-dislocations ($p=0.01$) tended to be operated earlier. Improvement of one grade or more was present in 55.6% in AIS grade A, 60.9% in AIS grade B, and 86.4% in AIS grade C patients. Admission AIS motor score ($p=0.0004$) and pre-operative IMLL ($p=0.00001$) were the strongest predictors of neurological outcome. AIS grade improvement occurred in 65.6%, 60%, and 80% of patients who

underwent decompression ultra-early, early, and late, respectively ($p=0.424$). Multiple regression analysis revealed that IMLL was the only significant variable predictive of AIS grade conversion to a better grade (odds ratio, 0.908; CI, 0.862-0.957; $p<0.001$).

They conclude that in patients with postoperative MRI confirmation of complete decompression following cervical TSCI, pre-operative IMLL, not the timing of surgery, determine the long-term neurological outcome ²⁾.

Preclinical and class III clinical data suggest improved outcomes by maintaining the mean arterial pressure > 85 mm Hg and avoiding hypoxemia at least for 7 days following cervical SCI, and this level of monitoring and support should occur in the ICU ³⁾.

100 cases of patients under 18 years at accident with acute traumatic cervical spinal cord injury admitted to spinal cord injury SCI centers participating in the European Multi-center study about SCI (EMSCI) between January 2005 and April 2016 were reviewed. According to their age at the accident, age 13 to 17, patients were selected for the adolescent group. After applying in- and exclusion criteria 32 adolescents were included. Each adolescent patient was matched with two adult SCI patients for analysis.

ASIA Impairment scale (AIS) grade, neurological, sensory, motor level, total motor score, and Spinal Cord Independence Measure (SCIM III) total score.

Mean AIS conversion, neurological, motor and sensory levels, as well as total motor score, showed no significant statistical difference in adolescents compared to the adult control group after a follow up of 6 months. Significantly higher final SCIM scores ($p < 0.05$) in the adolescent group compared to adults as well as a strong trend for a higher gain in SCIM score ($p < 0.061$) between first and last follow up was found.

Neurological outcome after traumatic cervical SCI is not superior in adolescents compared to adults in this cohort. Significantly higher SCIM scores indicate more functional gain for adolescent patients after traumatic cervical SCI. Juvenile age appears to be an independent predictor for a better functional outcome. ⁴⁾.

A prospective observational study at single-center with all patients with cervical spinal cord injury (SCI), attending our hospital within a week of injury during a period of October 2011 to July 2013 was included for analysis. Demographic factors such as age, gender, etiology of injury, preoperative American Spinal Injury Association (ASIA) grade, upper (C2-C4) versus lower (C5-C7) cervical level of injury, image factors on magnetic resonance imaging (MRI), and timing of intervention were studied. Change in neurological status by one or more ASIA grade from the date of admission to 6 months follow-up was taken as an improvement. Functional grading was assessed using the functional independence measure (FIM) scale at 6 months follow-up.

A total of 39 patients with an acute cervical spine injury, managed surgically were included in this study. Follow-up was available for 38 patients at 6 months. No improvement was noted in patients

with ASIA Grade A. Maximum improvement was noted in ASIA Grade D group (83.3%). The improvement was more significant in lower cervical region injuries. Patients with cord contusion showed no improvement as opposed to those with just edema wherein; the improvement was seen in 62.5% of patients. The percentage of improvement in cord edema ≤ 3 segments (75%) was significantly higher than edema with >3 segments (42.9%). Maximum improvement in FIM score was noted in ASIA Grade C and patients who had edema (especially ≤ 3 segments) in MRI cervical spine.

Complete cervical SCI, upper-level cervical cord injury, patients showing MRI contusion, edema >3 segments group have a worst improvement in neurological status at 6 months follow-up ⁵⁾.

A total of 66 patients diagnosed with traumatic cervical SCI were selected for neurological assessment (using the [International standards for neurological classification of spinal cord injury](#) [ISNCSCI]) and functional evaluation (based on the Korean version [Modified Barthel Index](#) [K-MBI] and [Functional Independence Measure](#) [FIM]) at admission and upon discharge. All of the subjects received a preliminary electrophysiological assessment, according to which they were divided into two groups as follows: those with cervical radiculopathy (the SCI/Rad group) and those without (the SCI group).

A total of 32 patients with cervical SCI (48.5%) had cervical radiculopathy. The initial ISNCSCI scores for sensory and motor, K-MBI, and total FIM did not significantly differ between the SCI group and the SCI/Rad group. However, at discharge, the ISNCSCI scores for motor, K-MBI, and FIM of the SCI/Rad group showed less improvement (5.44 ± 8.08 , 15.19 ± 19.39 and 10.84 ± 11.49 , respectively) than those of the SCI group (10.76 ± 9.86 , 24.79 ± 19.65 and 17.76 ± 15.84 , respectively) ($p < 0.05$). In the SCI/Rad group, the number of involved levels of cervical radiculopathy was negatively correlated with the initial and follow-up motors score by ISNCSCI.

Cervical radiculopathy is not rare in patients with traumatic cervical SCI, and it can impede neurological and functional improvement. Therefore, detection of combined cervical radiculopathy by electrophysiological assessment is essential for the accurate prognosis of cervical SCI patients in the rehabilitation unit ⁶⁾.

References

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