

An extremely favourable outcome in a patient with traumatic spinal cord injury with paraplegia: A case report

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ABSTRACT

Spinal cord damage caused due to trauma are very frequent in the population presently and large number of these patients suffer severe neurological deficits which rarely regain their normalcy. Several studies indicate that patients with ASIA grade A (complete) spinal cord injury show recovery of at least 1 to 2 grades if operated within a day of trauma and this outcome becomes dismal with passage of time. This case report mentions about a polytrauma patient who came to us with complete paraplegia and incontinence of the bladder and bowel, 7 days following a traumatic lumbar spine injury, underwent spinal fixation and decompression and showed exceptional recovery in subsequent follow-ups which in itself is an interesting and fairly uncommon outcome in such patients. This case report demonstrates that there is a possibility of regaining excellent functional outcomes in patients who have suffered extreme injuries to the spinal cord where treatment was delayed and also stresses that detailed research needs to be conducted as to determine the factors that may improve outcomes in such patients.

Keywords: ASIA Impairment scale, Spinal Cord Injury, Lumbar spine, Paraplegia.

1. INTRODUCTION

Spinal fractures or dislocations occur in between 5% and 10% of polytrauma patients (Hasler et al., 2011; Oliver et al., 2012), with 65 percent to 80 percent of these injuries involving the lumbar or the dorsal spine (Hasler et al. 2011; Wang et al., 2012). The thoracolumbar junction (i.e. T11 to L2) is the most frequently affected segment in most injuries (Gertzbein, 1992). Accidental high falls and Road traffic accidents are the major causations of these spinal fractures. Unfortunately, around 22% of patients with such injuries develop deficits, such as bowel and bladder dysfunction, paraplegia, or both. In addition to these debilitating injuries, these patients with paraplegia or other severe lumbar spinal cord injuries (SCIs) also have a 1 year mortality rate of 4% (Middleton et al., 2012).

When the nerves and spinal cord sustains a contusion, a complex biochemical cascade is precipitated leading to tissue oedema, ischemic

damage to microvasculature, and the production of inflammatory factors which causes secondary insults (Delamarter et al., 1995). The rationale for expeditious surgical decompression in cases of acute Spinal Cord Injury is that it may mitigate secondary injury, improving long-term neurological outcomes (Ahuja et al., 2017; Badhiwala et al., 2018). Grading of neurological deficits is as follows (Table 1).

Table 1 Grading of neurological deficits as per ASIA Impairment Scale

AMERICAN SPINAL CORD INJURY ASSOCIATION (ASIA) IMPAIRMENT SCALE		
Grade	Injury Description	Injury Type
A	Sensory as well as Motor function are completely lost	Complete
B	Sensory function is preserved. Motor function is lost	Sensory Incomplete
C	Motor function is maintained but more than half muscles have power less than grade 3	Motor Incomplete
D	Motor function is maintained but more than half muscles have power more than grade 3	Motor Incomplete
E	Initially the patient had deficits but now the sensory and the motor functions are absolutely Normal	Normal

The aim of operative intervention in patients who have sustained severe injury to the spinal cord is to stabilise the spine, correct any deformities in the spine and decompress the nerves roots and spinal cord of any residual impingement on the exiting neurons which in turn can provide a scope for neurological improvement, better clinical outcome and facilitate rehabilitation (Bohlman et al., 1985). It is universally accepted by many clinicians that superior clinical results can be obtained in patients with declining neurological status, with swift operative intervention (Chapman & Anderson, 1994). A 2 or more grade improvement on the ASIA Impairment scale could be achieved with early surgical decompression as evidenced by the Surgical Timing in Acute Spinal Cord Injury Study (STASCIS).

In his study of 470 patients taken from the Rick Hansen Spinal Cord Injury registry, Dvorak et al., (2015) concluded that patients with cervical, dorsal or thoracolumbar spinal injuries showed greater probability of neurological improvements when operated within a day of the injury (Noonan et al. 2012). La Rosa et al., (2004) found similar outcomes in his meta-analysis where he concluded that neurological improvement in patients where decompression surgeries were done within a day of injury was far better than those in whom the surgery was either delayed or were managed conservatively. The numerous studies done in the subject of matter are indicative of a poor neurological prognosis where surgeries are done after 24 hours of injury, but in a case that came to our hospital after 7 days of injury with a grade A deficit on ASIA impairment scale we observed good results post decompression and fixation which makes the outcome of this case interesting and fairly uncommon.

2. CASE REPORT

A 26 years old male patient presented to our casualty with chief complaints of low backache, loss of power, bladder and bowel incontinence and swelling and pain in both the ankle. Patient gives history of fall from a height of 30 feet, 7 days back. Following the injury he was taken to a local hospital for treatment where he was diagnosed to have L1 anterior wedge compression fracture with paraplegia and bladder and bowel incontinence along with right sided pilon fracture and bilateral calcaneal fracture. The patient was managed conservatively with best rest, painkillers and immobilisation with above knee slab application. Following this patient came to our hospital 7 days after injury. On presentation L1 vertebrae was tender, power in bilateral lower limb was grade 0, anaesthesia below L1 dermatome with saddle anaesthesia. Patient radiographs are as follows (Figure 1 and 2).



Figure 1 Lumbar spine X-ray (lateral view) with L1 wedges compression fracture.

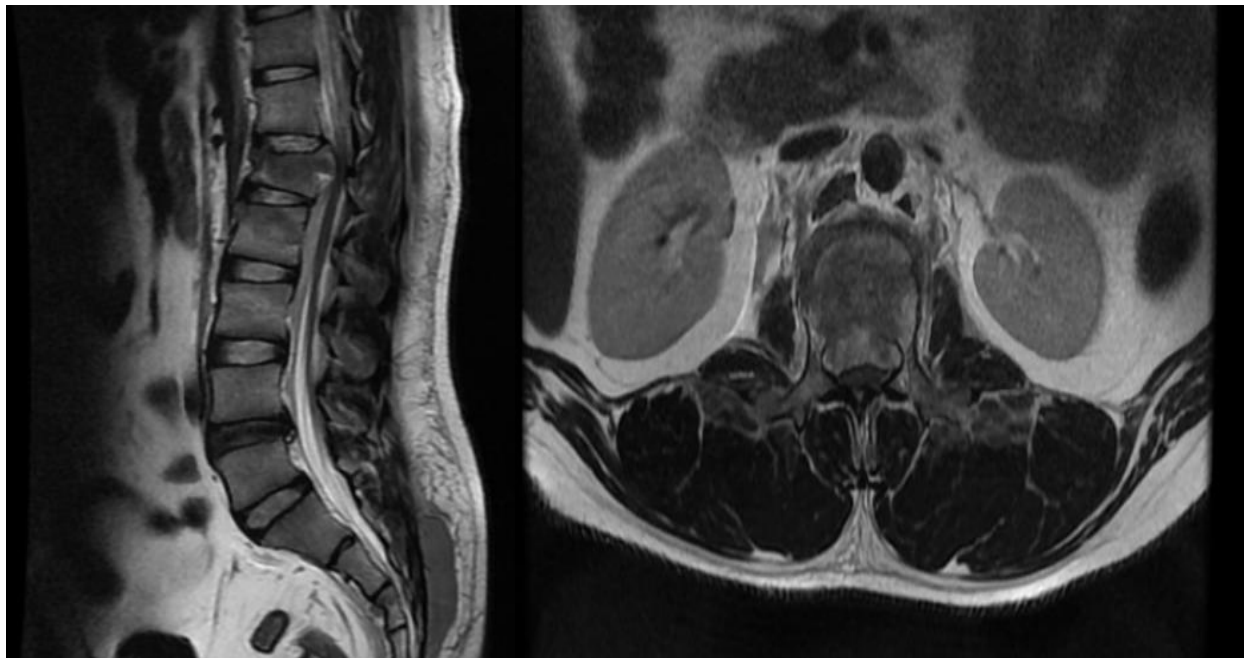


Figure 2 Pre-operative MRI of Lumbar vertebrae shows L1 burst compression fracture with compression over the spinal cord.

Patient was taken for operative management immediately wherein through posterior approach spinal fixation was done at D12, L1, and L2 level with 6 pedicle screws. Spinal cord was decompressed at the level of L1 vertebrae. Both the connecting rods were cross-linked (Figure 3). No intra-operative complications were encountered during the procedure.

Immediately post operatively bilateral lower limb power was grade 0, anaesthesia below L1 and no bladder & bowel control. On 7 days post-op patient was mobilised on wheel chair. 14 days post-op patient gained grade one power and some sensation in bilateral lower limbs. Patient was started on intense physiotherapy with all joint mobilisation, bedside sitting, quadriceps and hamstring strengthening exercises. Patient was evaluated every month for the next 6 months and currently patient has gained grade 4 powers in both lower limbs, regained full sensation in both the lower limbs and has complete bladder & bowel control. Patient is ambulatory and is doing well.

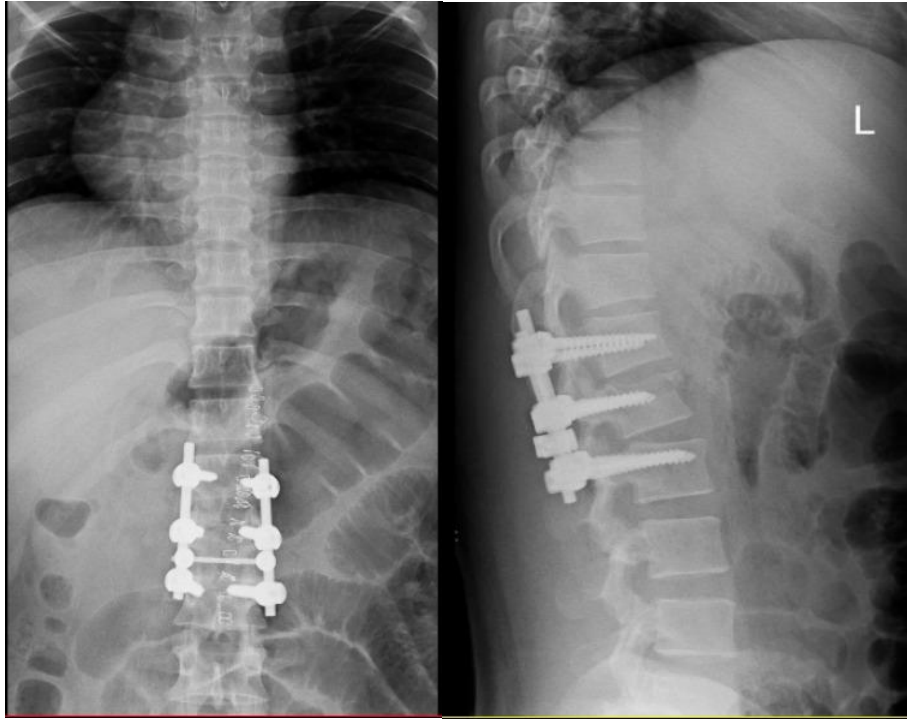


Figure 3 Following is the post op radiograph of the Lumbosacral vertebrae.

3. DISCUSSION

In the above case, a 26 years old male had L1 anterior wedge compression fracture with bladder and bowel incontinence, paraplegia and anaesthesia below L1 dermatome. The patient sought treatment elsewhere, where the definitive treatment was delayed and the patient presented to us 7 days late. Based on the research in the literature it has been universally accepted that in cases of severe injury inflicted to spinal cord, prompt decompressive surgeries should be done in order to obtain optimum neurological outcome. In a meta-analysis done by Bock et al., (2021), patients with grade B, C, and D deficit on ASIA impairment scale had a more favourable neurological recovery than patients with Grade A deficit.

In a study by Khorasanizadeh et al., (2019), they concluded that 19.3% of patients who have sustained complete (ASIA grade A deficit) Spinal Cord Injury experience a neurological improvement of at least 1 grade on ASIA impairment scale and convert to incomplete status. Grassner et al., (2016) conducted a study concluded that surgical intervention sooner than 8 hours after an injury would increase the chances of functional rehabilitation, citing considerably better Spinal Cord Independence Measure (SCIM) ratings in patients who had decompression surgeries within 8 hours of the injury. Sterner & Brooks, (2022) found significant neurological and clinical improvements with short transport time (less than 6 hours) and early spinal cord decompression (within 12 hours).

Jug et al., (2015), conducted a 6 months follow-up study concluded that patients who were surgically decompressed within 12 hours after sustaining injury had far better neurological improvement than those who had late intervention or managed conservatively and that motor improvement in patients who have sustained severe spinal cord trauma is majorly dependent on level, severity and mechanism of injury. Although these studies, reviews and meta-analyses provide a very strong evidence that early interventions are a vital cog in better functional outcome of Grade A complete spinal injuries and there has barely been any mention of cases or studies in the literature which prove this hypothesis otherwise, but with our case report here we have reported that a possibility of extraordinarily favourable outcome in patients with traumatic spinal injury exists. The fact that patients with Grade A Spinal Cord Injury can still recover neurologically months after their injury indicates that a severely injured spinal cord is not intrinsically irreversible.

4. CONCLUSION

Severe spinal cord injuries associated with complete paraplegia usually show improvement of only one or two grades in neurological deficit when operated within a day of injury, the scope of this improvement reduces even more significantly if this window of opportunity is missed but with this case report we can infer that with careful decompression, anatomical reduction and fixations, rigorous rehabilitation and well balanced nutrition, there is a possibility of drastic improvement in such patients and

hence requires an extensive research into the factors that can improve functional outcomes of patients who have sustained severe injury to spinal cord and had delayed treatment.

Author's Contribution

All authors contributed equally to the manuscript.

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Informed Consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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