

Is Late Neurologic Decompression Effective in Traumatic Spinal Cord Injury? Report of Two Cases and Review of the Literature

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Abstract

Introduction: Traumatic spinal cord injury (SCI) is a catastrophic event for patients with neurologic deficit and for the society in terms of economic issues. The prevalence of SCI seems to be increasing. There is not enough evidence regarding late neurologic decompression in patients with spinal cord injury.

Case Presentation: Here, we report on two patients with spinal cord injury, who were referred to our department after several days of trauma and both underwent decompression and posterior instrumented fusion (posterolateral decompression) with favorable results.

Conclusions: It seems that late neurologic decompression might have some benefits for patients with SCI.

Keywords: Spinal Cord Injury, Trauma, Thoracolumbar, Fracture, Late, Early, Decompression

1. Introduction

Traumatic spinal cord injury (SCI) is a catastrophic event for patients and also for the society in terms of economic issues (1-4). The prevalence of SCI seems to be increasing (5). The most common causes of SCI are fall from height and motor vehicle accident (2). Patients with SCI are usually young with life expectancy near that of the normal population (6). Traumatic SCI results from two consequent mechanisms. Primary insult is due to acute cord compression, stretching and contusion of the spinal cord due to acute displacement and force transition at the onset of trauma, and the secondary mechanisms, which have been investigated by a large number of studies. A cascade of secondary injury mechanisms such as venous congestion, cord ischemia, electrolyte shift, toxic neurotransmitter accumulation and inflammatory response are results of persistent compression of the spinal cord due to retro-pulsed bone fragment or displaced spinal column (1, 5, 7, 8). The primary insult is not preventable, however, the secondary injuries seem to be avertable although not completely, by an appropriate intervention. There is lack of enough evidence encouraging early or late decompression (7, 9). To the best of our knowledge, the basis of the current literature has concluded that early decompression can be considered for patients with acute SCI, and there is no recommendation regarding late decompression especially after 7 to 14 days of trauma (1, 4, 5, 9, 10). There is huge dilemma re-

garding the timing of surgical decompression in patients with SCI and it has not been determined if in patients with SCI, late decompression is effective, and whether late neurologic decompression changes the outcome of patients. Here, we report on two cases of spinal cord injury, who underwent late surgical neurologic decompression with the same technique with reasonable outcome.

2. Cases Presentation

Case 1: A 28-year-old young male laborer, who was referred to our department due to spinal cord injury and L2 vertebral fracture due to a fall from height 18 days before. In neurologic examination, according to the Frankel classification, his ASIA score was c and neurologic level was L3. In x-ray and CT scan L2 burst fracture with 70% canal compromise was revealed. Magnetic Resonance Imaging (MRI) showed severe canal stenosis and diffuse bone and cord edema at the fracture site.

Case 2: A 25-year-old man, who was referred to our hospital from another center due to spinal cord injury, eight days after having had a fall. He was medically stabilized and in the physical examinations, his ASIA score was B and neurologic level was L2. In x-ray and Computerized Tomography (CT) scan L1 burst fracture with severe canal compromise was diagnosed. Magnetic Resonance Imaging was re-

quested and diffuse bone edema and increased signal intensity in cord was identified.

Both patients underwent posterolateral decompression and posterior instrumentation and fusion on the 19th and 10th day after trauma, respectively. In the surgical technique after prone positioning and midline incision and dissection, pedicular screw instrumentation, two levels above and one below, was performed. Then bilateral laminectomy with partial facetectomy from the side, due to easier access to the retropulsed bone fragment, was done. Dural sac pulsation was not visible. After that, impactor retropulsed fragments were impacted into the fractured vertebral body. After decompression, dural sac pulsation was hardly visible. Then two rods were bilaterally inserted and fusion by autograft and allograft was carried on. The patients were discharged three days after the operation and visited postoperatively based on a routine follow up program, in two, six, twelve weeks, and 6 and 12 months after the operation. Patients were wheelchair bound in the first follow up and in every visit neurologic exam was performed and recorded. After four and two months, respectively, both cases became ambulatory by crutch and their ASIA score changed to D in both cases.

3. Discussion

Increase of knowledge regarding the pathophysiology of traumatic spinal cord injury suggests surgical decompression to prevent catastrophic sequels of SCI. However, the indication, optimal timing and even the impact of this intervention on the outcome of the patients still remain controversial because of the lack of enough evidence (7).

In the literature review, which was done by Fehlings et al. they concluded that there are only class III data recommending urgent surgical decompression in patients with incomplete spinal cord injury (11). La Rosa et al. conducted a meta-analytical approach through the literature regarding the efficacy of early surgical decompression in patients with SCI and concluded that early decompression can only be considered as an option for all patients with incomplete neurologic deficit to improve neurologic recovery. Nevertheless, there were a large number of variables, which influence the overall outcome of patients (7). In another study, Fehlings et al. compared the result of early (< 24 hours) versus late (> 24hours) decompression in patients with traumatic cervical spinal cord injury, and suggested that early neurologic decompression was safe and associated with neurologic improvement in patients (5). Rahimi-Movaghar, in a study on 12 patients with complete thoracic spinal cord injury concluded that surgical decompression and fusion had no benefit on neurologic recovery of the patients (2).

According to the lack of enough evidences regarding the beneficial effect of late decompression especially after 7 - 14 days of trauma, we decided to do surgical decompression, instrumentation and fusion for two patients with two goals; first to stabilize the spine and second, with less hope, giving a chance for neurologic improvement. Both patients underwent the same technique. When the canal opened, the dural sac was compressed due to the retropulsed bone. The spinal canal decompressed directly by impaction of the retropulsed bone into the vertebral body. At the end, the pulse of the dural sac was visible. Posterior and posterolateral fusion was done by autograft and allograft. Both patients were discharged from the ward the third day after surgery and followed according to the routine follow up program.

The philosophy of late decompression in these patients in spite of lacking strong evidences in favor of effectiveness of late decompression, was to stop secondary injury cascade due to retained compression. Some studies reported that the outcome of the surgery is not different after late decompression and there is no difference in neurologic improvement between patients that had underwent early (in the first 24 hours) decompression and those who underwent late (after 72 hours) decompression (4, 6). McKinley et al. reported that there is no considerable difference in functional outcome between patients that had underwent decompression during the initial 24, 24 - 72 hours, and after 72 hours of trauma and pulmonary complications were more frequent in patients that underwent late surgical intervention (6). It is accepted that the outcome of surgery in patients with SCI is multifactorial and every patient comprises an individual outcome. Based on the literature, it is evidently postulated that with early decompression, the secondary insult can be prevented (11-14). Another factor is that because the severity of primary insult is not measurable precisely at early stage of trauma, the prognosis of neurologic outcome in patients with similar neurologic deficit may be different.

In conclusion, there are no reports in the literature regarding the effectiveness of late surgical decompression (after 7 - 14 days of trauma) and this issue continues to be challenging and needs large multicenter RCTs in the future, however, it seems that surgical decompression even at late stages might be beneficial and ethically acceptable because any neurologic improvement, even minimal, may change the functional outcome in patients with SCI and has substantial benefits in terms of social and economical aspects.

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