Results Of Single Stage Posterior Instrumentation In Complete Traumatic Spondyloptosis Of Thoracolumbar Spine

Pathak A, Jain M, Tandon S, Verma R

Investigation preformed at Gandhi Medical College, Bhopal

Abstract:

Background: Complete traumatic spinal dislocations above lumbosacral junction are extremely rare injuries. These usually present with complete neural deficit below the level of injury. We present a short series of five patients of such unusual cases of traumatic spondyloptosis who presented to our hospital and were treated with single stage posterior instrumentation.

Material & methods: All patients with traumatic spinal injury with complete fracture dislocation i.e. more than 100% subluxation of one vertebra over the other treated with single stage posterior instrumentation were included in the study. Patients were assessed for the neural and bladder recovery, alignment of spinal column, implant loosening, rehabilitation and presence of bedsore.

Result: Five patients with mean age 31 years (range 22 to 36 years) and mean follow-up 14 months (range 12 to 18 months) were included in the study. All patients had with complete neurological deficit at the time of injury and none of patients neural power improved even at final follow-up. None of the patients had any bed sore present. All patients were mobile with the help of brace and wheel chair doing self- intermittent catheterization themselves. Radiologically, in all the patients the spinal column was well aligned, without any loss of alignment or fixation failure.

Conclusion: Traumatic spondyloptosis is an extremely rare severe form on spinal injury presenting with complete neurological deficit. Surgical management by posterior approach is aimed to realign the vertebral column for proper rehabilitation of patient. Though one cannot expect neurological recovery in these patients but still early restoration of normal spinal cord anatomy should be done to provide proper milieu to the spinal cord and for early rehabilitation to the patient.

Keywords: Traumatic Spondyloptosis, Complete thoracolumbar Dislocation, Rehabilitation

Address of correspondence:
Dr Abhishek Pathak,
Associate Professor,
Department of Orthopaedics,
Gandhi Medical College, Bhopal
Email – abhishek.dr@gmail.com

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Introduction

Traumatic spondyloptosis is an extremely rare form of injury, but is among the most severe form on spinal injury. It is defined as 100% or greater subluxation of one vertebral body over another vertebra in coronal or sagittal plane secondary to an injury, usually leading to complete cord transaction [1]. Since it is associated with either cord transaction or there is severe cord damage, it is always associated with neural deficit. Complete paraplegia is usually the rule and is seen in approximately more than 80% of the cases [2]. Due to complete neurodeficit associated with this type of injury, the prognosis is poor and the treatment is aimed for rehabilitation rather than the neural improvement. Complete fracture dislocation, or traumatic spondyloptosis is most commonly seen in L5-S1 lumbosacral region and it is rarely seen in lumbar or thoraco-lumbar region [3-10]. We here present a short series of five cases of traumatic spondyloptosis causing complete

cord / cauda equina injury, which was treated by surgical fixation for early rehabilitation.

Material and methods

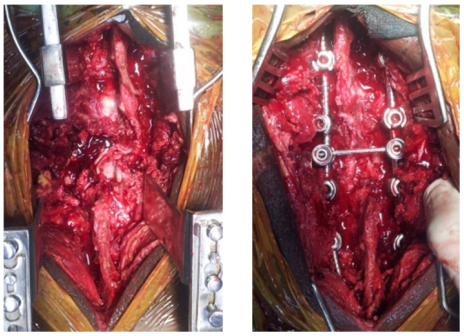
The study is conducted on patients of complete traumatic fracture dislocation presenting to our centre. The study was approved by institutional review committee and written informed consent was taken by all patients. All patients with any age or sex, coming to our center with traumatic spinal injury with complete fracture dislocation i.e. more than 100% subluxation of one vertebra over the other with any neurology were included in the study. Patients with open injury, Nontraumatic spondyloptosis, pathologic spondyloptosis or incomplete dislocation or subluxation of one vertebra over the other were excluded from the study.

All patients presenting with spinal trauma, were first haemodynamically stabilized and then a detailed history and thorough examination was done evaluating pain, tenderness, motor examination, sensory and autonomic examination including assessment of bladder and bowel, etc. Initial ASIA grade was calculated according to American Spinal Injury Association (ASIA) Impairment scale and recorded. All patients underwent a CT scan as well as MRI scan of the affected segment of spine to assess the bony injury pattern and document the cord and neural injury.

After routine investigation and fitness, all patients were operated under general anaesthesia in prone position over bolsters, using posterior midline approach to spine. The spinal column was restored in alignment by open reduction very gentle to avoid the injury of the great vessels. Once the reduction was achieved, the fixation of the spinal column was done with pedicle screws fixation two vertebra above and two levels below (fig 1).

Post operatively all patients were put on air/water mattress. Rehabilitation was started immediately following surgery unless contraindicated by other injuries. Patient were given appropriate nursing care, back care, active and passive physiotherapy, DVT prevention centripetal massage, bowel care (using biological bulk forming agents like isabgol / psyllium husk, laxatives were given if required), skin care, chest physiotherapy and psychological support. Regular bladder irrigation was done with mild antiseptic solution. Urinary catheter was removed and patients were taught method continous intermittent catheterization. Patients were mobilized with the help of anterior spinal hyperextension brace and wheel chair. Regular follow ups were done and at each follow up ASIA grade was analysed and recorded to see for neural recovery in any. Patients were also assessed for the other parameters like bladder recovery, alignment of spinal column, implant loosening and complications associated with long recumbency.

Fig 1. Intraoperative photos of patient with spondyloptosis showing dislocation (a) and reduction with placement of pedicle screw fixation (b).



a b

Result

Five patients were included in the study. The mean age of patients was 31 years (range 22 to 36 years).

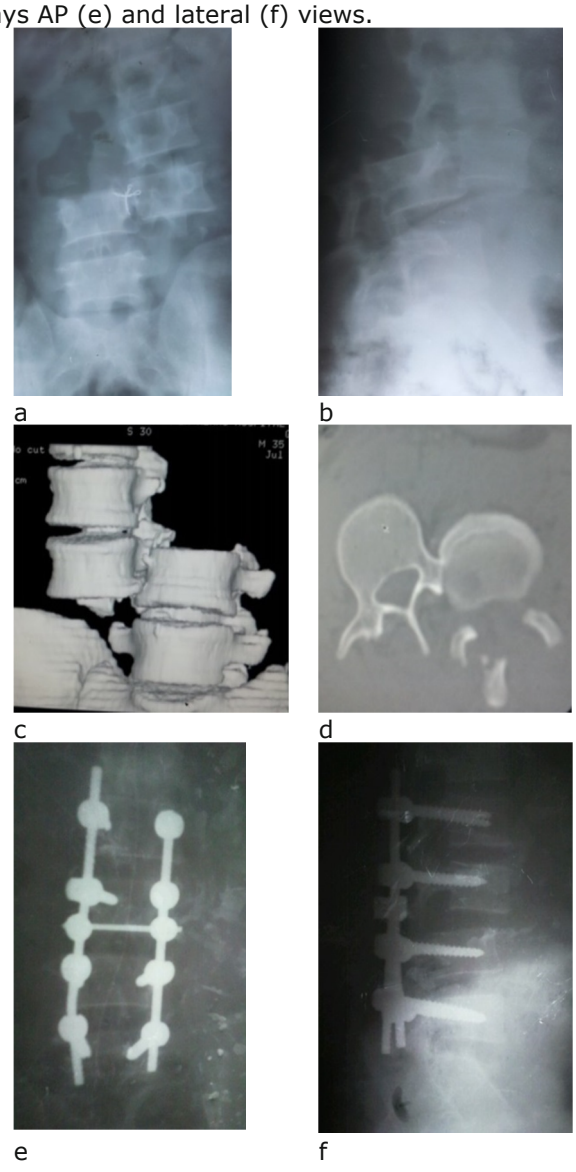
Four cases were male and one was female. Three sustained trauma due high velocity road traffic accident, whereas two sustained injury due to fall from height. One patient had additional fracture in bilateral calcaneum. The mean follow-up period was 14 months (range 12 to 18 months).

The preoperative ASIA score of the all the patients was type A i.e. all had complete neural deficit, with no sensory or motor function preserved below the injury. Bladder and bowel was also involved in all the patients as seen by incontinence. MRI of all the patients confirmed cord transection at the

level of injury. Three patients had spondyloptosis at L3 over L4 level and one at each D12 over L1, and one at L1 over L2. The delay in presentation of the patients was 32 hr (range 8 to 56 hrs) and mean delay in surgery was 36 hrs (range 24 to 72 hrs).

At final follow up, none of the patient have neurological recovery. None of the patients had any bed sore present. All patients were mobile with the help of brace and wheel chair. All patients were doing self- intermittent catheterization themselves without support. Radiologically, in all the patients the spinal column was well aligned, without any loss of alignment or fixation failure (fig 2).

Fig 2. Preoperative X ray AP (a) and lateral (b) views and CT scan transverse (c) and axial (d) views of 35 year patient with spondyloptosis treated by posterior approach with pedicle screw fixation showing good alignment in postoperative X rays AP (e) and lateral (f) views.



Discussion

Spondyloptosis is a form of severe spinal dislocation or advanced spondylolisthesis, in which one spinal segment is dislodged from the other segment [11-13]. Traumatic spondyloptosis is an extremely rare entity, but has severe problems than milder forms of spondylolisthesis [14]. Paraplegia with bowel and badder incontinence occurs in almost all cases of spondyloptosis either thoracic or lumbar.

According to the three column concept describe by Dennis, injury involving all the three columns are unstable injuries [15]. Mechanism of injury described for these injuries is due to high impact trauma causing axial compression and shearing simultaneously leading to fractured facet joints and all ligament rupture leading to complete dislocation of spine. Hence these injuries involve disruption of all the three spinal column, and are inherently severely unstable injuries.

Suggested treatment methods ranges from benign neglect, in situ fusion to decompression and fusion [10,16-24]. In treatment of spinal trauma, only stable fractures can be managed conservatively by bed rest, while unstable fractures require open reduction and stabilisation with rigid instrumentation. Since these injuries are severely unstable, these should not be treated conservatively, because conservative treatment can lead to increased complications related to long bedridden and further, non-surgical treatment may cause future spinal deformity and continuous back pain and delayed rehabilitation [25,26].

Surgical treatment with reduction and rigid stabilization is advisable for such complete dislocation for achieving the alignment and early rehabilitation. The surgery can be done via anterior, posterior or combined approach [4,12-18]. There are very few case reports or series describing complete traumatic spondyloptosis [3-9]. All these reported cases / series has described posterior instrumentation as the standard method of treatment. The posterior approach, is most

commonly used and had shown good success and fewer complications [5,27-35]. The posterior reduction and fixation using pedicle screws for the thoracolumbar spondyloptosis alone is sufficient to provide good alignment and sufficient stable fixation [36,37]. We also treated all our patients via posterior approach for reduction and pedicle screw fixation and were able to achieve reduction, alignment and stable fixation in all the patients. In all cases we manipulated the dislocated spine very gently so as avoid any further damage to the cord and anterior large vessels, a plausible complication which can have futile results.

Since these patients had complete neurodeficit with cord transaction present, the prognosis is poor. It has been shown that rather than fracture severity assessed radiologically, the degree of anatomical injury found at surgery is a better predictor of outcome [2]. Hence it can be said that surgery in these spondyloptosis patients helps to prognosticate the injury in addition to helps to achieve alignment, decreased deformity and provide early rehabilitation. In our series, all patients showed complete cord transaction following a high impact trauma. None of the patient had neurological recovery postoperatively as there was complete cord / cauda equina transaction. The only aim of surgery was to realign the spine to provide better mileu to the cord and stabilize it for proper rehabilitation of the patient, which was achieved by surgical treatment in all our patients.

Conclusion

Traumatic spondyloptosis is an extereme rare condition causing complete neurological deficit. Posterior instrumentation provides satisfactory results as far as realignment and stabilisation is considered. While reduction manipulation should be gentle so as to avoid injury to great vessels this lies immediately anterior to the injured spine. The main aim of surgery is to make injured vertebral column stable to allow for proper reahabilitation, rather than neural recovery.

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