



A PROSPECTIVE STUDY OF THE OUTCOME OF TRAUMATIC DORSOLUMBAR FRACTURES TREATED WITH POSTERIOR STABILISATION BY PEDICLE SCREW FIXATION

Orthopaedics

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ABSTRACT

INTRODUCTION: The spinal trauma is one of the leading problems in modern era where the individuals are more at risk due to high energy trauma. Thoracolumbar spinal segment is the 2nd most commonly involved segment after the cervical segment in spinal injuries. About 35 to 60% of all spinal injuries occurring between T12 and L2. The fractures at thoracolumbar level have associated neurological injury in 15 to 20% patients

AIM OF THE STUDY: The aim of this study is to study the efficacy of pedicular screw and rod fixation system in achieving stability and clinical, neurological and radiological outcome

MATERIALS AND METHODS: In all, a total of 40 cases were evaluated and assessed during the study period. The study was conducted in the Department of Orthopaedics, GVMCH Villupuram. Pre operative x-rays CT, MRI were done and neurological status recorded in all patients. The clinical outcome was measured with Denis pain scale and Denis work scale. Neurological status was assessed with ASIA scale.

RESULTS: In our study the clinical outcome was good. Most of the patients returned to their previous job and had a considerable reduction in pain. 90% of patients had an improvement in their neurological status. There was a decrease in the regional kyphotic deformity and an increase in anterior vertebral height during the follow up, and four patient had superficial wound infection.

CONCLUSION: Instrumented posterior stabilization provides less surgical exposure, correction of deformity and better stabilization of fractures.

KEYWORDS

Dorsolumbar Fracture, Posterior Stabilization, Pedicle Screw

Thoracolumbar fractures are relatively common injuries. Numerous classification systems have been developed to characterize these fractures and their prognostic and therapeutic implications. Patients with unstable burst fractures and with neurologic deficits require direct or indirect decompression. Posterior stabilization can be effective with Chance fractures and flexion-distraction injuries that have marked kyphosis, and in translational or shear injuries.

Denis's three-column concept :

The anterior column-consists of anterior longitudinal ligament, anterior half of the vertebral body, and anterior portion of the annulus fibrosus.

The middle column consists of the posterior longitudinal ligament, posterior half of the vertebral body, and posterior aspect of the annulus fibrosus.

The posterior column- neural arch, the ligamentum flavum, facet capsules, and the interspinous ligaments.

SURGICAL MANAGEMENT:

The goals of surgical treatment include restoring alignment, correcting deformity, decompressing neural structures and achieving stable spinal column. Surgical treatment offers significant advantages in select cases.

1. It restores sagittal plane alignment, corrects translation and decompresses the neural structures.
2. Operative management may facilitate neurological improvement.
3. It may decrease rehabilitation time compared to recumbent treatment.
4. Fusion with instrumentation gives stable spine construct.

Surgical decompression:

This is commonly done by posterior or by anterior decompression. The aim of the surgery is to decompress the spinal cord and give it a better chance for neurological recovery.

Indications:

1. Demonstrable neural compression and worsening neurological deficit.
2. Demonstrable neural compression and myelopathy, especially worsening.
3. Demonstrable neural compression and persistent or worsening radicular symptoms.

MATERIALS AND METHODS

In all, a total of 40 cases were evaluated and assessed during the study period between August 2015 and July 2018. The study was conducted in the Department of Orthopaedics, GVMCH Villupuram. The patients were initially assessed in the casualty according to their presentation and then they underwent a detailed evaluation of their hemodynamics, spine, neurological status and other injuries. After initial investigations and haemodynamic stabilization, patients were assessed neurologically in detail. A neurological chart was maintained for each patient. All the patients had routine X-rays of thoracolumbar and lumbar spine in both Anteroposterior and Lateral views. In all the patients MRI with CT films was done. The pre-operative neurological status was graded on the basis of ASIA grading. The indication for the surgery was instability for which instrumentation was needed to restore spinal stability or to protect neurological elements.

Inclusion criteria:

1. Age group >21 years
2. Traumatic thoracolumbar fractures T11-L2.
3. Unstable fractures with or without neurological deficits.
4. Kyphotic angle > 30 degrees
5. Loss of vertebral body height more than 50%
6. Spinal canal compromise > 50%

Exclusion criteria:

1. Age <21 years
2. Associated cervical spine fractures and sacral spinal fracture.
3. Patients not willing for surgery.
4. Medically unfit for surgery.

PREOPERATIVE WORK UP:

NEUROLOGICAL ASSESSMENT:

In thoracic and lumbar spinal lesions it is important to determine the level and extent of neurological injury. Spinal shock, if present it rarely lasts longer than 24 hours, but might last for days or weeks exceptionally. A positive bulbocavernosus reflex or return of anal wink reflex indicates the end of spinal shock. An initial examination should include a detailed sensory examination, motor examination and reflex functions. Sacral sensory sparing is an important evidence of incomplete neurological injury.

The most widely accepted classification for categorizing patients with neurological injury is the one proposed by American spinal injury association (ASIA) impairment scale.

ASIA Scale:

Grade A: Absent motor (Grade 0/5) and sensory function below the injury level.
 Grade B: Sensation present, motor function absent (grade 0/5).
 Grade C: Sensation present, motor function active but not useful (grade 1 to 2/5).
 Grade D: Sensation present, motor function active and useful (grade 3 to 4/5).
 Grade E: Normal motor (Grade 5/5) and sensation function.

Post operative management:

All the patients were given post op intravenous antibiotics for 3 days. Physiotherapy was started from first day post operatively. On the second day patients were allowed to roll from side to side. They were allowed to sit up and were mobilized on a wheel chair after application of Taylor's brace on the third post operative day. A close watch was kept for any improvement or deterioration in the neurological status. Taylor's brace was worn on all times of the day except when the patient is lying down. The brace was used for two months post operatively. Sutures were removed on the 12th post operative day.

Follow up:

All the patients were followed up at interval of 6th week, 12th week, 6 months and 1 year respectively. On each follow up clinical, radiological & neurological examination was done to assess spinal stability, reduction in pain, improvement in range of movements, reduction of deformity, and check for any complications. Bladder training was given to patients who were affected with urinary incontinence.

FOLLOW UP ASSESSMENT:

1. NEUROLOGICAL ASSESSMENT:

Neurological examination was done using the ASIA scale at regular visits.

2. RADIOLOGICAL ASSESSMENT:

Radiological assessment was done by measuring

- a. Regional kyphotic angle
- b. Anterior vertebral body height.

3. CLINICAL ASSESSMENT:

Clinical assessment was done using the Denis pain scale and Denis work scale.

DENIS PAIN SCALE:

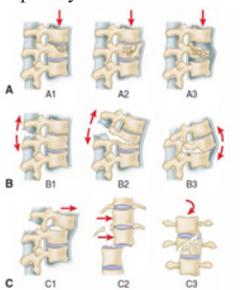
Grade Criteria

- 1 No pain
- 2 Occasional, minimal pain : no need for medication
- 3 Moderate pain, occasional medication, no interruption of work or activities of daily livings
- 4 Moderate to severe pain, occasional absences from work, significant in activities of daily livings
- 5 Constant severe pain, chronic medication

DENIS WORK SCALE:

Grade Criteria

- 1 Return to previous employment (heavy labor) or physically demanding activities
- 2 Able to return to previous employment (sedentary) or return to heavy labor with lifting restrictions
- 3 Unable to return to previous employment but working full time at a new job
- 4 Unable to return to full time work
- 5 No work, completely disabled



AO CLASSIFICATION: A-compression injuries, B-distraction injuries.

RESULTS.

	No of patients
AO classification	
Type A	37
Type B	2
Type C	1
Mode of injury	
RTA	22
Accidental fall from height	18
Level of injury	
D11	16
D12	12
L1	8
L2	4
Sex distribution	
Male	30
Female	10

Asia scale grade	No of patients before surgery	No of patients after last follow up
Grade A	6	4
Grade B	2	2
Grade C	21	2
Grade D	7	10
Grade E	4	22

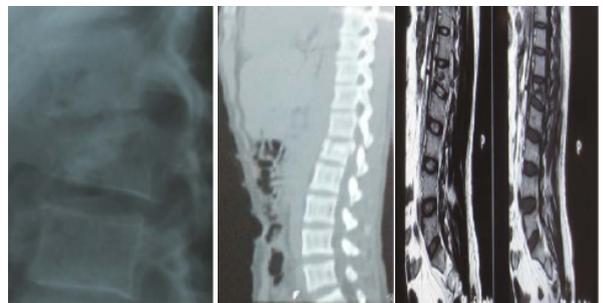
Complications:

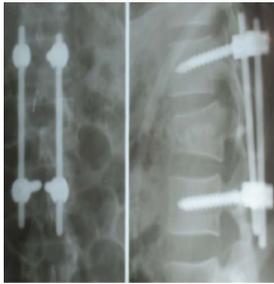
In our study 36 patient had no complications. four patients has superficial infection of the operated site. patient were treated with antibiotics based on culture and sensitivity.

Radiological assessment:

In our study average regional angle of 40 patients is 22.5 degree. and the postoperative angle was 8.2 degree and average angle at last visit was 12.5 degree. In our series, average anterior vertebral height among 40 patients is 13.5mm where as height in post operative height was 21.3mm and in last visit was 20.4 mm. In our series, out of 40 pateints, 22(55%) were having denis pain scale of P1, 12(30%) were having scale of P2, 4(10%) patients were having scale of P3 and 2(5%) patient was having a scale of P4. In our series, out of 40 patients, 18(45%) were having denis work scale W1, 16(40%) were having work scale of W2, 02(5%) patient was having W3 & 4(10%) patients were having work scale W4

Case Illustration:





- polytrauma patient. *Spine (Phila Pa 1976)* 2010;35(21 Suppl.):S187–92.
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DISCUSSION

AGE AND SEX DISTRIBUTION:

In our study we had 75% males and 25% female patients. The average age was 36.6 years and more common in the third and fourth decade. Gregory F. Alvine et al in their study found that average age was 31 years, with a male predominance. Rick C. Sasso et al, in their study had 77% males and 23% females with a mean age of 34 years. Razak M, et al in their study found that average was 30 with a male predominance

ASSOCIATED INJURIES:

In our study, 5 patients had associated head injury ,4 patients had calcaneum fracture and 1 patient had fracture of fibula.30 patients had no other injury. CT brain was taken for patients with head injury and neurosurgeon fitness for surgery was obtained. Patients with fracture calcaneum and fibula were managed conservatively.

DURATION OF INJURY TO SURGERY:

In our study, 30 patients underwent surgery within 10 days of injury and 10 patients had surgery within 20 days of surgery and the mean hospital stay was 18 days. Sasso et al noted that the average time interval between injuries to surgery was 4 days and mean hospital stay was 16 days. While Razak et al noted the average time duration to surgery was 5.6 days.

CONCLUSION

Thoracolumbar spine fractures are more common in the 3rd and 4th decade of life with male predominance due to outdoor activities. The commonest mode of injury was road traffic accident. The posterior midline approach provides adequate exposure and direct visualization. Blood loss is minimal and operating time is less. Pedicle screw fixation should be done as early as possible in order to facilitate neurological recovery, help in good nursing care and early mobilization of the patient and to prevent deterioration of the neurological status. Pedicle screw instrumentation provides less surgical exposure, correction of deformity and better stabilization .It provides fixation and stabilization of all the three columns.

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