



## A Study on Management and Outcome of Thoracolumbar Spinal Trauma with Neurological Deficit

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### Abstract

*Thoracolumbar fractures have been treated conservatively in the past. This mode of treatment is accompanied with various complications. It is very laborious. Cost of therapy in terms of hospital stay and care by trained personnel is also very high. In our country, where there is an acute shortage of trained persons conservative management, more often ends up as benign neglect.*

**Methodology:** *This study was a prospective study of fixation with pedicle screw and fusion in traumatic unstable thoracolumbar spine. During the period 20 cases of traumatic thoracolumbar spine fractures were treated surgically with posterior decompression and fusion.*

**Results:** *In our study 55% of the cases were of Grade A power, 25% cases were Grade C power and 20% of cases were of Grade B power on admission. Only 30% patients had useful recovery (Grade D & E). Type A fractures and type B fractures had incidence of 40% each. Fall from height was the most common cause.*

**Conclusion:** *It was observed that posterior stabilization with pedicle screw was effective. And showed improvement in the neurological status.*

*It was much better in patients with incomplete cord Injury. Early mobilization and ambulation are the major advantages of this procedure. The results in our series of 20 cases have been encouraging. But there is need for more cases and longer follow-up.*

**Keywords:** *thoracolumbar fractures, management, complications, pedicle screws.*

### Introduction

Injuries to spine are dreaded problems. They cause infinite morbidity and disability to the patient. If not treated urgently & rationally, patient may be confined to bed for the rest of his life<sup>[34]</sup>. Thoracolumbar spine is the most commonly injured part of the spine. In this era of increasing mechanization, automobiles and industrialization, there is sharp increase in physical trauma and spinal cord injuries. Incidence of traumatic spinal

cord injury is estimated to be between 29-50 million cases per year<sup>(2)</sup>. Motor vehicle accidents is the most common cause of traumatic spinal cord injury (>45%), other causes include fall from height (>25%) and gunshot injuries (15%). The gender propensity is about 4:1<sup>(6,7)</sup>.

It perhaps is the worst of all survivable trauma's in terms of psychological and socio-economic impact. Historically, thoracolumbar fractures have been treated with bed rest for a period of 8-12

weeks<sup>[35,36]</sup>. This mode of treatment is accompanied with complications in terms of hospital stay, bed occupancy and care by trained personnel<sup>[34]</sup>. In a country like ours, where there is acute shortage of hospital facilities, conservative management ends up being a benign neglect. So there is an urgent need for exploring possibility of surgical stabilization, early mobilizations and rehabilitation of patients. Surgical treatment can be by anterior, posterior, lateral or anteroposterior approaches. As most spine surgeons are more experienced in posterior approach, it is a safe alternative. This study was conducted to ascertain the results of Pedicle screw fixation for operative treatment of thoracic and lumbar spine injuries with neurological deficit.

### Material and Methods

20 cases of different age group and gender with fractures and fracture dislocation of thoracic and lumbar spine admitted in GMC Jammu from 2006 to 2008 were studied. On arrival, the patient was assessed and stabilized in terms of airway, breathing and circulation. Immobilization was done on a hard board. Detailed history, thorough physical and neurological examination was carried out. Patient was started on Intravenous dose of methyl prednisolone as per National Spinal Cord Injury Study (NASCIS-III) recommendation. Radiological examination and MRI was performed to know the exact level of injury, extent of injury, kyphotic angle and loss of vertebral height. Chest physiotherapy, care of back, bowel and bladder was performed

### Exclusion Criteria

- Pathological fractures
- Stable/unstable fractures without neurological deficit.
- Gross osteoporosis.

### Surgical Procedure

By standard posterior midline incision. The affected site was exposed. Awl was put under image intensifier for the exact portal of entry. The pedicle probe and the depth gauge were used to know the appropriate size of the pedicle screws.

Prior to rod placement, the alignment tool was also used. The rod was cut to a length. Contoured to conform to the sagittal contour of the spine. Autogenous Cortico Cancellous bone graft was placed either before or after the placement of the rod. Secure tightening of each set screw was performed with the screw driver in conjunction with the rod pusher. Postoperative antibiotics were used for three days. The patient was allowed to ambulate under supervision on the first postoperative day with Taylor brace. In paraplegics and in patients with partial recovery, parallel bar gait training was started after 6 weeks with the help of a physiotherapist. Check radiographs were taken to confirm stability, reduction, vertebral height and change in kyphotic angle. Patients were followed up for a period of one year. The results were analyzed on the basis of:

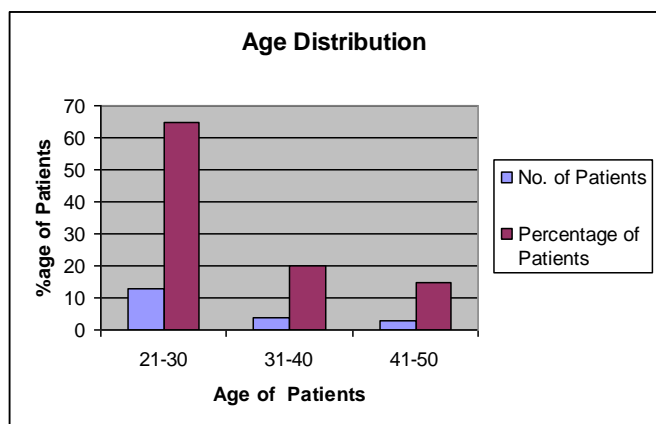
- 1) Neurological recovery as per FRANKEL GRADING (ASIA impairment scale),
- 2) Spine stability (Kyphotic angle, Vertebral body height, Status of fusion) and
- 3) Complications
- 4) (a) General- Bed Sores, RTI, UTI, Deep venous thrombosis, Joint contractures.  
b) Surgery related- Screw loosening, Screw breakage, Rod breakage, Wound infection and Improper placement of screws)

**Fig-I**



**Table-I** Age Distribution

Age	No. of Patients	Percentage of Patients
21-30	13	65
31-40	4	20
41-50	3	15

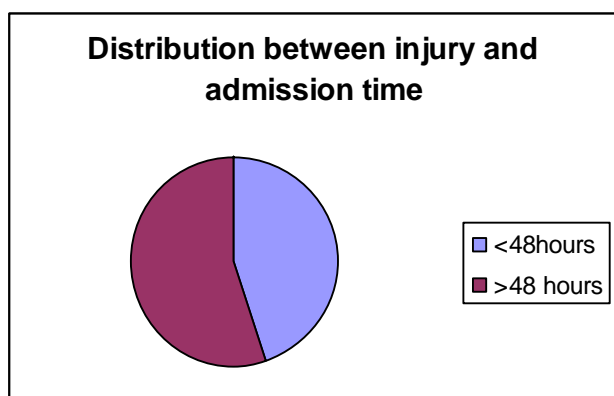


**Table-II** Sex Distribution

Sex	No. of Cases	%age of Cases
Male	19	95
Female	1	5

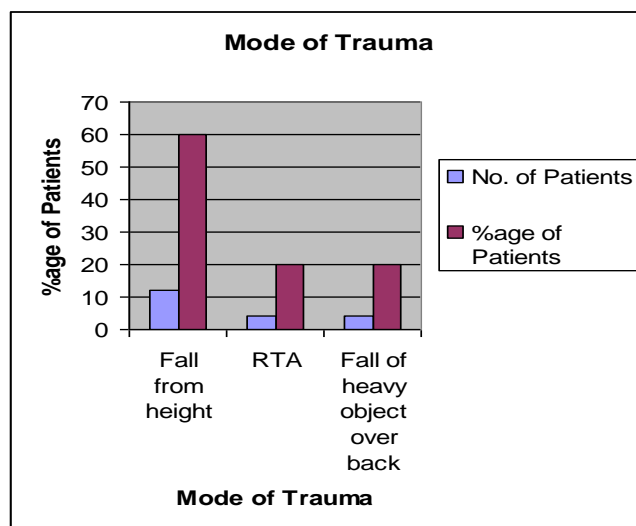
**Table-III** Duration between Injury and Admission

Duration	No. of Cases	%age of Cases
<48hours	9	45
>48 hours	11	55



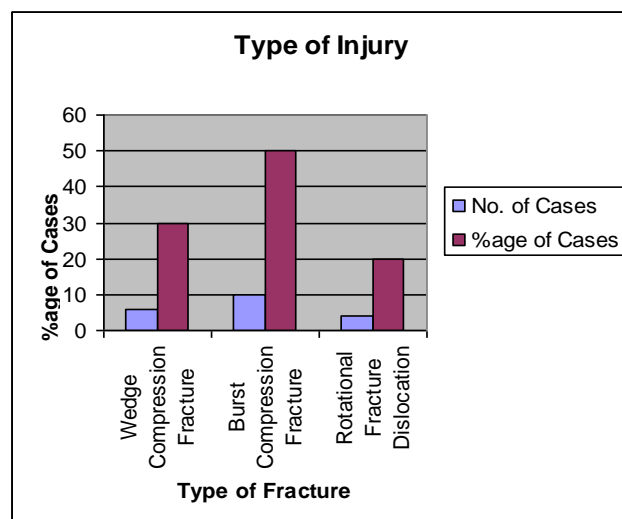
**Table-IV** Mode of Trauma

Mode of Trauma	No. of Patients	%age of Patients
Fall from height	12	60
RTA	4	20
Fall of heavy object over back	4	20



**Table-V** Type of Injury

Type	No. of Cases	%age of Cases
Wedge Compression Fracture	6	30
Burst Compression Fracture	10	50
Rotational Fracture Dislocation	4	20



**Table-VI** Level of Injury

Vertebra Involved	No. of Cases	%age of Cases
D1 2 3	0	0
D4 5 6	0	0
D7	0	0
D8	1	5
D9	0	0
D10	0	0
D11	1	5
D12	3	15
L1	10	50
L2	4	20
L3	1	5
L4	0	0
L5	0	0

**Table-VII** Associated Injury

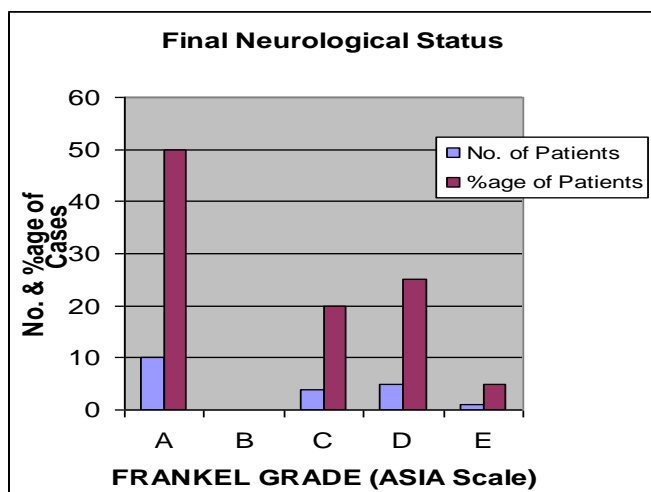
Type of Injury	No. of Cases	%age of Cases
Fracture of Right Calcaneum	1	5
Fracture of Tibia & Fibula	1	5
Fracture of Right Superior & Inferior Pubic Ramii	1	5

**Table-VIII** Neurological Status on Admission

FRANKNEL GRADE (ASIA Scale)	No. of Patients	%age of Patients
A	11	55
B	4	20
C	5	25
D	0	0
E	0	0

**Table-IX** Final Neurological Status

FRANKEL GRADE (ASIA Scale)	No. of Patients	%age of Patients
A	10	50
B	0	0
C	4	20
D	5	25
E	1	5



**Table-X** Vertebral Height

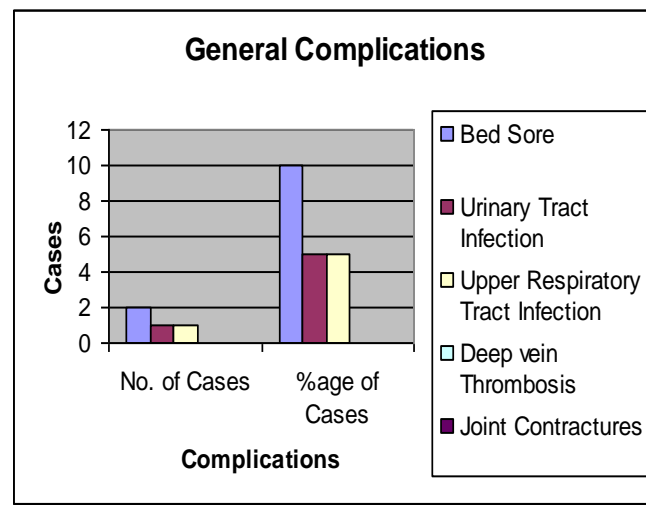
Cases	Vertebral Height Range %age	Average
Pre Operative	46.20 – 70.20	61.60%
Post Operative	53.40- 81.80	71.56%

**Table-XI** Kyphotic Angle

Cases	Range	Average
Pre Operative	10 <sup>0</sup> -45 <sup>0</sup>	28.36 <sup>0</sup>
Post Operative	5 <sup>0</sup> -30 <sup>0</sup>	12.15 <sup>0</sup>

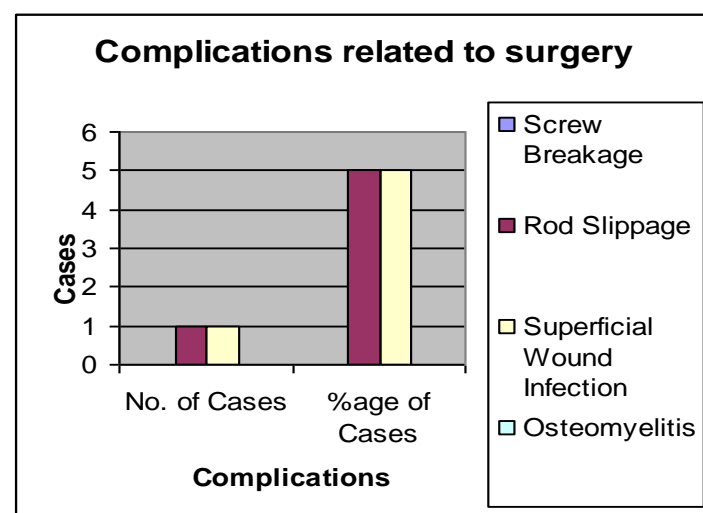
**Table-XIII** General Complications

Complications	No. of Cases	%age of Cases
Bed Sore	2	10
Urinary Tract Infection	1	5
Upper Respiratory Tract Infection	1	5
Deep vein Thrombosis	0	0
Joint Contractures	0	0



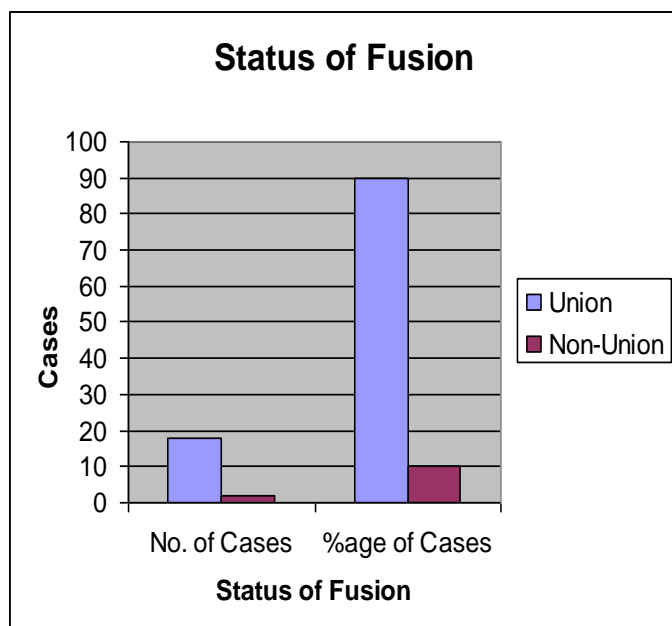
**Table-XIV** Complications related to surgery

Complications	No. of Cases	%age of Cases
Screw Breakage	0	0
Rod Slippage	1	5
Superficial Wound Infection	1	5
Osteomyelitis	0	0



**Table-XVI** Status of Fusion

Status of Fusion	No. of Cases	%age of Cases
Union	18	90
Non-Union	02	10



Fractures of thoracolumbar spine are very common. Most of them are unstable. Thus management of these fractures by conservative methods is difficult. They are also associated with neurological deficit which aggravates it further. Most authors agree on anterior decompression. Posterior spinal fixation has the advantage of being a less extensive approach with fewer post-operative complications without compromising on the quality of stabilization. The aim of this study was to assess the results of the operative management of post-traumatic thoracic and lumbar spine fractures with neurologic deficit.

### Discussion

We studied 20 cases of thoracolumbar spine injuries with neurologic-deficit. They were treated by decompression and posterior spinal fixation by pedicle screws. 95% of them were males<sup>(6,7)</sup>. 65% of them were of the age group of 21-30 years with mean age of 29.7 years<sup>(6,7,18,21)</sup>. Both of these factors are indicators of active outdoor life and consequent increased risk of injury. The commonest mode of injury was fall from height 60% of patients<sup>(5,6,7 18)</sup>. This correlates with the fact that burst compression was the commonest mechanism causing the fractures. The commonest level of vertebral involvement was thoracolumbar junction. L1 50%, L2 20% and D12 in 15% of the

patients<sup>(6,7,18,30,31)</sup>. The commonest type of fracture was Type-II (Burst compression type) in 50% of the cases, Type-I (Wedge compression type) and Type-III (Rotational fracture- dislocation type) in 20% of the cases<sup>(13,14,19,21)</sup>. Only cases with neurological-deficit were included. 55% of the cases were with Grade A power, 25% cases with Grade C power and 20% of cases were with Grade B power on admission<sup>(6,7,18,21)</sup>. 30% of the patients had useful recovery (Grade D & E) and 50% patients showed recovery by one or more grade by Frankel System of Grading<sup>(12,31)</sup>. None of the patients in this study had any neurological deterioration. All patients having incomplete neurological deficit showed some recovery. Preoperative degree of kyphotic deformity ranged from 10<sup>0</sup> to 45<sup>0</sup> with an average of 28.36<sup>0</sup>.

On follow up average degree of correction of kyphotic deformity was noted as 12.75<sup>0</sup> with range of 5<sup>0</sup>-30<sup>(6,7)</sup>. The complications related to surgery were one patient with rod slippage (5%), one patient with superficial wound infection (5%). General complication like bedsores were noted in 2 patients (10%) and one with urinary tract infection (5%) & upper respiratory tract infection (5%).

### Conclusion

It is widely accepted that the spinal deformity should be reduced as early as possible. A careful decompression is just an extension of the accepted theory of reduction providing maximum available space for the neurological elements. In this study we have found pedicle screw fixation fulfills all the aims of surgical treatment of fractures and fracture dislocation of thoracolumbar spine with neurologic involvement. The stability provided prevents further neural damage. During our study of 20 patients it was observed that posterior stabilization with pedicle screw was effective. It also showed a fair improvement in the neurological status. Neurological recovery was good in patients with incomplete cord Injury. Early mobilization and ambulation is one of the major advantages of this procedure which shortens



the rehabilitation. The results in our short series of 20 cases have been encouraging. But there is need for more cases and longer follow-up to come to categorical conclusion.

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