



## International Journal of Orthopaedics Sciences

ISSN: 2395-1958  
IJOS 2017; 3(4): 83-87  
© 2017 IJOS  
www.orthopaper.com  
Received: 13-08-2017  
Accepted: 14-09-2017

**Dr. Acharya Rajneesh**  
Father Muller Medical College,  
Departments of Orthopaedics,  
Mangalore, Karnataka, India

**Dr. Edward Nazareth**  
Father Muller Medical College,  
Departments of Orthopaedics,  
Mangalore, Karnataka, India

**Dr. Vasudeva Reddy**  
Father Muller Medical College,  
Departments of Orthopaedics,  
Mangalore, Karnataka, India

### Comparative study of neurological recovery following anterior and trans pedicular decompression with instrumentation in thoracolumbar spine fractures with neurological deficits

**Dr. Acharya Rajneesh and Dr. Edward Nazareth**

DOI: <https://doi.org/10.22271/ortho.2017.v3.i4b.13>

#### Abstract

**Background:** Spinal trauma is becoming a common problem in today's orthopaedic practice, more so in this era where the individuals are more at risk due to high energy trauma. An undiagnosed or sub-optimally managed spine injury can result in a neurologic deficit and permanently impair a patient's function and quality of life. The vast majority of these injuries have been shown to affect the motion segments between T11 and L2 that comprise the thoracolumbar junction. Early surgical decompression with instrumentation reduces hospital stay, facilitates early recovery and prevents prolonged morbidity, so there is an urgent need for exploring possibilities of surgical stabilization, early mobilization and rehabilitation of patients

**Materials and methods:** All the patients with thoracolumbar spine fractures who had undergone surgical decompression at the department of orthopaedics in Father Muller Medical College, Mangalore from June 2016 to August 2017, were included in this study and followed up at 3 months, 6 months and 1 year after surgery.

**Results:** A prospective follow up study of one year duration with a sample size of 30 patients were included. The patients with single level thoracolumbar spinal fractures selected after a pre-operative CT/MRI, undergoing surgical decompression at Father Muller Medical College & Hospital would be evaluated and assessed post-operatively for neurological recovery using ASIA (The American Spinal Injury Association) at 3<sup>rd</sup> month, 6<sup>th</sup> month and at last follow-up at one year. Anterior decompression with instrumentation and posterior decompression with instrumentation are both effective ways to stabilise spine but there is significantly better neurological recovery in anterior group compared to posterior group.

**Conclusion:** In our study functional outcome was assessed using Denis work scale at last follow-up. Out of 8 paraplegics 3 did not improve and completely wheel chair bound at 1 year and were completely disabled (W5). Out of 22 incomplete paraplegics 1 was completely disabled at 1 year (W5). Rest of the patients were able to return to some occupation at 1 year but none of them were able to return to their previous occupation with no restrictions. 3 out of 14 (21.42%) in anterior group and 5 out of 16 (31.25%) in posterior group were able to return to their previous occupation but with restrictions.

**Keywords:** Thoracolumbar, fracture, decompression, instrumentation

#### Introduction

Spinal trauma is becoming a common problem in today's orthopaedic practice, more so in this era where the individuals are more at risk due to high energy trauma. An undiagnosed or sub-optimally managed spine injury can result in a neurologic deficit and permanently impair a patient's function and quality of life. It has been estimated that 6% of all fractures involve the spinal column, with approximately 90% occurring within the thoracic or lumbar regions [1]. The vast majority of these injuries have been shown to affect the motion segments between T11 and L2 that comprise the thoracolumbar junction. This transitional zone may experience substantial biomechanical stresses during traumatic incidents, which generally make it more susceptible to fracture [2].

Many authors have advised recumbent treatment which was labour intensive and associated with complications due to long recumbency, increased cost of therapy, increased bed occupancy, increased hospital stay hours and care by trained personnel [3].

#### Correspondence

**Dr. Acharya Rajneesh**  
Father Muller Medical College,  
Departments of Orthopaedics,  
Mangalore, Karnataka, India

Early surgical decompression with instrumentation reduces hospital stay, facilitates early recovery and prevents prolonged morbidity, so there is an urgent need for exploring possibilities of surgical stabilization, early mobilization and rehabilitation of patients. This prospective comparative study aims at comparing the neurological outcomes after surgical decompression and instrumentation by anterior and transpedicular approach in thoracolumbar spinal fractures post-operatively at 3 months, 6 months and 1 year follow up periods.

**Aims and Objectives**

- To assess the neurological recovery following anterior and transpedicular spinal decompression in thoracolumbar spinal fractures.
- To compare functional recovery.
- To compare both procedures on speed of neurological recovery basis.
- To compare surgical complications and post-operative pain.
- To assess age distribution.

**Materials and Methods**

All the patients with thoracolumbar spine fractures who had undergone surgical decompression at the department of orthopaedics in Father Muller Medical College, Mangalore from June 2016 to August 2017, were included in this study and followed up at 3 months, 6 months and 1 year after surgery.

All patients with suspected thoraco-lumbar spine trauma were examined and detailed history regarding time of injury, place, mode of injury and time elapsed since injury were recorded. Patients were also enquired for involuntary passage of stools or urine after injury and recorded.

**Method of Collection of Data**

A prospective follow up study of one year duration with a sample size of 30 patients who fulfilled the inclusion and exclusion criteria were selected by purposive sampling.

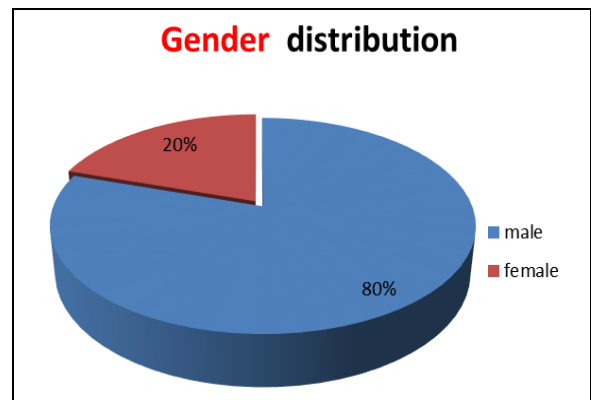
The patients with single level thoracolumbar spinal fractures selected after a pre-operative CT/MRI, undergoing surgical decompression at Father Muller Medical College & Hospital would be evaluated and assessed post-operatively for neurological recovery using ASIA (The American Spinal Injury Association) at 3<sup>rd</sup> month, 6<sup>th</sup> month and at last follow-up at one year.

Pre-op neurology	No. of cases	Percentage
Paraplegia	8	26.66%
Paraparesis	22	73.33%

- 3 out of 8 (37.5%) paraplegics did not improve and remained in ASIA ‘A’ indicating that primary injury cannot be reversed on decompression and stabilisation.
- 1 out of 22 paraparetic patients did not improve neurology (Grade B).
- Others improved their neurological status by atleast 1 grade.
- Out of 3 paraplegics who underwent posterior decompression and instrumentation, 2 remained as grade A.

ASIA grade	Pre-op	3months	6months	1year
A	3	2A and 1B	2A and 1C	2A and 1C
B	3	1B,1C and 1D	1B and 2D	1B,1D and 1E
C	4	3C and 1D	3D and 1E	3D and 1E
D	6	4E and 2D	6E	6E

**Results**



**Graph 1:** Gender distribution

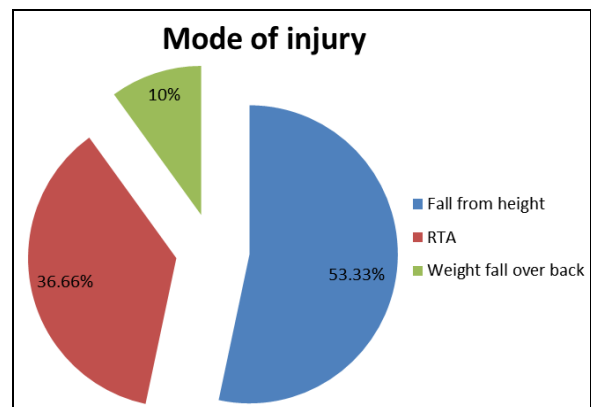
**Age distribution**

In our study most commonly affected age group was 30-40 years with 53.33%.

These people are employed and most of them were labourers requiring high physical demand.

**Mode of injury**

In our study fall from height was the most common mode of injury followed by RTA.



**Graph 2:** Mode of injury

**Neurological course**

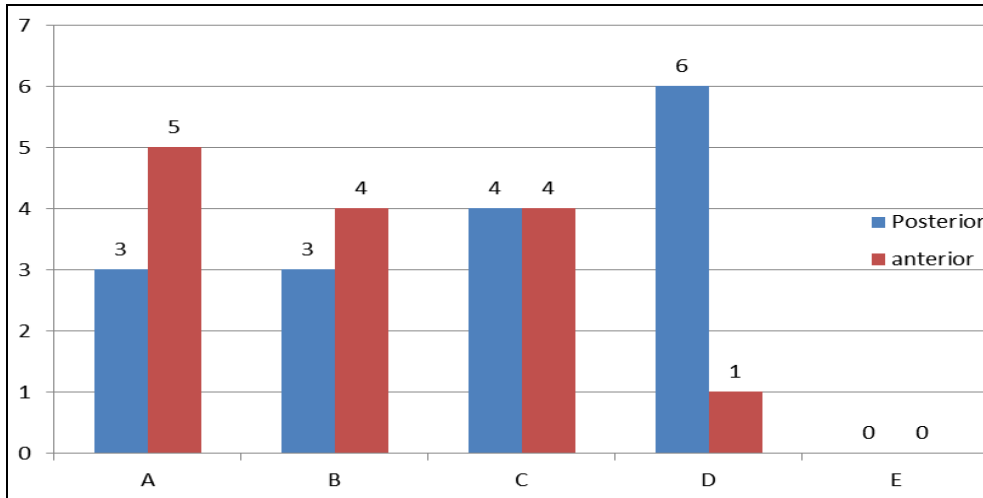
- Out of 5 paraplegics who underwent anterior decompression and instrumentation, 1 remained as grade A.
- Anterior group patients improved their neurological status by 2.21 grades on average.
- Posterior group patients improved their neurological status by 1.12 grades on average.

**Neurological course of posterior instrumentation group**

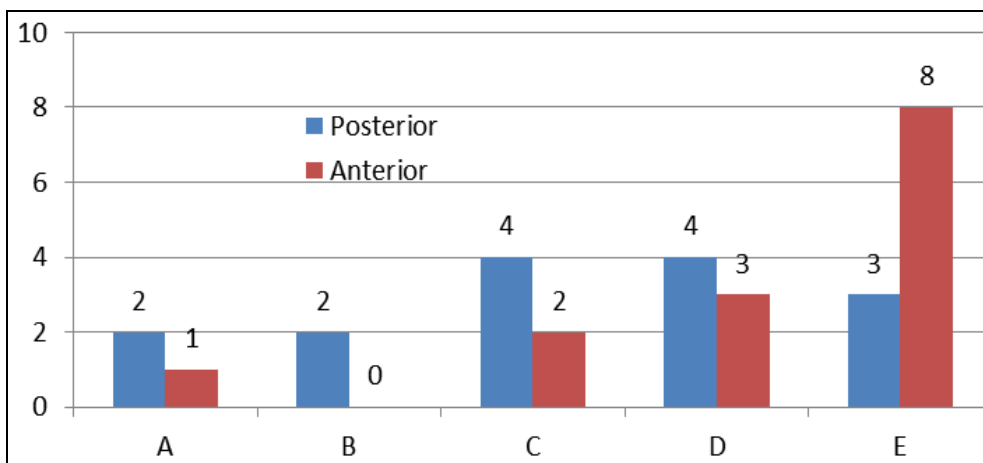
**Neurological course of anterior instrumentation group**

ASIA grade	Pre-op	3months	6months	1 year
A	5	1A,2B and 2C	1A,1C,2Dand 1E	1A,1C,2D and 1E
B	4	2C and 2D	1C,1D and 2E	1C and 3E
C	4	1C 1D and 2E	4E	4E
D	1	1E	1E	1E

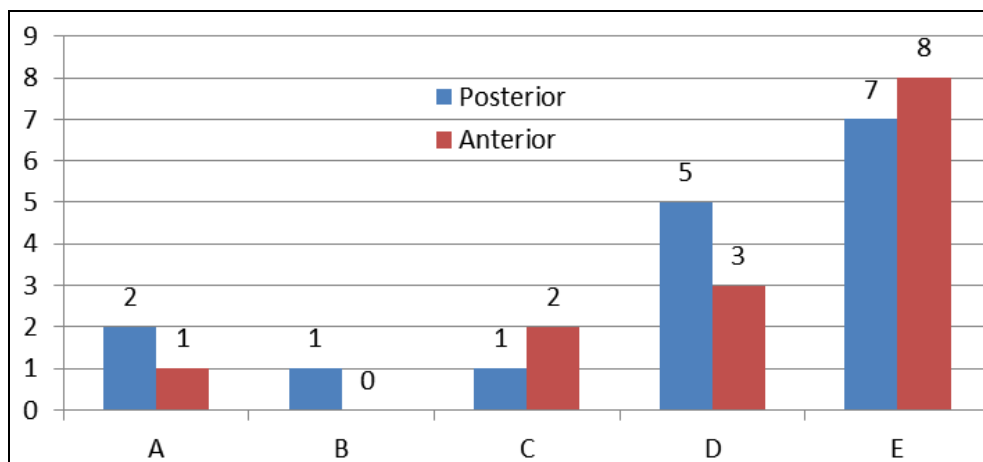
**Pre-op neurology**



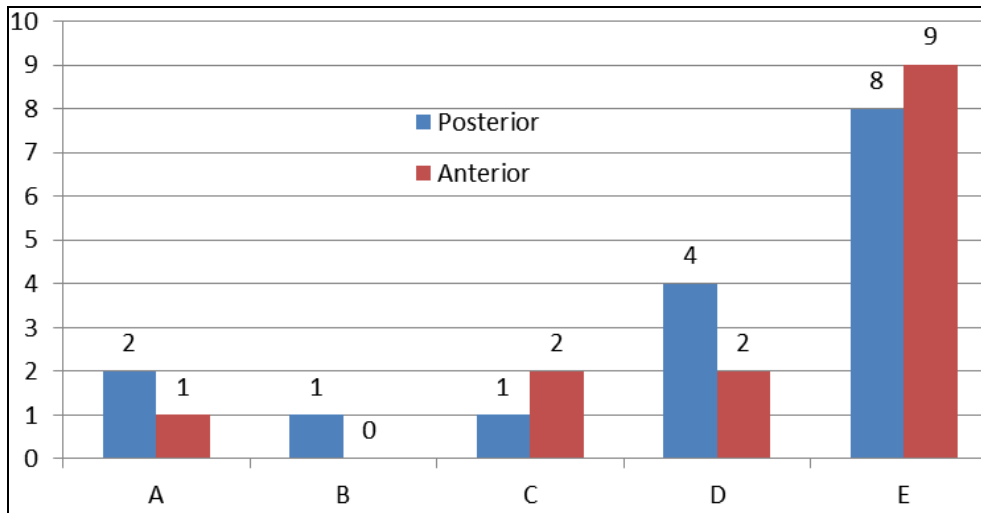
**Neurology at 3 months follow-up**



**Neurology at 6 months follow-up**



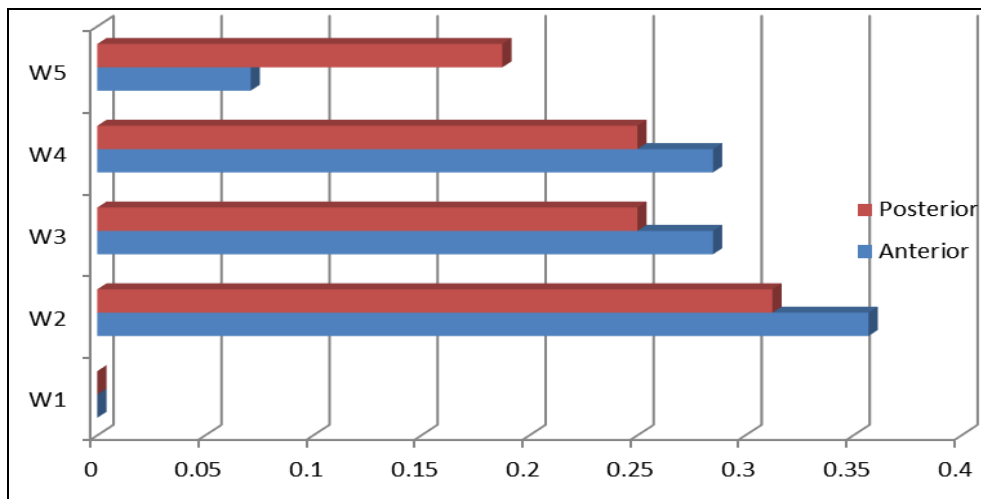
**Neurology at 1 year follow-up**



**Functional outcome at 1 year follow-up**

All patients were assessed at 1 year follow-up for functional recovery using Denis work scale and results were as below.

**Functional outcome**



**Complications**

Only 2 patients developed grade 3 bed sores rest of all are grade 1 or grade 2 sores which healed with regular dressings. All wound infections were superficial and healed with sensitive antibiotics.

LRTI was common in anterior group (4 out of 6) probably due to thoracotomy done in dorsal spine injuries which caused painful respiration for few days.

**Discussion**

Thoraco-lumbar spine fractures occur normally due to high velocity impact like fall from height, RTA and impact with a heavy object.

**Age**

Men are the most commonly affected group involving mainly young males, who are the bread-winners of family, leading to economical and psychological injury.

**Age distribution**

30-40 years is the most commonly affected (53.33%) and mean age was 35.46 years. This can be compared with R. Roy Camille [4], James Y Yue *et al.* [5] studies.

**Gender distribution**

In R.Roy Camille *et al.* [4] study 63% were males and 37% were females. In Eduardo R Luque [6] study 60% were male and 40% were females. In K.D. Tripathi and A.K.singh [7] study 80% were males and 20% were females. In our study 80% were males and 20% were females and it is comparable to fore-mentioned studies.

**Mode of injury**

Fall from height was the most common mode of injury in our study as a part of occupational hazard. This can be compared to Raj Bhadur and Manish Chaddha [8] study in which also fall from height was the most common mode.

**Neurological course**

All patients in our study were assessed using Frankel's modification of ASIA grading preoperatively and at all follow-ups. In our study 8 patients were paraplegics and 22 were incomplete paraplegics. 3 out of 8 paraplegics did not improve neurological status and wheel chair bound at 1 year follow-up indicating primary spinal cord injury can't be reversed with any modality of treatment. Out of remaining 22 incomplete paraplegic patients, one patient of Frankel's B grade did not improve neurological status. Rest of 21 patients

improved neurological status by minimum 1 Frankel's grade. 9 out of 14 (64.28%) in anterior group and 8 out of 16 (62.5%) in posterior group improved their neurology to normal (Frankel's grade E). 1 out of 14 anterior group patients (7.14%) and 3 out of 16 posterior group patients (18.75%) did not improve neurological status.

Thus it can be concluded that decompression and stabilisation by either anterior or posterior approach will definitely help in improving neurological status and results were comparable to other studies.

#### Functional outcome

In our study functional outcome was assessed using Denis work scale at last follow-up. Out of 8 paraplegics 3 did not improve and completely wheel chair bound at 1 year and were completely disabled (W5).

Out of 22 incomplete paraplegics 1 was completely disabled at 1 year (W5). Rest of the patients were able to return to some occupation at 1 year but none of them were able to return to their previous occupation with no restrictions.

3 out of 14 (21.42%) in anterior group and 5 out of 16 (31.25%) in posterior group were able to return to their previous occupation but with restrictions (W2).

#### Post-op pain

All patients in our study were given standardised analgesic dose and were assessed for pain on post op day 1 using Visual Analogue Score.

Patients of anterior group were found to be experiencing 7.71 pain score on average and 7.31 pain score in posterior group.

#### Conclusion

Our study comparing neurological outcome following anterior and posterior decompression with instrumentation, conducted between June 2016 to August 2017 has led to following derivations.

1. Anterior decompression with instrumentation and posterior decompression with instrumentation are both effective ways to stabilise spine but there is significantly better neurological recovery in anterior group compared to posterior group. We attribute this to direct visualisation and better decompression in anterior group compared to posterior group, whereas in posterior group decompression is mainly due to ligamentotaxis by postural reduction.
2. Functional recovery at 1 year follow-up also showed better results in anterior group indicating functional recovery is dependent on neurological recovery.
3. All patients can be made to sit and if possible to walk by atleast on the 5<sup>th</sup> post-operative day following rigid instrumentation in both groups.
4. Postoperative pain was comparably more in anterior decompression and instrumentation and patients had more post-operative lower respiratory tract infection in anterior group probably due to atelectasis and increased dead space of lung due to pain. Hence morbidity is comparably more in the anterior decompression and instrumentation group and it should be weighed against better neurological improvement in comorbid and minimal deficit patients.
5. No patient was able to return to the previous employment which were physically demanding. Hence spinal injuries are disabling many times for manual labourers who are the sole bread winners for the family requiring compensation or support from employers/government bodies.

6. As expected, a correlation was found between neurological recovery and the severity of initial spinal cord injury in both groups. The patients who had severe cord indentation/transection, had the worst outcome.
7. Bed sore is the most common complication developing in spine injury patients inspite of good nursing care, which were developed once patient is discharged from hospital due to ineffective back care.

#### References

1. Gertzbein SD. Scoliosis Research Society. Multicenter spine fracture study. *Spine* 1992; 17:528-540.
2. DeWald RL. Burst fractures of the thoracic and lumbar spine. *Clin Orthop Relat Res.* 1984; 189:150-161.
3. Soreff J. Assesment of the result of traumatic compression fractures of the thoraco-lumbar vertebral bodies. *Stokholm, Karoinska hospital.* 1975; 1112:27.
4. Roy Camille R. Saillant G, Mazel C. Internal fixation of the lumbar spine with pedicle screw plating. *Clinical orthopaedics and related research* 1986; 2037-17.
5. James JY. Sossan A. Selgrath C. Lawrence, Wilkins, Kenneth *et al.* The treatment of upper middle lower thoracic and lumbar spine injuries with transpedicular instrumentation. A 3 years consecutive series. *Spine.* 2002; 27(24):2782-2787.
6. Eduardo R. Luque. Interpeduncular segmental fixation. *Clinical orthopaedic and Related research.* 1986; 203:54-57.
7. Tripathi KD. Singh AK. Management of thoracolumbar spine injuries. *Indian Journal of Orthopaedics.* 2001; 35(2):43-47.
8. Manish Chaddha and Raj Bhadur. Steffee variable screw placement system in the management of unstable thoracolumbar fractures: A third world experience. *Journal of Injury.* 1998; 29(10):737-747.