

## A study of clinical and radiological outcome in dorso-lumbar spine fractures stabilised by screw fixation

Mahesh Prasad<sup>1</sup>, Rakesh Choudhary<sup>2</sup>, Neelu Prasad<sup>3\*</sup>

<sup>1</sup>Associate Professor, Department of Orthopaedics, Patna Medical College Patna, Bihar, India

<sup>2</sup>Associate Professor, Department of Orthopaedics, Patna Medical College Patna, Bihar, India

<sup>3</sup>Assistant Professor, Department of Anatomy, Nalanda Medical College, Patna Bihar, India

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### Abstract

The estimates available shows 75% of the all spinal fractures are dorsolumbar spine injuries. This study was mainly undertaken in order to evaluate the clinical and radiological outcome of dorsolumbar spine fractures stabilized by using Screws and to study the complications of this treatment. **Material and methods:** A prospective study was undertaken among 55 cases with dorsolumbar spine fractures admitted to tertiary care centre. The patients were operated for pedicle screw fixation of dorsolumbar fractures and subjected for clinical and radiological outcome by using a radiograph in two views (AP and Lateral). **Results:** About 35 patients with dorsolumbar spine fractures improved with the treatment of screw fixation. The improvement was evidenced by decrease in the kyphotic angle and AVBCP, improvement in Beck's index. Most of the patients also reported excellent results after the procedure. **Conclusion:** The pedicle screw fixation remains as implant of choice for the treatment of dorsolumbar spine fractures.

**Keywords:** Dorsolumbar spine, Fracture, Screw, Kyphotic angle, Beck's index.

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### Introduction

Spine fractures are important orthopaedic problem in today's world, where the life style and individuals make them prone for injury[1]. The literature available shows that, 6% of the all fractures affect the spinal column and 90% of them are found in the thoracic or lumbar regions[2]. The increase in motor vehicles and increases the exposure to the high energy trauma as a result of thoracolumbar and dorsolumbar fractures and dislocations have increased. These injuries occur most frequently in males aged between 15 and 29 years of age and they usually present with neurological deficit[3]. The injury exceeding the strength and stability of spinal column can result in fracture of the spine. The surgical management of dorsolumbar

vertebra differs from cervical and thoracic fractures due to transition from stiff kyphotic spine to lumbar lordotic spine which is mobile[4]. The part of the spinal cord which extends and ends near the mechanically vulnerable Thoraco Lumbar Junction (TLJ) contains primary efferents of all lumbosacral roots and contains the canal encroachment and also the presence of attachment of diaphragm around the TLJ and so having significant neurological consequences. This study was undertaken to evaluate the restoration and alignment of spine and canal using kyphotic angle and vertebral body height and to study the clinical and radiological outcome following fixation of dorsolumbar spine with the screws.

### Material and Methods

A prospective study was undertaken in the department of orthopaedics of a tertiary care teaching hospital among 53 patients between January, 2016 to April, 2020. The clearance from institutional ethics committee was obtained and informed consent was

\*Correspondence

**Dr. Neelu Prasad**

Assistant Professor, Department of Anatomy, Nalanda Medical College, Patna Bihar, India.

**E-mail:** [drneelu17f@gmail.com](mailto:drneelu17f@gmail.com)

obtained from all the patients who participated in the study. All the patients were operated for thoracolumbar junction spine fractures with screw fixation. All the patients were followed for 2 months to 3 years. The patients with Traumatic thoracolumbar spine fractures, those who were haemodynamically stable and aged between 20 to 65 years were included in to the study. The patients with pathological fractures and with spondylolysis thesis were excluded from the study.

All the patients were subjected for detailed examination including the mode and time of injury, clinical examination and examination of head, cervical spine, abdomen and chest was conducted.

First the patients were stabilized before subjecting them for the surgery. A thorough examination of spine

and neurological evaluation was conducted according to American Spinal and Injury association of neurological evaluation. Both AP and lateral view radiograph of the injured spine was taken. McAfee's classification was used to for classifying the fractures. The radiographs also excluded the fractures in patients with injuries. The radiograph also indicated the loss of sagittal angle and sagittal index. The time from injury to operation was 8 to 36 days. The status of the spinal cord was examined by using Magnetic Resonance Imaging. Posterior approach with pedicle screw fixation was for all the cases. The data thus obtained was compiled and analyzed using Statistical Package for Social Services (SPSS vs 20).

## Results

**Table 1: Distribution of the study group according to demographic and basic characteristics**

		Frequency	Percent
Age group	Less than 30 years	9	25.7
	31 – 40 years	9	25.7
	41 – 50 years	12	34.3
	51 – 60 years	5	14.3
Sex	Male	23	65.7
	Female	12	34.3
Mode of injury	Fall	8	22.9
	RTA	27	77.1
AO classification	A	25	71.4
	B	10	28.6
Load sharing	Mean $\pm$ SD	3.89 $\pm$ 0.8	
Duration between accident and operation	Less than 15 days	7	20.0
	15 – 30 days	21	60.0
	More than 30 days	7	20.0

The mean age of the patients in this study was 39.2 ( $\pm$  9.85) years. Majority of the patients were aged between 41 – 50 years. Males outnumbered females. About 77.1% of the injuries were due to RTA and 22.9% were

due to fall. About 71.4% of the patients had Type A injuries according to AO classification. The mean load sharing was 3.89. Around 60.0% of the patients were operated 15 – 30 days after the injury.

**Table 2: Radiological and functional characteristics at baseline and at follow up**

Characteristics	Pre operative (Mean $\pm$ SD)	Follow up (Mean $\pm$ SD)	T value	P value, Sig
Kyphotic angle	17.14 $\pm$ 7.02	10.31 $\pm$ 4.78	7.266	0.000, Sig
Beck's index	0.52 $\pm$ 0.08	0.64 $\pm$ 0.14	-5.534	0.000, Sig
Anterior Vertebral Body Compression Percentage	50.82 $\pm$ 3.74	19.83 $\pm$ 4.83	33.581	0.000, Sig

The mean kyphotic angle before the operation was 17.14 degrees which had improved to 10.31 degrees which was statistically significant. The mean Beck's Index (Sagittal index) before the operation was 0.52

which has improved to 0.64 which was statistically significant. The anterior vertebral body compression percentage was 50.82 before the operation and significantly decreased to 19.83.

**Table 3: Clinical outcome**

Outcome	Frequency	Percent
Excellent	16	45.7
Fair	15	42.9
Poor	4	11.4
Total	35	100

About 45.7% of the patients had excellent results, 42.9% had fair results and 11.4% had poor results.

**Table 4: Complications of the surgery**

Complications	Frequency	Percent
Nil	31	88.6
Bed sore	1	2.9
Superficial infection	2	5.7
UTI	1	2.9
Total	35	100

No complications were seen in 88.6% of the cases. Superficial infection was encountered in 5.7% of the cases, bed sore in 2.9% of the cases and UTI in 2.9% of the cases.

### Discussion

This study was mainly undertaken to study the clinical and radiological outcome following fixation of the dorsolumbar spine with the screws. The screw fixation has been shown to result in biomechanically superior to other strelisation constructs. The screw fixation is a commonly used procedure. The mean age was 39.2 years in this study. The patients were aged between 41 – 50 years and were males. A study by Rajaiah et al had noted that the mean age was 33 years [4]. The spinal injuries related sports are common in younger individuals as result of sports in contrary to the results of this study [5]. A study by Camille et al had reported that the mean age was 30 years [6]. High velocity road traffic accidents were the main causative factor for the accidents. A study by Rajaiah et al had shown that the fall from height was the main mode of injury [4]. A study by Sen et al also reported that the fall from height was the main mode of injury [7]. This study had shown that, the mean kyphotic angle significantly decreased after fixation with the screws. A study by Yung & thng et al had shown a significant decrease in the kyphotic angle to 3.68 degrees at the follow up [8]. Similarly, Kim et al also noted that the decrease in the angle to 8.2 degrees [9]. Butt et al had also shown decrease in loss of sagittal angle to 3.4 [10]. The Sagittal index (Beck's index) also increased significantly as evidenced in this study. A study by Yung et al had shown that the sagittal index had improved to 0.79 at the final follow up [8]. The anterior vertebral body compression also significantly reduced after the

surgery. A study by Ekapichon et al had shown that, the AVBCP was reduced to 24 [11]. Study by Yung et al also shows that the AVBCP was decreased to 24 [8]. About 45.7% of the patients had excellent results, 42.9% had fair results and 11.4% had poor results. Superficial infection was encountered in 5.7% of the cases, bed sore in 2.9% of the cases and UTI in 2.9% of the cases. The complications were less with this procedure as evidenced by this study.

### Conclusion

The screw fixation to the dorsolumbar fractures had shown a favourable improvement in clinical and radiological parameters. Hence, the pedicle screw fixation can be recommended as the implant of choice for the treatment of dorsolumbar spine fractures.

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