

COMPARATIVE EVALUATION OF TWO DIFFERENT FIXATION METHODS FOR MANAGEMENT OF THORACOLUMBAR FRACTURES: AN INSTITUTIONAL BASED STUDY

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Received : 08/09/2023
Received in revised form : 03/10/2023
Accepted : 29/10/2023

Keywords:

Fixation, Thoracolumbar, Fracture.

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DOI: 10.47009/jamp.2023.5.6.68

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (6); 328-330



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Abstract

Background: The present study was conducted for comparing two different methods of fixation in the management of thoracolumbar fracture. **Materials and Methods:** A total of 40 patients diagnosed with type A thoracolumbar fractures were enrolled. All the patients were randomly assigned to two study groups of 20 cases each. Patients in group 1 were treated with three-level percutaneous fixation. Patients in group 2 underwent two-level percutaneous fixation. Plain X-radiographs, computed tomography (CT) scans and magnetic resonance imaging (MRI) were obtained in order to determine the type of fracture and other details of the fracture. All the results were recorded in Microsoft excel sheet and was subjected to statistical analysis using SPSS software. Chi-square test and student t test were used for evaluation of level of significance. **Result:** Mean VAS loss among patients of group 1 and group 2 was 2.3 and 3.8 respectively. Significant results were obtained while comparing the mean blood loss and mean VAS among the two study groups. However; while comparing the radiological parameters among the patients of the two study groups, non-significant results were obtained. **Conclusion:** Three-level percutaneous fixation showed better results among patients with thoracolumbar fractures.

INTRODUCTION

The thoracolumbar spine area at T10-L2 is the most common region of the spine affected by trauma due to the specific biomechanics of this segment. This area is commonly referred to as the thoracolumbar junction. It is highly susceptible to injury because it is a transition area from the rigid and less mobile thoracic spine due to the attached ribs bilaterally to a more flexible caudal lumbar spine.^[1,2]

The causes of thoracolumbar fracture are different depending on patient's age. In younger patients, fracture is more likely to occur due to a high-energy trauma, such as motor vehicle accident, motorcycle accident, and falling injury.^[3] However, in elderly, even falls from standing position to ground can cause fractures due to osteoporosis and decreased cognition. Therefore, the appropriate treatment for the thoracolumbar fracture is important.^[4] The surgical treatment via posterior approaches, known as traditional open surgery, was popular for decades. In recent years, percutaneous pedicle screw fixation technique has been widely used. The use of additional

screws in the intermediate pedicles is also disputable.^[5,6] Hence; the present study was

conducted for comparing Two Different Methods of Fixation in the Management of Thoracolumbar Fracture.

MATERIALS AND METHODS

The present study was conducted in the Department of Neurosurgery, Patna Medical College, Patna, Bihar (India) for comparing two different methods of fixation in the management of thoracolumbar fracture. A total of 40 patients diagnosed with type A thoracolumbar fractures were enrolled. All the patients were randomly assigned to two study groups of 20 cases each. Patients in group 1 were treated with three-level percutaneous fixation. Patients in group 2 underwent two-level percutaneous fixation. Plain X-radiographs, computed tomography (CT) scans and magnetic resonance imaging (MRI) were obtained in order to determine the type of fracture and other details of the fracture. All the results were recorded in Microsoft excel sheet and was subjected to

statistical analysis using SPSS software. Chi-square test and student t test were used for evaluation of level of significance.

RESULTS

Mean age of the patients of group 1 and group 2 was 49.3 years and 48.1 years respectively. Majority proportion of patients of both the study groups were males. Mean duration of surgery among patients of

group 1 and group 2 was 79.3 minutes and 83.1 minutes respectively. Mean blood loss among patients of group 1 and group 2 was 139.5 ml and 227.8 ml respectively. Mean VAS loss among patients of group 1 and group 2 was 2.3 and 3.8 respectively. Significant results were obtained while comparing the mean blood loss and mean VAS among the two study groups. However; while comparing the radiological parameters among the patients of the two study groups, non-significant results were obtained.

Table 1: Demographic data

		Group 1	Group 2
Mean age (years)		49.3	48.1
Gender	Males	16	14
	Females	4	66
Fracture site	T11	5	4
	T12	3	5
	L1	6	7
	L2	6	4

Table 2: Comparison of clinical variables

Variable	Group 1	Group 2	p-value
Mean duration of surgery (minutes)	79.3	83.1	0.775
Mean blood loss (ml)	139.5	227.8	0.001 (Significant)
Mean VAS at 3 months	2.3	3.8	0.003 (Significant)

Table 3: Comparison of radiographic variables

Variable	Group 1	Group 2	p-value
Preoperative Cobb angle (Degree)	16.8	17.2	0.712
Postoperative Cobb angle (Degree)	5.9	6.1	0.581
Preoperative Anterior height ratio	63.9	65.7	0.322
Postoperative Anterior height ratio	86.9	88.7	0.928

DISCUSSION

Fractures of the thoracic and lumbar region constitute a spectrum of injuries ranging from simple undisplaced fractures to complex fracture dislocations. The thoracic spine is functionally rigid due to coronally oriented facet joints, thin intervertebral discs and the ribcage. Thus, it requires huge amounts of energy to produce fractures and dislocations. The narrow spinal canal in this region predisposes to spinal cord damage resulting in a high incidence of neurological deficit.^[7-9] Patients with majority of thoracolumbar fractures may require surgical intervention, depending upon the degree of spinal instability. Over the past 75 years, many classification systems have been developed to quantify the degree of spinal instability and neurological compromise accurately, thereby aiding the decision-making process.^[10,11] Hence; the present study was conducted for comparing Two Different Methods of Fixation in the Management of Thoracolumbar Fracture.

Mean age of the patients of group 1 and group 2 was 49.3 years and 48.1 years respectively. Majority proportion of patients of both the study groups were males. Mean duration of surgery among patients of group 1 and group 2 was 79.3 minutes and 83.1 minutes respectively. Mean blood loss among patients of group 1 and group 2 was 139.5 ml and

227.8 ml respectively. Mean VAS loss among patients of group 1 and group 2 was 2.3 and 3.8 respectively. Clinical and radiological outcomes between percutaneous pedicular screwing (closed reduction internal fixation [CRIF]) and classical open reduction internal fixation (ORIF) in lumbar spine fracture without neurologic deficit was compared in a previous study conducted by Bronsard N et al. Postoperative pain on VAS was significantly lower after CRIF, allowing earlier gait resumption and return to work and daily activity. There were no significant differences in length of hospital stay, patient satisfaction, screw malpositioning or postoperative or end-of-follow-up kyphosis angle. Percutaneous surgery provided clinical and radiological outcomes strictly comparable to those of open surgery.^[12]

In the present study, significant results were obtained while comparing the mean blood loss and mean VAS among the two study groups. However, while comparing the radiological parameters among the patients of the two study groups, non-significant results were obtained. In another similar study conducted by Panteliadis P et al, authors assessed different levels of fixation with respect to radiological outcomes in terms of fracture reduction and future loss of correction. The most common mechanism was high fall injury, and the most common vertebra L1. Burst fractures were the ones

with the highest incidence. The 2/2 fixation achieved the best reduction of the fracture, but with no statistical significance. The correction is maintained better by the 2/2 fixation, but there is no statistical difference compared to the other fixations. Insertion of screws at the fracture level did not improve outcomes. The data of their study identified a trend toward better radiological outcomes for fracture reduction and maintenance of the correction in the 2/2 fixations.^[13] Biakto KT et al et al, in another previous study, authors compared short segment pedicle screw fixation and long segment pedicle screw fixation for treatment of neglected single level thoracolumbar burst fracture. Kyphotic angle correction of less than three degrees, were achieved in 20% of patients treated with short segment fixation, while the long segment counterpart achieved only 12,5%, with $p = 0,579$. Six out of sixteen patients (37,5%) underwent long segment fixation had poor hospital length of stay (>14 days), while none of the short segments had it, but the difference was insignificant ($p = 0,246$). Patients' complain of pain was significant in fair category. There were no significant differences in outcome between short segment and long segment pedicle screw fixation for treatment of patient with neglected single level thoracolumbar burst fracture.^[14]

CONCLUSION

Three-level percutaneous fixation showed better results among patients with thoracolumbar fractures.

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