

A Clinical Study on Management of Unstable Dorsolumbar Spine Injuries with Transpedicular Screw and Rod Fixation in our Institute

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Abstract: ***Background:** Dorsolumbar trauma is the most common cause of paraparesis or paraplegia. Optimal goals of the management include establishment of a painless, balanced and stable spinal column with vertebral fusion. **Material & method:** we reviewed various types of fractures of dorsolumbar spine, their management and outcome in a prospective study of 42 cases of dorsolumbar trauma managed surgically at our centre (October 2016 – December 2018). All patients underwent complete neurological examination, CT and MR imaging of the spine. **Study design & settings:** prospective observational study in a tertiary care centre from 2016-2018. **Results:** most common mode of injury was fall from height (70%). Majority of the patients belonged to frankel grade a (70%). All patients were operated using posterior approach. There was deterioration in neurological status in one patients while 4 patients had improvement. Average local kyphotic angle preoperatively was 22 degree .average local kyphosis angle postoperatively was 6 degree. Average local kyphosis angle at final follow up was 8 degree range from 0-13 degree with loss of kyphosis angle was 2 degree. **Conclusion:** we conclude that fall from height is the most common cause of dorsolumbar fracture with majority affected belonging to young population and had significant deficits, thus causing significant burden on the society. Prompt surgical management is safe and helps in early mobilization and rehabilitation, thus facilitating possible neurological recovery and achieving an improved quality of life.*

Keywords: Dorsolumbar fracture, Frenkels Score, Paraplegia, Rehabilitation, Transpedicular fixation

1. Introduction

Trauma to the thoracic and lumbar vertebra is one of the most common cause of traumatic paraparesis or paraplegia[1,2]. These can occur with or without bowel bladder involvement. Dorsolumbar fractures often cause a neurologic deficit and present a significant economic burden to the family and society. Accepted methods of treatment of dorsolumbar burst fractures include conservative therapy, posterior reduction and instrumentation, and anterior decompression and instrumentation. Early mobilization and rehabilitation is the most important aim of the management [1,3]. Majority of the dorsolumbar fractures are unstable. Optimal goals of the management include establishment of a painless, balanced and stable spinal column with fusion of least number of vertebra⁴. The management of dorsolumbar fractures has been the subject of much controversy. There exist different criteria for the choice of the management based on the severity of kyphotic deformity, canal compromise, vertebral height loss, and neurologic Status [1,4,5]. To our knowledge, none of the existing criteria for the treatment of dorsolumbar burst fractures is generally accepted. In this study we review various types of fractures of dorsolumbar spine, their management and outcome.

2. Material & Method

All surgically treated dorsolumbar fractures between October 2016 and December 2019 were reviewed prospectively at King George Hospital, Vishakapatnam. All patients had undergone complete neurological examination, roentgenography and magnetic resonance imaging. Clinically Patients were graded using Frankel classification of neurological deficits pre- and postoperatively as follows:

- Absent motor and sensory function
- Sensation present, motor function absent

- Sensation present, motor function active but not useful (grade 2—3/5)
- Sensation present, motor function active and useful (grade 4/5)
- Normal motor and sensory function.

Preoperative plain radiographs with sagittal and axial computed tomography (CT) scans were reviewed regarding three separate characteristics of the fracture site.

- The amount of vertebral body actually comminuted by the injury, as best seen in sagittal CT, or lateral plain X-ray.
- The apposition of the fracture fragments, as best seen on axial CT cuts through the fracture site.
- The fractures were categorized to 5 main groups according to mode of injury and pathomorphological uniformity [6]- 1. Compression Fracture 2. Burst Fractures 3. Flexion Distraction Injuries 4. Fracture Dislocations 5. Spondyloptosis

All patients were operated and fixation with or without fusion was done. Post operatively patients underwent either X-ray or CT and were examined for construct placement, spinal canal decompression and kyphosis correction (Fig. 1, 2). Local kyphosis angle was measured by Kobb method i.e. the angle between two lines, the first is perpendicular to the superior end plate of the vertebra above and second is inferior end plate of the vertebra below. All of them were mobilized using dorsolumbar brace from the second postoperative day. Regular physiotherapy was done in all patients after the surgery

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3. Results

We analyzed all surgically treated dorsolumbar fractures treated by Neurosurgery department of this tertiary care centre from October 2016 to December 2019

Our patients ranged from 18yrs to 50 yrs with 31 males and 11 females. Most importantly majority of them belonged to age group of 20- 39 (65%). Most common mode of injury was fall from height (66 %). Road traffic accidents accounted for 12 out of which almost all were due to running over by the vehicle or due to high-speed acceleration deceleration injury .

Majority of our patient (70%) belonged to Frankel grade A, i.e., complete motor and sensory loss below the injury. Only 20 % of the patients had some useful motor sensory function. 29 patients (70%) had bowel bladder involvement. Majority of the patients (90%) had some neurological deficit. 12 patients (30%) had associated systemic injuries

Most common vertebra involved was L1 vertebral body (12 patients). Common type of fractures were compression and burst fractures both accounting for 16 and 17 each respectively (Table 1). On MR imaging 9 patients (28 %) showed complete cord transection. Another 14 (44%) showed cord signal changes with nine (28%) showing normal cord.

Table 1: Fracture Pattern in Dorsolumbar Spinal Injuries

Compression Fracture	16(39%)
Burst Fractures	17(39%)
Flexion Distraction Injuries	2(5%)
Fracture Dislocations	7(17%)
Spondyloptosis	0

Surgical Management

Mean duration from injury to surgery was 8 days. All of them were approached posteriorly. Short segment fixation was done in 30 patients where as in 12 patients long segment fixation was done.

Postoperative Complications

Most common complication was chest infection (14%). Wound infection was present in 5 patients (12 %). . Two patients had construct failure with screw pullout and had to be operated again.

Outcome

Outcome was measured at 4-month follow up or at last follow up visit. Mean follow up was 6.2 months with range of 4 to 10 months.. Overall, 4 patients had neurological improvement . Out of 25 patients in Frankel A- C, only five patients improved neurologically, while 3 in Frankel grade D showed improvement and all 4 patients in Frankel type E were neurologically same. However, there was no statistical significance for Frankel grade in predicting the improvement of the patient except in grade A patients (Table 2). None of the patient had neurological deterioration. The surprising finding was that one patient of Frankel grade A also showed improvement in his neurological status.

Table 2: Correlation of prognosis with Frankel grade on admission

Frankel Grade	Improved	Same
A (n = 21)	0	30
B/C(n=4)	2	2
D (n = 3)	2	2
E (n = 4)	0	4

6 out of 14 (43 %) patients who were operated within 7 days of injury showed neurological improvement compared to 4 out of 31 patients who were operated after 7 days of injury (Table 3). This figures show that early surgery is beneficial in neurological recovery of these patients. However, the P value was not statistically significant ($p = 0.08$). There was a statistically significant correlation between the cord change on MRI and the neurological recovery at final follow up. Majority of the patients (29) were still voiding through urinary catheter. Bedsore was present in 8 (18%) patients.

Table 3: Correlation with the timing of surgery

Duration before surgery	<7 days (N=14)	>7 days (N=21)
Improvement	6	4
Same	8	17

Local kyphosis angle as measured by Kobb's method Average local kyphotic angle preoperatively was 22° with a range from $18-30^{\circ}$. Average local kyphotic angle postoperatively was 6° with a range from $0-8^{\circ}$. Average local kyphosis angle at final follow up was 8° with a range from $0-13^{\circ}$. The loss of kyphosis angle from immediate post operative to final follow up was 2° .

4. Discussion

Dorsolumbar spine fractures account for the most common cause of traumatic paraplegia. Most of the affected belong to the productive age group, thus having a major economic burden on the society. The aim of treatment is restoration of function of the patient by creating a healing environment to allow a stable pain free spinal column, with the minimal risk to the patient [7,8,9]. Disadvantages of conservative treatment include deterioration in neurological status in 17% of the patients, progressive kyphotic deformity in 20%, persistent backache, decubitus ulcer and deep venous thrombosis.

Most of these complications can be avoided by early mobilization and decreased hospital stay by early surgery [7,9,10]. In our series, majority had severe neurological deficits, This could explain the lower percentage of neurological improvement compared to others in our study. Even though Statistically insignificant, greater fraction of patients operated within 7 days showed improvement compared to those who where operated after 7 days. Our study showed that no cord changes on MRI at the time of injury had good neurological recovery. The study showed that almost all patients with incomplete cord injury improved with time. Only factor which was significant in deciding the outcome was pre operative frankel score, with almost all patients who had preoperative frankel score of C, D or E showing improvement as shown by other studies as well [6,7]. Even in complete cord injury the incidence of complication due to immobilization of patients were reduced

dramatically with improved quality of life. In our study average loss of kyphosis angle was 2 degree.. We suggest that for better correction and maintenance of kyphotic angle global fixation along with fusion should be taken into consideration. Thus early surgery can help in rehabilitation and mobilization of patients thus preventing the complications such as decubitus ulcers, chest infection, deep venous thrombosis etc. this also makes patients independent on others for their daily activities.

5. Conclusion

Fall from height is the most common cause of dorsolumbar fractures with majority affected belonging to young population and presenting with significant deficits, thus causing significant burden on the society. Surgical management is safe and helps in early mobilization and rehabilitation, thus facilitating possible neurological recovery.

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