

RESULTS WITH NON-OPERATIVE TREATMENT IN DORSOLUMBAR FRACTURES WITH NO NEUROLOGICAL DEFICIT: A FUNCTIONAL ASSESSMENT

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ABSTRACT

Background: The purpose of this prospective study was to assess the functional outcome of conservative treatment with early ambulation of dorso-lumbar spine fractures with no neurological deficit.

Aims & Objective: The purpose of this prospective study was to identify the risk factors for dorso-lumbar spine injuries, and to assess the efficacy of non-operative treatment with early ambulation, and functional outcome of the patients.

Material and Methods: From October 2008 to June 2010, 48 consecutive patients with single-level thoracolumbar spinal injury, with no neurological deficit were managed non-operatively. A custom-made thoracolumbosacral orthosis was worn by all patients for six months, and early ambulation was recommended. Patients were evaluated as per TLICS score, and if score was ≤ 4 with no neurological deficit then, they were treated with conservative treatment and included in the study. The Denis Pain and Work Scale were used to assess the clinical outcome. The average follow-up period was 6.5 months (range, 4 to 11 months). Statistical analysis done by observational descriptive statistics using SPSS 19.0.

Results: Radiological parameters, such as Cobb's angle, showed loss of fracture reduction, which was not statistically significant. However, the functional outcome was satisfactory in 40 out of 48 patients, with no complications recorded on completion of treatment.

Conclusion: Conservative treatment with early mobilization using TLS orthosis had good results in patients with TLICS score < 4 . We support the concept that TLICS is a reliable and easy-to-use classification for the conservative treatment and prognosis of thoracolumbar spinal fractures.

KEY-WORDS: Thoracolumbar Spine; Fractures; Nonoperative Treatment; Functional Outcome; TLICS Score

Introduction

The Dorso-Lumbar (DL) segment of spine (D11 to L2) is an unstable zone between fixed dorsal and mobile lumbar spine at a junction of dorsal kyphosis and lumbar lordosis. Dorso-lumbar segment is the most frequent site of injury in spine after cervical spine in adults.^[1] The injury although is not associated with high mortality, causes severe morbidity (mortality is 0.5% as compared to 20% in cervical spine injuries). With the introduction of motorized vehicles and exposure to high-energy trauma, the incidence of dorso-lumbar spinal injuries has substantially increased.

Most common cause of dorso-lumbar spine fracture in India is fall from height, while in western countries the cause is motorized

vehicular accidents. Requirement of multidisciplinary team approach, high cost of treatment and higher incidence in low socioeconomic strata of society has resulted in the injury being often neglected.^[2] Vertebral column injuries are reported to occur in approximately 6% of trauma patients, with half of these patients sustaining spinal cord or nerve root neurologic injury. Damage to the spinal cord results in paralysis and loss of sensation below the level at which the cord has been injured; together with loss of ability to control bladder and bowel.

The management of these fractures in the dorso-lumbar segment of the spine has been the subject of controversy for many years.^[3] The advantages of surgery include a shorter period of bed rest and hospitalization, better correction of kyphotic deformity, avoidance of later deterioration caused

by instability, and an opportunity to perform direct or indirect decompression of the neural elements.^[4,5] Conservative management of dorso-lumbar spine fractures, with bracing and early mobilization, may prevent deformity, and postural reduction can produce indirect decompression of the spinal canal. This type of management also eliminates prolonged periods of recumbency and hospitalization.^[6,7]

The purpose of this prospective study was to identify the risk factors for dorso-lumbar spine injuries, and to assess the efficacy of non-operative treatment with early ambulation, and functional outcome of the patients included in this study.

Materials and Methods

A total of 48 patients with TLICS score ≤ 4 and Frankel grade E presenting to us between October 2008 and August 2010 were treated conservatively and reviewed prospectively. All patients underwent complete neurological examination, local spine examination and roentgenography. Preoperative plain radio-graphs were reviewed,

1. To identify the mechanism of fracture
2. To find out the posterior ligament complex integrity.

Table-1: Thoracolumbar Injury Classification and Severity Score (TLICS)

Characteristics	Score
Injury Morphology Points	
Vertebral Body Load Injury	
Compression	1
Burst	2
Translational/rotational	3
Distraction	4
Integrity of PLC Points	
Intact: no injury to PLC	0
Suspected/indeterminate	2
Definite injury	3
Neurological deficits	
Intact, no deficits	0
Nerve-root deficits only	2
Complete spinal-cord injury	2
Incomplete spinal-cord injury	3
Cauda equine syndrome	3

All patients were classified according to Thoracolumbar Injury Classification and Severity Score (Table 1).^[3] A score of less than or equal to four was considered for conservative treatment. All patients were treated with custom moulded

acrylic thoraco-lumbo-sacral orthosis (TLSO) once distension of abdomen and ileus was resolved. The average time for starting mobilization was 3.2 day range from 2 to 5 days. The brace was carefully moulded to try to correct as much deformity as possible and to indirectly decompress the spinal canal through ligamentotaxis. The brace was worn for six months.^[8] While wearing the brace, patients were taught isometric exercises to help maintain the condition of trunk muscles. After removal of the brace the patients were allowed to return to work.

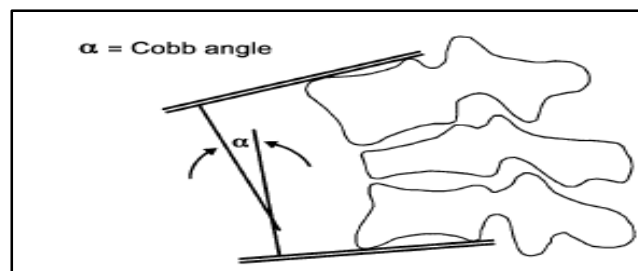


Figure-1: Cobb Angle

X-rays at follow-up evaluations were taken at 1, 3, 6 months, and at final follow up, with the patient upright. Before and after treatment, the amount of kyphosis at fracture site was manually measured on lateral spinal radiograph by the examiner. Local kyphosis angle was measured by cobb 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 (figure-1).

Statistical analysis was done using SPSS 19.0 for windows.

Results

Patients with thoracolumbar severity score of less than or equal to four was considered for conservative treatment. Total 72 patients were treated conservatively but 48 patients who met the criteria for inclusion, were involved in the study. Five patients with pathological fractures; twelve with osteoporotic fractures, two with cardiopulmonary problems and last five patients treated operatively with short-segment posterior pedicle screw instrumentation were excluded from the study.

Epidemiology: Our patients ranged from 18yrs to 73 yrs (Mean age was 46.8 years) with 40 males

and 8 females. Most importantly majority of them belonged to age group of 20- 39 (65%). Most common mode of injury was fall from height in 32 patients (66 %). Road traffic accidents accounted for ten patients. Four patients had fracture due to fall of heavy object over back and two patients had railway accident.

Clinical Profile: All patients in our study belonged to Frankel grade E, i.e., completely normal neurology. Ten patients (21%) had associated systemic injuries (Table 2).

Table-2: Associated Injuries with Dorsolumbar Fractures (n = 10)

Type of injury	No. of patients
Lower limb	4
Upper limb	4
Thorax	2

Radiology: Most common vertebra involved was L1 vertebral body (28 patients). Second most common involvement was D12 vertebra (12 patients). The distribution is shown in fig.2. Wedge compression fracture accounting for majority of the cases in 38 cases and burst fracture was found in 10 patients.

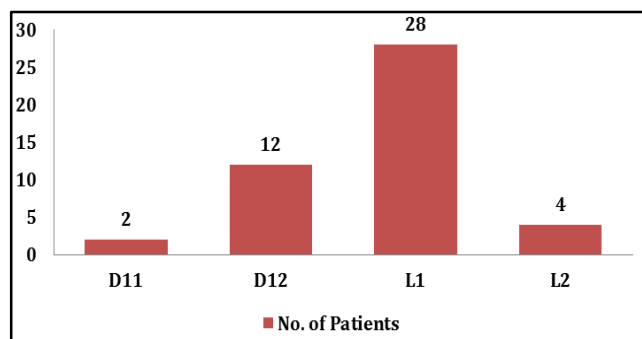


Figure-2: Distribution of Patients according to Involvement of Vertebra

Management: Spinal injuries were classified according to Thoracolumbar Injury Classification and Severity Score (Table 3). All patients were managed with Thoraco lumbosacral orthosis for six months. The mean duration of hospital stay was 5.3 days (range 2-20 days). In majority of the patients cause for prolonged hospital stay was associated injuries.

Table-3: TLICS score

TLICS score	No. of Patients
1	17
2	14
3	15
4	2

Complications: Three patients with urinary tract infections were treated with antibiotics. No neurological deficits were recorded during the treatment and during follow up.

Radiographic Evaluation: The mean Cobb angle at injury was 11.2° (range 9° to 15°). At final follow up, the average angle was 13.5° (range 10° to 19°), with a mean loss of correction 2.3°. The mean final loss of correction was not statistically significant (P > 0.01).

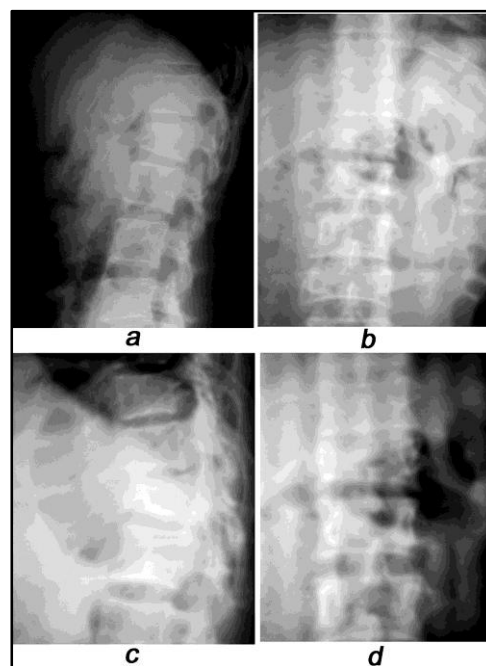


Figure-3: A case of post traumatic fracture of D12 vertebra (a, b: Skiagram at the time of injury showing wedge compression fracture with intact posterior elements. c, d: Skiagram at final follow up showing minimal increase in the kyphotic angle.)

Functional Outcome: The functional outcome in this study group was satisfactory in 40 (83.3%) and unsatisfactory in 8 (16.7%) of the 48 patients. Thirty eight patients (79.5%) rated their pain as slight or none. Four patients (8.4%) complained of moderate pain and needed anti-inflammatory medication. One patient (3%), rated his pain as moderate to severe, used occasional medication. Two patients who reported constant, severe pain and required continuous medication (Table 4).

According to dennis work scale 42 patients (87.5%) patients were able to return to their original employment while 2 patients required modification in their employment but were fully employed in a new occupation. Four patients were unable to do full time job (Table 5).

Table-4: Dennis Pain Scale at Final Follow-Up

Pain Score	Pain Scale	No. of Patients
P1	No pain	28
P2	Minimal pain, no medication	14
P3	Moderate pain no work interruption	3
P4	Severe pain absence from work	1
P5	Pain constant, incapacitating	2

Table-5: Dennis Work Scale at Final Follow-Up

Work Score	Work Scale	No. of Patients
W1	Regular physical work	25
W2	Slight restricted physical work	17
W3	Full time light job	2
W4	Part time job	2
W5	Unable to work	2

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 management of fractures in the thoracolumbar region is a controversial subject. The management of these fractures is confusing, when the patients have normal neurology.^[10,11] In our series a conservative approach to the management of dorsolumbar spine fractures was practiced. There is no agreed surgical procedure for spinal fracture but pedicular screws and rod fixation is practiced nowadays widely.^[12,13] Weinstein J et.al in a prospective study reported excellent to good results with conservative treatment in burst fractures without neurological deficit.^[14] Hyperextension casting and bracing as an effective treatment modality in the conservative management of dorsolumbar burst fracture.^[8] Witzman et.al. reported satisfactory results from conservative treatment of patients with intact posterior elements and dorso-lumbar burst fractures, with early ambulation in a thoracolumbosacral orthosis (TLSO).^[15] Comparison studies between conservative and operative treatment done by Dennis et al.^[16] and Jacobs et al.^[17] found significant advantage of operative fixation in burst fractures of dorsolumbar spine with no neurological deficits. Classification of an injury should permit its identification by means of a simple algorithm based on easily recognizable radiographic and clinical characteristics, regarding the severity of the spinal injury. During last decade many

classifications of dorsolumbar spine injuries have been proposed for better knowledge and understanding of spinal injuries.^[18-20] However, unidentified ligamentous ruptures, dislocations, spontaneously reduced spinal subluxation and the inability to demonstrate the maximal displacement by available imaging techniques, are limitations in all classifications. Thoracolumbar Injury Classification and Severity score is identified by the fracture mechanism, neurological involvement and the integrity of posterior ligament complex. In the current series, patients with a dorso-lumbar compression fractures and with a TLICS score of four or less, were treated in a closed manner with a custom molded thoracolumbosacral orthosis (TLSO) brace. In literature Mumford et al^[21] in their study with conservative management of dorsolumbar injuries reported 8% progression of collapse while Cantor et al reported average 1° progression of kyphosis.^[7] In our series we recorded an average 2.3° progression of kyphosis. In our series 87% of cases returned to active work with none of the case having any neurological deterioration. These findings are comparable with similar other studies of Chow et al^[8], Shen et al^[9], & Tropiano et al^[22] with an average 75 to 85% return to activity after injury.

Conclusion

The decision-making for conservative management with early ambulation of dorso-lumbar spine fractures should not be based solely on the thoracolumbar injury classification system score. A thorough physical, neurological and spinal examination and thorough patient evaluation regarding prior activities, social and educational background and future plans, should be carried out. Reviews of patients radiographs and CT scans are also essential to determine the risks and benefits of non-operative treatment. Conservative treatment with early mobilization using TLS orthosis had good results in patients with TLICS score <4 and no neurological deficit. We support the concept that TLICS is a reliable and easy-to-use classification for the conservative treatment and prognosis of thoracolumbar spinal fractures.

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