

## Original Research Article

# Retrospective analysis of conservatively treated thoracolumbar burst fracture

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### ABSTRACT

**Background:** Thoracolumbar burst fractures accounts for 10 to 40 percent of the spinal column fractures carries a significant morbidity and mortality. Vertebral fractures are usually followed by chronic pain, deformity, loss of height and crowding of internal organs. A combination of the above problems can adversely affect the self-esteem and ability to carry on the daily activities. The objective of the study was to find proportion of the conservatively treated thoracolumbar burst fracture and the factors associated with the final outcome of the treatment with the clinical, radiological evidences.

**Methods:** In this study 36 patients with burst fracture of thoracolumbar spine without neurological deficit, treated conservatively from January 2015–August 2016 were included. The overall follow up period was 18 months. Various radiological parameters were taken in to consideration like Cobb angle, canal stenosis, sagittal alignment, and fragment displacement. Treatment outcome was evaluated by short form survey questionnaire (SF-36), Denis score for pain and work and the visual analogue scale (VAS).

**Results:** The overall functional outcome in this study group 30.55% returned to the previous employment. 25% back to their previous job with restrictions. 27.7% unable to return to the previous job but works fulltime in a new job. 16.7% unable to return to full time work. No one is completely disabled. The Cobb angle remains same or decreased in 53% and in 47% with minimum -8 maximum 5. The severe pain score was in 5.6% of cases.

**Conclusions:** Proper selection of patients and their prior activities, social and educational background and future plans in addition to a thorough physical, neurological and spinal examination are mandatory to achieve satisfactory result.

**Keywords:** Thoracolumbar fracture, Conservative treatment, Residual deformity, Patient's sufferings, Treatment outcome

### INTRODUCTION

The commonest site for thoracolumbar burst fractures between T10 –L2, ranging from 10% to 45%.<sup>1-3</sup> because of the lack of stability and increased mobility of spine at that level. Burst fractures are characterized by the impairment of anterior and middle column, displacing the vertebra with or without rotation of the posterior cortex of the vertebral body that appears in the CT as canal stenosis.<sup>4</sup> There were no clear consenses about treatment method of choice among authors. Watson–Jones

concluded to treat the injury as any fracture or dislocation of other region of the body by reducing in extension and immobilization with a plaster cast until there was consolidation.<sup>5</sup> Nicoll reported stable fractures anterior, and lateral wedging, lamina fractures above L4 were treated “functionally” with bed rest and progressive exercises, and unstable fractures, fracture dislocation and lamina fracture below L4 with orthosis in a neutral position or the physiological position of the torso.<sup>6</sup> Despite the large number of publications on the conservative management of thoracolumbar burst

fractures most of the studies does not discuss the relationship between the final kyphosis and functional outcome in patients who were treated conservatively.

Many studies about the neurological deficit in relation to spinal stenosis is still controversial, Mohanty et al in 2008 found no association between the extent of canal stenosis and the severity of neurological deficit.<sup>7</sup> In 1992 Fontijne et al reported a positive correlation between neurological deficit and spinal canal stenosis in 139 patients with thoracolumbar burst fracture.<sup>8</sup> Many authors have advised surgical treatment if the fracture is unstable, with Kyphosis >30, height loss >50%, compression of the spinal canal more than 50%, and the lesion of the posterior ligament complex associated with neurological deficit.<sup>9,10</sup>

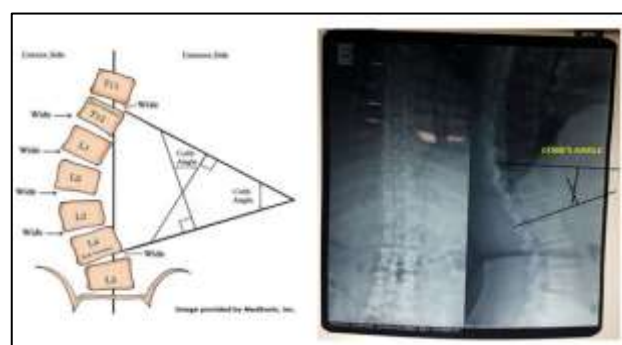
The objective of this study was to carefully select the patients who are to be treated conservatively with deformity and without neurological involvement and observe the correlation between the post traumatic residual deformity in the spine and the functional outcome by using various data like clinical findings, radiological measurements of deformities and its variability during the course of treatment and at the end of the treatment. The patient subjective feeling of improvement were evaluated by using the standard SF 36 questionnaire, and Denis score for pain and work and the quantification of pain based on visual analogue scale (VAS).

## METHODS

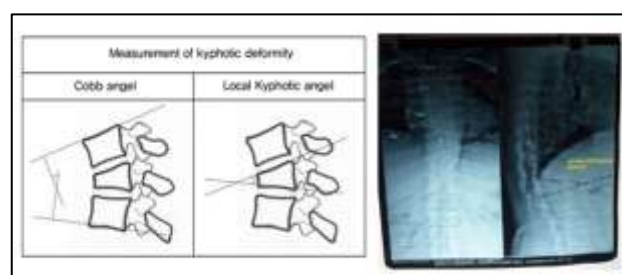
In accordance with the guidelines and approval of the ethical committee, Madha Medical College and Research Institute, patients who were treated conservatively for thoracolumbar burst fracture following trauma from January 2015 to August 2016 were taken up for this study. Only the single segment burst fracture without neurological involvement was included. The multilevel vertebral fracture, pathological fractures of the spine due to osteoporosis, ankylosing spondylitis, malignant metastasis and the cases without case records, X-rays and CT scan were excluded. Total of 36 patients with their documents were taken up for this study in which male 21, and female 15 patients age between 22 years–69 years and the overall follow up period was 18 months mean duration of hospitalization was 10.5 days (range, 3 to 25 days). All the patients were treated with absolute bed rest and guarded mobilization started after four weeks with spinal brace (Taylors brace). The brace was worn for six months while wearing the brace, patients were taught isometric exercises to maintain the condition of trunk muscles. After removal of the brace the patients could return to work.

The degree of kyphosis at the fracture site from the next adjacent vertebrae above and below was measured using Cobb method from the X-Rays taken at the time of admission, discharge and on the completion of treatment

as shown in Figure 1 and 2. In the CT scan the vertebral body comminution and the presence of spinal canal narrowing by bone fragments were compared and analyzed with the initial, discharge and the final follow up CT scan. 36 item short-form survey questionnaire S.F-36 as shown in Table 1, Denis pain scale as given in Table 5 and work scale as given in Table 6 and visual analogue scale (VAS) as in Table 4. Questionnaire were administered to all our patients and from the patients' feedback the outcome of the treatment were evaluated. Finally the medical record review was performed to obtain the percentage and occurrences clinical data and to substantiate the data collected from various other methodologies mentioned above.



**Figure 1: Cobb's angle.**



**Figure 2: Local thoracic angle.**

## RESULTS

Various factors and their mean, standard deviation, minimum and maximum values were used to analyze the outcome of the fractures following conservative line of management as given in Table 1.

Demographic profile up to the age of 50 and after the age of 50 shares equal percentage 18 patient each (50%). Older the age the agility of bone decreases. The work and violence related injuries are more common in men. So men are affected more than women as given in Table 2.

Modernization in the automobile technology along with the increase in the number of vehicles and human population and the lack of road traffic safety awareness all these factors has become the major cause for road traffic accidents and the spinal injuries accounts for 52.8% as given in Table 3.

**Table 1: Descriptive statistics of patients with thoracolumbar burst fracture.**

	Age	Months	Initial kyphosis	Final kyphosis	Progression	VAS	SF 36	Denis pain	Denis work
<b>N</b>	36	36	36	36	36	36	36	36	36
<b>Mean</b>	48.69	8.58	23.5	22.08	-0.58	4.11	91.44	2.61	2.47
<b>Median</b>	50	9	11	11.5	0	4	90	2	2
<b>SD</b>	14.64	1.86	6.79	7.36	5.96	2.85	7.81	1.10	1.38
<b>Minimum</b>	13	6	3	2	-8	0	68	1	1
<b>Maximum</b>	83	12	40	32	5	8	100	5	5

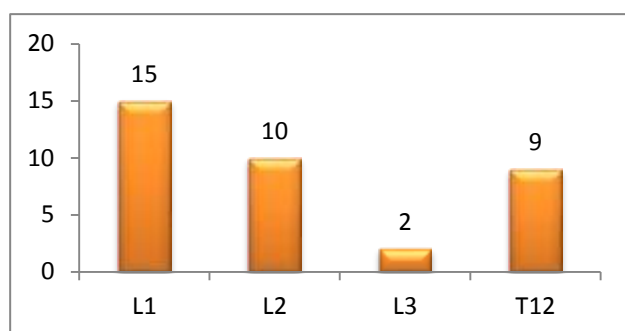
**Table 2: Demographic profile.**

Age	Frequency	Percentage
<30	4	11.2
31-40	8	22.3
41-50	6	16.1
51-60	8	22.4
>60	10	28
<b>Sex</b>		
<b>Female</b>	15	41.7
<b>Male</b>	21	58.3

**Table 3: Distribution of type of trauma.**

Trauma	Frequency	Percentage
<b>Being struck by falling objects</b>	2	5.5
<b>Fall from height</b>	15	41.7
<b>RTA</b>	19	52.8
<b>Total</b>	36	100

T12–L2 are the commonest site for thoracolumbar burst fractures because of the lack of stability and increased mobility of spine at that level as given in Figure 3.

**Figure 3: Distribution frequency of vertebra level fracture.**

The visual analog scale (VAS) is one of the most commonly used methods to measure the pain intensity. VAS is a straight horizontal line of fixed length, usually 100 mm orientated from the left (worst) to the right (best). Twenty five patients (69.3%) suffered from no or mild pain, nine patients (25%) suffering from moderate

pain requiring occasional medication only two patients (5.5%) suffering severe pain requiring regular medication as given in Table 4.

**Table 4: Pain score by visual analog scale (VAS) among patients with thoracolumbar burst fracture.**

VAS	Frequency	Percentage
<b>0 to 4 mm no pain</b>	11	30.5
<b>5 -44 mm mild pain</b>	14	38.8
<b>45-74 mm moderate pain</b>	9	25
<b>75-100 mm severe pain</b>	2	5.5
<b>Total</b>	36	100

Evaluation was done through the use of a questionnaire in which the patients were asked to rate their pain on a scale from 1 to 5 as in Table 5.

**Table 5: Denis pain score among patients with thoracolumbar burst fracture.**

Denis pain	Frequency	Percentage
<b>P1: No pain</b>	5	13.8
<b>P2: Occasional mild pain, not requiring medication</b>	14	38.9
<b>P3: Moderate pain, occasional use of medications, not precluding the performance of Professional or daily activities</b>	9	25
<b>P4: Moderate to severe pain, occasional job absence, significant changes on daily activities</b>	6	16.7
<b>P5: Continuous severe pain, use of chronic medications for pain</b>	2	5.6
<b>Total</b>	36	100

Evaluation was done through the use of a questionnaire in which the patients were asked to rate their working

capabilities, before and after injury, on a scale from 1 to 5 as given in Table 6.

**Table 6: Denis work score among patients with thoracolumbar burst fracture.**

Denis work	Frequency	Percentage
<b>W1: Return to previous employment (heavy labor) or physically demanding activities</b>	11	30.6
<b>W2: Able to return to previous employment (sedentary) or return to heavy labor with restrictions</b>	9	25
<b>W3: Unable to return to previous employment, but works full time at a new job</b>	10	27.7
<b>W4: Unable to return to full time work</b>	6	16.7
<b>W5: No work, completely disabled</b>	0	
<b>Total</b>	36	100

The Cobb's angle getting reduced (improved) in nineteen patients (53%) of cases and seventeen patients (47%) showed minimal increase in the Cobb angle in the final follow-up X-rays and this minimal increase is insignificant as presented in Table 7.

**Table 7: Progression pattern among patients with thoracolumbar burst fracture-Cobb angle.**

Progression	Frequency	Percentage
<b>-8</b>	2	5.6
<b>-7</b>	2	5.6
<b>-6</b>	3	8.3
<b>-5</b>	3	8.3
<b>-4</b>	5	13.9
<b>-1</b>	1	2.8
<b>0</b>	3	8.3
<b>2</b>	12	33.3
<b>4</b>	3	8.3
<b>5</b>	2	5.6
<b>Total</b>	36	100

## DISCUSSION

In this study the commonest fracture site was L1, L2, and D12 as given in Figure 1 because of the increased mobility of spine in that area. Males are more affected especially in the work related and violence related injuries as presented in Table 2. Spinal fractures following trivial injuries are commonly seen above 60 years as shown in Table 1 & 2, as older people are more

prone to injuries as they age and their agility declines. Modernization in the automobile technology along with the increase in the number of vehicles and human population and the lack of road traffic safety awareness all these factors have become the major cause for road traffic accidents and the spinal injuries as given in Table 3. The mean progression of the deformity was -0.58 with the standard deviation 5.96. The progression of the Cobb angle to the maximum of 5 degree in two patients (5.6%) as seen in Table 7. The pain score evaluated by Denis pain score, VAS also 2patients (5.6%) suffering from severe pain this percentage of patient suffering from severe pain could be attributed to the increase Cobb angle of five degree in two patients (5.6%) as in Table 7. No one was permanently disabled.

To achieve a good result before deciding to treat a patient conservatively proper selection of patients and their prior activities, social and educational background and future plans in addition to a thorough physical, neurological and spinal examination are mandatory to achieve satisfactory result. On the basis of clinical and radiological and feedback from the patients through the questionnaire by various methodologies our overall functional outcome was found to be acceptable coincides with the other studies by Weinstein, Cantor et al and Weitzman.<sup>11-13</sup>

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*Ethical approval: The study was approved by the institutional ethics committee*

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