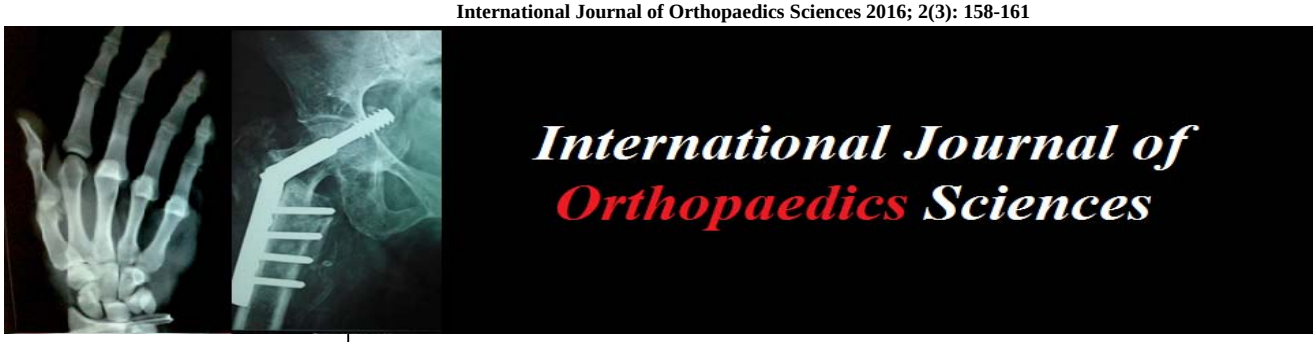

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Clinical profile of patients treated for thoracic and lumbar spine injuries

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Abstract
Introduction: Approximately 90% of all spinal fractures occur in the thoracic and lumbar spines. In fact, the majority of thoracic and lumbar injuries occur within the region between T11 and L1, commonly referred to as the thoracolumbar junction
Methodology: A general physical examination which included nourishment status, height, weight, body mass index, pallor, icterus, cyanosis and clubbing were done. Blood pressure and pulse of the patient was measured and recorded. Local examination of spine were inspected for swelling, any scar, sinus and palpated for tenderness.
Results: Commonly fractured vertebra is L1(30%) and then L2 and L3 jointly (23.33%). Least fractured vertebra is L4
Conclusion: The most common mode of injury in these patients with thoracolumbar vertebral fractures was fall from height (80%) followed by road traffic accidents (RTA)

Keywords: RTA, thoracic and lumbar injuries

1. Introduction

Reports of trauma to the thoracolumbar spine with associated neurologic injury were described as early as 3000 BC in the Edwin Smith Papyrus. With the introduction of motorized vehicles and greater exposure to high-energy blunt trauma, the occurrence of thoraco-lumbar fractures and dislocations has increased substantially. Recent data have indicated that motorcycle accidents are associated with a greater chance of severe and multiple-level spinal column injuries than other types of vehicular trauma. As with other spine trauma, thoraco-lumbar injuries occur most frequently in male patients between 15 and 29 years of age [1].

Approximately 90% of all spinal fractures occur in the thoracic and lumbar spines. In fact, the majority of thoracic and lumbar injuries occur within the region between T11 and L1, commonly referred to as the thoracolumbar junction. A variety of factors can explain this increased susceptibility. The thoracolumbar junction is a transition zone between the relatively stiff thoracic spine, stabilized by the costovertebral articulations, and more mobile lumbar spine. This area also exhibits significant alterations in flexion-extension and rotational degrees of freedom, as well as morphological and biomechanical changes in intervertebral disc architecture. Neurologic deficit reportedly occurs in approximately 15% to 20% of thoracolumbar fractures and dislocations [2].

Various classification schemes have been proposed to describe thoracolumbar fractures and dislocations. Advancements in imaging technology have increased our understanding of their pathomechanics, and have therefore improved their classification. The ideal classification scheme should allow reliable clinical application, provide a consistent prognosis and, ultimately, optimization of treatment decisions. As with other fractures, this has not, as yet, occurred.

In 1943, Watson-Jones identified comminuted wedge fractures as a subset of thoracolumbar injuries; these are now commonly referred to as burst fractures. Later that decade, Nicoll created the first well-known classification system for thoracolumbar trauma, which was stimulated by his review of injuries sustained by coal miners. The system focused on morphological differences between various injury patterns. About a decade later, Holdsworth proposed that burst fractures were the result of extreme flexion and further divided these injuries into stable or unstable patterns. His assessment of stability depended on the integrity of the PLC.

Based on Holdsworth's work, Kelly and Whitesides developed a two-column concept of spinal stability in which they delineated an anterior column consisting of the vertebral body, disc, anterior longitudinal ligament (ALL), and posterior longitudinal ligament (PLL), and a posterior column, which was formed by the posterior neural arch, facet joints, and PLC [3-5].

The next step was Denis' development of the three-column theory of spinal instability upon which he later based a classification system of thoracolumbar injuries. The system contained four main categories of injury: compression fractures, seat-belt injuries, burst fractures, and fracture-dislocations. These were further divided into 16 subgroups. Aimed mainly at providing information on the morphology and injury mechanism, this classification scheme has been less useful for grading stability or assigning treatment. The distinguishing feature of the Denis classification is the importance placed on the middle column, made up of the posterior vertebral body, posterior disc, and PLL. Using Denis' definition, injury to this middle column indicates mechanical instability, and by nature of their fracture morphology, all burst fractures would therefore be considered unstable. Although Denis' classification scheme is an attractive system that gained popularity throughout the years, its basic premise has not enjoyed clinical support, as the literature contains a number of reports of burst fractures that have been successfully treated by nonoperative methods, provided the PLC is intact. In addition to these shortcomings, recent analysis has found the inter- and intraobserver reproducibility of the Denis system to be relatively low [6-8].

Recognizing this problem with the Denis system, McAfee *et al* proposed another classification scheme. Using x-rays and CT analysis of 100 thoracolumbar injuries, they proposed that the mechanism of failure of the middle column, by axial compression, axial distraction, or translation in the transverse plane, could be determined, which would influence stability. The McAfee system divided injuries into six categories: wedge-compression fractures, stable burst fractures, unstable burst fractures, Chance fractures, flexion-distraction injuries, and translational injuries. This system was devised before pedicle screw instrumentation was available at a time when hook-based systems were the most commonly used instrumentation systems. The McAfee system indicated which injuries would be best treated by distraction or compressive constructs, an important consideration at the time. Since its publication, its inter- and intraobserver reliability has not been tested, nor has it been validated prospectively [9].

The most comprehensive system in current use is the AO classification system, which was developed after reviewing the x-rays and CT scans of 1,400 injuries in a number of trauma centers. It divides injuries into three basic groups based on the primary mechanism of failure. These groups are compression (group A), distraction (group B), and torsional or rotational forces (group C). Further subgroups were developed to characterize the fracture location and morphology, as well as to distinguish between osseous or ligamentous disruption and the direction of displacement. Group A injuries result primarily from axial or compressive loads, with or without flexion, with limited involvement of the posterior elements. With greater forces, there may be significant height loss, and vertebral body fragments can be retropulsed into the spinal canal in neurologic compromise. Group B injuries are the result of distraction forces and are by definition inherently unstable. Group C, or rotational injuries, also imply gross ligamentous injury. These injuries are often associated with transverse process fractures, costovertebral dislocations, translational malalignment between vertebral bodies, and frequently, neurologic deficit [10]

2. Methodology

A detailed clinical history of the patient was elicited which included name, age, sex, address, occupation, telephone number, duration of symptoms, co-morbid illness such as diabetes mellitus, hypertension, cardiac, cardiac disorder, coagulation disorders.

A general physical examination which included nourishment status, height, weight, body mass index, pallor, icterus, cyanosis and clubbing were done. Blood pressure and pulse of the patient was measured and recorded.

Local examination of spine were inspected for swelling, any scar, sinus and palpated for tenderness.

Pre op and post op Neurological examination of whole body was done (bulk, tone, power, reflexes, sensation of upper and lower limb). Bladder and bowel sensation and planter reflex were evaluated.

2.1 Investigations

- PREOP- complete blood count, random blood sugar, KFT, LFT.
- XRAYS-chest P/A view, spine A/P and lateral view.
- DEXA scan.
- CT SCAN spine.
- MRI spine.

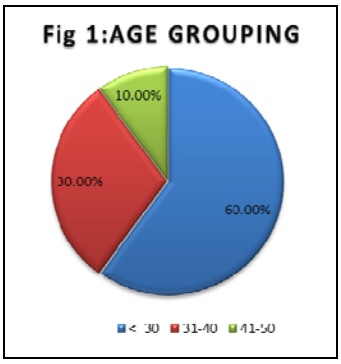
Patient were given patient information sheet and were explained in details about the study. A full informed consent was obtained and patient was taken to operation theatre. Screw loosening, loss of correction, and nonunion will be checked in plain radiograms 6 weeks, 3 months, 6 months after operation.

Screw loosening will be defined as a radiolucency of 1 mm or wider at the bone–screw interface. Loss of correction is defined as an increase in kyphosis greater than 3° or slippage of more than 2 mm at the fixed segment. Any movement observed on the lateral view of flexion–extension or any discontinuity of the trabecular bony bridging on the plain radiogram will be regarded as evidence of nonunion. The development of secondary changes in the adjacent vertebrae and intervertebral spaces will also be evaluated at that time.[21]

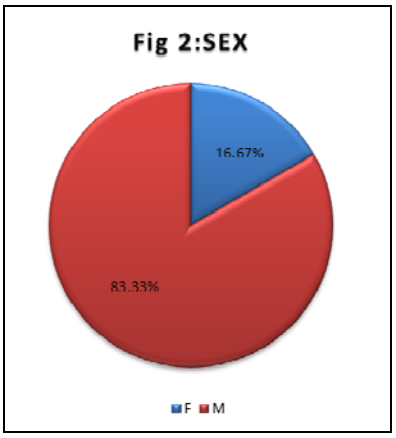
Radiographic assessments will be performed by the radiologist, then independently by another radiologist/Orthopedics who is not informed concerning the values of the intraoperative insertional torque and BMD.

3. Results and Discussions

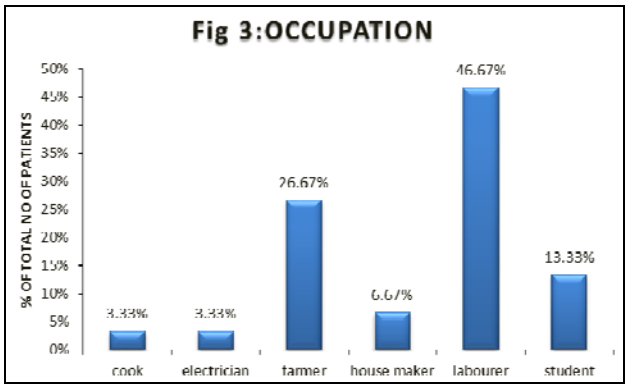
The mean age of the study group was 28.97 years with standard deviation (SD) of ±8.02 years ranging from minimum of 18 years to maximum of 48 years. The age distribution is presented in



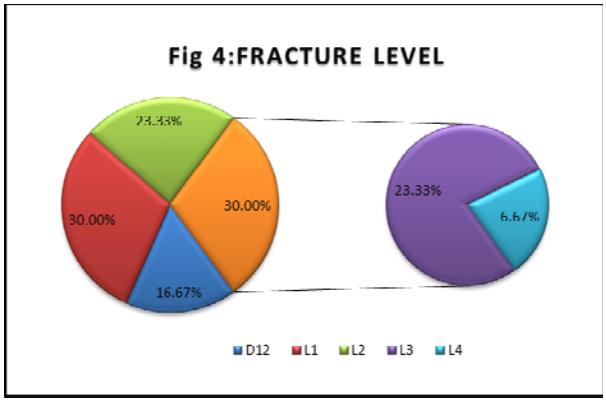
There were 25(83.33%), males and 5 (16.67%) females. The sex distribution of the study group showed a clear male preponderance with male to female ratio of 5: 1. The sex distribution is shown in Figure 2



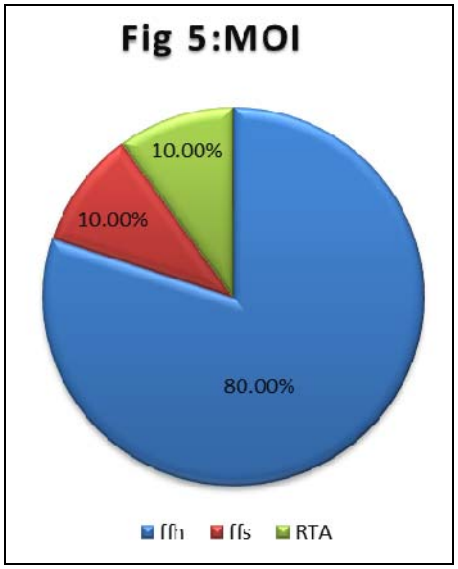
Most of the patients were labourer (46.67%), as they are working on sites so more prone for fall from height.



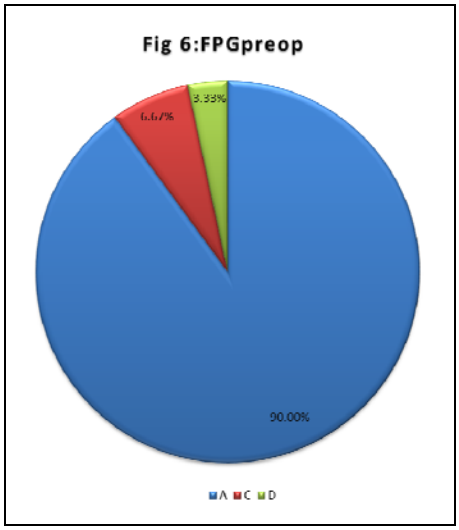
Commonly fractured vertebra is L1 (30%) and then L2 and L3 jointly (23.33%). Least fractured vertebra is L4.



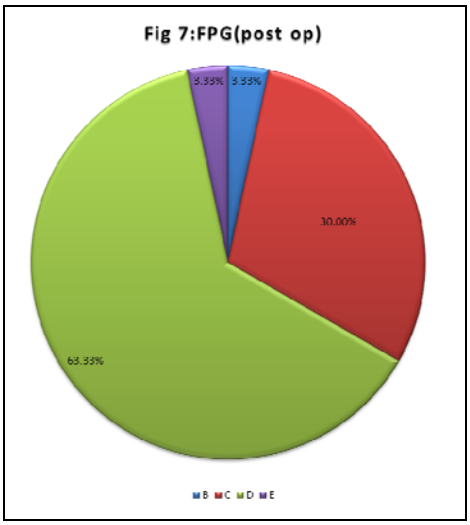
The most common mode of injury in these patients with thoracolumbar vertebral fractures was fall from height (80%) followed by road traffic accidents (RTA) which accounted for (10%) as shown in Figure below. In only 5 patients (10%) the injury was due to fall from stairs.



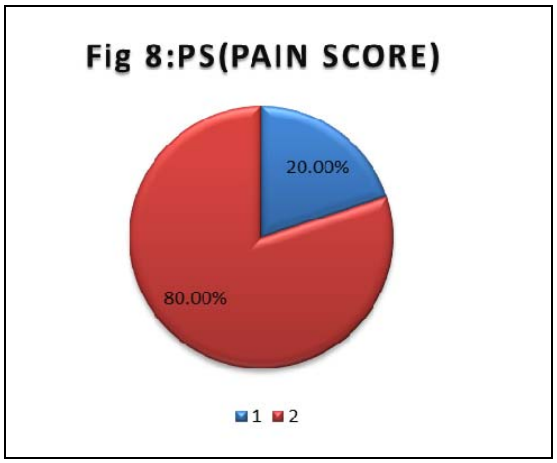
According to frenkel paraplegia grading scale, 90% patients has complete paraplegia i.e no motor or sensory function.



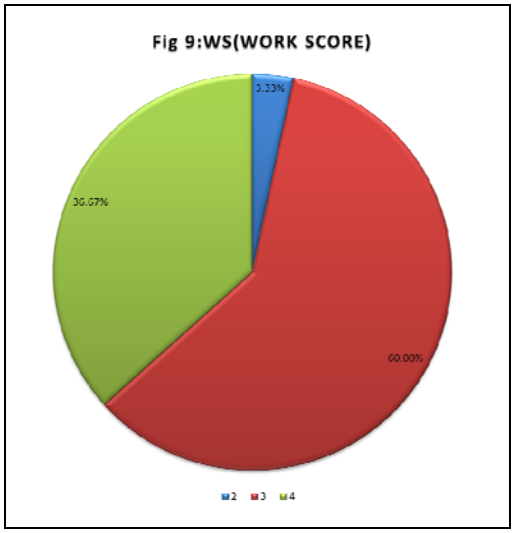
Post operatively, 63.33% patients walk properly without any support, 30% patients motor power is useless but patient may walk and only 3.33% recovered fully.



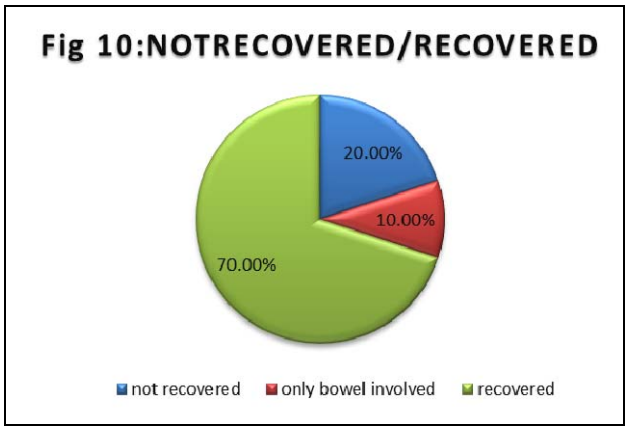
According to DENIS pain score 80% of the patients having minimal or occasionally pain and required no medication. 20% patients having no pain.

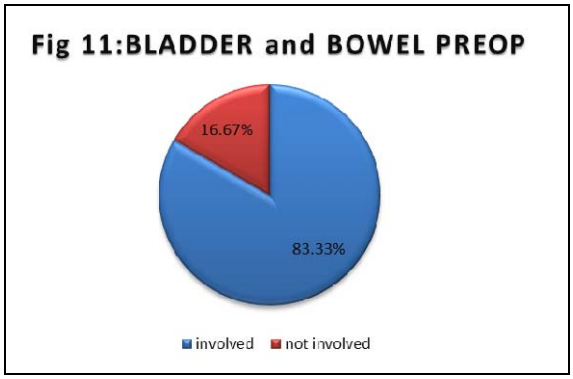


Only 3.33% of the patients returned to previous employment (sedentary) and heavy work with restrictions. Most of the patients (60%) were unable to return to previous employment but can do full time a new job.



Majority of the patients (70%) recovered with both bladder and bowel involvement. In which 83.33% patients suffered from bladder and bowel involvement.





4. Conclusion

Most spinal fractures occur in the thoracic and lumbar spine or at the connection of the two (thoracolumbar junction). Treatment depends on the severity of the fracture and whether the patient has other associated injuries.

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