

Original Research

Management of Thoracolumbar Spinal Fracture at Tertiary Care Hospitals: A Retrospective Study

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ABSTRACT

Objective: This study aimed to evaluate the fracture types, neurological deficits via the ASIA grading system, and to analyze fracture management strategies, post-fracture and surgical complications, in patients with thoracolumbar fractures.

Materials and Methods: A retrospective observational study was conducted on 114 TLS patients aged 16-75 years with known cases of TLS fracture. Data included demographics, mechanism of injury, radiographic investigations, fracture classifications, ASIA grades, treatment types, and outcomes. Descriptive statistics were used for analysis.

Results: The current study found that the majority of patients were male (64%) and aged 20-29 years (36%). Falls from height were the leading mechanism of injury. AO classification revealed a predominance of A1 (26.3%) and A2 (21.9%) fractures. ASIA A (complete neurological deficits) was found in 35.1% of patients, and ASIA E (no neurological deficit) in 31.6%. Conservative treatment was employed in 55.3% while 44.7% of patients underwent surgery, mostly through a posterior approach. Common complications included spinal cord compression (35.1%), pressure sores (21.9%), and neuropathic pain (13.2%). Overall, 70% of patients showed good recovery.

Conclusion: The study concluded that posterior surgical intervention is preferred, yielding favorable outcomes. Hence, early diagnosis and appropriate interventions are also crucial for minimizing complications and improving prognosis.

Keywords: Thoracolumbar, decompression, Neurological Deficits, laminectomy, Ligamentous injuries.

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INTRODUCTION

The spine is a complex structure, with multiple

joints stabilized and supported by surrounding muscles, which provides head and trunk stabilization in different postures and movements.¹ The Spinal fractures encompass a wide range of injuries, ranging from simple fractures of the spinal processes to complex fractures affecting multiple vertebrae.² Spinal fractures are linked to an increased incidence of morbidity, mortality, and long-term disability, with disability being the most prominent.³

Spinal fractures are categorized and managed based on their anatomical location and are classified into seven cervical, twelve thoracic, five lumbar, five sacral, and 4 fused coccygeal vertebrae.⁴

Among all spinal fractures, thoracolumbar junction fractures (T10 to L2) are the prevalent spinal injuries.⁵ The common causes of such fractures are motor vehicle accidents (MVA), road traffic accidents (RTA), falls from height, and recreational and occupational injuries.⁶ Previous literature found that 38% of TLS fractures are due to motor vehicle accidents, followed by falls (30%), assault (14%), and sports-related accidents by 9%.⁷ Incidence of TLS fracture also differed by gender, which predominantly affects male individuals as compared to females, at a ratio of 4:1, and in the productive age group, between 15 and 40 years.⁸ Another study reported that nearly 75% to 90% of all spinal fractures occur in the thoracic and lumbar spine.⁹

Thoracolumbar fracture classification systems are designed to facilitate and improve effective communication among spine surgeons, help to guide treatment, and predict the prognosis, with an ideal system being simple, comprehensive, consistent, and replicable in predictive outcomes.¹⁰ Most of the existing classifications have certain strengths and weaknesses. Denis three-column spine theory, proposed in 1989, which later served as the foundation for the AO classification of spinal injuries, which categorizes fractures into three types: compression fracture (Group A), distraction injury (Group B), and

translational injury or rotational injury (Group C), with the severity and the surgical necessity increases from group A to C.¹¹⁻¹³ For evaluation of neurological deficits associated with spinal fracture, the American Spinal Injury Association Impairment Scale, a standardized neurological examination used by the rehabilitation team to assess the sensory and motor levels that were affected by the spinal cord injury.¹⁴

Radiographical assessments begin with Plain radiographs, along with CT scans, which reveal most bone injuries, while stable fractures, including compression fractures and mild burst fractures (AO type A), do not require complex imaging.¹⁵⁻¹⁷ However, major soft tissue injuries remained undetected, as CT scans and plain radiographs do not accurately visualize and assess ligamentous structure.¹⁸ MRI is effective in identifying neural structures, ligaments, spinal canal content, and intervertebral discs.¹⁹ Furthermore, CT myelography is less frequently used as compared to past decades but remains the preferred option when MRI is contraindicated, i.e., in patients with pacemakers and intraocular foreign bodies.¹⁵

Fortunately, most of the TLS fractures are considered stable and can be managed conservatively using a properly fitted brace or a hyperextension cast.²⁰

Furthermore, non-surgical management techniques include thoracolumbar orthosis, plaster cast, Jewett brace, and a plastic body cast recommended for 12 weeks.¹⁸ One study by Siebenga et al, 2006, observed that conservative treatment with 5 days of bed rest on a Roto-Rest bed (KCI, San Antonio, TX, USA), followed by 3 months usage of a Jewett brace, compared with a similar group treated with short-segment posterior pedicle screw fixation reported different results with more improvement in quality of life was observed in surgical group.²¹

Surgical management of TLS fractures provides some benefits over non-surgical treatment, particularly for patients who are

unable to endure prolonged use of an orthotic device.²² Immediate surgical stabilization promotes prompt mobilization, earlier rehabilitation, and restores sagittal alignment more consistently.²³ Surgical decompression also more reliably and more effectively clears a compromised spinal canal and can more effectively restore neurologic function and improve rehabilitation.¹⁸ Surgical interventions for TLS involve different approaches, including posterior, anteroposterior and combined, with operative planning and stabilization based on a multifactorial decision-making process, and the specific location of the fracture is the primary consideration in choosing between the posterior and anterior approaches-available techniques are posterior segmental instrumentation, fusion with or without posterior decompression, percutaneous pedicle screw instrumentation, lateral interbody fusion, anterior column fusion and spinal neuromonitoring is routinely utilized during such procedures.²⁴ Therefore, the current study aims to analyze the type of thoracolumbar fractures, ASIA neurological grading at presentation, associated complications, and surgical approaches utilized in clinical populations. These findings will provide deep insight into the clinical patterns and current practices in the management of thoracolumbar spine fractures.

METHODOLOGY

Study Design/Setting/Duration

This study was a retrospective observational study conducted in the Department of Orthopedic Surgery at Nangarhar Regional Hospital, Afghanistan. The duration of the study was 12 months from December 2023 to January 2025 for clinical evaluation, treatment, and outcomes of patients with thoracolumbar spinal fractures. Ethical approval for this study was obtained from Nangarhar Regional Hospital Directorate (Approval No. 021, dated 05/10/2023).

Sample Size

A total of 114 patients with thoracolumbar spinal fractures across various age groups were recruited in this study.

Inclusion/Exclusion Criteria

The study included both male and female patients aged 16 to 75 years with radiographically confirmed thoracolumbar spinal fractures (T10-L2). Besides this, patients willing to provide informed consent were recruited for this study. Patients with previous spinal cord injuries/fractures, congenital spinal deformities, and pathological fractures due to malignancy or osteoporosis were excluded. Further, patients not willing to participate and spinal fractures other than at the thoracolumbar junctions were not included in this study.

Data Collection/Analysis

Data was collected using a structured proforma, including demographic details, mechanism of injury, neurological status (using ASIA classification), imaging findings, type of management, post-fracture and post-surgical complications, and outcomes. Imaging modalities included plain X-rays, MRI, CT scans, and biochemical testing. Both conservative and surgical approaches, with anterior and posterior approaches, were documented. Treatment outcomes were classified as good, moderate, and poor. Furthermore, data were analyzed through SPSS software version 22. Descriptive statistics, such as frequencies and percentages, were tabulated for categorical variables.

RESULTS

Patient Demographics

Table 3.1 illustrates the demographics of patients undergoing thoracolumbar spinal fracture management. Out of 114 participants, 73(64%)

were male and 41(36%) were female, indicating a greater incidence of such fractures in males. The majority of patients, 41(36%), with thoracolumbar fractures were between 20-29 years, indicating that young adults most commonly affected age group, followed by 20(17%) in 30-39 years, 16(14%) in 60-75 years, 13(12%) in 16-19 years, 13 (12%) in 40-49 years and only 11(9%) ranged between 50-59 years of age, highlighting the occurrence of these fractures across wide age range. Geographical location showed that the majority of patients, 62(54%), were from Nangarhar, followed by Kunar 28(25%), Laghman 14(12%), and the least number of patients were from Nuristan 10(9%).

Table 1: Demographics.

Demographics	Categories	Frequency (n=114)	Percentage (%)
Gender	Male	73	64
	Female	41	36
Age	16-19 years	13	12
	20-29 years	41	36
	30-39 years	20	17
	40-49 years	13	12
	50-59 years	11	9
	60-75 years	16	14
Geographical location	Nangarhar	62	54
	Nuristan	10	9
	Laghman	14	12
	Kunar	28	25

Causes of Injury

Table 2 demonstrates the cause of the thoracolumbar fracture.

The most common cause was a fall from height, accounting for 67(59%), indicating it as a leading mechanism of injury. This was followed by cases that involved objects falling by 24(21%) and Road traffic accidents (RTA) by 23(20%).

Mode of Hospital Transportation and Duration of Hospital Admission.

Table 3 shows the data on the mode of pre-hospital transportation and the duration from

injury

Table 2 Cause of injury.

Hospitalized Patients	Frequency (n=114)	Percentage (%)
RTA	23	20
Fall from height	67	59
An object falling on the patient	24	21

N=114; RTA= Road Traffic Accidents

to hospital admission among patients with thoracolumbar spinal fractures. A substantial number of patients, 80(70%), were transported to the hospital without receiving any first aid, indicating a lack of instant trauma care, and 70 (61%) were transported via ambulance. In contrast, only 19(17%) of patients received pre-hospital transportation with first aid. Regarding time duration from injury to hospital admission, only 5(4%) of patients with thoracolumbar spinal fractures reached the hospital within 4 hours, which is an ideal window for initiating the management of fractures and associated injuries. While 55(48%) of patients were admitted to the hospital after 24 hours, 54(47%) were admitted after several days post-injury. This significant delay in definitive care reflected systemic barriers, including transportation, referral delays, and a lack of public awareness.

Table 3: Pre-Hospital Transportation and Hospital Admission Duration.

Modes/ duration of transportation	Response	Frequency (n=114)	Percentage (%)
Pre-Hospital Transportation	With first aid	19	17
	Without first aid	80	70
	By ambulance	70	61
Time to hospital admission	Within 4 hours	5	4
	After 24 hours	55	48
	After several	54	47

days

Diagnosis of Thoracolumbar Spinal Fractures

The data on the imaging and diagnostic tools used for the assessment of patients with thoracolumbar spinal fractures are summarized in Table 4. It had been identified that X-rays were performed in all 114(100%) patients, indicating that primary radiographic evaluation was used as the initial diagnostic tool. Furthermore, a simple MRI and CT scan were performed in 100(87%) and 20 (17%) patients for assessment of soft tissues, intervertebral discs, spinal cord involvement, ligamentous damage, and complex fracture patterns. Biochemical tests were performed in 50 patients (57%) to rule out infections and assess their overall health status. However, advanced and invasive diagnostic tools such as CT myelography, contrast MRI, and electromyography were not performed, suggesting limited availability of such facilities.

Table 4: Imaging and diagnostic tools.

Imaging and diagnostic tools	Frequency (n=114)	Percentage (%)
Routine X-rays	114	100
Biochemical tests	50	57
Spine CT Scan	20	17
CT Myelography	0	0
Simple MRI	100	87
Contrast MRI	0	0
EMG	0	0

Nc; CT= Computed Tomography; MRI=Magnetic Resonance Imaging; EMG=Electromyography

AO Classification

The AO Spine Classification was employed to classify the types of spinal fractures and is summarized in Figure 1. A significant proportion of patients (26.3%) experienced A1-type fractures, which encompassed wedge compression injuries and were typically considered stable fractures. This is followed by A2 fractures in 21.9% of

patients; these are split-type fractures, and A3 fractures (incomplete burst fracture), in 11.4% of patients, with involvement of the posterior wall, which may narrow the spinal canal. A4 fractures occurred in 9.6% of cases, and these constitute a complete burst fracture of the vertebral body and were more likely to need closer surveillance or surgical treatment since they may be unstable. It was noticed that 7.9% of patients had A0 fractures, which are minor injuries such as isolated fractures of spinous and transverse processes. Regarding distraction fractures, B2 fractures were observed in 14% of patients, involving bony failure of the posterior tension band and considered more unstable fractures than type A fractures. Similarly, B1 fractures, which disrupt ligamentous structures without bone injury, were seen in only 1.8% of the population. However, no cases of B3 fractures were observed that were caused by hyperextension. Additionally, Type C-type injuries, the most severe and highly unstable form of fractures, usually caused by rotational displacement, were found in 7% of patients.

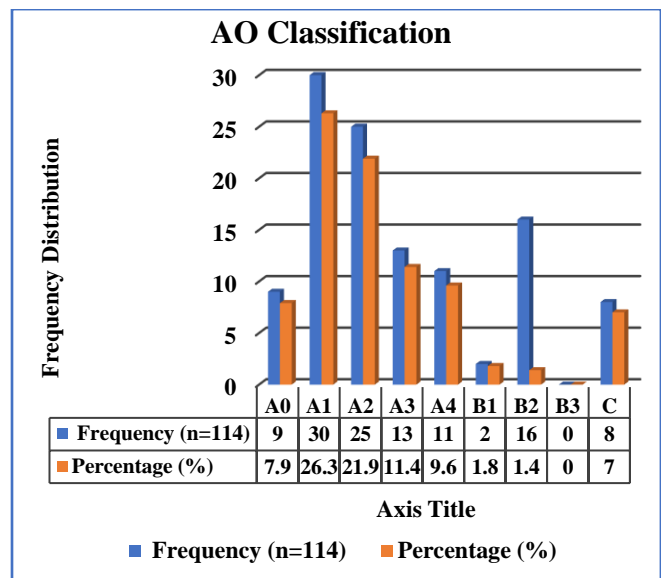


Figure 1: Frequency Distribution of Patients Based on AO classification, N=114.

Presence of Neurological Deficits

Table 5 demonstrates neurological deficits based on the ASIA scale, and it has been observed that approximately 40(35.1%) had ASIA-A, representing complete neurological deficits. Similarly, a total of 35(30.7%) of patients had incomplete neurological deficits which were further classified into 8.8% as ASIA B (sensory preserved but no motor function), 10.5% as ASIA C (some motor function but less than 50% of muscles have grade ≥ 3), and 11.4% as ASIA D (more than 50% of muscles below injury levels have motor grade ≥ 3). While no neurological deficits (ASIA E) were observed in 39(34.2%) patients, this indicates normal sensory and motor function.

Table 5: Presence of neurological deficits.

Status of Neurological Deficit	ASIA grades	Frequency (n)	Percentage (%)
Complete neurological deficits	ASIA A	40	35.1
Subset of incomplete deficits	ASIA B	10	8.8
	ASIA C	12	10.5
	ASIA D	13	11.4
No neurological deficit	ASIA E	39	34.2

N=144; ASIA=American Spinal Injury Association; ASIA A=complete neurological deficits; ASIA B=sensory preserved but no motor function; ASIA C= some motor function but less than 50% of muscles have grade ≥ 3 ; ASIA D=more than 50% of muscles below injury levels have motor grade ≥ 3 ; ASIA E=no neurological deficits

Frequency Distribution of Treatment Techniques and Surgical Approaches

The data in Tables 6 (a & b) show the distribution of patients with thoracolumbar fractures based on the type of treatment and surgical approaches they received. Out of a total of 114 patients, 63(55.3%) were managed using a conservative treatment approach, which includes bed rest, bracing, and pain management, while 51 (44.7%) underwent surgical treatment. The majority of them were treated by using the posterior surgical approach, specifically, decompression combined with osteosynthesis was the most frequently performed procedure 35, 68.6%). Additionally, decompressive laminectomy and only osteosynthesis were performed in 10(19.6%) and

6(11.8%) patients. In contrast, none of the patients underwent the anterior surgical approach (corpectomy plus fusion).

Table 6a: Treatment Techniques.

Treatment Type	Frequency (n=114)	Percentage (%)
Conservative	63	55.3
Surgical	51	44.7

Treatment Outcome

Treatment outcomes following thoracolumbar fracture management are summarized in Table 7. It had been observed that 60(70%) of patients represented good outcomes, indicating

Table 6b: Frequency distribution of surgical approaches.

Surgical Approach	Frequency (n=51)	Percentage of surgical patients (%)	
Posterior approach	Decompression + osteosynthesis	35	68.6
	Decompressive laminectomy only	10	19.6
Anterior approach	Osteosynthesis only	6	11.8
	Corpectomy + fusion (cage/graft)	0	0

significant recovery, and patients regained near-normal function after surgery. In contrast, 44(25%) of them had a moderate outcome with partial recovery. However, poor outcomes had been seen only in 10 patients (5%), reflecting minimal improvement with severe disability among them.

Table 7: Treatment Outcomes:

Outcome	Frequency (n=114)	Percentage (%)
Good	60	70
Moderate (with disability)	44	25
Poor	10	5

Post-Fracture and Surgical Complications

The clinical data in Table 8 revealed a wide range of injuries and complications associated with thoracolumbar spinal fractures. Spinal-specific injuries were most prevalent among post-fracture injuries, with spinal cord compression at the T10-L2 level observed in 40(35.1%) patients, followed by fracture dislocation and ligamentous injuries in 15 (13.2%) and 12 (10.5%) of patients, outlining the severity of trauma to the spinal cord. Similarly, 11(9.6%) of patients had concussion injury.

Among thoracic injuries, rib fractures were observed in 8(7.0%), hemothorax in 3(2.6%), and pneumothorax in 2(1.8%), reflecting the existence of chest trauma. Post-fracture injuries to the lower limb reported sensory 7(6.1%) and motor 9(7.9%) deficits. Likewise, abdominal injuries and pelvic ring fractures were found to be the least

frequent. Furthermore, subsequent Complications following injury or surgery were also identified, including wound-related, Implant-related, Post-operative, Fracture-related, and systemic complications. Wound-related complications consisted of 7.02% and 5.26% of superficial and

Table 8: Associated injuries/complications.

Categories			Number	Percentage
Fracture-associated injuries	Thoracic injuries	Rib fractures	8	7.0
		Hemothorax	3	2.6
		Pneumothorax	2	1.8
	Head injuries	Concussion	11	9.6
		Liver/spleen laceration	2	1.8
	Abdominal injuries	Intraabdominal bleeding	1	0.9
		Organ contusion	1	0.9
		Spinal-specific	Spinal cord compression (T10-L2)	40
	Pelvic injuries	Fracture dislocation	15	13.2
		Ligamentous injuries	12	10.5
Pelvic ring fracture		3	2.6	
Lower Limb Injuries	Sensory deficit	7	6.1	
	Motor deficit	9	7.9	
Wound-related	Superficial wound infection	8	7.02	
	Deep wound infection	6	5.26	
Implant-related	Hardware loosening	5	4.39	
	Hardware breakage	3	2.63	
	CSF leakage	2	1.75	
Complication	Post-operative	Surgical site hematoma	6	5.26
		Respiratory infection	11	9.6
		Gastrointestinal complication	6	5.26
	Fracture related	UTI	10	8.8
		Pressure sores	25	21.9
		DVT	12	10.5
		Neuropathic pain	15	13.2
Systematic	Fever/sepsis	5	4.4	

N=114; UTI=Urinary Tract Infection; DVT= Deep Venous Thrombosis; CSF= Cerebrospinal Fluid

deep infections. Regarding implant-related complications, hardware loosening occurred in 4.39% and hardware breakage in 2.63% of patients. Post-operative complications included CSF leakage in 1.75% of patients, surgical site hematoma in 5.26%, respiratory infection in 9.6%, gastrointestinal complications in 5.26%, and urinary tract infections (UTIs) in 8.8% of patients. Moreover, 21.9% of patients suffered from pressure sores, 10.5% from DVT, and 13.2% from neuropathic pain. However, systemic complications encompassing fever of sepsis were noted in 4.4% of patients undergoing management of thoracolumbar spinal fractures. These findings underlined the complex and multi-system impact of thoracolumbar spinal fractures.

DISCUSSION

Thoracolumbar spinal fracture (TLS), commonly occurring at T10 to L2 levels of the spine, is prevalent in young active males. These injuries often lead to significant neurological deficits, disability, and surgical intervention. Regarding gender distribution, the current study highlighted that, out of total 114 patients, 73(64%) were male and 41(36%) were female, reflecting a clear predominance of thoracolumbar spinal fracture among males, and 41(36%) with thoracolumbar fractures were between 20-29 years possibly due to greater involvement in insensitive and high-risk physical activities. Comparatively, a previous study reported that 61.5% of the population was comprised of males with a productive age range from 19 to 60 years.²⁵ The findings from demographic characteristics from both studies consistently support the analysis that males, especially those in their active working age, were more vulnerable to suffering from thoracolumbar spinal fractures.

The current study found the risk factors of thoracolumbar spinal fractures and reported that falls from height emerged to be the predominant cause of such fractures, accounting for 67/114 of

cases (59%), followed by fractures due to objects falling (21% of cases) and RTA (20%). These findings outlined that vertical trauma mechanisms, particularly due to occupational and accidental falls, were major predictors of spinal fractures. In contrast, the previous study identified that motorcycle accidents were the principal cause (36.7%), followed by falls from height (31.4%), and car accidents by 17%. Furthermore, the previous study indicated a gender-based pattern, with motorcycle accidents being a more prevalent risk factor among males (39%), while falls from height were more prevalent among females (35.5%).²⁶ The discrepancy in the mechanism of injury between the studies might indicate geographical, socioeconomic, and lifestyle differences, mainly concerning the mode of transportation. Similarly, both studies observed falls and vehicle accidents as the principal contributors to thoracolumbar fractures; however, the current study did not report a gender-based mechanism of injury.

The AO Spine classification of thoracolumbar injuries is a commonly used thoracolumbar spinal fracture classification system. The current demonstrated predominance of Type A fractures, particularly A1 (26.3%) and A2 (21.9%), followed by A3, A4, and A0, with prevalence rates of 11.4%, 9.6% & 7.9%, indicating varying degrees of compression and burst fractures. Among the distraction fractures, B2 fractures were observed in 14%, B1 in 1.8% while none of the cases had B3 fractures. Type C fractures were observed in 7% of patients, representing severe instability with translational and rotational displacement. These findings were aligned with a previous study that also reported a predominance of type A fractures (77.5%), with A1 (26.7%) and A2 (22.2%) fractures being frequent, followed by type B fractures (16.1%), while Type C accounts for 6.03% of cases.²⁵ Similarly, another study reported an even higher proportion of type A fractures (88.9%), with A1 (56.3%) and A3 (33.3%) being the leading subtypes. However, their study observed type C

fractures (5.6%) as the second most common, and

type B fractures were comparatively rare (1.9%).²⁷

This variation in the distribution of fracture types across studies highlights differences in the mechanism of trauma, injury severity, and regional and demographic factors.

In terms of the management of thoracolumbar spinal fractures, the current study reported that 63(55.3%) of patients were managed conservatively, by recommended bed rest, bracing, and pain management approaches, while 51(44.7%) underwent surgical intervention. Similarly, a study done in Jordan in the year 2023 also commonly adopted conservative treatment 197(42.0%), followed by fusion surgery in 151(32.2%), kyphoplasty in 105(22.4%), and vertebroplasty in 16(3.4%).⁵ This reflects a comparatively balanced approach between surgical and non-surgical methods. In contrast, the international multi-regional study in 2025 evaluated 213 patients across five geographical regions and found significant regional differences in the surgical management of thoracolumbar burst fractures, and that study reported that surgical management was highest in India (92.3%) and in the Middle East (92.6%), followed by Europe (68.4%), while considerably lower in North America (26.1%) and Australia (12.5%). Conversely, non-surgical treatment was more common in North America (73.9%) and Australia (87.5%). These differences were statistically significant ($p < 0.001$).²⁸ However, the current study did not find statistical significance across various regions of Afghanistan.

Moreover, in the current study, a total of 51/114 patients underwent surgical treatment, predominantly using the posterior approach. Specifically, 35(68.6%) of patients received decompression with osteosynthesis, 10(19.6%) decompressive laminectomy, and 6(11.8%) had only osteosynthesis. None of the TLS patients was treated via an anterior approach. Such findings indicated a strong preference for posterior surgical strategies in the current study. Compared, a previous study reported similar

results in a review of 101 patients, where 96 patients were treated with the posterior approach, only 5 patients underwent a combined anteroposterior procedure, and 22 patients received surgical decompression,²⁹ reflecting consistent results with the current study. Meanwhile, another study utilized a slightly different surgical distribution, using the posterior approach in half of the cases and a combined anteroposterior approach in the other half, while the anterior approach was employed in minimal cases.³⁰ All studies emphasized surgical intervention favoring the posterior route, possibly due to its lower complication rate and easier access with sufficient biomechanical stability in most thoracolumbar fracture patterns.

In the current study, ASIA A (complete neurological deficit) was detected in 35.1% of patients, ASIA B–D (incomplete neurological deficits) in 30.7% of patients, while 34.2% of patients had no neurological deficit (ASIA E). This specified that nearly 68.4% of patients had some sort of neurological impairment. In contrast, the large-scale study reported only 9% of patients with complete deficits (ASIA A), 74% with incomplete deficits (ASIA B–D), 74% with no neurological deficit (ASIA E). Moreover, that study also found a strong correlation between fracture type and neurological deficits, with ASIA A–D being more frequent in type C injuries (57.4%), followed by type B (33.1%), and type A (11.1%) ($p < 0.01$) in patients with thoracolumbar spinal fractures.³¹

Additionally, the current study also comprehensively evaluated injuries and complications associated with thoracolumbar spinal fractures. It had been found that spinal-specific complications were most frequent, with spinal cord compression observed in 35.1% of cases, followed by fracture dislocation in 13.2% and ligamentous injuries in 10.5% of patients. Similarly, among neurological deficits, 7.9% of patients exhibited motor deficits. Thoracic injuries, including rib fractures, hemothorax, and

pneumothorax, were seen in 11.4%, head injuries in 9.6%, and abdominal injuries were less common (1.8%). In terms of postoperative complications, the current study found that the most prevalent complications among them were pressure sores (21.9%), neuropathic pain (13.2%), respiratory infections (9.6%), and UTIs (8.8%). Likewise, 7.02% of patients had superficial infections and 5.26% had deep infections. Similarly, implant-related (hardware loosening = 4.39%, breakage = 2.63%), gastrointestinal complications (5.26%), surgical site hematomas (5.26%), and fever/sepsis (4.4%) were also reported in the current study. In contrast, the multicenter study conducted in 2023 analysed 535 patients undergoing type B and C thoracolumbar injuries, with at least one complication found in 43% of patients, which included 6.9% of surgical-site complications and 13.8% of cases with UTIs.³² Similarly, another previous study also outlined a wide range of complications associated with surgical treatment, including 25% UTIs, 10% sepsis, pneumonia (7.5%), DVT (2.5%), and decubitus ulcers in 12.5% of cases. Furthermore, that previous study also explored the impact of surgical timing, and reported that a lower median number of complications was observed in patients who underwent early operation, and this difference was comparatively non-significant ($p=0.827$).³³ However, the current study did not examine surgical timing.

Although this current study has yielded some very interesting findings about the clinical profile, along with management and outcomes of thoracolumbar fractures, it also has several limitations. The current study did not evaluate the hospital stays or time to return since these factors are vital for both functional recovery and socioeconomic outcomes regarding their impact. Current analysis also excluded regional or geographical treatment practice differences that could have had an effect on appropriate management decisions and outcomes because of

variation in healthcare resources. The current study did not address age and gender-based associations with neurological deficits, type of fracture, and surgical approach in depth concerning fracture patterns, treatment preferences, or recovery trajectory differences. Lastly, health-related quality of life (HRQoL) and physical status were not evaluated in the present study, which highlights the need for future research programs on understanding the outcomes for thoracolumbar fracture patients. Overall, all such findings underline the need for targeted management strategies to reduce morbidity in this vulnerable population.

Conclusion

This study outlined that TLS fractures, particularly in young males, are commonly caused by falls and frequently present with significant neurological deficits. AO type A and ASIA A were the most prevalent fractures and neurological grades, respectively. Moreover, conservative treatment remained the primary approach. However, in surgical management, posterior surgical interventions showed superior functional outcomes. Early hospital admission, accurate imaging, and timely intervention are crucial in optimizing recovery and reducing disability.

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Additional Information

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1.	Hamed Shir Shinwari & Mohammad Shafi Fazli	1. Study design and methodology
2.	Hamed Shir Shinwari & Mohammad Shafi Fazli	2. Paper writing
3.	Hamed Shir Shinwari	3. Data collection and calculations
4.	Hamed Shir Shinwari & Mohammad Shafi Fazli	4. Analysis of data and interpretation of results
5.	Hamed Shir Shinwari & Mohammad Shafi Fazli	5. Literature review and referencing
6.	Mohammad Shafi Fazli	6. Editing and quality insurer