

COMPARATIVE OUTCOMES OF CONSERVATIVE VERSUS POSTERIOR OPERATIVE MANAGEMENT IN NEUROLOGICALLY INTACT PATIENTS WITH STABLE THORACOLUMBAR BURST FRACTURES: A RANDOMIZED CONTROLLED INTERVENTIONAL STUDY



Orthopaedics

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ABSTRACT

Background And Objective: Thoraco-lumbar burst fractures from high-energy trauma present challenges in selecting the optimal treatment strategy in neurologically intact patients. Evidence comparing conservative management and posterior pedicle screw fixation remains mixed. This study compared clinical and radiological outcomes of both modalities in stable thoraco-lumbar burst fractures. **Methods:** Sixty patients aged 18–60 years with AO Type A3–A4 thoraco-lumbar (T10–L2) burst fractures were enrolled and randomized to conservative treatment with thoraco-lumbar orthosis (n=30) or operative fixation via posterior pedicle screws (n=30). Outcomes were evaluated at 2 weeks, 6 weeks, 4 months, and 12 months using segmental kyphosis, anterior vertebral body height, Visual Analog Scale (VAS), Oswestry Disability Index (ODI), and Japanese Orthopaedic Association (JOA) scores. **Results:** The operative group showed significantly less kyphosis progression (1.60° vs 3.33° , $p<0.001$) and lower VAS pain scores at all follow-ups ($p<0.001$). ODI scores were also superior in the operative group at each interval ($p<0.001$). Loss of anterior vertebral body height was not significantly different ($p=0.133$). JOA scores at 12 months were comparable ($p=0.309$), and return to daily activities was similar (63.3% operative vs 60.0% conservative). **Conclusion:** Surgery provides better deformity correction, pain relief, and early functional recovery, whereas conservative treatment yields similar neurological outcomes and return-to-activity rates at one year. Management should be individualized based on fracture severity, patient activity level, and rehabilitation potential.

KEYWORDS

thoraco-lumbar burst fracture, conservative management, posterior pedicle screw fixation, spinal alignment, kyphosis correction, functional outcome.

INTRODUCTION

Spinal trauma represents one of the most debilitating forms of musculoskeletal injury, and fractures of the thoraco-lumbar region account for nearly 60%–70% of all traumatic spinal fractures.¹ Within this region, burst fractures form a distinct subset typically resulting from high-energy forces such as motor vehicle accidents, falls from height, or other mechanisms producing sudden axial loading of the vertebral column; rarely, severe muscular contractions during seizures have also been implicated.² The thoraco-lumbar junction (T10–L2) is particularly susceptible due to its anatomical transition from the rigid thoracic to the more mobile lumbar spine.³

A burst fracture involves failure of the vertebral body under axial compression, causing fragmentation and centrifugal displacement of bony fragments. These retropulsed fragments may encroach into the spinal canal, posing a potential threat to neurological structures. Although many patients remain neurologically intact at presentation, the risk of progressive deformity, chronic pain, and late neurological deterioration necessitates careful selection of the optimal management strategy.

Historically, neurologically intact thoraco-lumbar burst fractures were managed conservatively with bed rest, external bracing, and physiotherapy, aiming for natural healing and gradual mobilization. With advances in spinal instrumentation, operative intervention—particularly posterior pedicle screw fixation—has gained increasing acceptance, offering immediate mechanical stability, deformity correction, and early ambulation. Despite this evolution, the superiority of either approach remains controversial. Some studies report improved radiological restoration of vertebral body height and kyphosis with surgical treatment, whereas others show comparable functional recovery and pain relief between operative and conservative management. Importantly, surgery carries inherent risks including wound infection, implant failure, and anesthesia-related complications, requiring a careful balance of benefit and risk.

Given the clinical burden of thoraco-lumbar burst fractures and the economic implications of long-term disability, there remains a need for high-quality randomized trials comparing surgical and non-surgical strategies in neurologically intact patients. Along with radiological correction, patient-centred outcomes such as pain, disability, and quality of life must be considered to establish evidence-based treatment guidance.

The present randomized controlled interventional study was undertaken to fill this gap by comparing conservative management with posterior operative fixation in neurologically intact patients with stable thoraco-lumbar burst fractures. Through detailed clinical and radiological assessment over a structured follow-up period, the study aims to clarify the effectiveness, safety profile, and functional implications of each modality, thereby aiding informed and individualized treatment planning.

This study aims to evaluate and compare the clinical and radiological outcomes of conservative versus posterior operative management in neurologically intact patients with stable thoraco-lumbar burst fractures. The primary focus is to assess differences in radiological correction—specifically segmental kyphosis and anterior vertebral body height loss—at final follow-up, as well as functional outcomes using the Oswestry Disability Index (ODI). In addition, secondary evaluation includes comparison of clinical recovery through Japanese Orthopaedic Association (JOA) scores and patient-reported pain levels, enabling a comprehensive appraisal of both anatomical alignment and functional rehabilitation in the two treatment groups.

MATERIALS AND METHODS

Study Design and Ethical Approval:

This hospital-based, prospective, randomized, controlled interventional study was conducted in the Department of Orthopaedics, SMS Medical College and Attached Hospitals, Jaipur, Rajasthan, with the objective of comparing the clinical and radiological outcomes of conservative versus posterior operative management in neurologically intact patients with stable thoraco-lumbar burst fractures. Ethical approval was granted by the Institutional Ethics Committee (IEC No: 119/MC/EC/2023), and the study was carried out in accordance with the Declaration of Helsinki (2013 revision). Written informed consent was obtained from all participants prior to enrolment.

Study Population And Duration:

The study included adult patients aged 18–60 years presenting with single-level thoraco-lumbar burst fractures at levels T10–L2 and confirmed to be neurologically intact at the time of admission. Patient recruitment, intervention, and follow-up were carried out from January 2024 to December 2024, ensuring uniform evaluation of all patients over a minimum 12-month observation period.

Sample Size And Randomization:

A total of 60 patients fulfilling eligibility requirements were enrolled and allocated equally into two groups (n = 30 each) through computer-generated randomization. Patients in the operative group underwent posterior pedicle screw fixation, whereas those in the conservative group were treated with thoraco-lumbar orthosis and physiotherapy. The sample size was calculated to achieve 80% study power at a 5% level of significance.

Eligibility Criteria:

Patients were considered eligible for enrolment if they were adults aged between 18 and 60 years, presented within two weeks of injury, and demonstrated a single-level thoraco-lumbar burst fracture between T10 and L2 classified as AO Type A3 or A4, with no neurological deficit (N0) on initial examination. Patients were excluded if they had spinal malignancy or metastatic disease, metabolic or endocrine disorders affecting bone health, a history of previous spinal surgery, or concomitant traumatic injuries that would impede participation in a standardized rehabilitation protocol. Individuals with congenital spinal deformities or those requiring operative fixation beyond 10 days from the time of injury were also excluded to maintain uniformity in treatment timelines and outcome assessment.

Baseline Evaluation:

Upon admission, all patients underwent a comprehensive clinical and radiological evaluation including demographic profiling, mechanism of injury, pain severity, physical examination, and neurological assessment. Radiographic evaluation included anteroposterior and lateral X-rays to assess vertebral alignment and fracture configuration, MRI to evaluate canal compromise and posterior ligamentous complex integrity, and CT scans in selected cases for detailed osseous assessment.

Intervention Protocols:

In the operative group, patients underwent posterior spinal fixation using pedicle screw and rod constructs under general or spinal anesthesia with standard aseptic precautions and perioperative antibiotic prophylaxis. Postoperative management included analgesics, wound care, thoraco-lumbar bracing, and early mobilization under physiotherapist supervision.

In the conservative group, patients were managed with initial bed rest followed by mobilization under a thoraco-lumbar orthosis (TLSO), combined with an analgesia regimen and a structured physiotherapy program. Mobilization and weight-bearing were progressively increased depending on pain tolerance and radiological stability.

Follow-Up Schedule:

Follow-up evaluations were conducted at 2 weeks, 6 weeks, 4 months, and 12 months. Each assessment comprised pain scoring, neurological examination, and functional evaluation using the Oswestry Disability Index (ODI) and Japanese Orthopaedic Association (JOA) score. Radiological outcomes were quantified by measuring segmental kyphosis (Cobb angle) and anterior vertebral body height at each follow-up.

Outcome Assessment:

Primary outcomes included the change in segmental kyphosis and anterior vertebral body height between baseline and the final follow-up. Secondary outcomes included pain intensity (VAS), ODI and JOA functional scores, time to mobilization and return to daily activities, peri- and postoperative complications, and the need for re-intervention.

Statistical Analysis:

All collected data were tabulated in a computerized master sheet and analyzed using standard statistical software. Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables as frequencies and percentages. Comparative analysis between the two groups was performed using appropriate parametric or non-parametric tests based on the distribution of variables. A p-value < 0.05 was considered statistically significant.

RESULTS

Baseline Patient Characteristics

A total of 60 neurologically intact patients with stable thoraco-lumbar (T10–L2) burst fractures were included in the final analysis, with 30 patients managed operatively through posterior pedicle screw fixation

and 30 patients treated conservatively with thoraco-lumbar orthosis and physiotherapy. The majority of patients belonged to the 18–40-year age range (70.00%), indicating a predominance of young and middle-aged adults exposed to high-energy trauma during their economically productive years. The sex distribution was equal across the cohort, with 30 males (50.00%) and 30 females (50.00%), demonstrating that both genders were nearly equally susceptible to high-impact thoraco-lumbar injuries.

Road traffic accidents were the most frequent mechanism of trauma, accounting for 41.67% of cases, followed by falls from height (36.67%) and other trauma causes such as domestic and sports injuries (21.67%). Most patients (46.67%) presented within the first five days after injury, and 80.00% presented within the first ten days. BMI distribution revealed that 53.33% of patients were within the normal range (18.5–24.9 kg/m²), while 46.67% were overweight (25–29.9 kg/m²), with no patients underweight or obese, ensuring minimal BMI-related confounding in functional and radiological outcomes.

The fracture distribution pattern demonstrated clear clustering around the thoraco-lumbar junction. L1 was the most commonly injured vertebra (28.33%), followed by T11 (25.00%), T12 (16.67%), T10 (13.33%), and L2 (16.67%). Based on AO Spine Classification, Type A3 fractures were predominant (60.00%), while Type A4 fractures represented 40.00% of the cohort. The higher proportion of A4 fractures in the operative group (46.67%) than in the conservative group (33.33%) reflects a clinical preference for surgical intervention in more complex burst fractures.

Table 1-Baseline Demographic And Injury Characteristics

Variable	Category	Frequency (%)
Age (years)	18–40	42 (70.00%)
	>40	18 (30.00%)
Sex	Male	30 (50.00%)
	Female	30 (50.00%)
BMI	Normal (18.5–24.9)	32 (53.33%)
	Overweight (25–29.9)	28 (46.67%)
Mode of injury	Road traffic accident	25 (41.67%)
	Fall from height	22 (36.67%)
	Other	13 (21.67%)
Time to presentation	≤5 days	28 (46.67%)
	6–10 days	13 (21.67%)
	>10 days	19 (31.67%)

Table 2-Fracture Profile

Variable	Category	Frequency (%)
Fracture Level	L1	17 (28.33%)
	T11	15 (25.00%)
	T12	10 (16.67%)
	T10	8 (13.33%)
	L2	10 (16.67%)
AO classification	Type A3	36 (60.00%)
	Type A4	24 (40.00%)

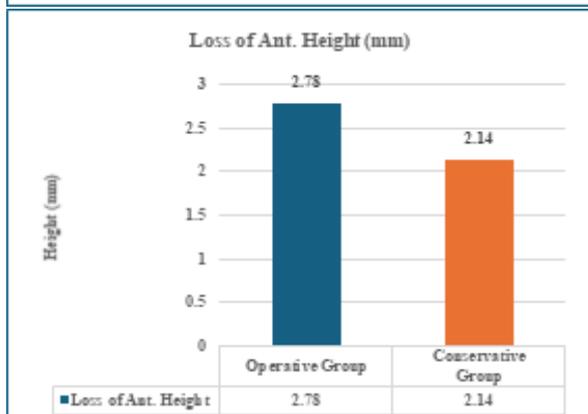
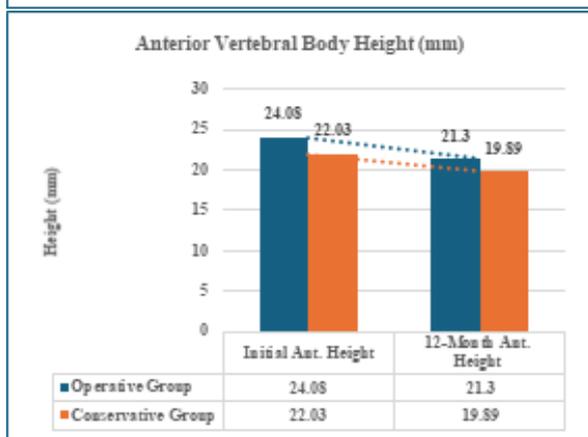
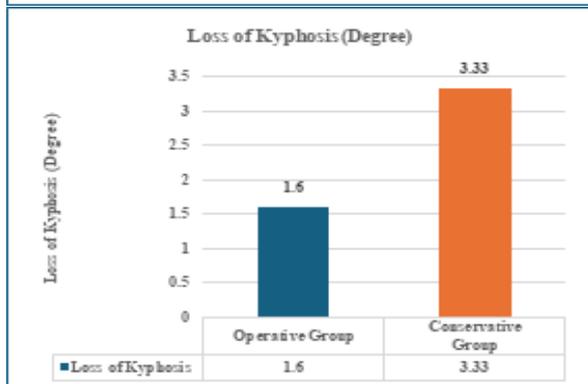
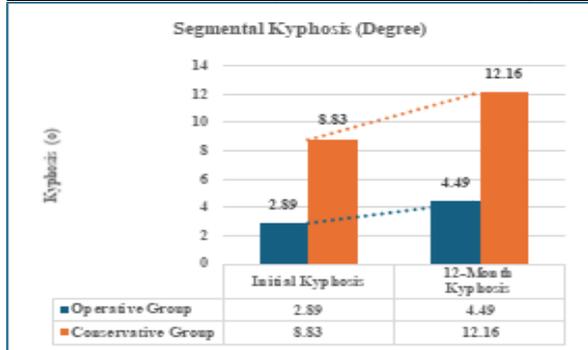
Clinical And Radiological Outcomes

Radiological assessment demonstrated notable differences in spinal alignment preservation between the two treatment groups. At baseline, the mean segmental kyphosis angle was considerably lower in the operative group (2.89° ± 0.63) compared with the conservative group (8.83° ± 1.17), indicating better initial alignment in surgically treated patients. At the 12-month follow-up, kyphosis progression remained significantly lower in the operative group (4.49° ± 0.33) than in the conservative group (12.16° ± 0.63). The mean loss of kyphosis over the follow-up interval was 1.60° ± 0.72 in the operative group and 3.33° ± 1.44 in the conservative group (p < 0.001), reinforcing the superior capacity of pedicle screw fixation to maintain sagittal spinal balance and minimize post-injury deformity.

Evaluation of anterior vertebral body height further supported these findings. Although both groups showed a significant decrease from baseline to final follow-up (p < 0.001), the operative group demonstrated better absolute height restoration at both time points. Loss of anterior vertebral body height over 12 months was 2.78 ± 1.60 mm in the operative group versus 2.14 ± 1.67 mm in the conservative group. However, this intergroup difference was not statistically significant (p = 0.133), indicating that while surgery provided superior kyphosis correction, both approaches were largely comparable in preventing progressive vertebral collapse.

Table 3-Radiological Outcomes (Kyphosis and Vertebral Body Height)

Parameter	Operative (Mean ± SD)	Conservative (Mean ± SD)	p-value
Initial Kyphosis (°)	2.89 ± 0.63	8.83 ± 1.17	<0.001
Kyphosis at 12 Months (°)	4.49 ± 0.33	12.16 ± 0.63	<0.001
Loss of Kyphosis (°)	1.60 ± 0.72	3.33 ± 1.44	<0.001
Initial Ant. Vertebral Height (mm)	24.08 ± 1.03	22.03 ± 1.05	<0.001
Ant. Height at 12 Months (mm)	21.30 ± 1.27	19.89 ± 1.07	<0.001
Loss of Vertebral Height (mm)	2.78 ± 1.60	2.14 ± 1.67	0.133

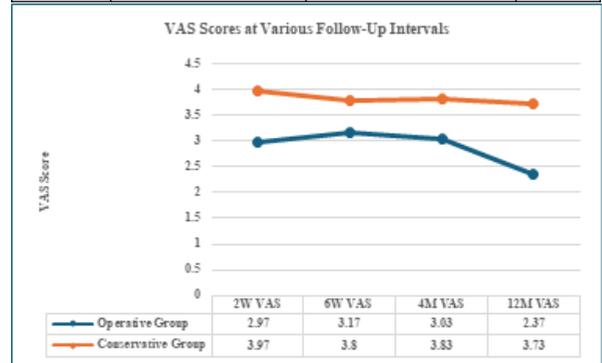


Pain Outcomes

Pain intensity, measured using the Visual Analog Scale (VAS), decreased progressively in both groups across successive follow-up intervals; however, pain scores were consistently lower in the operative group at every time point. At 2 weeks, the operative group had a mean VAS score of 2.97 ± 0.62 compared with 3.97 ± 0.81 in the conservative group. By the 12-month evaluation, the mean VAS score had reduced to 2.37 ± 0.76 in the operative cohort versus 3.73 ± 1.14 in the conservative group. All intergroup comparisons across follow-ups were statistically significant (p < 0.001), confirming superior pain relief among surgically treated patients, likely contributing to earlier mobilization and improved quality of life.

Table 4-VAS Pain Scores Over Time

Interval	Operative (Mean ± SD)	Conservative (Mean ± SD)	p-value
2 Weeks	2.97 ± 0.62	3.97 ± 0.81	<0.001
6 Weeks	3.17 ± 0.65	3.80 ± 0.76	<0.001
4 Months	3.03 ± 0.72	3.83 ± 0.70	<0.001
12 Months	2.37 ± 0.76	3.73 ± 1.14	<0.001



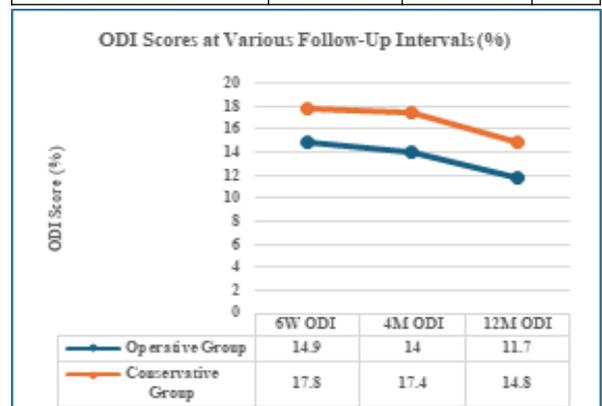
Functional Outcomes

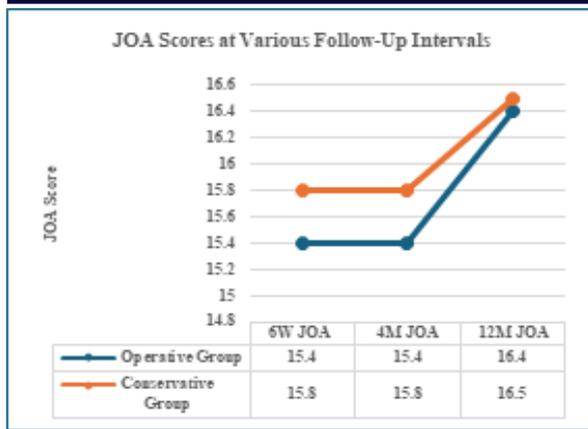
Functional outcomes, evaluated using the Oswestry Disability Index (ODI) and the Japanese Orthopaedic Association (JOA) score, showed a consistent trend favouring the operative group in terms of disability reduction. ODI scores were significantly lower in the operative group at 6 weeks, 4 months, and 12 months (all p < 0.001), demonstrating superior functional independence throughout the follow-up period.

JOA scores showed a contrasting trend in the early stages, with the conservative group scoring slightly higher at 6 weeks and 4 months (p = 0.039 and p = 0.023, respectively). However, by 12 months, JOA scores were statistically comparable between the two groups (p = 0.309), indicating that both treatment modalities eventually achieved similar neurological and motor recovery outcomes.

Table 5-Functional Outcomes (ODI and JOA Scores)

Score	Operative (Mean ± SD)	Conservative (Mean ± SD)	p-value
ODI — 6 Weeks	14.90 ± 2.51	17.80 ± 2.82	<0.001
ODI — 4 Months	14.00 ± 2.48	17.40 ± 2.83	<0.001
ODI — 12 Months	11.70 ± 1.97	14.80 ± 2.27	<0.001
JOA — 6 Weeks	15.40 ± 0.73	15.80 ± 0.61	0.039
JOA — 4 Months	15.40 ± 0.73	15.80 ± 0.59	0.023
JOA — 12 Months	16.40 ± 0.49	16.50 ± 0.51	0.309



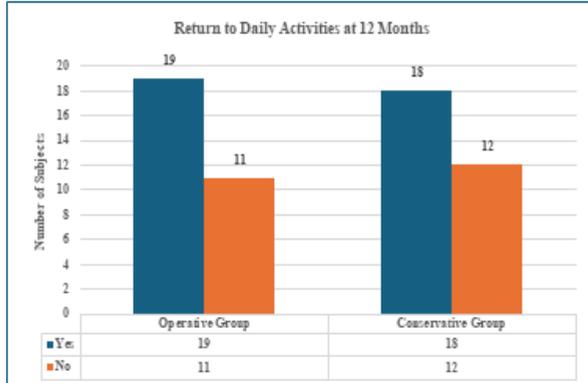


Return To Daily Activities

Return to daily activities at the 12-month follow-up demonstrated comparable outcomes between treatment groups. In the operative group, 19 patients (63.33%) resumed routine daily activities without restrictions, whereas 18 patients (60.00%) did so in the conservative group. Although the operative group showed a slight numerical advantage, the difference was not statistically significant, indicating that both treatment strategies ultimately restored functional independence in the majority of patients.

Table 6-Return To Daily Activities At 12 Months

Activity Status	Operative (n = 30)	Conservative (n = 30)	Total (n = 60)
Returned to Activities	19 (63.33%)	18 (60.00%)	37 (61.67%)
Not Returned	11 (36.67%)	12 (40.00%)	23 (38.33%)



DISCUSSION

This prospective, randomized, controlled study compared conservative management with posterior pedicle screw fixation in neurologically intact patients with stable thoraco-lumbar (T10-L2) burst fractures. Both groups were comparable at baseline in terms of age, sex, BMI, mechanism of injury, fracture level, and AO fracture type, allowing a balanced comparison of treatment outcomes. The main findings were:

- Operative management provided significantly better radiological outcomes, particularly with respect to segmental kyphosis correction and maintenance.
- Anterior vertebral body height loss over 12 months was small and not significantly different between groups.
- Surgery resulted in consistently lower VAS pain scores and better ODI scores at all follow-up intervals up to 12 months.
- JOA scores and return to daily activities at 12 months were similar between groups, suggesting comparable long-term functional and neurological recovery.

Taken together, these findings indicate that operative treatment offers clear advantages in sagittal alignment and early to mid-term pain and disability, while conservative management achieves similar neurological and overall functional independence at one year.

Baseline Profile and Comparison with Existing Literature

The study population predominantly comprised young to middle-aged adults, with 70% of patients aged between 18–40 years, reflecting a typical high-energy trauma demographic. This age pattern is in line

with previous series by Shen et al.¹, Wood et al.¹¹, Siebenga et al.¹², and Tropiano et al.¹³, all of whom reported mean ages in the mid-30s for thoraco-lumbar burst fractures. The equal sex distribution in our cohort (50% male, 50% female) contrasts with the male predominance reported in most earlier studies but is advantageous from a methodological standpoint, reducing sex-related confounding in pain perception or functional recovery.

High-energy trauma mechanisms predominated, with road traffic accidents and falls from height accounting for the vast majority of injuries, mirroring the patterns described in earlier clinical and systematic studies. L1 was the most frequently involved vertebra, followed by T11 and T12, reaffirming the thoraco-lumbar junction as the biomechanically vulnerable transition zone. AO Type A3 fractures were more common than A4, and A4 fractures were proportionally more frequent in the operative group, reflecting real-world clinical preference to treat more complex, comminuted fractures surgically. This distribution is consistent with previous series and supports the external validity of the present cohort.

Radiological Outcomes: Kyphosis and Vertebral Height

The operative group showed significantly lower initial kyphosis and significantly less progression of kyphotic deformity at 12 months compared to the conservative group. Mean loss of kyphosis was roughly half in the operative arm, demonstrating that posterior pedicle screw fixation effectively maintains sagittal alignment. These results closely parallel those of Siebenga et al.¹² and Pehlivanoglu et al.¹, who also reported superior kyphosis correction and maintenance with surgical stabilization compared with nonoperative treatment.

In contrast, the loss of anterior vertebral body height over 12 months was modest and not significantly different between groups, despite higher absolute vertebral height in the operative group at baseline and follow-up. Similar observations have been made in earlier studies, where surgery improved alignment and vertebral body morphology but did not always produce a statistically meaningful difference in height loss compared with conservative management. Meta-analytic data also suggest that while surgery achieves better radiographic correction, particularly in kyphosis, the clinical relevance of these radiological gains remains debated.

Pain And Functional Outcomes

Pain outcomes in this study clearly favoured the operative group. VAS pain scores were significantly lower at all time points—from 2 weeks through 12 months—among surgically treated patients. This suggests that mechanical stabilization with posterior instrumentation translates into better pain control both in the early postoperative phase and over the medium term. These findings echo the early and mid-term results reported by Shen et al.¹ and Siebenga et al.¹², who also observed lower pain scores in surgical cohorts during the first months to years of follow-up.

Functional disability, as measured by the ODI, was consistently and significantly lower in the operative group at 6 weeks, 4 months, and 12 months, indicating superior early and mid-term recovery of daily activities and work capacity with surgical management. This is in agreement with Siebenga et al.¹², who demonstrated better functional scores in surgically managed A3 burst fractures.

However, long-term studies and meta-analyses introduce nuance to this apparent advantage. Work by Wood et al.¹¹, as well as pooled data from Gnanenthiran et al.¹, Rometsch et al.¹, and Chou et al.¹, have shown that differences in pain and disability between surgical and non-surgical groups tend to diminish over longer follow-up periods, with some studies even demonstrating superior long-term pain and disability outcomes in nonoperatively treated patients.

Neurological Recovery And Return To Daily Activities

JOA scores in this study revealed small, early differences and long-term equivalence between groups. The conservative group had slightly higher JOA scores at 6 weeks and 4 months, likely reflecting the absence of surgical trauma and perioperative morbidity. By 12 months, however, JOA scores were essentially identical, indicating comparable neurological and functional recovery in both groups. This pattern is in line with Pehlivanoglu et al.¹, Hitchon et al.¹, and multiple meta-analyses, which collectively indicate that surgery does not confer a neurological advantage in patients who are neurologically intact at baseline.

Return to daily activities at 12 months was also similar between groups, with 63.3% of operative and 60.0% of conservative patients resuming routine activities. These findings mirror earlier randomized trials and systematic reviews that report no significant difference in return-to-work or return-to-activity rates between surgical and non-surgical treatment in neurologically intact thoraco-lumbar burst fractures.

Strengths And Limitations

The strengths of this study include its prospective, randomized, controlled design, the homogeneous inclusion of neurologically intact AO Type A3 and A4 burst fractures, and the use of standardized outcome measures (VAS, ODI, JOA, kyphosis angle, vertebral height) with a clearly defined follow-up schedule. Balanced baseline demographics and fracture profiles enhance internal validity and support direct comparison of conservative and operative treatment.

However, several limitations must be acknowledged. This was a single-centre study with a relatively modest sample size ($n = 60$), which may limit the statistical power to detect smaller differences and affects generalizability. The follow-up duration of 12 months, while adequate for early and mid-term assessment, does not capture potential long-term divergences in pain, disability, implant-related complications, or adjacent segment degeneration. The study did not include formal cost-effectiveness analysis, work productivity data, or broader quality-of-life instruments beyond ODI and JOA, all of which are relevant when comparing surgery with conservative care. Finally, blinding of patients and clinicians was not feasible due to the nature of interventions, introducing a potential risk of performance and reporting bias.

Clinical Implications And Future Directions

The findings of this study support a selective approach to the management of neurologically intact thoraco-lumbar burst fractures. Operative posterior fixation offers clear benefits in terms of better sagittal alignment, improved pain control, and superior early and mid-term functional outcomes, and may be especially appropriate in younger, active patients, in those with more severe deformity or A4 fractures, and in individuals whose occupational demands favour rapid mobilization and alignment correction.

Conversely, conservative management with bracing and structured physiotherapy yields comparable neurological outcomes and return to daily activities at one year, with acceptable radiological results and without the risks, costs, and potential long-term hardware-related issues associated with surgery. For many patients with stable fractures, minimal kyphosis, and lower functional demands, nonoperative treatment remains a valid and evidence-supported option.

Future multicentre trials with larger sample sizes, extended follow-up, and integrated health-economic and quality-of-life analyses are needed to clarify which subgroups derive the greatest long-term benefit from surgery and to define thresholds of deformity, pain, and instability that should prompt operative intervention. Until such data are available, management decisions should be individualized, balancing radiological findings, patient expectations, comorbidities, socio-occupational demands, and resource availability.

CONCLUSION

In neurologically intact patients with stable thoraco-lumbar burst fractures, both conservative management and posterior pedicle screw fixation proved to be effective treatment strategies. Surgical intervention demonstrated clear advantages in terms of maintaining sagittal alignment, reducing kyphotic progression, and achieving superior early to mid-term pain relief and functional recovery reflected by lower VAS and ODI scores. However, conservative treatment produced comparable long-term neurological function and return to daily activities at 12 months, without the risks or costs associated with surgery. The comparable anterior vertebral body height loss and similar 12-month JOA scores between groups indicate that radiological improvements following surgery do not necessarily translate into superior long-term clinical outcomes in neurologically intact patients. These findings reinforce that the decision to operate should not be based solely on radiological deformity, but should instead take into account fracture stability, patient age and activity level, occupational demands, symptom burden, expectations, and rehabilitation capacity. Overall, posterior pedicle screw fixation is advantageous for patients requiring rapid mobilization, deformity

correction, and earlier pain resolution, while conservative management remains a valid and effective alternative for patients with stable fractures, mild deformity, and lower physical demands. Future multicentre studies with larger sample sizes, cost-utility analysis, and longer follow-up are warranted to identify the subgroups of patients who benefit most from surgical versus non-surgical treatment and to better define evidence-based treatment algorithms for thoraco-lumbar burst fractures.

Conflict Of Interest:

The authors declare that they have no conflict of interest related to this research.

Source Of Funding:

This study was conducted as part of the academic requirements at S.M.S. Medical College & Attached Hospitals, Jaipur. No external funding was received for this research.

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