ORIGINAL ARTICLE

The effect of fusion levels on clinical outcomes in traumatic lower lumbar vertebral fractures

Halil Gök,[1] Alim Can Baymurat,[2] Asim Ahmadov,[2] Alpaslan Senkoylu[2]

[1]Department of Orthopaedics and Traumatology, Ankara Etlik City Hospital, Ankara-*Türkiye*

[2]Department of Orthopaedics and Traumatology, Gazi University Faculty of Medicine, Ankara-*Türkiye*

ABSTRACT

BACKGROUND: Fractures of the lower lumbar spine (LLS) are uncommon and present unique biomechanical challenges. This study aimed to assess and compare the clinical and radiological outcomes of short-segment posterior instrumentation (SSPI) versus long-segment posterior instrumentation (LSPI).

METHODS: A retrospective cohort of patients aged 18–63 years who underwent posterior instrumentation for thoracolumbar (TL, T10–L2) or LLS (L3–L5) fractures between 2005 and 2022 was analyzed. SSPI was applied for AO type A2–A4 injuries, while LSPI was reserved for type B2, B3, and C injuries. Functional outcomes were assessed using the Oswestry Disability Index (ODI) and visual analog scale (VAS), while radiological alignment was evaluated with the sagittal Cobb angle (SCA). Forty-nine patients were included: 33 with thoracolumbar (TL) fractures and 16 with LLS fractures.

RESULTS: Eight LLS patients underwent SSPI, eight received LSPI, and all TL fractures were treated with SSPI. SCA improved significantly in all groups ($p<0.001$). In LLS fractures, LSPI resulted in worse function (ODI 40.6±15.4 vs. 25.4±7.2, $p=0.040$; VAS 3.0±1.7 vs. 2.2±2.4, $p=0.038$) compared with SSPI. Functional outcomes for LL-SSPI and TL-SSPI were comparable. SSPI achieved similar radiological correction with 19% shorter operative time and reduced blood loss.

CONCLUSION: In this study, the SSPI method was found to be a safe option for the management of LLS fractures from both clinical and radiological perspectives. In contrast, the LSPI method should be reserved for highly unstable injuries, as it may have a detrimental effect on lumbar function.

Keywords: Lower lumbar fractures; short-segment fusion; long-segment fusion; posterior instrumentation; Oswestry Disability Index; sagittal Cobb angle.

INTRODUCTION

Lower lumbar spine (LLS) fractures are relatively uncommon compared to thoracolumbar injuries, and there remains no clear consensus among spine surgeons regarding their optimal management.[1,2] One of the most commonly reported disadvantages of conservative treatment is pain and neurological dysfunction, occurring in 20-50% of cases due to progressive loss of lumbar lordosis and collapse of the vertebral body. In contrast, surgical management is associated with specific concerns. The incidence of complications following surgical treatment has been reported to range between 3% and 11%. These include pedicle screw malposition, dural or nerve root injury, and the sacrifice of motion segments, which may accelerate adjacent segment degeneration.[3,4]

This region is characterized by larger vertebral bodies, strong paraspinal muscles, sagittally oriented facet joints, pronounced lumbar lordosis, and increased mobility.[5] These features contribute to mechanical stability but also complicate surgical

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Address for correspondence: Alim Can Baymurat

Department of Orthopaedics and Traumatology, Gazi University Faculty of Medicine, Ankara, Türkiye

E-mail: alimcanbaymurat@yahoo.com

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decision-making. Inadequately managed LLS fractures can lead to neurological impairment, persistent pain, and progressive deformity.[6] The primary surgical objectives are restoration of vertebral alignment, stabilization of the spinal column, and prevention of further neurological injury.[7]

Extensive research exists on surgical strategies for thoracolumbar (TL) and lumbar fractures, with multiple studies showing favorable results for short-segment posterior instrumentation (SSPI) compared to traditional long-segment posterior instrumentation (LSPI).[1,2,7] While operative management is well established for unstable LLS fractures, there remains ongoing debate regarding the optimal length of fixation, particularly in relation to AO classification.[2,4,8] High-quality comparative evidence focusing specifically on LLS fractures remains limited.[8]

We postulated that SSPI offers similar clinical and radiological outcomes for type A LLS fractures as it does for TL fractures, and provides superior functional results compared to LSPI in type B and C fractures. The present study aimed to compare mid- to long-term outcomes of SSPI and LSPI in LLS fractures, with TL-SSPI serving as the reference group.

MATERIALS AND METHODS

Study Design and Ethical Considerations

This retrospective analysis received approval from the institutional review board and adhered to the principles of the Declaration of Helsinki (Approval No: E-77082166-604.01-1176128, 19.02.2025). Eligible participants were patients aged 18-63 years who underwent posterior instrumentation (PI) for thoracolumbar (TL) or LLS fractures between 2005 and 2022. Only those treated within two weeks post-injury and followed for at least 24 months (mean follow-up: 84 months) were included. The two-week threshold was chosen to ensure uniformity in early surgical intervention and to minimize the risk of neurological deterioration.

Fracture types were classified using the AO Spine TL Injury Classification System. Eligible injuries included types A2, A3, A4, B2, B3, and C. Exclusion criteria were complete spinal cord injury, severe osteoporosis (T-score ≤-2.5 or requiring cement-augmented fixation), pathological fractures, prior spinal surgery, active infection, and revision procedures (Fig. 1). Each patient provided written informed consent allowing the utilization of clinical and radiological records for scientific purposes.

Fracture Classification and Surgical Decision-Making

Fracture patterns were identified using the AO Spine TL Injury Classification System. Surgical technique was determined according to fracture type and the extent of ligamentous injury. SSPI was performed in type A2 (split fractures), type A3 (incomplete burst with progressive collapse), and type A4 (complete burst) injuries, where ligamentous compromise was minimal. LSPI was reserved for type B2 (posterior tension band disruption), type B3 (hyperextension injury), and type C (fracture-dislocation), which exhibit significant instability requiring extended fixation.

All fractures were independently assessed by two senior spine surgeons, with preoperative consensus reached in every case. Interobserver reliability for classification was high (Cohen's κ=0.87). This approach ensured consistency in both fracture evaluation and instrumentation selection.

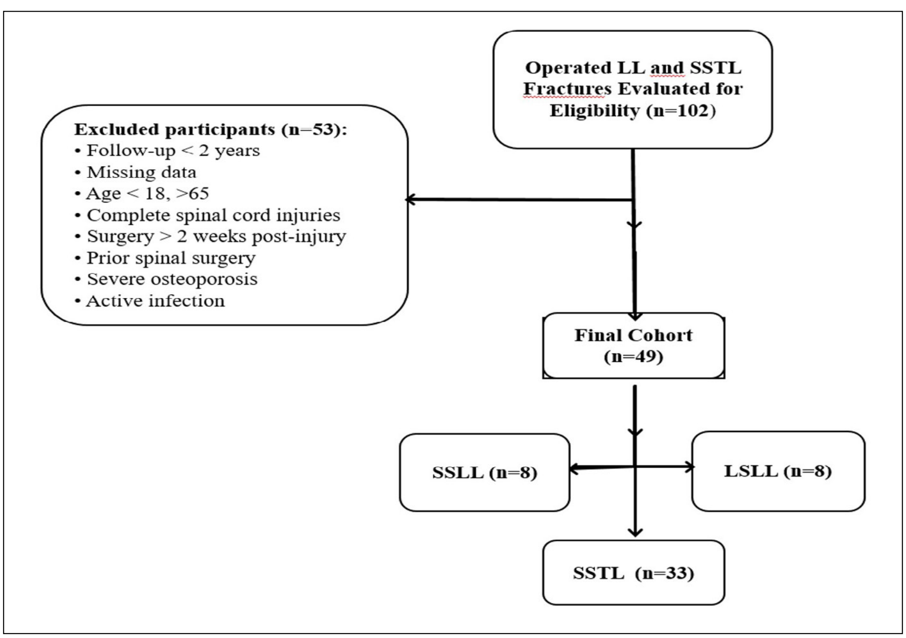

Figure 1. Patient selection flowchart. *LL: Lower Lumbar; SSTL: Short-segment thoracolumbar; SSLL: Short-segment lower lumbar; short-segment posterior instrumentation; LSLL: Long-segment lower lumbar.*

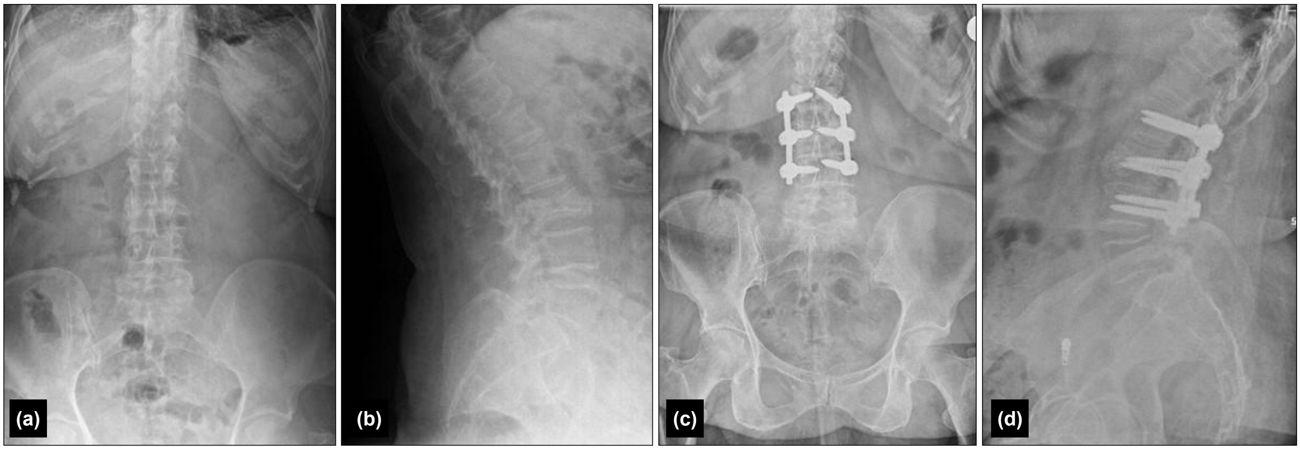

Figure 2. Preoperative **(a,b)** and postoperative **(c,d)** plain radiographs of a patient who underwent short segment posterior instrumentation for L 3 vertebral fracture.

Patient Groups

A total of 49 patients were included in the study. They were categorized into three cohorts according to the fracture site and the surgical technique employed. The TL group comprised 33 patients, whereas the LLS group included 16 patients (SSPI: 8; LSPI: 8) (Fig. 1):

1. LL-SSPI Group: Fixation included the fractured vertebra, one vertebra above, and one below.

2. LL-LSPI Group: Fixation encompassed the fractured vertebra plus at least two vertebrae above and below.

3. TL-SSPI Group: Used as a control group, following the same fixation principles as LL-SSPI.

It is important to note that the LL-SSPI and LL-LSPI groups represented different fracture severities (type A vs. types B/C), which limits the validity of direct comparisons between them.

Surgical Procedure

Two experienced spine surgeons performed all procedures using a standardized posterior approach with the patient in the prone position. Intravenous prophylactic antibiotics were administered 30 minutes before incision. Bilateral pedicle screws were placed using the freehand method under fluoroscopic guidance. The screws measured 5.5–6.5 mm in diameter and 40–50 mm in length, and all were composed of polyaxial titanium.

For SSPI, screws were placed in the fractured vertebra and its immediate neighbors (Fig. 2 a, b, c, d), while LSPI included additional segments above and below (Fig. 3 a, b, c, d). Fracture reduction was achieved primarily by ligamentotaxis. Fusion was performed in all patients using autografts harvested from spinous processes and lamina, supplemented with morselized allografts when necessary. No vertebral augmentation techniques (vertebroplasty or kyphoplasty) were applied in this series.

Data Collection and Outcome Measures

Demographic information (age, sex, Body Mass Index [BMI]), fracture classification, and neurological status were retrieved from medical records. Functional assessment employed the Oswestry Disability Index (ODI) and visual analog scale (VAS) scores, recorded preoperatively and at final follow-up. Radiological evaluation of sagittal Cobb angle (SCA) and sagittal alignment parameters was performed using lateral radiographs at three time points: preoperative, early postoperative, and final follow-up.

Intraoperative data included duration of surgery, estimated blood loss, length of hospital stay, and perioperative complications.

Statistical Methods

The statistical analyses were conducted using IBM SPSS Statistics version 27 (IBM Corp., Armonk, NY, USA). Continuous data were expressed as mean±standard deviation or as median with interquartile range, whereas categorical data were presented as frequencies and percentages. The Shapiro-Wilk test was employed to verify normality. In cases of non-normal distribution, non-parametric tests were applied.

Comparisons of continuous variables between groups were performed using the Mann-Whitney U test, while categorical variables were analyzed with chi-square or Fisher's exact tests. Longitudinal changes in SCA were examined using the Friedman test, with Wilcoxon signed-rank post hoc analyses applied subsequently, and Kendall's W was computed to evaluate agreement. Multiple comparisons were adjusted using the Benjamini-Hochberg procedure. A p-value <0.05 denoted statistical significance.

RESULTS

A total of 49 patients were included in this study: 33 with TL fractures and 16 with LLS fractures. Among the LLS fracture

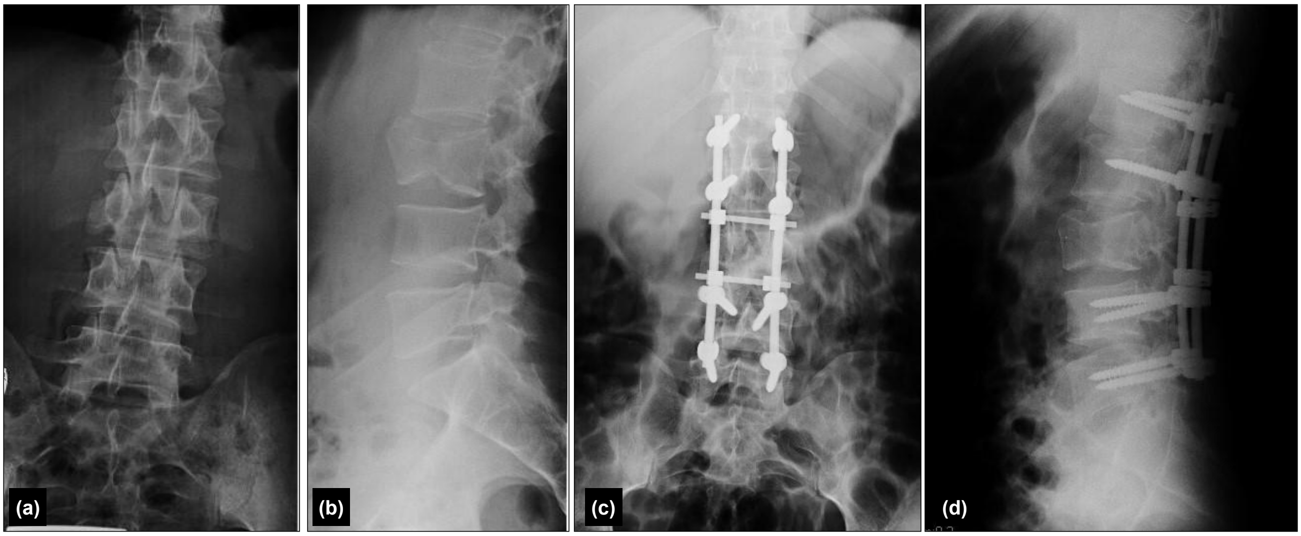

Figure 3. Preoperative **(a,b)** and postoperative **(c,d)** plain radiographs of a patient who underwent long segment posterior instrumentation for L 3 vertebral fracture.

patients, eight underwent SSPI and eight underwent LSPI, while all 33 TL fracture patients were treated with SSPI. The median age of all patients was 39 years (range: 18–63 years), with no significant difference in age between the TL and LLS groups (p=0.773). The majority of patients were male, and sex distribution was similar across groups (p>0.05). Median follow-up duration was 84 months (range: 60–232 months). No significant differences in follow-up duration were ob-

Table 1. Demographic and baseline clinical characteristics of patients with thoracolumbar (TL) and lower lumbar (LL) fractures

	TL Fractures (n=33)	LL Fractures (n=16)	Total	P values[a]
Age (mean±SD)	40.5±14.1	39.1±11.4	40.1±13.2	0.773
Follow-up period (months) (mean±SD)	91.1±35.3	95.1±32.8	92.4±34.2	0.481
Median (IQR)	83 (70–97)	83 (71–94.5)	84 (71–94.5)	-
Sex (F/M)	11 (33.3%) / 22 (66.7%)	4 (25.0%) / 12 (75.0%)	15 (30.6%) / 34 (69.4%)	0.743[b]
Level of fracture	L1: 7 (21.2%), L2: 7 (21.2%), T10: 5 (15.2%), T11: 6 (18.2%), T12: 8 (24.2%)	L3: 7 (43.8%), L4: 8 (50.0%), L5: 1 (6.3%)	L1: 7 (14.3%), L2: 7 (14.3%), L3: 7 (14.3%), L4: 8 (16.3%), L5: 1 (2.0%), T10: 5 (10.2%), T11: 6 (12.2%), T12: 8 (16.3%)	-
PI length (Short ≤2 / Long ≥3)	33 (100%)	8 (50.0%) / 8 (50.0%)	33 (67.3%) / 16 (32.7%)	0.761[b]
PI length (mean±SD)	2.9±0.9	3.1±1.3	3.0±1.0	0.757
BMI (mean±SD)	25.6±4.1	27.8±5.0	26.3±4.5	0.196
ODI (mean±SD)	22.9±10.6	33.0±14.0	26.2±12.6	0.019
VAS (mean±SD)	1.6±1.1	2.2±2.0	2.1±1.6	0.065

TL: Thoracolumbar; LL: Lower lumbar; SD: Standard deviation; ODI: Oswestry Disability index; VAS: Visual analog scale; BMI: Body Mass Index. Values are presented as mean±standard deviation for continuous variables and frequencies (percentages) for categorical variables. P-values for continuous variables were derived from aMann-Whitney U tests. For categorical variables, bchi-square or Fisher's exact test was used. Significant differences (p<0.05) were observed for the Oswestry Disability Index (ODI) and Visual Analog Scale (VAS) scores. IQR: Interquartile range (Q3–Q1).

served among groups (p=0.481 for TL vs. LLS; p=0.682 for SSPI, p=0.710 for LSPI). The interquartile range (IQR) for follow-up was 71–94.5 months (Q1=71, Q3=94.5), indicating consistency of long-term surveillance across groups. Detailed demographic characteristics and fracture features are presented in Table 1.

Significant improvements in SCA were observed in all groups throughout follow-up (p<0.001 for all). Preoperative mean SCA was significantly higher in the TL fracture group (25.5°±6.4°) compared to the LLS fracture group (12.0°±2.3°; p<0.001). Postoperative and final follow-up measurements showed significant and sustained correction in both TL and LLS fracture groups, with significant differences persisting between these groups (postoperative p<0.001, final follow-up p<0.001). SSPI resulted in significant improvements in SCA for both TL (mean improvement: 17.1°±3.8°) and LLS fractures (mean improvement: 13.0°±3.6°), with no statistically significant differences between these two groups (p>0.05, effect size=0.32). In contrast, LSPI achieved significantly greater improvement in SCA for TL fractures compared to LLS fractures (TL: 25.7°±8.0° vs. LLS: 13.3°±3.1°, p<0.05, effect size=0.49). Friedman test results indicated significant changes across measurement points within all groups (p<0.001), supported by strong concordance as indicated by Kendall's W (TL fractures: 0.904–0.945; LLS fractures: 0.939–0.945). Comprehensive results for SCA measurements are summarized in Table 2. Effect sizes (Cohen's d) for all pairwise comparisons are provided in Table 2 to facilitate clinical interpretation.

At final follow-up, clinical outcomes assessed by ODI and VAS scores showed significantly better results for the TL fracture group compared to the LLS fracture group (ODI: p=0.019, VAS: p=0.005). Specifically, within the LLS fracture group, ODI scores in patients treated with LSPI were significantly higher (indicating worse disability) compared to TL fracture patients (p=0.040, effect size=0.33). Within the SSPI group, ODI and VAS scores were lower in TL fracture patients compared to LLS fracture patients, though these differences did not reach statistical significance (ODI: p=0.255, VAS: p=0.066). Due to differences in fracture types between SSPI (AO type A) and LSPI (AO type B and C) within the LLS fracture group, these subgroup comparisons should be interpreted with caution. Detailed clinical outcomes (ODI and VAS scores) are presented in Table 3.

Table 2. Comparative analysis of functional and radiological outcomes in patients with thoracolumbar (TL) and lower lumbar fractures by surgical technique

Variable	TL SSPI (n=33) (mean±SD)	LL SSPI (n=8) (mean±SD)	LL LSPI (n=8) (mean±SD)	P value (LL)	P value (S)	P value (L)
Age	45.21±14.33	40.25±12.10	38.00±11.39	0.938	0.46125	0.71
Follow-up period (months)	84.86±18.24	87.50±16.51	102.75±43.59	0.917	0.682	0.71
Sex (F/M)	33%/67% (11/22)	37.5%/62.5% (3/5)	12.5%/87.5% (1/7)		0.675	1
ODI	20.36±10.26	25.38±7.17	40.63±15.42	0.459	0.255	0.040 (0.33)*
VAS	1.96±1.08	2.18±2.39	3.00±1.69	1	0.0666	0.038
BMI	24.64±3.39	26.75±4.53	28.75±5.63	1	0.46125	0.258
Preoperative SCA	21.14±3.66	11.50±2.14	12.50±2.56	1	<0.001 (0.55)*	<0.001 (0.55)*
Postoperative SCA	3.57±1.83	-2.75±1.49	-3.00±1.51	0.938	<0.001 (0.54)*	<0.001 (0.54)*
Last control SCA	4.07±2.46	-1.50±2.27	-0.75±1.39	1	0.003 (0.49)*	0.005 (0.44)*
Improvement in SCA	17.1±3.83	13.00±3.6	13.25±3.06	0.915	0.050 (0.32)*	0.003 (0.49)*

TL: Thoracolumbar; LL: Lower lumbar; SD: Standard deviation; SSPI: Short-segment posterior instrumentation; LSPI: Long-segment posterior instrumentation; SCA: Sagittal Cobb angle; Preop: Preoperative; Postop: Postoperative; ODI: Oswestry Disability Index; VAS: Visual analog scale; BMI: Body Mass Index. P value (S) represents the Mann-Whitney U test comparing short posterior instrumentation (PI) fusions between thoracolumbar (TL) and lower lumbar (LL) fractures. P value (L) represents the Mann-Whitney U test comparing long pelvic incidence–based (PI) fusions between TL and LL fractures. P value (TL) represents the Mann-Whitney U test comparing short and long PI fusions within TL fractures. P value (LL) represents the Mann-Whitney U test comparing short and long PI fusions within LL fractures. All p values were adjusted for Type I error using the Benjamini-Hochberg procedure. Effect sizes (Cohen's d equivalent) are indicated in parentheses for significant p values, marked with an asterisk (*). Improvement in the sagittal Cobb angle (SCA) was calculated as the difference between the last follow-up SCA and the preoperative SCA. Statistical significance was set at p<0.05.

Table 3. Sagittal Cobb angles at preoperative, postoperative, and final follow-up in thoracolumbar (TL) and lower lumbar fractures

	TL Fractures (n=33)	LL Fractures (n=16)	Total	P values
Preoperative SCA (mean±SD)	25.5±6.4	12.0±2.3	21.1±8.4	<0.001
Postoperative SCA (mean±SD)	2.6±2.0	-2.9±1.5	0.8±3.2	<0.001
Last control SCA (mean±SD)	3.5±2.6	-1.1±1.9	2.0±3.2	<0.001

TL: Thoracolumbar; LL: Lower lumbar; SD: Standard deviation; SSPI: Short-segment posterior instrumentation; LSPI: Long-segment posterior instrumentation; SCA: Sagittal Cobb angle; Preop: Preoperative; Postop: Postoperative.

DISCUSSION

This study tested the hypothesis that SSPI in LLS fractures achieves functional outcomes comparable to TL-SSPI and provides superior results to LSPI in the LLS region. Our findings support this, showing that LLS fractures managed with SSPI had ODI and VAS outcomes similar to those of TL fractures treated with the same technique, and better than LLS fractures treated with LSPI.

The increased mobility and unique biomechanical profile of the LLS spine contribute to the challenge of surgical management. While LSPI offers strong stabilization, it also limits lumbar motion and may accelerate adjacent segment degeneration, leading to worse long-term function. This was reflected in our cohort, where LLS-LSPI patients demonstrated higher ODI scores. Conversely, SSPI preserved segmental mobility while maintaining radiological correction, which may explain the superior functional outcomes.

Previous literature has suggested that SSPI is biomechanically sufficient in stable or moderately unstable LLS fractures, particularly when pedicle screws are placed into the fractured vertebra.[2] Our results align with these findings, as both SSPI and LSPI produced significant sagittal correction, with no statistical difference in the magnitude of improvement. Notably, pedicle screws were consistently inserted at the fracture level in SSPI cases, enhancing construct stability through ligamentotaxis.

Unlike osteoporotic burst fractures, high-energy traumatic LLS fractures typically occur in younger patients, whose bone quality is usually sufficient for pedicle screw fixation.[9] There are a limited number of high-quality studies on the optimal management of LLS fractures. Several publications advocate for conservative treatment in neurologically intact patients, emphasizing favorable outcomes in selected cases.[3,10] In contrast, other studies highlight the biomechanical challenges of this region and report superior radiological and functional results with SSPI.[4,11] Most current guidelines and recent evidence recommend surgical intervention for unstable LLS fractures—especially those with significant vertebral body collapse, posterior ligamentous complex injury, or progressive deformity—while conservative treatment is reserved for stable fracture patterns and patients without neurological deficits.[7] Our findings are consistent with this evidence, as SSPI provided satisfactory outcomes in appropriately selected LLS fracture patients, further supporting its role as an effective surgical approach for instability in this anatomically unique region. Kaminski et al.[10] reported that transpedicular bone grafting combined with posterior fixation for LLS fractures was insufficient to correct local kyphosis and failed to restore lumbar lordosis adequately. Due to a high complication rate, the authors suggested that conservative treatment may be reasonable in selected cases. In contrast, our study demonstrated significant improvement in SCA after posterior instrumentation in LLS fractures. Notably, preoperative SCA values were similar between the SSPI and LSPI groups within LLS fractures. However, both postoperative and final follow-up SCA measurements indicated significant and sustained restoration of sagittal alignment in both groups, highlighting the effectiveness of posterior instrumentation. Although the improvement in SCA was numerically greater in the LSPI group, there was no statistically significant difference compared to SSPI. Importantly, the correction achieved between preoperative and postoperative values was significant for both techniques. These results align with prior investigations indicating that insertion of pedicle screws into the injured vertebra, particularly in the context of short-segment instrumentation, is effective for correcting local kyphotic deformity and restoring sagittal alignment via ligamentotaxis.[12,13] In our cohort, pedicle screws were placed into the fractured vertebra in all patients who underwent short-segment fixation, supporting this approach for optimal alignment and stability in selected LLS fractures.

Regarding functional assessment, Erkan et al.[4] reported that patients with LLS fractures managed conservatively experienced improvements in functional (ODI) and pain (VAS) scores at final follow-up. Similarly, in our study, both ODI and VAS values showed significant improvement at final follow-up across all groups. Notably, patients with TL fractures and those with LLS fractures treated with SSPI achieved similar functional outcomes, as reflected by comparable ODI and VAS scores. However, LLS fracture patients who underwent LSPI had significantly higher ODI values at final follow-up, indicating greater residual disability. These findings suggest that both conservative and surgical management can lead to functional improvement in LLS fractures. However, LSPI may be associated with less favorable outcomes compared to short-segment fixation, likely due to greater loss of lumbar mobility and increased biomechanical stress on adjacent segments.

A recent study by Suer et al.[7] highlighted that SSPI offers advantages such as reduced operative time and less intraoperative blood loss compared to LSPI. Several studies have reported significantly less blood loss, shorter incision lengths, and shorter operative times, especially with SSPI, including cases involving fractured vertebrae.[8,14-16] These findings are consistent with our results, as SSPI in the present study provided effective clinical and radiological outcomes while reducing surgical invasiveness.

Limitations

This investigation is subject to certain limitations. Primarily, the retrospective nature of the study may lead to inherent biases, such as those related to case selection and outcome reporting, which might restrict the external validity of the findings. In addition, residual confounding from unmeasured factors such as baseline comorbidities or injury energy could not be excluded. Second, the limited number of participants, especially in the lower lumbar fracture subgroups, reduces the robustness of statistical analyses and increases the likelihood of false-negative findings. Third, functional outcomes (ODI and VAS scores) were assessed only at the final follow-up, so changes over time could not be evaluated. Moreover, advances in implant technology and surgical techniques over the 2005–2022 study period may have introduced treatment heterogeneity. Although patients with known severe osteoporosis or poor intraoperative bone quality requiring cement augmentation were excluded, routine dual-energy X-ray absorptiometry (DEXA) screening was not performed for all patients. Therefore, the impact of subclinical low bone mineral density on clinical or radiological outcomes could not be assessed. Furthermore, one of the significant limitations of the study is that adjacent segment disease was not evaluated. In particular, adjacent segment disease following fusion surgery in the mobile lumbar region is a significant problem. Finally, as a single-center study, these findings may not be fully generalizable to other patient populations or clinical settings. To further validate and expand upon these findings, a prospective multicenter study is being planned.

CONCLUSION

Current evidence on lower lumbar fractures remains scarce, and clinical decision-making is often extrapolated from thoracolumbar injury data. In this study, SSPI emerged as a less invasive yet effective surgical option for both LLS and TL fractures, offering significant functional and radiological improvement. Particularly in stable or moderately unstable fracture patterns, SSPI yielded outcomes comparable to LSPI while better preserving lumbar mobility and minimizing surgical morbidity. Given these advantages, SSPI may be considered the preferred surgical strategy in appropriately selected LLS fractures. However, LSPI retains its role in highly unstable injuries where extended fixation is warranted. Careful patient selection based on fracture type and degree of instability remains essential. Extensive multicenter, forward-looking investigations are required to substantiate the present observations and to refine evidence-based guidelines for this anatomically unique region of the spine.

Ethics Committee Approval: This study was approved by the Gazi University Rectorate Ethics Committee (Date: 19.02.2025, Decision No: E-77082166-604.01-1176128).

Peer-review: Externally peer-reviewed.

Authorship Contributions: Concept: H.G., A.C.B., A.A.; Design: H.G., A.A., A.S.; Supervision: H.G., A.S.; Resource: A.A., A.C.B., H.G.; Materials: A.C.B., A.A.; Data collection and/or processing: H.G., A.C.B.; Analysis and/or interpretation: H.G., A.C.B., A.A., A.S.; Literature review: H.G., A.C.B., A.A., A.S.; Writing: A.A., A.C.B., H.G.; Critical review: H.G., A.C.B., A.A., A.S.

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ORİJİNAL ÇALIŞMA - *ÖZ*

Travmatik alt lomber vertebra kırıklarında füzyon seviyelerinin klinik sonuçlara etkisi

AMAÇ: Alt lomber (AL) omurga travmatik kırıkları nadir görülür ve özgün biyomekanik zorluklar içerir. Bu çalışma, kısa segment posterior enstrümantasyonun (KSPE) uzun segment posterior enstrümantasyona (USPE) kıyasla klinik ve radyolojik sonuçlarını karşılaştırmayı amaçlamaktadır.
GEREÇ VE YÖNTEM: 2005–2022 yılları arasında, 18–63 yaş aralığında olup torakolomber (TL) (T10-L2) ve AL (L3-L5) seviyelerinde kırık nedeniyle posterior enstrümantasyon uygulanan hastalar retrospektif olarak incelendi. Tip A2-A4 kırıklarda KSPE, tip B2, B3 ve C kırıklarda ise USPE tercih edildi. Fonksiyonel sonuçlar Oswestry Disabilite İndeksi (ODİ) ve Vizüel Analog Skala (VAS) ile, radyolojik sonuçlar ise sagittal Cobb açısı (SCA) ile değerlendirildi. Toplam 49 hasta analiz edildi (33 TL, 16 AL).
BULGULAR: AL kırığı olan 8 hastaya KSPE, 8 hastaya USPE uygulandı. Tüm TL hastaları KSPE ile tedavi edildi. SCA tüm gruplarda anlamlı şekilde düzeldi ($p<0.001$). AL-USPE sonrası fonksiyonel skorlar daha kötüydü: ortalama ODI 40.6±15.4 iken AL-KSPE'de 25.4±7.2 ($p=0.040$); VAS sırasıyla 3.0±1.7 ve 2.2±2.4 ($p=0.038$). AL-KSPE sonrası ODI ve VAS skorları TL-KSPE ile benzerdi (ODI $p=0.255$; VAS $p=0.066$). KSPE, %19 daha kısa ameliyat süresi ve daha az kan kaybı ile eşdeğer radyolojik düzelme sağladı.
SONUÇ: Bu çalışmada, SSPE yönteminin hem klinik hem de radyolojik açıdan AL kırıklarının tedavisi için güvenli bir seçenek olduğu bulunmuştur. Buna karşın, USPE yöntemi lomber fonksiyon üzerinde olumsuz etkileri olabileceğinden, yüksek derecede instabil yaralanmalarda uygulanmalıdır.

Anahtar sözcükler: Alt lomber kırıklar; kısa segment füzyon; Oswestry Engellilik İndeksi; posterior enstrümantasyon; sagittal Cobb açısı; uzun segment füzyon.

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