

Spinopelvic Parameters as Predictors of Sagittal Correction Loss in Thoracolumbar Fractures

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INTRODUCTION: Thoracolumbar spine fractures can be managed either conservatively or surgically, depending on the fracture type and associated clinical factors. A common challenge in both treatment approaches is the progressive loss of correction of the sagittal alignment, particularly the correction of the sagittal profile over time. The underlying risk factors contributing to this loss of correction remain insufficiently understood. In the context of degenerative spinal disorders, spinopelvic parameters have increasingly gained relevance as key determinants in therapeutic decision-making. Building on this concept, the present study aims to systematically investigate the incidence and severity of vertebral height loss and kyphotic deformity following thoracolumbar fractures, with specific focus on their relationship to preoperatively assessed spinopelvic parameters.

METHODS: This prospective study enrolled 30 patients diagnosed with thoracolumbar vertebral fractures, treated either conservatively or surgically. The cohort comprised 14 female and 16 male patients. Spinopelvic parameters were assessed using upright lateral radiographs and included pelvic tilt (PT), pelvic incidence (PI), sacral slope (SS), lumbar lordosis (LL), sagittal vertical axis (SVA), and bisegmental kyphosis (BK). Radiological and clinical evaluations were conducted at two time points: immediately postoperatively or following initial diagnosis, and at a 3-month follow-up. Loss of sagittal alignment was quantified by calculating the change in the bisegmental kyphosis angle between the two time points. Subjective functional impairment was evaluated using the Oswestry Disability Index (ODI).

RESULTS SECTION: The study cohort had a mean age of 57 years (SD ±16). Conservative treatment was performed in 11% of patients, while 89% underwent surgical stabilization. According to the AO classification, A3 fractures were the most frequent (55%), followed by A1 and A4 fractures (11% each) and type B injuries (22%). Analysis of spinopelvic parameters revealed a positive, though weak, correlation between sacral slope, pelvic tilt, and pelvic incidence with changes in the bisegmental kyphosis angle. The sagittal vertical axis (SVA) demonstrated the strongest predictive value, showing a positive Pearson correlation ($r = 0.39$, $p = 0.055$). At the 3-month follow-up, the mean change in the bisegmental kyphosis angle was 3.5° (SD ±3.8°), highlighting the tendency toward progressive sagittal correction loss over time.

DISCUSSION: The findings of this study demonstrate a positive correlation between an increased sagittal vertical axis (SVA) and greater vertebral height loss in thoracolumbar fractures. At the 3-month follow-up, the mean post-treatment bisegmental angulation was 3.5° , indicating a moderate kyphotic deformity with substantial interindividual variability. While the observed correlation is moderate, it may be influenced by the limited sample size and relatively short follow-up period. These results highlight the clinical relevance of sagittal alignment—particularly the SVA—as a potential predictor of progressive post-traumatic deformity. Consequently, spinopelvic parameters should be carefully assessed and integrated into the decision-making process when selecting the optimal treatment strategy for thoracolumbar fractures.

SIGNIFICANCE/CLINICAL RELEVANCE: Despite the moderate correlation ($r = 0.39$), these findings carry important clinical implications. Acknowledging the impact of sagittal imbalance and elevated spinopelvic parameters on progressive sagittal alignment loss may enable more tailored, patient-specific strategies in the management of thoracolumbar fractures.

DISCLOSURES: None.

IMAGES AND TABLES:

Figure 1: Correlation between loss of correction and sagittal vertical axis.

Correlation between loss of correction and sagittal vertical axis

