Changes in Spinopelvic Sagittal Parameters Up to Three Years after Single-Level Lumbar Fusion

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INTRODUCTION:
Sagittal correction aims to restore the sagittal alignment parameters of the spine to normal physiologic ranges. Degenerative changes are more likely to develop in patients with worse spinopelvic alignment, leading to persistent pain and paresthesia. Thus, the primary aim of this study is to assess the status of spinopelvic alignment after single-level lumbar fusion surgery for primary degenerative conditions at various timepoints following surgery. The secondary aim is to identify factors associated with sagittal imbalance at 2-3 years postoperatively.
METHODS:
Adult patients who underwent primary single-level fusion between L4 and S1 from 2010 to 2019 were retrospectively identified. Preoperative, immediate postoperative, six-months, one-year, and two-years postoperative radiographs were reviewed. Assessed spinopelvic parameters included lumbar lordosis (LL), segmental lordosis (SL), disc height (DH), sacral slope (SS), and pelvic tilt (PT). Pelvic incidence (PI = PT + SS) and pelvic incidence-lumbar lordosis mismatch (PI-LL) were calculated. Patients were also categorized based on cutoffs for sagittal imbalance (PI-LL > 10 degrees and PT > 20 degrees), and demographic, surgical, and radiographic parameters were compared.
RESULTS:
Compared to immediate postoperative radiographs, change in SL was significantly greater at 2-3 years postoperatively than six-months postoperatively ($p=0.028$). However, changes in DH, LL, SS, PT compared to immediate postoperative radiographs were minimal at 6 months, 1 year, and 2-3 years. There were significantly more patients with PI-LL mismatch > 10 degrees immediately postoperatively compared to 6 months ($p<0.001$), 1 year ($p<0.001$), and 2-3 years ($p<0.001$). Moreover, the proportion of patients with PT > 20 degrees immediately postoperatively was significantly higher compared to 6 months ($p=0.038$), 1 year ($p=0.001$), and 2-3 years ($p=0.001$).
DISCUSSION AND CONCLUSION: This study demonstrated that radiographic spinopelvic parameters did not significantly change at 6 months postoperatively, with little difference at 1 or 2-3 years as well. Therefore, obtaining additional radiographs beyond 6 months following surgery for the purpose of tracking spinopelvic alignment may not be necessary.