Comparing single level transforaminal interbody fusions versus prone lateral interbody fusions at L4-5: A radiographic analysis for sagittal alignment and spinopelvic parameters

Gabriella P. Williams, MD; James J. Zhou, MD; Nafis B. Eghrari, BS; Juan Pedro Giraldo, MD; S. Harrison Farber, MD; Luke K. O'Neill, BS; Joseph M. Abbatematteo, MD, PharmD; Jonathan J. Lee, MD; Luis M. Tumialán, MD; Juan S. Uribe, MD

Introduction: Lateral Lumbar Interbody Fusion (LLIF) and Transforaminal Lumbar Interbody Fusion (TLIF) are common techniques used to treat various conditions in the lumbar spine. As surgical methods evolve, LLIFs in the prone position have become increasingly common and the effect of this positioning on postoperative spinal alignment should be evaluated.

Objectives: The present study aims to directly compare radiographic outcomes following prone L4-5 lateral lumbar interbody fusion (LLIF) versus transforaminal lumbar interbody fusion (TLIF).

Methods: We retrospectively identified who underwent single-level L4-L5 TLIFs and single-level prone L4-L5 LLIFs at our institution between 2017 and 2022. Preoperative and postoperative scoliosis films were analyzed to compare spinopelvic alignment outcomes.

Results: Between 2017 and 2022, 89 patients underwent single-level TLIF (n=73) or prone LLIF (n=16) with or without posterior pedicle screw fixation at L4-5. The TLIF cohort had relatively larger PI-LL mismatch than the prone LLIF group (11.8 [8.7] vs 6.0 [4.1], p=0.017). Otherwise, all pre-op radiographic measurements had no statistically significant difference. Patients in the prone LLIF group had a statistically significant reciprocal increase in postoperative segmental lordosis at L2-3 compared to the TLIF group (4.0 [3.3] vs. 0.2 [2.4], $p<0.001$). There were no other differences found between the two groups' radiographic outcomes including change in segmental lordosis at L4-5, segmental lordosis at L5-S1, or overall lumbar lordosis.

Conclusion: Both L4-5 prone LLIF and TLIF produce similar radiographic outcomes in terms of L4-5 segmental and overall lumbar lordosis, as well as overall spinopelvic alignment. However, in this analysis L4-5 prone LLIF patients had a statistically significant increase in segmental lordosis at L2-3. Further investigation is warranted to elucidate the impact of reciprocal postoperative changes in the lumbar spine and their impact on patient outcomes.