

## Reoperation Risk for Operative ASD and Nonunion in Posterolateral Lumbar Fusions with Pedicles Screws (PLFs) stopping at L1 versus T10/T11/T12

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### INTRODUCTION:

Choosing where to stop in lumbar fusions has been highly debated. An argument to go to T10/T11/T12 is that it reduces adjacent segment disease via increased stability afforded by the rib cage. However, it is also well known that extending the fusion more proximally may be associated with higher perioperative complications, nonunion, and revision surgery. Stopping at L1 means less blood loss and increased mobility but possible higher adjacent level disease. This study aims to assess if there are differences in reoperation risk for adjacent segment disease and nonunion by upper instrumented vertebrae to inform clinical practice.

### METHODS:

We conducted a cohort study using data from a US-based integrated healthcare system's Spine Registry. Adult patients  $\geq 18$  years old with degenerative disc disease who underwent primary posterior fusion with instrumentation in the lumbar/thoracic regions, including to the sacrum were included (2009-2022). Patients with diagnosis of trauma, cancer, and infection, as well as procedures that occurred outside of T10-Sacrum and with skipped levels were excluded. The exposure of interest was lumbar fusion proximal endpoint, defined as stopping at L1 vs stopping at T10/T11/T12 ( $\geq T10$ ). Propensity score-weighted Cox proportional hazards regressions were used to evaluate reoperation risk for adjacent segment disease (ASD) and for nonunion during follow-up. Prior to outcome evaluation, propensity scores were calculated using a multivariable logistic regression model with patient and surgical covariates as predictors of treatment assignment. ASD was further evaluated by follow-up time into early (0-2.5 years) and later ( $>2.5$  years) years to adjust for issues with the proportionality assumption. Hazard ratios (HR) and 95% confidence intervals (CI) are reported.

### RESULTS:

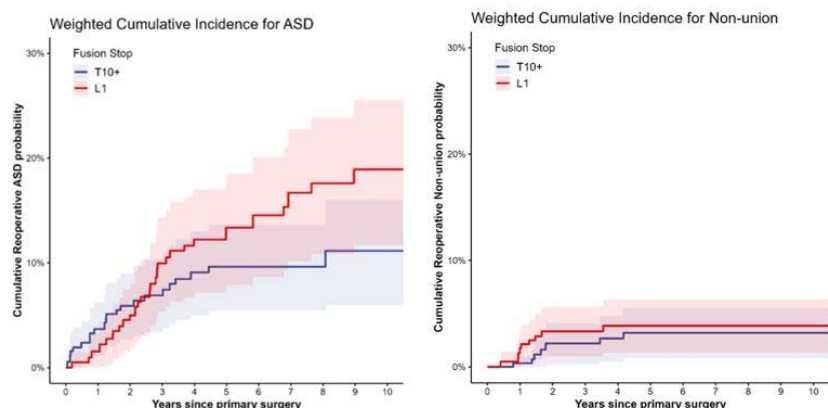
The study cohort was comprised of 455 lumbar fusions, including 227 stopping at L1 and 228 fusions stopping at  $\geq T10$ . Mean age for the cohort was 68.4 years and 51.4% were female. Median follow-up time was 6.3 years.

At 5-years follow-up, the crude incidence for operative ASD was 12.6% for L1 and 10.4% for  $\geq T10$  (Figure). After adjustment in the propensity-score weighted model, no difference in operative ASD risk was observed within 2.5-years following the lumbar fusion (HR=1.03, 95% CI=0.54-1.99). However, post 2.5-years follow-up, a lower risk of operative ASD was observed for fusions stopping at  $\geq T10$  compared to those stopping at L1 (HR=0.34, 95% CI=0.13-0.89).

Non-union incidence at 5-years follow-up was 4.5% for the L1 group and 3.8% for the  $\geq T10$  group (Figure). In the adjusted model, no difference in operative non-union was observed for fusions stopping at  $\geq T10$  compared to L1 (HR=0.75, 95% CI=0.23-2.41).

### DISCUSSION AND CONCLUSION:

There are no differences in ASD risk in short term follow-up between L1 and T10/T11/T12, however, a lower risk of ASD is observed after 2.5 years in the T10/T11/T12 group. No observed difference for nonunion risk was found between the groups.



**Figure.** Propensity score weighted cumulative incidence of operative adjacent segment disease (ASD) (left) and non-union (right) following lumbar fusions stopping at L1 and T10/T11/T12 (T10+). The shaded areas around the solid lines represent 95% CI.