Pelvic Incidence-Lumbar Lordosis Mismatch and Early Reoperation for Adjacent Segment Disease after Lumbar Fusion
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INTRODUCTION:
The incidence of symptomatic adjacent segment disease (ASD) following lumbar fusion surgery ranges from 0.6% to 3.9% per year. Sagittal malalignment may contribute to the development of ASD, particularly PI-LL mismatch, which is calculated as the difference between the pelvic incidence and lumbar lordosis. Patients with a high degree of PI-LL mismatch (over 10°) have higher incidences of ASD following lumbar fusion. The 2-year reoperation rate for patients with ASD undergoing 1-to-2 level lumbar fusion surgery was compared between patients with PI-LL mismatch and patients with normal PI-LL measurements postoperatively.

METHODS:
Consecutive patients undergoing elective 1 to 2 level lumbar fusion for degenerative conditions between 2016-2018 were retrospectively reviewed. Spinopelvic radiographic parameters were measured on immediate postoperative radiographs. PI-LL mismatch was determined using the age adjusted thresholds defined in Lafage et al. Following propensity score matching on age, sex, race, and body-mass index (BMI), early reoperation rates were compared between the PI-LL mismatch cohort and normal PI-LL cohort. Early reoperation was defined as symptomatic ASD requiring reoperation within 2 years of the index lumbar fusion surgery.

RESULTS:
A total of 219 patients underwent 1 to 2 level lumbar fusion with an average age of 59 years old and 59.8% female. The mean follow-up was 3.2 years. Patients in the PI-LL mismatch cohort (N=148) were younger (57.5 vs. 63.5, p<0.001) and had a higher proportion of black patients (31.8% vs. 11.3%, p=0.001) compared to the normal PI-LL cohort. A total of 100 patients in the PI-LL mismatch cohort were propensity score matched to 66 patients in the normal PI-LL cohort, resulting in no difference in age (p=0.177), sex (p=0.302), race (p=0.727), or BMI (p=0.892). Using these matched cohorts, the rate of early reoperation for ASD in the PI-LL mismatch cohort was 8.0 %, which was similar to the 9.1% reoperation rate in the normal PI-LL cohort (p=0.805) with a mean time to reoperation of 1.28 and 1.33 years, respectively.

DISCUSSION AND CONCLUSION:
Younger patients and African Americans were more likely to have a postoperative PI-LL mismatch. However, after propensity score matching, PI-LL mismatch was not associated with early reoperation for ASD in patients undergoing 1-to-2 level lumbar fusions for degenerative conditions.