# Pelvic Incidence and Sagittal Balance Changes between Flexion and Extension

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INTRODUCTION: Pelvic incidence (PI) has, historically, been considered a static parameter. Recent studies show PI can change in a variety of situations. PI change can, potentially, affect sagittal alignment in patients with fused thoracolumbar fusion. The effect of PI change on sagittal vertical axis (SVA) has not been investigated.

METHODS: 106 patients were retrospectively evaluated with pre- and post- op EOS images. PI, pelvic tilt (PT), sacral slope (SS), and lumbar lordosis were measured by trained individuals. Parameter variation and inter-observer reliability measurements were analyzed.

RESULTS: 12.3% of patients demonstrated PI changes ≥6°. These changes demonstrated no directional bias and exceeded accepted measurement error. Utilizing this cohort, the isolated effect of PI change on SVA was calculated as described in figure 1. The linear distance from C7 to S1 was calculated for each individual with PI change exceeding measurement error. The minimum, maximum, and mean estimated change in SVA were 3.666, 19.676, 7.519 respectively. Using the average linear measurement from C7 to T1 in this cohort, normal SIJ motion of 3 degrees would produce an estimated SVA variation of 5.623.

DISCUSSION AND CONCLUSION:

Based on this cohort of patients, and assuming a planned correction to 0 mm SVA, patients with excessive SIJ motion may demonstrate wide variability in global sagittal alignment despite appropriately performed thoracolumbar correction. the mean change in SVA for patients with >6° of SI motion was estimated to be 7.519. Maximum and minimum variation in SVA was found to be 19.676 to 3.666 respectively. Considering normal SI joint motion of 3°, SVA can still vary up to 5.623 cm.

In conclusion, pelvic incidence (PI) is a dynamic parameter that may significantly affect global sagittal alignment, emphasizing the importance of considering PI during both surgical planning and surgery.