

**Abstract:**

Background: Recent studies support the need for sagittal alignment restoration when performing lumbar degenerative spinal fusions. The development of patient-specific spine rods (PSSR) may help maintain or improve sagittal alignment in these surgeries.

Methods: A retrospective review was conducted for patients who underwent posterior spinal surgeries involving 4 or less levels. The pre-planned PSSR radii of curvature (ROC) was compared to standard pre-bent rods with a ROC of 125 mm. All surgeries were performed at a single institution by 3 surgeons from September 2016 through October 2018. Data was then compared using a 2-tailed paired t-test. PSSR had either 1 or 2 definitive ROCs.

Results: For rods with 2 ROCs, the “cranial” curve was measured between the upper instrumented level and L4 or L5. The “caudal” curve was measured between L4 or L5 and the lower instrumented level. The PSSR with 1 ROC and the caudal portion of the rods with 2 ROCs were significantly smaller than the industry standard ROC.

Conclusion: PSSR demonstrate more acute ROC than industry standard rods. In PSRs, the most lordosis occurs between L4-S1 and flattens out at the thoracolumbar junction, mimicking the normal distribution of lumbar lordosis (LL). PSSRs could help achieve or maintain sagittal alignment and prevent the sequela of flat back syndrome.