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**ASF/PSF Improves Lumbar Sagittal Alignment in Multilevel Fusions for Adult Isthmic Spondylolisthesis**

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**Purpose:** A consecutive series of patients with L5-S1 low-grade isthmic spondylolisthesis undergoing anterior/posterior multilevel spinal fusion were retrospectively studied to determine the influence of this procedure on fusion rate and lumbar sagittal plane alignment. Based on this data, could a preoperative guide to sagittal correction be determined for use intraoperatively?

**Methods:** Between 1992 and 2000, of 127 adult patients undergoing fusion for isthmic spondylolisthesis, 9 were identified who met the following criteria: L4-S1 anterior-posterior spinal fusion with 2-year minimum followup. There were 6 males and 3 females with average age 43 (23-55). 4 patients had grade 1 and 5 grade 2 isthmic spondylolisthesis. Indications for L4-S1 fusion include supra-adjacent degeneration as seen on MRI. Retroperitoneal, muscle-sparing, anterior interbody fusion with allograft structural grafts preceded posterior instrumented fusion and decompression. Standing pre and postoperative radiographs were evaluated for fusion. Sagittal angulation data was measured according to the nomenclature of Wiltse and Winter<sup>1</sup>. In addition, angulation of the superior endplate of L4 to the horizontal was determined.

**Results:** All patients clinically fused. Radiculopathy disappeared in all patients, and 8 of 9 patients reported no or minimal symptoms only at worse requiring non-narcotic analgesics. Average (pre/post) operative angles were: Sacral inclination (49.8,47.2), Lumbosacral joint angle (4.6,16.7), Lumbar lordosis (46.8, 39.8), lumbosacral (47.8, 44.3), superior endplate of L4 to the horizontal (-7.5, 5.5). The sacrohorizontal angle did not change postoperatively (46.6, 48.3). 4 patients had horizontal superior endplates of L4, and in these patients, lumbar lordosis averaged 36 (+/- 2) degrees.

**Conclusions:** In this series of patients, ASF/PSF induced fusion and improvement of lumbar sagittal alignment with no complications. 4 of 9 patients who had horizontal L4 superior endplates had normal lumbar lordosis<sup>2</sup> postoperatively. The theoretical benefit of a horizontal adjacent segment is minimized disc shear thwarting degeneration. It is proposed that the preoperatively determined sacrohorizontal angle be used to subtend an angle from the sacral to L4 superior endplate intraoperatively as a guide to produce the optimum radiological outcome: a horizontal cephalad adjacent segment disc.

1. Wiltse LL, Winter RB. Terminology and measurement in spondylolisthesis. J Bone Joint Surg [Am] 1983;65:768-72.
2. Jackson RP, McManus AC. Radiographic analysis of sagittal plane alignment Spine 1993;19:1611-8.

