Extended Asymmetrical Pedicle Subtraction Osteotomy for Adult Spinal Deformity: 2-Dimensional Operative Video

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Pedicle subtraction osteotomy (PSO) is an effective technique to correct fixed sagittal malalignment. A variation of this technique, the “trans-discal” or “extended” PSO (Schwab grade IV osteotomy), involves extending the posterior wedge resection of the index vertebra to include the superior adjacent disc for radical discectomy. The posterior wedge may be resected in asymmetric fashion to correct concurrent global coronal malalignment. This video illustrates the technical nuances of an extended asymmetrical lumbar PSO for adult spinal deformity. A 62-yr-old female with multiple prior lumbar fusions presented with worsening back pain and posture. Preoperative scoliosis X-rays demonstrated severe global sagittal and coronal malalignment (sagittal vertical axis [SVA, C7-plumbline] of 13.5 cm, pelvic incidence [PI] of 60°, lumbar lordosis [LL] of 14° [in kyphosis], pelvic tilt [PT] of 61°, thoracic kyphosis [TK] of 18°, and rightward coronal shift of 9.3 cm). The patient gave informed consent to surgery and for use of her imaging for medical publication. Briefly, surgery first involved transpedicular instrumentation from T10 to S1 with bilateral iliac screw fixation, and then T11-12 and T12-L1 Smith-Petersen osteotomies were performed. Next, an extended asymmetrical L4 PSO was performed and a 12° lordotic cage (9 × 14 × 40 mm) was placed at the PSO defect. Rods were placed from T10 to iliac bilaterally, and accessory supplemental rods spanning the PSO were attached. Postoperative scoliosis X-rays demonstrated improved alignment: SVA 5.5 cm, PI 60°, LL 55°, PT 36°, TK 37°, and 3.7 cm of rightward coronal shift. The patient had uneventful recovery.

KEY WORDS: Deformity, Degenerative lumbar spine, Osteotomy, Pedicle subtraction, Scoliosis, Spine surgery, Surgical technique

Disclosures
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COMMENT
PSO is a powerful technique for correction of severe sagittal imbalance, especially in cases with rigid or fused spines. The technique can be modified to address coronal imbalance as well.
The authors effectively demonstrate an extended asymmetrical PSO in a concise video supplemented by 3-dimensional animation models. Operative nuances were described during the exposure, osteotomy, cage placement, closure of osteotomy, and spine fixation.

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