Background

The degenerative loss of lumbar lordosis is a common feature in degenerative lumbar scoliosis (DLS). Previous studies have shown transforaminal lumbar interbody fusion (TLIF) using expandable cages can improve anterior and middle disc height, and improve both segmental and regional lordosis when compared to static (non-expandable) height cages.

Purpose

This is the first report of the expanding cage effect on sagittal plane parameters in spinal deformity patients with DLS undergoing instrumented arthrodesis, with early clinical and radiographic outcomes and complications.

Study Design

Retrospective radiograph review; Observational study of preliminary clinical results using a new technology of the expanding cage

Patient Sample

45 consecutive adults undergoing primary or revision spinal arthrodesis for DLS augmented with TLIF at average 1.8 levels using a new hydraulic expanding cage at 4 centers. Age averaged 64 years (range 40-80 years); Number of TLIF levels: one- 7 patients, two- 23 patients, three- 15 patients.

Outcome Measures

Radiograph measurements: anterior, middle, and posterior disc height; Disc angle (local lordosis); Regional lordosis (L1-S1), sagittal and coronal balance, pelvic incidence, scoliosis. Clinical: Visual analog pain scores (VAS), Oswestry disability index (ODI)

Methods

All patients had DLS with stenosis and listhesis and failed 6 months conservative care. Open posterior instrumented fusions averaged 6.6 levels (range 2-16 levels). TLIF technique: Crescent shaped expanding cage insertion height of 6mm, 8mm, or 12mm were placed front and center in the disc, expanded up to 6mm above insertion height using hydraulic pressure to improve cage fit and fill. Cage expansion assisted in distracting the anterior interspace and acting as a fulcrum to increase segmental lordosis when combined with posterior compression instrumentation, +/-Ponte osteotomies. Backfill bone graft was used in the disc space in all TLIF

levels.

Results

All sagittal parameters improved (P<0.01). TLIF anterior disc height: Preop- 6.7mm (range 0-14mm), 1year- 15.2mm (range 10-20mm); Middle disc height: Preop- 5.5mm (range 1-12mm), 1 year- 11.2mm (range 6-18mm); Posterior disc height: Preop: 3.9mm (range 1-8mm), 1 year- 6.6mm (range 1-18mm). Segmental (disc space) lordosis: Pre-op- 4.9°, 1 year- 13.2° (range 4-30°). Regional lordosis (levels L1-S1): Preop- 27.8° (range 8-50°), 1 year- 49.8° (range 36-62°). Two patients remained in global sagittal imbalance>5mm. Early complications: neurologic deficit -0, loss of cage expansion height – 0. Revision surgery was required in 2 for unrelated adjacent level fractures in the thoracolumbar spine in deformity patients. Three additional patients required removal of symptomatic iliac screws. For 15 patients with more than 1 year follow-up, improvement was noted in VAS: pre- 6.1, 1 year– 2.9; ODI scores improved: preop– 47.5 (P<0.05), 1 year – 25.0 (P<0.05).

Conclusions

This study supports the safety, efficacy, and segmental and regional lordosis capability of a new crescent shaped hydraulic expandable TLIF cage. Early clinical outcomes in DLS are favorable. Improved sagittal parameters may be achieved with the assistance of and expandable TLIF cage.