Multicenter Minimally Invasive AxiaLIF L5-S1 Interbody Fusion for Anterior Column Support at the End of a Long Segment Construct: Feasibility, Safety, Complications, Early and Late 3 Year Outcomes

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Introduction: Long segment fusion to the sacrum has been reported to have a high pseudoarthrosis rate. Anterior column support to lower the pseudarthrosis rate has traditionally been performed through open ALIF, TLIF or PLIF.

Methods: We report on 97 consecutive patients status post Minimally Invasive AxiaLIF L5-S1 fusion at the end of a long segment construct performed over the last 4 years at 2 major spine centers. 21 patients underwent 2-level AxiaLIF fixation at L5-S1 and L4-5. All patients had three or more levels fused above the instrumented AxiaLIF levels. 63 patients had fusions extending above the thoracolumbar junction with 20 of these patients having fusions into the proximal thoracic spine. Fusion was augmented with local bone, RhBMP2 (Infuse) and Grafton putty both in the interbody space and the facets posteriorly. Visual Analog Scores (VAS), Treatment Intensity Scores (TIS), SF-36, Oswestry Disability Index (ODI) and Radiographs were recorded.

Results: Mean follow up was 24 months (range: 1 to 44 months). 71 patients have greater than 1 year follow-up with 37 greater than 2 years and 21 patients greater than 3 years follow-up. Mean patient age was 62 years old (range: 22 to 81). Preoperative diagnoses included scoliosis (68 patients) and multilevel degenerative disc disease (29 patients). Clinical and Functional outcomes are charted below (figure 1).

At 1 yr solid arthrodesis at L5-S1, was noted in 67/71 patients, further confirmed on CT in 56 of these patients. There were no intraoperative complications with the AxiaLIF fusion. 14 patients had iliac bolt fixation at one center, with 0 patients at the other. One iliac bolt had to be revised secondary to a broken screw. There have been no bowel injuries, sacral fractures or sacral pedicle screw failures. There were two pseudarthroses at L5-S1 with facet screws and both were revised with pedicle screws successfully. There was one late infection with non-union revised with removal of the implant, ALIF and iliac bolt fixation and the fourth patient had sacral pedicle screw loosening revised with additional iliac bolt fixation. There were two patients with superficial wound dehiscence. One patient had a malpositioned AxiaLIF screw causing radiculopathy, which was satisfactorily and safely repositioned.

Conclusions: AxialLIF L5-S1 minimally invasive interbody fusion may be a viable alternative for providing anterior column support for long segment fusions to the sacrum. Majority of these patients were not instrumented to the ilium and have shown solid fusion with maintenance of correction up to three years. The absence of distal implant failure may attest to the biomechanical strength of the L5-S1 construct. This procedure may provide similar fusion rates at the L5-S1 disc space and improved functional outcomes when compared with more traditional procedures. More importantly the clinical outcomes suggest that with the AxiaLIF bolt iliac screw fixation may not be necessary in long constructs.