Radiographic Assessment of Fusion in Lateral Lumbar Inter-body Fusion Performed as a Stand-alone Procedure
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Introduction: Preliminary reports of lateral lumbar inter-body fusion (LLIF) through a minimally invasive transpsoatic approach suggests favorable fusion rates. Inter-body fusion is traditionally augmented with posterior instrumentation for secure circumferential fusion under the same anesthesia. We hypothesize that if there is careful selection of the surgical candidate, appropriate cage dimension with a wide surface resting on the apophyseal ring, LLIF may be successfully performed as a stand-alone procedure. We retrospectively reviewed the radiographic fusion outcomes of LLIF cases from our institution, which underwent this procedure as a stand-alone technique.

Material and methods: A retrospective review of 78 consecutive cases was performed who underwent minimally invasive LLIF performed as a stand-alone procedure at 166 levels by 3 surgeons. LLIF was performed as the first step of a staged anterior and posterior fixation, however the second stage was not required in all but 8 patients. The indications were spinal stenosis, degenerative scoliosis, spondylolisthesis and junctional disc degeneration. Each patient included in this study underwent a mini-open, trans-psoatic lateral lumbar inter-body fusion without same stage posterior fixation at first surgery. All patients received dynamic flexion-extension radiographs at 10.4 months. CT scan was performed on 53 patients (67%) at 7.1 months and 26 had dynamic flexion-extension radiograph at 9.1 months. A detailed measurement of plain radiographic parameters was also performed for pre-operative, post-operative and final follow-up to assess correction of coronal and sagittal deformity, restoration of disc height and complications like subsidence and end plate fracture. Pre-operative coronal deformity was measured with Cobb’s angle and sagittal deformity by sagittal balance. Clinical outcomes were recorded using VAS, ODI and SF-12 scoring methods.

Results: Solid fusion was confirmed by CT scan and dynamic flexion-extension radiographs at 154 levels in 70 patients. There was correction of 2.9 degrees of coronal angulation, and 6.2 degrees of lordosis at each level. 50 patients with 61.7 mm positive sagittal balance was restored by 38.4 mm. Non-union was noted at 12 levels in 8 patients who required a second-stage augmentation of fixation through a posterior approach for non-union, cage subsidence and axial pain. 16 patients had end plate fracture leading to subsidence at 21 levels. There were no incidence of neurovascular injury and cage dislocation.

Conclusion: LLIF is an excellent technique in achieving degenerative lumbar deformity correction, treating spinal stenosis and intractable discogenic backache through a less morbid, minimally invasive technique. Historically requiring same stage posterior fixation, the fusion rates of LLIF performed as a stand alone procedure has not been studied. Our results show that LLIF can be a reasonable modality in a select population of patients who have single or multiple level degenerative disc disease. Judicious use of this technique greatly reduces peri-operative morbidity and can be a valuable tool in the armamentarium of the lumbar surgeon.