Long Term 2 to 4 year Clinical and Functional Outcomes of Minimally Invasive Surgery (MIS) for Adult Spinal Deformity

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Introduction: Traditional surgical approaches for Adult Spinal Deformity are associated with significant blood loss and morbidity; in a population, that is often elderly with multiple medical comorbidities.

Methods: Consecutive series of patients with greater than 2 year follow-up who have undergone MIS Correction of Adult Spinal Deformity were selected for this study. 37 patients fit the inclusion criteria. Deformities included degenerative scoliosis (25), idiopathic scoliosis (6), and post laminectomy scoliosis (6). All underwent deformity correction and fusion using all or a combination of 3 MIS techniques: Lateral Transpsoas discectomy and interbody fusion(37), AxiaLIF L5-S1 interbody fusion(18) and segmental multilevel percutaneous pedicle screw fixation(35). 35 of the patients were staged with the lateral fusion done first followed by the posterior instrumentation and fusion including the AxiaLIF done three days later. 2 patients had stand-alone lateral fusion. Fusion was augmented with local bone, Bone Morphogenetic Protein (rh-BMP2) and Grafton Putty DBM at each interbody space and in the Facets. Radiographs, visual analog scores (VAS), treatment intensity scores (TIS), Oswestry Disability Index (ODI) and SF-36 were assessed preoperatively and at each postoperative visit.

Results: Mean age was 67 years (range 22 to 84). Mean Follow-up was 34 mths (range: 24 to 47) with greater than 3 years follow-up in 18 patients. Mean Blood loss and mean surgical time was 366 cc and 225 min for the lateral fusion with 247 cc and 239 mins respectively for the posterior fusion incuding the AxiaLIF. Figure 1 charts the clinical and functional outcomes upto 3 yrs.

21 patients had transient thigh dysaesthesia for 2 to 6 weeks, 2 patients had quadriceps palsy that resolved within 6 months. One patient required removal of a proximal screw at 12 months after fusion was confirmed on CT scan and one patient had an asymptomatic proximal screw fracture with solid fusion. 3 patients needed secondary decompression, one for heterotopic ossification and 2 for persistent stenosis. 1 patient is since deceased of Renal failure and 1 patient developed an unrelated cerebellar haemorrhage that was satisfactorily evacuated with no residual effect. The two patients with stand-alone lateral fusions both developed non-unions and were posteriorly instrumented at 9 months and 1 year post-operatively. Pre-op Cobb angle was 22° (range: 7° to 62°), which corrected to 7° (range: 0° to 22°). Global coronal and Sagittal balance was also maintained at final follow-up. All patients were noted to have solid arthrodesis on plain films. This was further confirmed on CT Scan in 26 patients. No patient had iliac fixation and no failures of sacral screws or sacral fractures were noted.

Conclusions: A combination of 3 Novel MIS techniques allows comparable correction of Adult Scoliosis, with low pseudarthrosis rates and significantly improved functional outcomes at 3 years post-op. MIS techniques may afford surgical options and improved quality of life for the treatment of adult scoliosis.