Clinical: Deformity

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Minimally Invasive Spine Surgery in Adult Deformity Correction: A Prospective Case Series of 37 Patients

M.N. Scott-Young1, C. Magno2, D. Nielsen2, E. Mitchell2, N. Blanch2

1Bond University, Faculty of Health Sciences & Medicine, Robina, QLD, Australia, 2Gold Coast Spine, Southport, QLD, Australia

Purpose: Adult spinal deformity is a complex musculoskeletal problem in the aged patient. Spinal alignment analysis has come to the forefront of the spinal surgeon's pre and post operative considerations. One of the drawbacks of conventional open correction is the morbidity associated with the extensive soft tissue dissection that is associated with traditional deformity correction. Minimally invasive spine surgery (MISS) techniques can be employed in conjunction with modern surgical solutions to restore sagittal balance and spinal alignment in cases of degenerative spinal deformity. This study evaluates the safety, efficacy, and outcomes of MISS for complex de novo degenerative scoliosis.

Methods:

Study design: A prospective study including 37 patients with degenerative spinal deformity were treated by MISS techniques. The patients received MISS, anterior lumbar inter body fusion (ALIF), direct lateral inter body fusion (DLIF) and percutaneous and minimal access technology in conjunction with biological solutions such as bone morphogenic proteins (BMP2). Diagnosis was based on history, examination, MRI, CT discography, AP lateral whole spine, and electrophysiological studies. Minimum follow-up of the 37 patients was 12 months. Ten patients were male and 27 patients female, with an average age of 66.51yrs (range=44-82 yrs). The average operation duration was 146.73mins (range 75-300mins) with an average blood loss of 338.0mls (range 0-910.0).

Outcome measures: Clinical outcomes were measured using Oswestry Disability Index (ODI), Visual Analogue Score (VAS) back and leg, Roland Morris Disability Questionnaire (RMDQ), and SF-36 questionnaires. Patients were assessed preoperatively and at 3, 6 and 12 months. Radiological assessment consisted of AP lateral whole spine, flexion/extension standing films, and fine cut CT at 6 months. Cobb analysis of sagittal and coronal balance was performed.

Results: Analysis of results at latest follow-up versus baseline included mean reduction in mean back VAS back scores reduced from 77.08±17.85 to 22.11±20.79 (-71.3%); mean right VAS leg score reduced from 44.0±32.50 to 16.84±22.13 (-61.7%), while mean left VAS leg scores reduced from 41.73±32.89 to 27.32±27.76 (-34.5%). Mean RMDQ reduced from 16.50±4.23 to 7.44±5.59 (-54.9%). Mean ODI reduced from 46.54±17.08 to 25.46±17.89 (-45.3%); SF-36 PCS increased from 29.47±5.56 to 39.26±8.58 (+24.9%) and SF-36 MCS increased from 40.13±11.38 to 48.19±13.12 (+16.7%). Patient satisfaction surveys indicated that 77.78% patients rated their satisfaction with the surgery as “excellent” or “good” 3-months following their operation. All patients had greater than 50% correction of the preoperative coronal and sagittal Cobb angles. Complications included one vascular injury and one reoperation, and one L4 nerve root dysfunction. No infections, no transfusions and no pseudoarthrosis were detected.

Conclusions: Technological and biological innovations appear to enhance the safety and efficacy of MISS in elderly patients with adult spinal deformity. This study has shown comparable clinical and functional outcomes with traditional open techniques, as well as reduced complications. Improvement in pre to post operative sagittal and coronal balanced was achieved. The results of this preliminary study suggest there is a role for MISS in the care of degenerative spinal deformity. Confirmation through a controlled randomised prospective study would be desirable.