Least Invasive Lumbar Decompression, Interbody Fusion, and Pedicle Screw Implantation - A Case Study Report
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**Background context:** The open spinal surgery while addressing the pathology often disrupt normal anatomy, entail large quantities of blood loss requiring transfusion; prolonged hospital stay; long duration of narcotic pain medication; protracted rehabilitation programs; incomplete recovery; failure to return to prior occupation and increased cost to the individual and the society. Given the impact of surgical trauma on outcome; the increasing demand by patients for shortest post-operative downtime; the desire of the elderly patients (whose number is increasing) to continue vigorous physical activities, it is reasonable to explore the feasibility of the least invasive methods to remove the disease while preserving the normal anatomy.

**Purpose of study:** To investigate the feasibility of the least invasive lumbar decompression, interbody fusion and percutaneous pedicle screw implantation, for disorders which are usually treated by open decompression, fusion and pedicle screw implantation.

**Study design:** Prospective Study of case series treated by one surgeon in two centers.

**Patient sample:** Case series by one surgeon at two centers.

**Outcome measures:** Operating time; intra-operative blood loss; hospital stay; VAS scores for back and leg pain; Roland-Morris Disability Questionnaire; and post-operative imaging studies.

**Methods:** Patients completed VAS forms and Roland-Morris questionnaires pre- and post-operatively. Surgical procedures included arthroscopic decompression of the foramina and the discs; end-plate preparation and implantation of allograft bone chips and BMP-2 on collagen carrier; and percutaneous implantation of pedicle screws. The patients’ charts were reviewed for operative notes, hospital stay, medications, and imaging studies. The latest x-ray and CT scan films were reviewed and analyzed. Patients were followed up for the minimum of six months.

**Results:** 60 patients met the inclusion criteria. The average age is 52.8 years. The duration of illness ranged 2 months to 32 years. All patients had back and leg pain. Follow-up averaged 12 months. OR time was 2:90 hours. Estimated blood loss averaged 57.6 cc. Hospital stay averaged 2.6 days. Pre- and post-operative back pain averaged 7.5 and 2, respectively (p < 0.005). Pre- and post-operative leg pain averaged 7.0 and 1.7, respectively (p < 0.005). 47 imaging studies available at the last visits including x-ray and CT scan, showed solid fusion in 28 (59.6%) patients, stable fixation in 17 (36.2%), and osteolysis around the pedicle screws in 2 patients (4.2%). All patients had improved motor function and two patients complained of residual numbness. 8 (13%) patients complained of residual discomfort on the extension of the lumbar spine. 1 patient (1.6%) had medial penetration of one S1 screw with S1 nerve root irritation which required revision. One patient with painful loose pedicle screws required hardware removal. Both patients had satisfactory outcome after their second operations.

**Conclusion:** The LINDIF produced satisfactory results in all demographics. Anesthesia time was consistently short, blood loss was negligible. Hospital stay was brief for most healthy patients irrespective of age. The results of this study demonstrate how drastically the surgery related morbidity, and the economics thereof, can be reduced. The outcomes relating to patients in the age group of 71-90 years are particularly encouraging, given their increasing proportion in the population.