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Mini-open Lateral Transpsoatic Lumbar Discectomy and Interbody Fusion: Technique and Results

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Various methods of lumbar interbody fusion have been described in the literature. With the advent of Lateral Transpsoatic Interbody Fusion (LTIF), a wide cage resting on the apophyseal ring can be inserted into the intervertebral space without disrupting the anterior and posterior annular/ligamentous structures. The mini-open approach permits development of the retroperitoneal space under direct vision, and allows visualization and avoidance of intrapsoatic sensory and motor nerves. We hypothesize that the mini-open method will carry a lesser incidence of neurologic deficit and peritoneal injuries than the semi-closed method. In addition to testing this hypothesis, radiographic change in the coronal and sagittal plane alignment of the lumbar spine following LTIF was assessed, as well as fusion rates for stand alone cases and those with posterior instrumentation.

Study design and methods: A retrospective review of 164 consecutive cases (mean number of levels = 2.4) performed by three spine surgeons and one access surgeon over a 30 month period was conducted. Mean follow-up time was approximately one year. Operative indication included deformity, spinal stenosis and junctional breakdown. Straight lateral positioning of the patient with retroflexion of the operating table was confirmed fluoroscopically. A single small incision was placed laterally and a muscle splitting approach utilized. Rib resection was avoided whenever possible. The retroperitoneal space was developed under direct vision. Electrodiagnostic and when necessary, visual localization of the nerve roots was performed, prior to splitting of the psoas muscle. Sensory branches were avoided by visualization. Hand held retraction was converted to table mounted retraction in most instances. Discectomy and release of the contralateral annulus, along with placement of PEEK and/or carbon fiber implants (\pm BMP) was performed. Oblique muscles were closed in layers. In addition to review of the office and hospital charts, pre-operative, immediate post-operative and follow-up radiographs at 3 months, 6 months and one year was performed. Radiographic measurements were performed to assess change in the sagittal and coronal plane alignment of individual disc levels, overall lumbar spine and lumbar scoliotic curves. Radiographs were also analyzed for fusion at one year, as well as for other complications such as end plate fracture and subsidence.

Results: The most common post-operative complication was ipsilateral anterior thigh pain, which was transitory in nearly all cases, and was more common with the upper lumbar levels. There was no instance of major neurologic or vascular injury, nor was there any instance of peritoneal violation. End plate fracture and implant subsidence occurred more frequently in osteoporotic patients with T scores of less than -2.5. However, it was non-progressive in most instances, and did not significantly impact fusion or alignment at the affected levels. Resulting correction in coronal imbalance was much more pronounced than that obtained in the setting of sagittal imbalance.

Conclusions: The mini-open method of LTIF is effective in correcting coronal plane deformity, due to the parallelizing effect on adjacent end plates. Preservation of the anterior and posterior annular/ligamentous structures is important and contributes to the high rate of fusion in stand alone cases. The mini-open approach avoids injury to the peritoneum and minimizes the incidence of post-operative sensory and motor deficits.