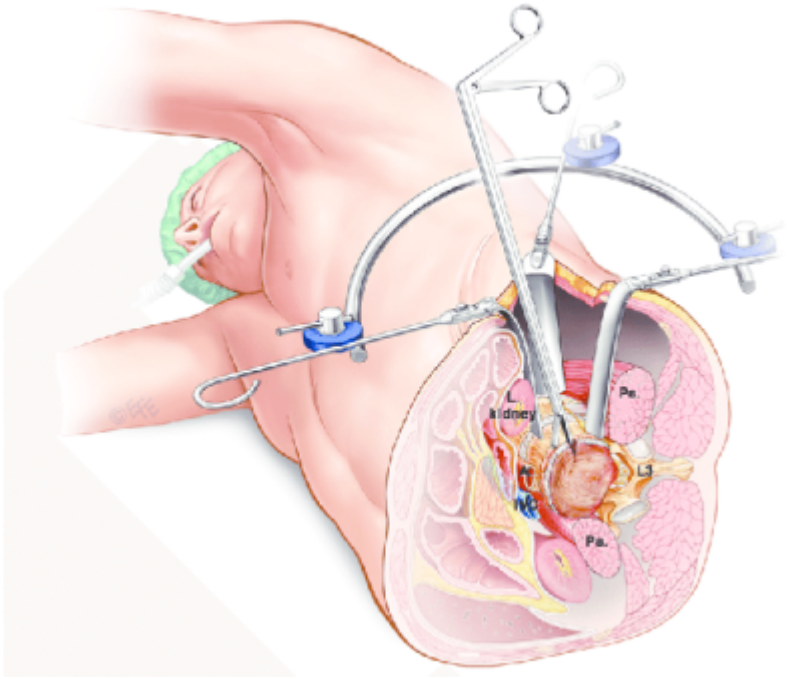
Oblique lumbar interbody fusion



Oblique lumbar interbody fusion (OLIF) is a minimally invasive surgical procedure that is used to treat certain types of lower back pain and spinal conditions, such as degenerative disc disease, herniated discs, and spinal instability.

One of the advantages of the OLIF procedure is that it allows the surgeon to access the spine without having to disrupt the muscles and other tissues in the back, which can result in less post-operative pain, a shorter hospital stay, and a faster recovery time compared to traditional open surgery.

However, not all patients are suitable candidates for OLIF, and the procedure carries some risks, such as infection, bleeding, nerve damage, and incomplete fusion. It is important to discuss the benefits and risks of OLIF with a qualified spine surgeon before deciding on the best treatment approach for a particular spinal condition.

Technique

Although it is associated with a lower risk of vascular injury compared with anterior midline approaches, neuromonitoring is considered mandatory to avoid neurologic complications. Interestingly, despite neuromonitoring, the reported risk of neurologic deficits with the extreme lateral transpsoas approach is greater than observed with other anterior approaches. An alternative lateral, oblique, psoas-sparing approach, named the oblique lumbar interbody fusion, uses the anatomic pathway between the abdominal vessels anteriorly and the lumbar plexus laterally to decrease the risk of neurologic and vascular injury; however, as yet, little on this new approach has been reported.

During an OLIF procedure, the surgeon makes a small incision in the patient's side, typically through

the flank, and uses specialized tools to access the spine between the affected vertebrae. The surgeon then removes any damaged or diseased disc material and inserts a bone graft or spacer between the vertebrae to promote fusion.

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Surgeons should pay attention to the state of coupled vertebral axial rotation of lumbar degenerative scoliosis for the oblique lumbar interbody fusion procedure [1)].

The oblique corridor allows access to the L1-L5 discs from both sides, but it is larger on the left side. The corridor between the iliac vessels and the psoas for L5-S1 is difficult to be applied clinically. Mild psoas retraction can moderately enlarge the oblique corridor. The genitofemoral nerve and diaphragmatic crura may be encountered in this approach and should be carefully observed [2)].

Standard treatment protocols for lumbar degenerative lesions in the setting of rheumatoid arthritis (RA) are lacking. The purpose of a study of Akbary et al., from St. Mary's Hospital, was to evaluate the clinical and radiologic outcomes of minimally invasive oblique lumbar interbody fusion (MI-OLIF) in RA patients having degenerative lumbar spine lesions.

This was a retrospective hospital-based case series (evidence level 4). Eight patients with degenerative lumbar disease with significant back pain and neurologic claudication underwent MI-OLIF with polyetheretherketone cage insertion and posterior pedicle screw instrumentation. The clinical outcomes were measured by the numerical rating scale (NRS) for back and leg pain and the Oswestry Disability Index (ODI), and radiologic outcomes were studied on radiographs, computed tomography, and magnetic resonance imaging. Minimum follow-up duration was 1 year.

Mean NRS results for back and leg pain preoperatively were 6.3 and 7.1 that improved to 2.6 and 2 for back and leg pain, respectively, at last follow-up. The mean ODI scores preoperatively were 58.02 that improved to 39.06 at last follow-up. All patients had good functional outcomes, good fusion rates, and were able to continue their activities of daily living without much disability at last follow-up.

MI-OLIF in patients with symptomatic lumbar spine degenerative lesions with RA seems to provide good short-term clinical and radiologic outcomes [3)].

Twenty-two patients with degenerative lumbar disease who underwent OLIF between October 2016 and January 2017 were included. Radiography, computed tomography (CT), and magnetic resonance imaging (MRI) were performed pre- and postoperatively. The cross-sectional area (CSA) of the dural sac, disc height (DH), cross-sectional height of the intervertebral foramina (CSH), and intervertebral foramina CSA (CSAF) were measured. Scores from the Visual Analogue Scale (VAS), Oswestry Disability Index (ODI), and Medical Outcome Study 36-Item Short-Form Health Survey (SF-36), obtained preoperatively, 1 week and 3 months postoperatively, and at the final follow-up, were compared.

Forty-five segments were fused in 22 patients using OLIF. Postoperatively, CSA increased from 0.79±0.32 cm2 to 1.40±0.37 cm2, DH increased from 0.67±0.24 cm to 1.15±0.31 cm, CSH increased

from 1.51±0.25 cm to 2.01±0.31 cm, and CSAF increased from 1.11±0.28 cm2 to 1.86±0.38 cm2 (P <0.01). The VAS, ODI, and SF-36 scores of all patients significantly improved postoperatively (P<0.05). There were no complications involving injuries to spinal nerves, great vessels, abdominal viscera, or ureters. Only one patient experienced injury to the psoas major.

OLIF is a safe and effective minimally invasive procedure for the treatment of degenerative lumbar disease [4)].

Fukaya and Hasegawa presented their early experience with circumferential MIS(cMIS), which involves oblique lumbar interbody fusion(OLIF)with percutaneous pedicle screw(PPS)fixation using a rod cantilever technique to enhance lumbar lordosis(LL)for ASD.

Twenty-one thoracolumbar ASD cases in which surgical correction was performed from the lower thoracic spine corresponded to class IIIa in the modified minimally invasive spinal deformity surgery(MISDEF)algorithm. Patients with a rigid curve and prior fusion were excluded. Surgery was performed in 2 stages. During the first stage, OLIF was performed from L1/2 or Th12/L1 to L4/5. After 4 to 7 days, the patients were re-imaged with standing radiography, and the second-stage surgery was performed with L5/S1 posterior lumbar interbody fusion(PLIF)and percutaneous instrumentation from the lower thoracic spine to the pelvis. Radiological deformity correction at 4 weeks and perioperative complications were evaluated. Scatter plots were created for comparison of preoperative and postoperative sagittal spinopelvic parameters.

The patients' mean age was 75 years. The mean operative time was 488 min, and the blood loss was 901 mL. Significant improvement in the spinopelvic parameters were found on the preoperative images of the sagittal vertical axis(SVA)(108mm to 33.5 mm), lumbar lordosis(LL)(18° to 48°), pelvic tilt(PT)(31.8° to 19.2°), and Cobb angle(CA)(21.1° to 11.9°). The change from the preoperative to the postoperative sagittal spinopelvic parameters(SVA, PI-LL, and PT)strongly correlated with preoperative values.

As cMIS resulted in improvement in spinopelvic parameters and no major complications, this technique could provide a safe and effective strategy to manage ASD even with severe sagittal imbalance [5)].

Mehren et al performed a chart review of intra- and perioperative complications of all patients who had undergone minimally invasive anterior lumbar interbody fusion through a lateral psoas-sparing approach from L1 to L5 during a 12-year period (1998-2010). During the study period, the oblique, psoas-sparing approach was the preferred approach of the participating surgeons in this study, and it was performed in 812 patients, all of whom are studied here, and all of whom have complete data for assessment of the short-term (inpatient-only) complications that we studied. In general, they performed this approach whenever possible, although it generally was avoided when a patient previously had undergone an open retro- or transperitoneal abdominal procedure, or previous implantation of hernia mesh in the abdomen. During the study period, posterior fusion techniques were used in an additional 573 patients instead of the oblique lumbar interbody fusion when they needed to decompress the spinal canal beyond what is possible through the anterior approach. In case of spinal stenosis calling for fusion in combination with a high disc space, severe endplate irregularity, or severe biomechanical instability, they combined posterior decompression with oblique lumbar interbody fusion in 367 patients. Complications were evaluated by an independent observer who was not involved in the decision-making process, the operative procedure, nor the postoperative

care by reviewing the inpatient records and operative notes.

A total of 3.7% (30/812) of patients who underwent the oblique lumbar interbody fusion experienced a complication intraoperatively or during the hospital stay. During the early postoperative period there were two superficial (0.24%) and three deep (0.37%) wound infections and five superficial (0.62%) and six deep (0.86%) hematomas. There were no abdominal injuries or urologic injuries. The percentage of vascular complications was 0.37% (n = 3). The percentage of neurologic complications was 0.37% (n = 3).

The risk of vascular complications after oblique lumbar interbody fusion seems to be lower compared with reported risk for anterior midline approaches, and the risk of neurologic complications after oblique lumbar interbody fusion seems to be lower than what has been reported with the extreme lateral transpsoas approach; however, they caution readers that head-to-head studies will need to be performed to confirm our very preliminary comparisons and results with the oblique psoas-sparing approach. Similarly, future studies will need to evaluate this approach in terms of later-presenting complications, such as infection and pseudarthrosis formation, which could not be assessed using this inpatient-only approach. Nevertheless, with the results of this study the oblique psoas-sparing approach can be described as a less-invasive alternative for anterior lumbar fusion surgery from L1 to L5 with a low risk of vascular and neurologic damage and without costly intraoperative neuromonitoring tools [6].

Videos

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