The lumbar interbody fusion trial: TLIF or PLIF for lumbar spondylolisthesis?

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The Lumbar Interbody Fusion Trial (LIFT)[1] was a Dutch multicenter randomized controlled non-inferiority trial designed to compare the clinical effectiveness of transforaminal lumbar interbody fusion (TLIF) and posterior lumbar interbody fusion (PLIF) for single-level spondylolisthesis. Both TLIF and PLIF are common surgical approaches for interbody fusion, yet there lacks sufficient high-level evidence to assess their relative effectiveness. The choice of either technique is often based on surgeon familiarity and preference, clearly demonstrating an impetus for this trial.

Across five hospitals, 161 adult patients with Meyerding grades I or II lumbar spondylolisthesis of degenerative, isthmic, or iatrogenic etiology were randomized to TLIF or PLIF. The primary outcome measure was improvement in the Oswestry Disability Index (ODI) at one year postoperatively. Mean ODI in the TLIF group improved from 46.7 to 20.7 (–26.0, CI –30.1; –22.2), and mean ODI in the PLIF group improved from 46.0 to 24.9 (–21.1, CI –25.1; –17.1); based on the pre-determined non-inferiority limit of 7.0 points, the authors concluded that TLIF is non-inferior to PLIF. There were no differences in quality of life (EQ-5D), back and leg pain (NRS), or complication rates between the two groups through one year postoperatively.

The rigorous enrollment protocol and multicenter collaboration are noteworthy features to the trial and lend credence to its internal and external validity in the Dutch population. However, a considerable challenge in any prospective study is length of follow-up. One year may be insufficient to capture the full spectrum of complications and patient outcomes associated with these surgical techniques. Symptomatic pseudarthrosis, hardware failure, and adjacent segment disease (ASD) requiring reoperation can manifest two years postoperatively. These can certainly affect the patient reported outcomes upon which the authors' conclusions are based. For example, in the Spinal Laminectomy versus Instrumented Pedicle Screw (SLIP) trial for lumbar degenerative spondylolisthesis by Ghogawala and colleagues,[2] 24 months elapsed before a patient in the fusion group required reoperation for ASD.

Randomized controlled trials in spine surgery may be limited in their generalizability due to strict inclusion criteria and lack of clinical equipoise. The LIFT study employs a per-protocol analysis, which only includes patients who completed the study according to the protocol. While this approach helps to maintain the study's internal validity, it may introduce selection bias. Furthermore, it is difficult to completely standardize surgical techniques. A pragmatic alternative to RCTs is a registry. The Quality Outcomes Database (QOD) is a multicenter, prospective registry that encompasses the full breadth of practice settings and geographic variation across the United States for a variety of neurosurgical and spinal pathologies. In this registry, the top 12 enrolling sites created the SpineCore Study group. They enrolled patients with Meyerding grade I lumbar spondylolisthesis (608 patients) with greater than 80% follow-up at 5 years postoperatively. The SpineCore Study Group showed that patients undergoing minimally invasive TLIF compared to open TLIF have similar outcomes for disability, back and leg pain, quality of life, satisfaction, and reoperation rates through 5 years after surgery.[3]

Serial postoperative radiographs are standard of care in the United States and are not included in the LIFT study. Follow-up radiographs are critical to assessing maintenance of appropriate foraminal height, disc height, lordosis, and instrumentation placement. Dynamic radiographs can alert surgeons to pseudarthrosis or adjacent segment disease prior to obtaining more advanced imaging if the clinical presentation warrants. While such radiographs are not standard in the Netherlands, they would provide useful objective data to compare TLIF and PLIF in addition to the patient-reported outcomes.

The authors are to be commended on their rigorous efforts and this valuable contribution to the literature for surgical treatment of lumbar spondylolisthesis. Future studies incorporating longer follow-up periods and postoperative imaging will help capture the full scope of clinical outcomes and their durability for TLIF and PLIF.

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Declaration of interests

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