

Cost-utility analysis of transforaminal versus posterior lumbar interbody fusion for symptomatic single-level spondylolisthesis (LIFT): a multicentre controlled, patient blinded, randomized trial

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Introduction

Transforaminal lumbar interbody fusion (TLIF) and posterior lumbar interbody fusion (PLIF) are widely used and clinically comparable techniques for the treatment of symptomatic single-level lumbar spondylolisthesis. When clinical effectiveness is similar, cost-utility becomes a key determinant for treatment selection. To address the current evidence gap of studies directly comparing cost-utility of TLIF and PLIF, the lumbar interbody fusion trial (LIFT) was conducted.

Materials and Methods

This cost-utility analysis was conducted alongside a multicentre, patient-blinded, randomized controlled trial in five hospitals in the Netherlands. Adults (≥ 18 years) with symptomatic single-level degenerative, isthmic, or iatrogenic lumbar spondylolisthesis eligible for posterior lumbar fusion were randomly assigned (1:1), stratified by centre, to TLIF or PLIF. Health-related quality of life was measured using the EQ-5D-5L at baseline, 3, 6, 12, and 24 months, and quality-adjusted life-years (QALYs) were calculated using the area-under-the-curve method. Costs were assessed from both healthcare and societal perspectives, using validated questionnaires (iMCQ, iPCQ & iVCQ) and real cost prices. Incremental cost-effectiveness ratios (ICERs) were estimated using non-parametric bootstrapping, and explored using cost-effectiveness planes and acceptability curves. The willingness-to-pay (WTP) threshold was €50,000 per QALY. The trial was registered in the Dutch Trial Registry (NL5722).

Results

A total of 154 patients were included in the modified intention-to-treat analysis (77 TLIF; 77 PLIF). Over 24 months, mean QALYs were higher in the TLIF group than in the PLIF group (mean difference 0.121; 95% bootstrapped CI -0.006 to 0.245, adjusted for baseline utility-scores). From a societal perspective, mean total costs were lower for TLIF (€31,811) than for PLIF (€34,094), yielding a mean cost difference of -€2,954 (95% bootstrap CI -€9,549 to €3,641, adjusted for baseline costs). TLIF was both more effective and less costly than PLIF. Uncertainty analyses showed that there was a 96% probability of TLIF being cost-effective compared to PLIF at a WTP threshold of €50,000 per QALY. Sensitivity and per-protocol analyses produced consistent results.

Conclusion

In patients with symptomatic single-level lumbar spondylolisthesis, TLIF is cost-effective compared to PLIF over a 24-months' time horizon, with higher health-related quality of life and lower societal costs. When both procedures are technically feasible, TLIF is the preferred surgical option.