

Lateral lumbar interbody fusion to address pseudarthrosis after prior posterior spinal instrumentation

Abstract

Purpose: Lumbar pseudarthrosis revision is challenging for both patients and surgeons, with no standard approach. This study aimed to evaluate radiographic fusion and index-level re-revision rates after revision using lateral lumbar interbody fusion (LLIF), comparing standalone LLIF (SA-LLIF) and circumferential LLIF with posterior revision (360°-LLIF). Secondary outcomes included perioperative parameters and sagittal alignment.

Methods: This retrospective, single-center cohort study included patients undergoing LLIF for lumbar pseudarthrosis between 2007 and 2023 with ≥ 1 -year follow-up. Patients were stratified into SA-LLIF and 360°-LLIF groups. Fusion was assessed at one year using the Bridwell grading system (grades I-II considered fused). Perioperative parameters, re-revision, and sagittal alignment were evaluated.

Results: Thirty-eight patients were included (SA-group: $n = 26$; 360°-group: $n = 12$). Groups were comparable except for a higher BMI in the 360°-group ($p = 0.035$). Overall fusion was 84.2%, with rates of 80.8% in SA-LLIF and 91.7% in 360°-LLIF ($p = 0.392$). No patient required re-revision for non-union; one 360° patient underwent wound revision. Operative time (233 vs. 84 min, $p = 0.005$), and estimated blood loss (625 vs. 100 mL, $p = 0.001$) were higher in the 360°-group. Length of stay and sagittal alignment parameters were similar between groups.

Conclusion: Both 360°-LLIF and SA-LLIF may represent viable revision strategies for pseudarthrosis after posterior instrumentation, each with distinct advantages. Fusion rates were numerically higher with 360°-LLIF but not statistically different, and no patient in either group required secondary revision surgery for non-union. SA-LLIF was associated with shorter operative times and reduced EBL. Findings should be interpreted cautiously given the small sample size.

Keywords: Circumferential fusion; Lateral lumbar interbody fusion; Lumbar pseudarthrosis; Revision surgery; Standalone LLIF.