

# Single Level Minimally Invasive Transforaminal Lumbar Interbody Fusion vs Lateral Lumbar Interbody Fusion for Degenerative Spinal Pathology: Clinical Outcome Comparison in the Elderly

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## INTRODUCTION:

Two popular techniques utilized for lumbar arthrodesis are minimally invasive transforaminal lumbar interbody fusion (MIS-TLIF) and lateral lumbar interbody fusion (LLIF). Despite their high fusion rates and suitable postoperative clinical outcomes in elderly populations (age>65), literature comparing the two techniques for this target group is scarce. We aim to assess patient-reported outcome measures (PROMs) in patients age >65 undergoing single-level MIS-TLIF and LLIF for degenerative spinal pathology.

## METHODS:

A retrospective review of lumbar procedures performed between November 2005 and December 2021 was conducted using a prospectively maintained single-surgeon database. Inclusion criteria were set as primary, elective, single, MIS-TLIF, or LLIF procedures for degenerative spinal pathology in patients aged 65 years or older. Patients undergoing a revision or multi-level procedure, or surgery indicated for infectious, malignant, or traumatic etiologies were excluded. Additionally, patients < 65 years old were excluded. Patient demographics, perioperative characteristics, and patient-reported outcome measures (PROM) were collected. PROMs included Patient-reported Outcome Measurement Information System-Physical Function (PROMIS-PF), Visual Analogue Scale (VAS) for back and leg pain, Oswestry Disability Index (ODI), Short Form-12 Item Survey Mental and Physical Composite Scores (SF-12 MCS/PCS) with all values collected at the preoperative, 6-week, 12-week, 6-month, 1-year follow up time points. Postoperative complications were collected. Patients were grouped into two cohorts, depending on whether a patient underwent an MIS-TLIF or LLIF. Demographic and perioperative characteristics were compared between groups using chi-square and Student's t-test for categorical and continuous variables, respectively. Groups were evaluated for significant differences in PROM score improvements from their respective baseline value using a paired samples t-test and any differences in PROM scores between groups were evaluated at each time point using an unpaired Student's t-test.

## RESULTS:

107 patients were eligible for the study, with 74 patients in the MIS-TLIF cohort. Significant differences between the cohorts were noted for smoking status ( $p = 0.003$ ). Degenerative spondylolisthesis predominated in the MIS-TLIF cohort while a greater proportion of the LLIF cohort demonstrated foraminal stenosis ( $p \leq 0.004$ , all). Postoperative narcotic consumption on day 0 was significantly greater for patients in the LLIF cohort ( $p = 0.048$ ). Patients in the MIS-TLIF cohort demonstrated greater rates of postoperative nausea and vomiting (18.9% vs 3.0%). No other significant differences in postoperative complications were noted between cohorts. Preoperative PROM scores did not significantly differ between cohorts. Postoperative mean PROMs scores did not differ for all PROMs collected at all postoperative time points. MIS-TLIF cohort reported significant improvement from preoperative baseline to the 1-year time point for all PROMs collected at all individual postoperative time points with the exception of SF-12 MCS at all timepoints, SF-12 PCS at 6-weeks, and PROMIS-PF at 6-weeks and 1-year ( $p \leq 0.018$ , all). The LLIF cohort reported significant improvement from preoperative baseline to the 1-year time point for all PROMs collected at all individual postoperative time points with the exception of VAS leg at 6-weeks, SF-12 MCS at 6-weeks, 12-weeks, and 1-year ( $p \leq 0.049$ , all).

**DISCUSSION AND CONCLUSION:** Elderly patients undergoing either single-level MIS-TLIF or LLIF for degenerative spinal pathology demonstrated similar long-term clinical outcomes for physical function, disability, leg pain, and back pain. Interestingly, 6-week improvement for leg pain was significantly improved for the MIS-TLIF cohort compared to the LLIF cohort. The results of our study may guide surgeons when setting expectations for elderly patients undergoing either LLIF or MIS-TLIF.

Table 1 Patient Demographics

Table with columns: Total (n=107), MIS-TLIF (n=45), LLIF (n=62), p-value. Rows include Age (mean (SD)), Sex, Body Mass Index Category (BMI), Body Mass Index (Mean ± SD), Ethnicity, Religion, Anemia, Other, Smoking Status, Diabetes, Hypertension, Renal Disease, CKD (Mean ± SD), ASA, and AHA/ACC.

Table 2 Postoperative Characteristics

Table with columns: Total (n=107), MIS-TLIF (n=45), LLIF (n=62), p-value. Rows include Spinal Pathology, Back Pain (VAS), Leg Pain (VAS), Opioid Use, Postoperative Day of Discharge (PODD), Postoperative VAS Pain, and Postoperative Narcotics.

Table 3 Postoperative Complications

Table with columns: Total (n=107), MIS-TLIF (n=45), LLIF (n=62), p-value. Rows include Urinary Tract Infection, Acute Renal Failure, Allergic Reaction, Hematoma, Postoperative Hemorrhage, and Venous Thromboembolism.

Table 4 Patient Reported Outcome Measures

Table with columns: MIS-TLIF (n=45), LLIF (n=62), p-value. Rows include VAS Back, VAS Leg, ODI, and SF-36 (Physical, Mental, Role-Physical, Role-Mental).

ASA: American Society of Anesthesiologists; CKD: Chronic Kidney Disease; BMI: Body Mass Index. \*p-value calculated using Student's t-test for continuous variables and chi-square for categorical variables. Boldface indicates significance.

PODD: Postoperative Day of Discharge. PODN: Postoperative Narcotics. PODH: Postoperative Hemorrhage. PODI: Postoperative Infection. \*p-value calculated using Student's t-test for continuous variables and chi-square for categorical variables. Boldface indicates significance.

VTE: venous thromboembolism. \*p-value calculated using chi-square for categorical variables. Boldface indicates significance.

\*p-values calculated using paired sample t-test to determine postoperative improvement. Boldface indicates significance.