Preoperative Back Pain Severity Influences Postoperative Clinical Outcomes and Trajectory in Patients undergoing Lateral Lumbar Interbody Fusion

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INTRODUCTION: The Visual Analog Scale (VAS) is a frequently used and validated instrument for assessing a patient’s self-perceived lower back and leg pain and is often employed to assess the efficacy of lumbar surgical intervention. Our study seeks to assess how preoperative severity of presenting lumbar back pain may influence postoperative clinical trajectory and patient-reported outcome measures (PROMs) following lateral lumbar interbody fusion (LLIF).

METHODS:
A prospectively maintained surgical database was retrospectively reviewed for lumbar operations between June 2005 and December 2021. Patients with primary LLIF procedures were included while those with incomplete preoperative VAS back surveys, or had surgery indicated for infectious, malignant, or traumatic etiologies were excluded. PROMs were administered at preoperative and various postoperative time points and included physical function, pain, and disability. Postoperative complications were collected for each group as well. Patients were grouped into two cohorts, dependent on preoperative VAS back scores of <7 for mild-moderate pain or \( \geq 7 \) indicative of severe back pain. Demographic and perioperative characteristics were compared among groups using chi-square and Student’s t-test for categorical and continuous variables, respectively. Mean PROM scores were compared between cohorts at each time point utilizing a unpaired Student’s t-test. Postoperative improvement from preoperative baseline within each cohort was assessed with paired samples t-test. Achievement of Minimum Clinical Important Difference (MCID) was determined by comparing \( \Delta \)PROM scores to previously established threshold values. MCID achievement rates were compared between groups with chi-squared analysis.

RESULTS: The patient cohort consisted of 199 patients with 84 patients in VAS back Preoperative <7. The only demographic difference of note is the higher rate of hypertension (p<0.029) in the VAS back Preoperative <7 cohort. Majority of patients in both cohorts had presenting spinal pathology of degenerative spondylolisthesis with concomitant central stenosis. A significantly greater proportion of patients in the VAS back preoperative <7 cohort reported central and foraminal stenosis. No significant differences were noted between cohorts for operative duration, estimated blood loss, or postoperative day of discharge. Patients in the severe back pain cohort demonstrated significantly greater mean postoperative length of stay, greater postoperative VAS pain scores on POD0 and 1, and greater postoperative narcotic consumption on POD1 (p \leq 0.049, all). Rate of postoperative complications did not differ between cohorts. Preoperative mean PROM scores were significantly different for all PROMs collected. Cohorts demonstrated significant mean postoperative differences for the following PROMs at the following postoperative time points: VAS back at 6 weeks, 12 weeks, 6 months, and 2 years, VAS leg at 6 months, ODI at 6 weeks, 12 weeks, 6 months, and 2 years, SF-12 PCS at 6 months, and PROMIS-PF at 12 weeks, 6 months, and 1 year (p\leq0.049, all). The Preop VAS back <7 patient cohort showed improvements from preoperative to 2 years for all PROMs collected at postoperative timepoints except for VAS leg at 1-year, ODI at 6 weeks, SF-12 PCS at 6 weeks, and PROMIS-PF at 6 weeks. Preop VAS back \( \geq 7 \) patient cohort demonstrated improvement in this time period for all PROMs collected at all postoperative timepoints. Patients in the VAS back \( \geq 7 \) patient cohort demonstrated greater proportion achieving MCID for VAS back at 6 weeks, 12 weeks, 1 year, and overall as well as for VAS leg at 6 weeks (p\leq0.043, all).

DISCUSSION AND CONCLUSION:
Patients in both preoperative back pain severity cohorts demonstrated significant long-term clinical improvement from their respective preoperative baselines at 2-years postoperatively for back pain, leg pain, physical function, and general disability. Patients with severe preoperative back pain (VAS >7), however, demonstrated significantly inferior short (6weeks-6months) and long-term (2 years) mean outcome scores for back pain and general disability. 2-year mean outcome scores for leg pain and physical function were similar between cohorts. Results from our study may be used by surgeons to understand differing postoperative trajectories of patients undergoing LLIF stratified by back pain severity.