Anterior Interbody Approaches Are Associated with Lower Rates of Reoperation than Posterior Interbody Approaches in the Setting of Long Posterior Fusion to the Pelvis for Adult Spinal Deformity

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INTRODUCTION: In patients undergoing long posterior fusions to the pelvis for adult spinal deformity, interbody devices often serve as an important component of the surgical strategy to correct sagittal deformity and provide anterior column support. While prior studies have investigated differences in rates of adverse outcomes based on interbody fusion approach in this patient population, the generalizability of their findings has been limited by sample size. The present study aimed to utilize a large, national administrative database to identify differences in postoperative adverse events and reoperation when such long posterior constructs are performed with anterior versus posterior lumbar interbody approaches.

METHODS: The January 2010 to April 2023 PearlDiver M170Ortho database was retrospectively queried to identify all patients undergoing long-construct posterior spinal fusion to the pelvis, excluding those under 18 years old and those with diagnoses of tumor, neoplasm, or infection on the day of surgery. This population was divided into mutually exclusive study cohorts: those with anterior-approach interbody fusion occurring within two weeks prior to the long-construct procedure, and those with posterior-approach interbody fusion performed on the same day as the long-construct procedure. The two cohorts were matched 1:1 based on age, sex, and Elixhauser Comorbidity Index (ECI).

Ninety-day postoperative all adverse events, severe adverse events, minor adverse events, hospital readmission, and emergency department visits were assessed and compared using multivariable analyses with Bonferroni correction for repeated hypothesis testing. Finally, five-year subsequent surgeries were assessed by Kaplan-Meier survival curves and compared with log-rank testing. Subsequent operations occurring within two weeks following long-construct spinal fusion were excluded to avoid capturing additional staged procedures in the survival analysis.

RESULTS: In total, 4,995 long-construct posterior spinal fusion patients undergoing concurrent or staged anterior- or posterior-approach interbody fusion were identified, for which anterior-approach interbody fusion was performed for 1,221 (24.6%) and posterior-approach interbody fusion was performed for 3,734 (75.4%). Patients in the anterior group were younger (63.9 years vs. 64.8 years, P=0.004) and had a greater comorbidity burden (5.7 vs. 5.3, P=0.005). There was no significant difference in the sex distribution between the two groups (Anterior: Male - 378 [31.0%], Female - 843 [69.0%]. Posterior: Male - 1,264 [33.9%], Female - 2,470 [66.1%]. P=0.067). Matching yielded two cohorts of 1,052 patients (Male: 317 [30.1%], Female: 735 [69.9%]).

The matched cohorts had no significant difference for any of the assessed 90-day postoperative adverse events. However, the 5-year reoperation rate for the posterior interbody group was higher than that of the anterior interbody group (27.9% vs 22.7%, P=0.007) **(Figure 1)**.

DISCUSSION: With long posterior fusions to the pelvis for deformity, there is often the question of the relative morbidity and durability of anterior or posterior interbody adjuncts. The current study was able to isolate two large cohorts to facilitate this comparison. No difference in 90-day postoperative adverse outcomes was identified, suggesting that these factors are not drivers for this interbody approach decision. However, the posterior interbody approach group had a higher 5-year reoperation rate that bears consideration and may not have been detected by prior studies with lesser statistical power. Limitations of the present study include its retrospective nature, reliance on administrative data, and lack of spine-specific outcome measures other than revision rates.

SIGNIFICANCE/CLINICAL RELEVANCE: In addition to patient-specific anatomic and spinal alignment considerations, the increased reoperation rate for long-construct spinal fusion patients undergoing posterior-approach interbody fusion relative to those undergoing anterior approaches should be a notable factor for surgeons to evaluate when creating individualized operative management plans for adult deformity surgeries to the pelvis.

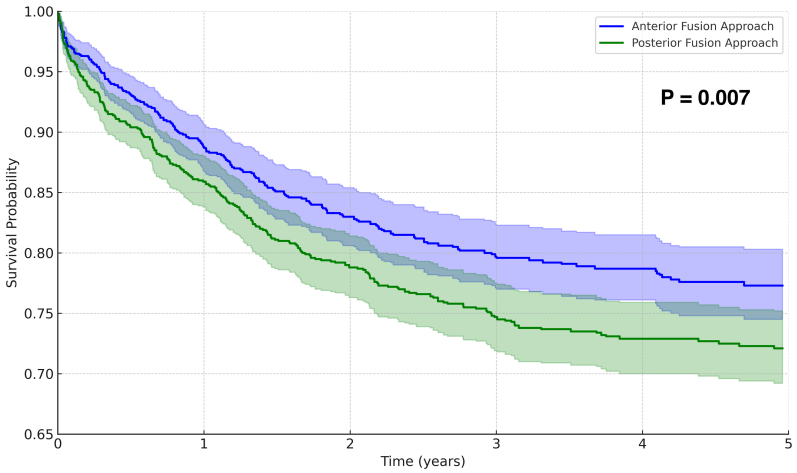

Figure 1. Kaplan-Meier survival curves for reoperation for the anterior interbody fusion approach (blue) and posterior interbody fusion approach (green). Survival indicates the probability of not undergoing a reoperation. There was a significant difference in survival between the anterior and posterior approach groups (P=0.007).