Complications After Anterior Lumbar Interbody Fusion in Patients with Prior Abdominal Surgery

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INTRODUCTION: Anterior lumbar interbody fusion (ALIF) is a widely utilized surgical technique for the treatment of numerous spinal pathologies, some of which include degenerative disc disease, spondylolisthesis, trauma, and spinal deformities. The ALIF approach necessitates mobilizing the intra-abdominal viscera and vasculature in order to effectively access the ventral surface of the spine for discectomy and implant insertion. Understandably, there is a unique morbidity profile associated with this approach due to the increased exposure of vasculature, visceral organs, the genitourinary system, and soft tissue. Adhesions, scarring, and altered anatomy following procedures such as laparotomy, cesarean section, colectomy, or other major abdominal operations may increase operative difficulty, prolong exposure time, and elevate the risk of complications. Existing literature often cites significant prior abdominal surgery with adhesions as a relative contraindication to ALIF. However, there is a paucity of data regarding the rates of ALIF post-op complications following specific abdominal surgeries and the nature of these complications, this study aims to investigate this clinical relationship.

METHODS: A retrospective cohort study was performed using a national insurance database. Of the 1,123,841 ALIF patients from 2010–2024, patients were stratified according to history of prior cesarean section (CSEC; n=5,085), prior non-obstetric abdominal surgery (ABD; n=49,734), any prior abdominal surgery (ANYABD; n= 54,819), and no prior abdominal surgery (NOABD; n=1,069,022). Outcomes included complications within 30 days, 90 days, and one year. Complication subtypes included vascular injury, gastrointestinal complications (e.g., ileus, fistula), venous thromboembolism, infection, reoperation, and mechanical complications. Univariate and multivariate logistic regression were performed with predictor variables of age, sex, and Elixhauser Comorbidity Index (ECI).

RESULTS SECTION: Among 1,123,841 ALIF patients (57% male), total complications occurred in 28,698 (2.6%) at 30 days, 39,858 (3.5%) at 90 days, and 60,824 (5.4%) at 1 year. Logistic regression was performed comparing complication rates between the separate surgery types. Univariate analyses demonstrated that prior abdominal surgery significantly increases the odds of complications in nearly all sub-groups. Patients with prior non-obstetric abdominal surgery (ABD) or any abdominal surgery (ANYABD) had more than double the odds of complications compared to those without abdominal surgery (NOABD) at all time points (1-year OR 2.3, 95% CI 2.2–2.4; p<0.0001) (Table 1). On the other hand, patients with a history of cesarean section (CSEC) showed no significant increase in risk compared to NOABD (1-year OR 1.16, 95% CI 0.99–1.35; p=0.07). However, after adjusting for age, sex, and comorbidity burden (ECI) the differences between groups were no longer significant (ABD vs NOABD at 1 year: OR 1.00, 95% CI 0.97–1.04; p=0.82) (Table 2). The ECI in the adjusted model was the strongest predictor of complications (OR 1.08, 95% CI 1.07–1.09, p<0.0001).

DISCUSSION: While raw complication rates appear significantly higher in patients with prior abdominal surgery, these differences become nonsignificant once comorbidity burden is adjusted for. ECI, a measure of a patient's preexisting illness burden, was the primary predictor of risk, with adjusted models only showing significant differences in post-operative compilations in relation to the comorbidity index. While complications after ALIF are not uncommon, prior studies have suggested a higher risk among patients with a history of abdominal surgery. In contrast, our findings demonstrate that prior abdominal surgery itself does not independently increase postoperative complications, rather, patients with prior abdominal operations tend to have a greater comorbidity burden, which likely explains their higher unadjusted complication rates. In terms of implications for clinical practice, this study suggests comorbidity burden rather than surgical history should take precedence when assessing perioperative risk for ALIF candidates.

SIGNIFICANCE/CLINICAL RELEVANCE: This study investigates the importance of surgical history in predicting ALIF complications and specific post-operative outcomes. Patients with prior abdominal surgery represent a vulnerable subgroup and would benefit from comorbidity optimization rather than solely surgical history guiding perioperative risk assessment and surgical planning.

Table 1. Comparing Post Operative Complication Rate Between Surgery Type (Unadjusted)

Comparison	30-day OR (95% CI)	p-value	90-day OR (95% CI)	p-value	1-year OR (95% CI), p-value
ABD vs NOABD	2.60 (2.50–2.70)	<0.0001	2.40 (2.30–2.50)	<0.0001	2.30 (2.20–2.40), <0.0001
ANYABD vs NOABD	2.60 (2.40–2.80)	<0.0001	2.40 (2.20–2.60)	<0.0001	2.30 (2.10–2.50), <0.0001
CSEC vs NOABD	1.10 (0.93–1.30)	0.26	1.12 (0.96–1.31)	0.18	1.16 (0.99–1.35), 0.07
ABD vs CSEC	2.30 (2.00–2.70)	<0.0001	2.10 (1.90–2.50)	<0.0001	2.00 (1.80–2.30), <0.0001
ANYABD vs CSEC	2.30 (2.00–2.70)	<0.0001	2.10 (1.80–2.50)	<0.0001	2.00 (1.70–2.30), <0.0001

Table 2. Comparing Post Operative Complication Rate Between Surgery Type (Adjusted for ECI, age, sex)

Comparison	30-day OR (95% CI)	p-value	90-day OR (95% CI)	p-value	1-year OR (95% CI), p-value
ABD vs NOABD	1.02 (0.98–1.06)	0.32	1.01 (0.98–1.05)	0.41	1.00 (0.97–1.04), 0.82
ANYABD vs NOABD	1.03 (0.96–1.10)	0.46	1.02 (0.96–1.09)	0.49	1.01 (0.95–1.07), 0.74
CSEC vs NOABD	1.05 (0.92–1.21)	0.43	1.06 (0.93–1.21)	0.39	1.08 (0.95–1.23), 0.24
ABD vs CSEC	0.98 (0.87–1.11)	0.72	0.97 (0.86–1.10)	0.69	0.95 (0.84–1.07), 0.42
ANYABD vs CSEC	0.99 (0.87–1.13)	0.91	0.98 (0.86–1.12)	0.85	0.96 (0.84–1.10), 0.39
ECI (per 10 pts)	1.08 (1.07–1.09)	<0.0001	1.08 (1.07–1.09)	<0.0001	1.08 (1.07–1.09), <0.0001