Following Posterior Lumbar Fusion, Patients With Asthma Are At Increased Odds Of Both Pulmonary And Non-Pulmonary Perioperative Adverse Events

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INTRODUCTION: Posterior lumbar fusion (PLF) is a common procedure for which patient factors are known to affect perioperative outcomes. Identifying and understanding the potential impact of preoperative factors on postoperative adverse outcomes may help define areas in need of greater optimization. Asthma has not been specifically considered in this regard, even though it is the most common inflammatory airways disease. The purpose of the current study was to investigate risk of perioperative adverse events in adult patients with asthma following one or two level PLF with or without interbody.

METHODS: Adult patients undergoing primary PLF were identified from 2015 – 2021Q3 Pearldiver M157 administrative datasets. Exclusion criteria included: age < 18 years, surgical indications of trauma, neoplasm, or presence of infection, as well as not being active in the database for 90 days following their procedure.

Asthma patients were matched to those without 1:4 based on age, sex, and Elixhauser Comorbidity Index (ECI). The incidence of 90-day adverse events was compared using multivariable logistic regression (significance defined as $p < 0.0023$). Log-rank test was used to compare rates of five-year revision. The matched asthma group was then stratified based on disease severity for analysis of 90-day aggregated (any, severe, and minor) adverse events.

RESULTS SECTION: Among 159,294 PLF patients, asthma was noted for 17,295 (10.9%). Multivariable analysis revealed that patients with asthma were at increased odds of experiencing 90-day pulmonary adverse events, in order of decreasing odds ratio (OR): pneumonia (OR=3.64), atelectasis (OR=2.85), respiratory failure (OR=2.45), and pleural effusion (OR=2.26)($p<0.0001$ for each, Figure). Asthma was also associated with non-pulmonary adverse events, in order of decreasing OR: emergency department visits (OR=2.97), urinary tract infection (OR=2.38), cardiac event (OR=2.09), deep vein thrombosis (OR=1.70), sepsis (OR=1.66), pulmonary embolism (OR=1.64), acute kidney injury (OR=1.55), transfusion (OR=1.47), hematoma (OR=1.45), and surgical site infection (OR=1.31)(Figure). Further, asthma patients had significantly higher rates of five-year revision (88.4% versus 93.0%, $p<0.0001$).

Upon secondary analysis stratifying asthma by severity, patients with all severity levels of asthma showed elevated odds of adverse events following PLF. These associations increased in odds with increasing severity of asthma (Table).

DISCUSSION: Over a tenth of patients undergoing PLF were identified as having asthma, and these patients were found to be of greater odds of numerous pulmonary and non-pulmonary adverse events (a trend that increased with asthma severity), as well as five-year revisions.

SIGNIFICANCE/CLINICAL RELEVANCE: Patients with asthma at greater odds of multiple pulmonary and non-pulmonary adverse events, such patients clearly need specific counselling, optimization, and risk mitigation strategies when considering posterior lumbar fusion.

IMAGES AND TABLES:

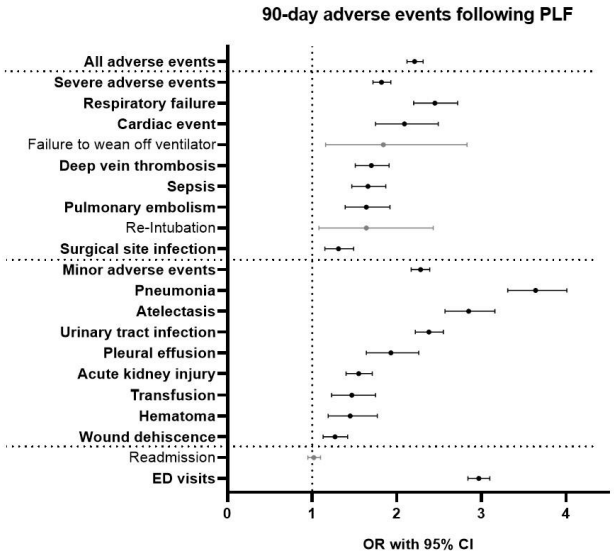

Figure. Forest plot of odds ratios (OR), 95% confidence intervals (CI) of 90-day outcomes following posterior lumbar fusion (PLF) in patients with and without asthma. Grey denotes nonsignificant odds ratios, black/bold denotes significant odds ratios

Table. Multivariable analysis of 90-day outcomes of adult patients with varying severities of asthma who underwent posterior lumbar fusion with or without interbody, one or two level, between 2015-2021 Q3. Reference level = Not Asthma

	Mild Intermittent [OR (95% CI)]	P-value	Mild Persistent [OR (95% CI)]	P-value	Moderate Asthma [OR (95% CI)]	P-value	Severe Asthma [OR (95% CI)]	P-value
All adverse events	2.07 (1.89,2.27)	**P<0.0001**	2.70 (2.36,3.09)	**P<0.0001**	2.91 (2.61,3.25)	**P<0.0001**	5.85 (4.73,7.23)	**P<0.0001**
Severe adverse events	1.58 (1.38,1.79)	**P<0.0001**	2.02 (1.69,2.40)	**P<0.0001**	2.23 (1.94,2.56)	**P<0.0001**	4.97 (3.93,6.24)	**P<0.0001**
Minor adverse events	2.30 (2.08,2.54)	**P<0.0001**	3.00 (2.61,3.45)	**P<0.0001**	2.92 (2.60,3.28)	**P<0.0001**	4.63 (3.72,5.76)	**P<0.0001**