GLP-1 Receptor Agonist Use is Associated with Reduced Complications Following Thoracic and Lumbar Fusions for Degenerative Spine Disease: A BMI-Stratified Retrospective Study

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INTRODUCTION:

Obesity is a known risk factor for complications following thoracic and lumbar fusions. While GLP-1 receptor agonists are increasingly used for metabolic optimization, their impact on postoperative outcomes in spine surgery remains underexplored. Prior studies have suggested systemic benefits of GLP-1 use, particularly in total joint arthroplasty, but their effect in spine surgery patients remains uncharacterized. To evaluate the impact of GLP-1 receptor agonist use on 90-day medical and 2-year surgical complications in patients undergoing thoracic and lumbar fusions for degenerative spine disease, stratified by BMI category.

METHODS:

A retrospective cohort study was conducted using a national database (2010–2023). Adult patients undergoing thoracic or lumbar spinal fusion for degenerative pathology were identified via CPT and ICD codes. Patients with spinal deformity were excluded. GLP-1 receptor agonist users were identified through pharmacy claims within 6 months prior to surgery and matched 4:1 to non-users by age, sex, and Charlson Comorbidity Index. Patients were stratified by BMI into six groups: <19.9 (Underweight), 20.0–24.9 (Normal), 25.0–29.9 (Overweight), 30.0–34.9 (Obesity Class I), 35.0–39.9 (Obesity Class II), ≥40.0 (Obesity Class III). **Primary outcomes** included: **90-day medical complications**: renal failure, anemia, arrhythmia, pneumonia, DVT, PE, stroke, UTI, and readmission. **2-year surgical complications**: revision surgery, mechanical failure, and wound complications. Adjusted hazard ratios (aHR) and p-values were derived using Cox proportional hazards models for each BMI category. Significance was set at $p<0.05$.

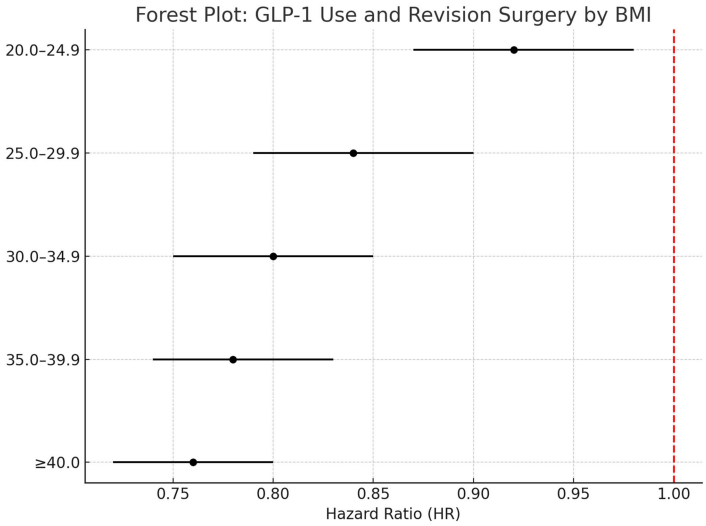
RESULTS:

A total of 59,391 patients undergoing thoracic and lumbar fusions were included after matching (47,359 GLP-1 users, 12,032 non-users). Baseline demographics were well balanced. **90-Day Medical Complications:** GLP-1 use was associated with significantly reduced complications across several BMI groups: BMI 25.0–29.9: decrease in anemia (aHR 0.89), arrhythmia (aHR 0.86), UTI (aHR 0.85), readmission (aHR 0.83); *all p<0.05*. BMI 30.0–34.9: decrease in anemia (aHR 0.86), PE (aHR 0.84), UTI (aHR 0.81); *all p<0.01*. BMI ≥40.0: decrease in renal failure (aHR 0.78), stroke (aHR 0.72), pneumonia (aHR 0.71); *p<0.01*. **2-Year Surgical Complications:** GLP-1 users demonstrated improved surgical outcomes: BMI 25.0–29.9: decrease in revision surgery (aHR 0.84), wound complications (aHR 0.85); *p<0.05*. BMI 30.0–34.9: decrease in mechanical failure (aHR 0.80), revision (aHR 0.80), wound complications (aHR 0.82); *p<0.05*. BMI ≥40.0: consistent downward trend across all surgical endpoints.

DISCUSSION AND CONCLUSION:

GLP-1 receptor agonist use is associated with significantly reduced risk of postoperative complications following thoracic and lumbar fusions, particularly in overweight and obese patients. These benefits may stem from the metabolic, anti-inflammatory, and vascular effects of GLP-1 therapy. The magnitude of benefit appeared to increase with BMI, suggesting an important role in surgical optimization for higher-risk cohorts. This study is one of the first large-scale studies exploring GLP-1 impact in spine surgery.

GLP-1 receptor agonists are associated with a reduction in both 90-day medical and 2-year surgical complications after thoracic and lumbar fusions, particularly in patients with BMI ≥25. These findings support consideration of GLP-1 therapy as part of preoperative optimization for degenerative spine surgery in overweight and obese populations. Prospective trials are warranted to confirm these associations.


Forest Plot: GLP-1 Use and Revision Surgery by BMI
20.0–24.9
25.0–29.9
30.0–34.9
35.0–39.9
≥40.0
0.75
0.80
0.85
0.90
0.95
1.00
Hazard Ratio (HR)