

The Impact of GLP-1 Agonist Use Prior to Lumbar Spine Surgery on Patient Outcomes and Complication Rates

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INTRODUCTION: Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) effectively reduce obesity, a risk factor for spine surgery complications. However, they may impair nutrient absorption and muscle mass, affecting recovery. While GLP-1s may promote wound healing through reduced inflammation and angiogenesis, they also delay gastric emptying, potentially leading to malnutrition and muscle wasting (critical concerns for post-operative rehabilitation). Although previous work has shown potential benefits of GLP-1 RA use in arthroplasty patients, data on spine surgery outcomes remain limited. The purpose of this investigation was to retrospectively compare pre-operative comorbidities and post-operative complication rates between patients taking GLP-1 medications and those who were not.

METHODS: This study is a retrospective review of all patients taking a GLP-1 drug pre-operatively undergoing cervical or lumbar decompression or fusion surgery in a single hospital system between January 2018 and October 2024. Patient medical records were queried to collect demographic variables and pre-operative comorbidities, as well as post-operative complications. Data was also collected for a cohort of case-control-matched patients (CONTROL) who were matched based on age, sex, BMI, and surgery type. The primary outcome was overall complication rate. Secondary outcomes included operative and non-operative infections, deep venous thrombosis, and pulmonary embolus. A t-test was used to compare patient demographics and pre-operative co-morbidity indices as well as length of stay (LOS), procedure time, blood loss between groups. A two-proportion Z-test was used to compare post-operative complication frequencies and pre-operative co-morbidity frequencies. Type-I error set at $\alpha=0.05$.

RESULTS: A total of 86 (m=44, f=42) patients were included in the GLP-1 cohort and 253 (m=136, f=117) in the control cohort. Among all patients analyzed, there was no significant difference in age, gender, or BMI between the cohorts ($P>0.05$). The GLP-1 cohort had a significantly higher Charlson Co-morbidity Index (CCI; 4.98 vs 3.17; $P<0.001$) along with elevated LOS (107 \pm 25h vs 72 \pm 12h, $P=0.007$) and frequency of obesity (78% vs. 64%, $P=0.025$), diabetes (100% vs. 45%, $P<0.001$), and chronic kidney disease (49% vs. 30%, $P=0.002$). However, no differences in post-operative complications were observed. Interestingly, following a sub-analysis comparing only diabetic patients (86 GLP-1=86; CONTROL=114), the GLP-1 cohort was observed to have a lower infection rate (4.7% vs 12.3%; $P=0.031$) and total complication rate (8.1% vs. 15.8%; $P=0.046$) compared to the CONTROL group.

DISCUSSION: Among diabetic patients undergoing spine surgery, GLP-1 medications may help reduce post-operative infection and all-cause complication rates. Future prospective studies are needed to confirm these findings and to evaluate the clinical impact of GLP-1 medications on long-term outcomes.

SIGNIFICANCE/CLINICAL RELEVANCE: This study highlights the potential protective role of GLP-1 receptor agonists in reducing post-operative complications among diabetic patients undergoing lumbar spine surgery. These findings suggest that GLP-1 medications may confer peri-operative benefits beyond glycemic or caloric control. Clinically, this underscores the importance of considering GLP-1 therapy as part of a comprehensive pre-operative optimization strategy for diabetic spine surgery patients. Further prospective research is warranted to validate these results and guide evidence-based peri-operative management protocols and to explore the potential impact on long-term clinical outcomes.