Glucagon-Like Peptide-1 Receptor Agonists and Postoperative Outcomes Following Laminectomy in Patients with Type 2 Diabetes: A Retrospective Cohort Study

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INTRODUCTION: Patients with type 2 diabetes mellitus (T2DM) undergoing spinal surgery are at an elevated risk for postoperative complications. Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) improve glycemic control and weight loss and have been associated with favorable perioperative outcomes in spinal fusion and arthroplasty populations. However, their effects following isolated laminectomy procedures remains unclear. The objective of this study was to evaluate the association between GLP-1 RA use and postoperative outcomes, including metabolic parameters, medical complications, surgical complications, and healthcare utilization, in obese and non-obese T2DM patients undergoing spinal laminectomy.

METHODS: The TriNetX database was queried to identify adult T2DM patients undergoing spinal laminectomy between 2018 and 2023. IRB exemption was obtained by our institution. Patients were stratified by obesity status (BMI ≥30 kg/m² vs. <30 kg/m²) and GLP-1 RA exposure. Propensity score matching (1:1) was performed to adjust for demographic and clinical covariates. Primary outcomes included 1-year changes in BMI and HbA1c, 90-day medical complications, 1-year surgical complications, and healthcare utilization (Emergency Department (ED) visits/readmissions at 90 days and 1 year).

RESULTS SECTION: After matching, 2,819 obese (GLP-1 RA: 1,354 male, 1,259 female; Non-GLP-1 RA: 1,354 male, 1,265 female) and 1,026 non-obese (GLP-1 RA: 568 male, 396 female; Non-GLP-1 RA: 592 male, 382 female) matched pairs were analyzed. At 1 year, BMI decreased among obese GLP-1 RA users (36.7 kg/m² to 36.4 kg/m², P = 0.044) and non-users (36.7 kg/m² to 36.2 kg/m², P = 0.001). HbA1c increased among GLP-1 RA users in both obese (7.07% to 7.14%, P = 0.059) and non-obese (7.35% to 7.50%, P = 0.031) cohorts, while non-GLP users demonstrated significant improvements. In the obese cohort, GLP-1 RA use was associated with increased odds of pulmonary embolism (OR = 1.963, 95% CI 1.142-3.374; P = 0.013), back pain (OR = 1.205, 95% CI 1.080-1.344; P = 0.001), and radiculopathy (OR = 1.167, 95% CI 1.052-1.294; P = 0.004). Among non-obese patients, GLP-1 RA use was associated with increased ED visits/readmissions at 90 days (OR = 1.263, 95% CI 1.039-1.536; P = 0.019) and 1 year (OR = 1.391, 95% CI 1.168-1.658; P < 0.001), back pain (OR = 1.311, 95% CI 1.089–1.577; P = 0.004), radiculopathy (OR = 1.255, 95% CI 1.056-1.490; P = 0.010), and lower limb mononeuropathy (OR = 2.457, 95% CI 1.247-4.842; P = 0.007). Rates of other major medical and surgical complications were similar between groups.

DISCUSSION: In T2DM patients undergoing laminectomy, GLP-1 RA use was not associated with reduced major complications and did not confer metabolic benefit. It was linked to higher odds of PE (obese), neuromuscular symptoms, and increased healthcare utilization (non-obese). These findings differ from prior studies of spinal fusion and suggest that the impact of GLP-1 RAs may vary by procedure type. Our study exhibited several limitations, including: inherent retrospective limitations, inability to account for unmeasured variables, outcomes were dependent on ICD-10-CM and CPT coding, and inability to access detailed intraoperative variables. Further prospective research is warranted to clarify underlying mechanisms and guide perioperative management in this growing patient population.

SIGNIFICANCE/CLINICAL RELEVANCE: Preoperative GLP-1 RA use was not associated with expected metabolic benefits and was linked to increased thromboembolic events, neuromuscular symptoms, and healthcare utilization. These results contrast with findings in spinal fusion, suggesting effects may vary by procedure type.

REFERENCES: 1) Wiener JM, Sanghvi PA, Vlastaris K, et al. GLP-1 Receptor Agonist Medications Alter Outcomes of Spine Surgery: A Study Among Over 15,000 Patients. *Spine* undefined;undefined. 2) Tummala BSS, Gibbs DC, Chavarria J, et al. GLP-1 Receptor Agonist Use in Elective Lumbar Spine Surgery: Reduced Pseudarthrosis Rates and Favorable Safety Profile. *Journal of Orthopaedics* 2025/05/08. 3) Goldman SN, Mani K, Scharfenberger T, et al. Glucagon-like peptide-1 receptor agonist use prior to spinal surgery results in reduced postoperative length of stay: A propensity-score matched analysis. *North American Spine Society Journal (NASSJ)* 2025/06/01;22.

Figure 1. Forest plot of postoperative outcomes in obese diabetic patients undergoing spinal laminectomy, comparing GLP-1 RA users to non-users (reference group). Outcomes include 90-day medical complications, 1-year surgical complications, and healthcare utilization. Odds Ratios (ORs) and 95% confidence intervals (CIs) are shown.
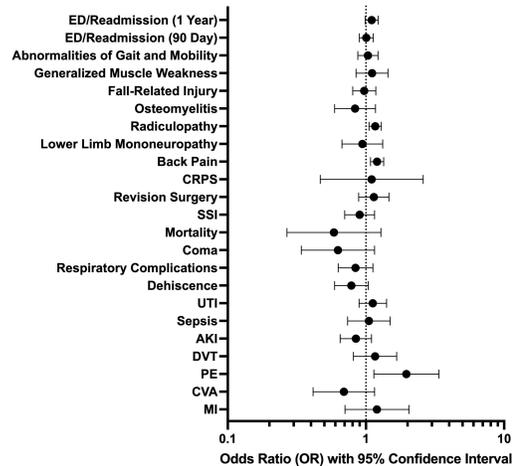

Figure 2. Forest plot of postoperative outcomes in non-obese diabetic patients undergoing spinal laminectomy, comparing GLP-1 RA users to non-users (reference group). Outcomes include 90-day medical complications, 1-year surgical complications, and healthcare utilization. Odds Ratios (ORs) and 95% confidence intervals (CIs) are shown.
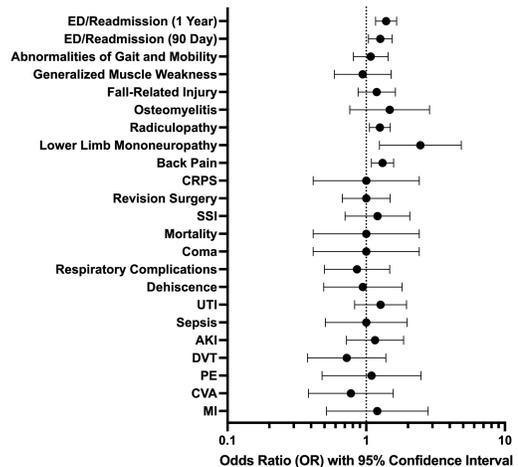
Table 1. Changes in BMI and HbA1c at 1 year postoperatively among obese and non-obese diabetic patients stratified by GLP-1 RA use.

	GLP-1 Agonist in Obese Diabetics (n=2,819)	Non-GLP-1 Agonist in Obese Diabetics (n=2,819)
BMI (kg/m²)		
Index BMI	36.7 ± 5.5	36.7 ± 5.5
BMI at 1 year	36.4 ± 5.7	36.2 ± 5.7
Mean Difference (95% CI)	-0.300 (-0.592 to -0.008)	-0.500 (-0.792 to -0.208)
P Value	*0.044*	*0.001*
HbA1c (%)		
Index HbA1c	7.07 ± 1.36	7.04 ± 1.37
HbA1c at 1 year	7.14 ± 1.42	6.86 ± 1.30
Mean Difference (95% CI)	0.070 (-0.003 to 0.143)	-0.180 (-0.250 to -0.110)
P Value	0.059	*<0.001*

	GLP-1 Agonist in Non-Obese Diabetics (n=1,026)	Non-GLP-1 Agonist in Non-Obese Diabetics (n=1,026)
BMI (kg/m²)		
Index BMI	27.3 ± 2.9	27.0 ± 2.7
BMI at 1 year	27.4 ± 3.3	27.0 ± 3.3
Mean Difference (95% CI)	0.100 (-0.169 to 0.369)	0.000 (-0.261 to 0.261)
P Value	0.466	>0.999
HbA1c (%)		
Index HbA1c	7.35 ± 1.51	7.18 ± 1.32
HbA1c at 1 year	7.50 ± 1.63	7.05 ± 1.32
Mean Difference (95% CI)	0.150 (0.014 to 0.286)	-0.130 (-0.244 to -0.016)
P Value	*0.031*	*0.026*

BMI = Body Mass Index; CI = Confidence Interval; GLP-1 = Glucagon-Like Peptide 1; HbA1c = Glycated Hemoglobin