Glucagon-Like Peptide-1 Receptor Agonist Use and Postoperative Outcomes After Distal Radius and/or Ulna Fracture Fixation in Adults with Type 2 Diabetes

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INTRODUCTION: Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) are increasingly prescribed for patients with type 2 diabetes mellitus (T2DM) due to their favorable metabolic profile. Emerging literature has suggested that GLP-1 RAs may also influence surgical outcomes by improving glycemic control, reducing inflammation, and promoting wound healing. However, their impact on postoperative complications following upper extremity fracture fixation remains unknown. This study aimed to evaluate whether GLP-1 RA use is associated with improved postoperative outcomes in T2DM patients undergoing operative repair of distal radius and/or distal ulna fracture.

METHODS: A retrospective cohort study was conducted using the TriNetX research network, including patients with T2DM who underwent open surgical fixation of a distal radius and/or distal ulna fracture between January 1, 2018 and December 31, 2024. Patients were stratified into two cohorts based on active GLP-1 RA use within 6 months prior to surgery. Propensity score matching (1:1) was performed based on age, sex, race, BMI, HbA1c, nicotine use, insulin and metformin use, and diabetes-related complications (hyperosmolarity, ketoacidosis, nephropathy, and neuropathy). Outcomes were assessed using ICD-10-CM codes at defined timepoints. Primary outcomes included medical complications within 90 days, surgical complications within 180 days, and healthcare utilization through 180 days. Odds ratios (OR) with 95% confidence intervals (CI) were reported using logistic regression. The study protocol was reviewed by our institution's Institutional Review Board (IRB) and deemed exempt given the use of de-identified data (PRO00050721).

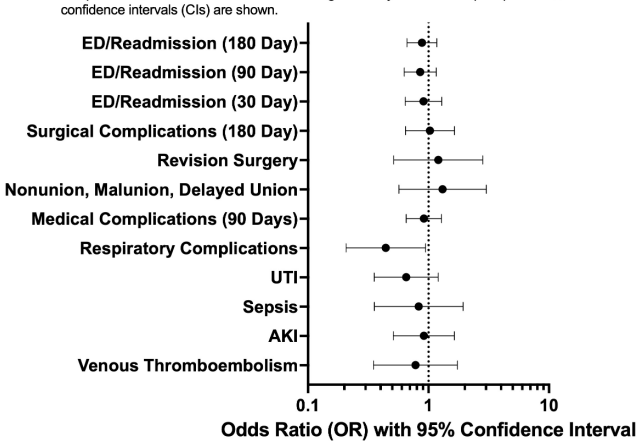
RESULTS SECTION: After matching, 443 patients (GLP-1 RA: Male = 99, Female = 327; Non-GLP-1 RA: Male = 89, Female = 339) were included in each cohort. Baseline characteristics were well balanced across all covariates. GLP-1 RA use was not associated with significant differences in pooled 90-day medical complications (OR 0.915, 95% CI 0.653-1.282, P = 0.605) or pooled 180-day surgical complications (OR 1.029, 95% CI 0.644-1.645, P = 0.905). Individual medical complication rates at 90 days, including myocardial infarction, stroke, venous thromboembolism, acute kidney injury, sepsis, urinary tract infection, or mortality, were similarly low and not significantly different between cohorts (all P > 0.05). Individual surgical complication rates at 180 days, including surgical site infection, wound dehiscence, nonunion/malunion/delayed union, hardware failure or implant loosening, and revision surgery, were also not significantly different (all P > 0.05). Notably, GLP-1 RA users had significantly lower odds of postoperative respiratory complications within 90 days (OR 0.442, 95% CI 0.207-0.944; P = 0.031). No significant differences were observed in emergency department visits and/or hospital readmissions at 30, 90, or 180 days postoperatively. Several individual outcomes had low event counts in both groups, limiting the precision of effect estimates and resulting in ORs of 1.000 with wide CIs.

Table I. Baseline Demographic Profiles of Patients Undergoing Operative Repair of Distal Radius Fractures With or Without the Use of Preoperative GLP-1 RAs (Before and After 1:1 Propensity Score Matching).

	Before PSM, Mean ± SD or No. (%)				After PSM, Mean ± SD or No. (%)			
	GLP-1 RA (N=448)	Non-GLP-1 RA (N=7,798)	*P* Value	SMD	GLP-1 RA (N=443)	Non-GLP-1 RA (N=443)	*P* Value	SMD
Age	62.5 ± 9.4	63.6 ± 13.2	0.097	0.091	62.6 ± 9.4	61.8 ± 11.4	0.270	0.074
Race								
White	332 (74.1)	5,527 (70.9)	0.143	0.072	328 (74.0)	348 (78.6)	0.114	0.106
Black or African American	37 (8.3)	738 (9.5)	0.395	0.042	37 (8.4)	31 (7.0)	0.449	0.051
Asian	18 (4.0)	398 (5.1)	0.307	0.052	18 (4.1)	10 (2.3)	0.124	0.103
Native Hawaiian or Other Pacific Islander	10 (2.2)	40 (0.5)	<0.001	0.148	10 (2.3)	10 (2.3)	>0.999	<0.001
American Indian or Alaska Native	10 (2.2)	47 (0.6)	<0.001	0.138	10 (2.3)	10 (2.3)	>0.999	<0.001
Other Race	11 (2.5)	249 (3.2)	0.385	0.045	11 (2.5)	10 (2.3)	0.825	0.015
Unknown Race	43 (9.6)	799 (10.2)	0.660	0.022	42 (9.5)	42 (9.5)	>0.999	<0.001
Sex								
Male	99 (22.1)	2,052 (26.3)	0.048	0.099	99 (22.3)	89 (20.1)	0.411	0.055
Female	332 (74.1)	5,332 (68.4)	0.011	0.127	327 (73.8)	339 (76.5)	0.351	0.063
Unknown	17 (3.8)	414 (5.3)	0.161	0.073	17 (3.8)	15 (3.4)	0.719	0.024
Medical Comorbidities								
Nicotine Dependence	93 (20.8)	1,118 (14.3)	<0.001	0.169	90 (20.3)	80 (18.1)	0.394	0.057
HHS	10 (2.2)	31 (0.4)	<0.001	0.162	10 (2.3)	10 (2.3)	>0.999	<0.001
DKA	10 (2.2)	48 (0.6)	<0.001	0.137	10 (2.3)	10 (2.3)	>0.999	<0.001
Diabetic Nephropathy	79 (17.6)	630 (8.1)	<0.001	0.288	74 (16.7)	77 (17.4)	0.789	0.018
Diabetic Neuropathy	102 (22.8)	576 (7.4)	<0.001	0.440	98 (22.1)	93 (21.0)	0.683	0.027
Metformin Use	188 (42.0)	1,188 (15.2)	<0.001	0.619	183 (41.3)	170 (38.4)	0.372	0.060
Insulin Use	225 (50.2)	1,680 (21.5)	<0.001	0.627	220 (49.7)	213 (48.1)	0.638	0.032
Laboratory Investigations								
Average BMI (kg/m²)	34.3 ± 7.9	30.9 ± 7.3	<0.001	0.452	34.4 ± 7.9	32.0 ± 7.6	<0.001	0.311
Average HbA1c (%)	7.3 ± 1.6	6.9 ± 1.7	<0.001	0.217	7.3 ± 1.6	7.1 ± 1.7	0.280	0.084

BMI = Body Mass Index; *DKA* = Diabetic ketoacidosis; GLP-*1 RA* = Glucagon-Like Peptide 1 Receptor Agonist; *HHS* = Hyperosmolar hyperglycemic syndrome; *PSM* = Propensity Score Matching; *SD* = Standard Deviation; *SMD* = Standardized Mean Difference

Figure 1. Forest Plot of postoperative outcomes in T2DM patients undergoing operative repair of distal radius and/or distal ulna fracture, comparing GLP-1 RA users to non-users (Reference Group). Outcomes include 90-day medical complications, 180-day surgical complications, and healthcare utilization through 180 days. Odds ratio (ORs) and 95% confidence intervals (CIs) are shown.



DISCUSSION: In this multicenter, matched cohort of adults with T2DM undergoing operative fixation of distal radius and/or distal ulna fractures, preoperative GLP-1 RA exposure within 6 months of surgery was not associated with differences in composite 90-day medical complications, composite 180-day surgical complications, or health care utilization through 180 days. GLP-1 RA exposure was associated with lower 90-day respiratory complications. This signal persisted despite small residual imbalance in BMI after matching, which would be expected to bias against lower respiratory risk in the GLP-1 RA cohort. Our study exhibited several limitations, including: inherent limitations of a retrospective analysis reliant on administrative and electronic health record data, potential misclassification of exposure, and small-cell suppression of rare events. These findings suggest a potential protective effect of GLP-1 RAs on pulmonary risk following upper extremity fracture surgery, though the mechanism remains unclear. Further prospective studies are warranted to validate this finding and explore whether GLP-1 RAs may serve as a modifiable risk factor in perioperative planning for diabetic patients.

SIGNIFICANCE/CLINICAL RELEVANCE: In adults with T2DM undergoing operative fixation of distal radius and/or distal ulna fractures, preoperative GLP-1 RA exposure was associated with lower odds of 90-day respiratory complications without increased surgical complications or healthcare utilization. These findings support the perioperative safety of GLP-1 RA use and suggest a potential pulmonary benefit that warrants prospective confirmation.

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