Pre-operative Weight Loss with GLP-1 Receptor Agonists is Associated with Lower Complication Rates Following Primary TKA than Pre-operative Bariatric Surgery

George Bcharah, Austin E Wininger, Saad Tarabichi, Zaid Shaker Elsabbagh, Jens Taylor Verhey, Mark J Spangehl, Henry D Clarke, Joshua Bingham

INTRODUCTION: Obesity is a risk factor for adverse outcomes following total knee arthroplasty (TKA). Bariatric surgery (BS) and glucagon-like peptide-1 receptor agonists (GLP-1 RAs) are weight loss strategies commonly encountered when treating TKA patients. This study aimed to compare short- and long-term complications among obese patients undergoing primary TKA who were treated with either BS or GLP-1 RAs preoperatively.

METHODS: A retrospective cohort study was performed utilizing the TriNetX database to identify obese patients (body mass index ≥30 kg/m²) who underwent primary TKA. From 181,437 patients, 5,438 had BS and 6,235 were prescribed GLP-1 RAs within one year prior to TKA. Propensity score matching was performed for cohort balancing. Ninety-day, two-year, five-year, and ten-year surgical complications (i.e., periprosthetic joint infection [PJI], periprosthetic fracture, instability, aseptic loosening, and all-cause revision surgery) and ninety-day medical complications were compared.

RESULTS:

At 90 days following TKA, patients in the BS cohort had significantly greater odds of readmission (OR 2.05, 95% CI 1.31–3.21, p<0.001), deep vein thrombosis (OR 1.91, 95% CI 1.34–2.74, p<0.001),blood transfusion requirement (OR 1.79, 95% CI 1.11-2.87, p<0.001), and bleeding events (OR 1.69, 95% CI 1.38–2.08, p<0.001) compared to those prescribed GLP-1 RAs. At five years, the BS cohort had a higher risk for aseptic loosening (OR 4.57, 95% CI 2.65-7.87, p<0.001), periprosthetic fracture (OR 2.59, 95% CI 1.39-4.81, p=0.002), all-cause revision TKA (OR 2.10, 95% CI 1.56-2.83), PJI (OR 1.74, 95% CI 1.27-2.38), and instability (OR 1.77, 95% CI 1.08-2.90, p=0.022).

DISCUSSION AND CONCLUSION: Compared to BS, use of GLP-1 RAs in the year prior to TKA was associated with significantly lower rates of PJI, periprosthetic fracture, instability, aseptic loosening, and all-cause revision. These findings highlight important differences between weight loss strategies and the underlying metabolic status of the patient.

414 **Table 1.** Patient characteristics in the bariatric surgery and GLP-1 receptor agonist cohorts before and after propensity score matching.

Variable	Bariatric Surgery (Before) n=5,575	GLP-1 Receptor Agonist (Before) n=7,356	*P*-value	Bariatric Surgery (After) n=3,629	GLP-1 Receptor Agonist (After) n=3,629	*P*-value
Age, years (mean ± standard deviation)	60.8 ± 8.5	63.9 ± 8.3	< 0.001	62 ± 8.3	62.1 ± 8.4	0.718
Female, n (%)	4,320 (77.5%)	4,674 (63.5%)	< 0.001	2,626 (72.4%)	2,686 (74.0%)	0.112
White, n (%)	4,037 (72.4%)	5,362 (72.9%)	0.544	2,631 (72.5%)	2,648 (73.0%)	0.654
Black or African American, n (%)	945 (17.0%)	1,016 (13.8%)	< 0.001	565 (15.6%)	532 (14.7%)	0.280
Hispanic or Latino, n (%)	279 (5.0%)	513 (7.0%)	< 0.001	205 (5.7%)	201 (5.5%)	0.838
Essential Hypertension, n (%)	3,267 (58.6%)	5,476 (74.4%)	< 0.001	2,311 (63.7%)	2,281 (62.9%)	0.465
Diabetes Mellitus, n (%)	1,531 (23.9%)	4,950 (67.3%)	< 0.001	1,317 (36.3%)	1,320 (36.4%)	0.942
Chronic Kidney Disease, n (%)	441 (7.9%)	1,072 (14.6%)	< 0.001	349 (9.6%)	313 (8.6%)	0.142
Hyperlipidemia, n (%)	1,593 (28.6%)	3,508 (47.7%)	< 0.001	1,281 (35.3%)	1,268 (34.9%)	0.749
Diseases of Liver, n (%)	402 (7.2%)	750 (10.2%)	< 0.001	302 (8.3%)	305 (8.4%)	0.899
Heart Failure, n (%)	365 (6.6%)	616 (8.4%)	< 0.001	252 (6.9%)	237 (6.5%)	0.482
Atrial Fibrillation and Flutter, n (%)	448 (8.0%)	546 (7.4%)	0.195	292 (8.1%)	269 (7.4%)	0.312
Nicotine Dependence, n (%)	281 (5.0%)	483 (6.6%)	< 0.001	200 (5.5%)	182 (5.0%)	0.344
Chronic Obstructive Pulmonary Disease, n (%)	415 (7.4%)	501 (6.8%)	< 0.001	207 (5.7%)	203 (5.6%)	0.839
Cerebrovascular Diseases, n (%)	345 (4.7%)	345 (4.7%)	< 0.001	160 (4.4%)	147 (4.1%)	0.448
Coagulation Defects, n (%)	233 (4.2%)	341 (4.6%)	0.212	164 (4.5%)	167 (4.6%)	0.866
Osteoporosis without Fracture, n (%)	306 (4.2%)	284 (5.2%)	< 0.001	203 (5.6%)	201 (5.5%)	0.679
Gout, n (%)	338 (4.6%)	308 (4.9%)	< 0.001	134 (3.7%)	124 (3.4%)	0.526
Peripheral Vascular Disease, n (%)	157 (2.5%)	214 (3.4%)	0.021	95 (2.6%)	87 (2.4%)	0.548
Sepsis, n (%)	75 (1.4%)	84 (1.4%)	0.949	50 (1.4%)	55 (1.5%)	0.759
Acute Myocardial Infarction, n (%)	109 (2.0%)	116 (1.9%)	0.012	41 (1.1%)	41 (1.1%)	1.000
Rheumatoid Arthritis, n (%)	229 (3.1%)	174 (3.1%)	< 0.001	130 (3.6%)	143 (3.9%)	0.423
Cerebral Infarction, n (%)	120 (1.6%)	199 (3.2%)	0.014	59 (1.6%)	55 (1.5%)	0.706
Peptic Ulcer, n (%)	55 (1.0%)	42 (1.4%)	0.191	14 (0.4%)	17 (0.5%)	0.347
Systemic Lupus Erythematosus, n (%)	52 (0.9%)	53 (1.0%)	< 0.001	18 (0.5%)	31 (0.9%)	0.479
Human Immunodeficiency Virus, n (%)	19 (0.3%)	23 (0.8%)	< 0.001	10 (0.3%)	10 (0.3%)	1.000
Glucocorticoids, n (%)	3,324 (59.6%)	4,752 (64.6%)	< 0.001	2,266 (62.4%)	2,283 (62.9%)	0.678
Non-Steroidal Anti-Inflammatory Drugs, n (%)	410 (7.4%)	891 (12.1%)	< 0.001	330 (9.1%)	307 (8.5%)	0.340
Body Mass Index, kg/m² (mean ± standard deviation)	37.2 ± 5.6	37.4 ± 5.5	0.007	37.2 ± 5.5	37.7 ± 5.5	0.796
Albumin, g/dL (mean ± standard deviation)	3.99 ± 0.40	4.12 ± 0.39	< 0.001	3.99 ± 0.40	4.12 ± 0.38	< 0.001

Table 2. TKA Outcomes Following Bariatric Surgery versus GLP-1 Receptor Agonists

Outcomes	Bariatric Surgery (n, %)	GLP-1 Receptor Agonists (n, %)	Odds Ratio (95% Confidence Interval)	*P*-value
90-Day (n=3,528)				
Revision TKA	25 (0.7%)	22 (0.6%)	1.14 (0.64 - 2.02)	0.661
Periprosthetic Joint Infection	41 (1.2%)	37 (1.0%)	1.11 (0.71 - 1.73)	0.649
Knee Instability	*<10 (0.3%)	*<10 (0.3%)	1.00 (0.42 - 2.40)	1
Aseptic Loosening	*<10 (0.3%)	*<10 (0.3%)	1.00 (0.42 - 2.40)	1
Periprosthetic Fracture	13 (0.4%)	*<10 (0.3%)	1.30 (0.57 - 2.97)	0.531
Superficial Surgical Site Infection	19 (0.5%)	29 (0.8%)	0.65 (0.37 - 1.17)	0.148
Deep Vein Thrombosis	87 (2.5%)	46 (1.3%)	1.91 (1.34 - 2.74)	**<0.001**
Pulmonary Embolism	49 (1.3%)	32 (0.9%)	1.44 (0.92 - 2.27)	0.111
Bleeding	256 (7.3%)	156 (4.4%)	1.69 (1.38 - 2.08)	**<0.001**
Myocardial Infarction	23 (0.7%)	14 (0.4%)	1.65 (0.85 - 3.21)	0.138
Stroke	24 (0.7%)	30 (0.9%)	0.80 (0.47 - 1.37)	0.412
Acute Kidney Injury	81 (2.3%)	70 (2.0%)	1.16 (0.84 - 1.60)	0.366
Transfusion	48 (1.4%)	27 (0.8%)	1.79 (1.11 - 2.87)	**0.015**
Emergency Department Visit	413 (11.7%)	367 (10.4%)	1.14 (0.98 - 1.33)	0.081
Readmission	59 (1.7%)	29 (0.8%)	2.05 (1.31 - 3.21)	**<0.001**
Mortality	*<10 (0.3%)	*<10 (0.3%)	1.00 (0.42 - 2.41)	1
2-Year (n=3,625)				
Revision TKA	107 (3.0%)	54 (1.5%)	2.01 (1.45 - 2.80)	**<0.001**
Periprosthetic Joint Infection	94 (2.6%)	55 (1.5%)	1.73 (1.24 - 2.42)	**<0.001**
Aseptic Loosening	42 (1.2%)	*<10 (0.3%)	4.24 (2.12 - 8.46)	**<0.001**
Periprosthetic Fracture	27 (0.7%)	15 (0.4%)	1.81 (0.96 - 3.40)	0.063
Knee Instability	32 (0.9%)	18 (0.5%)	1.79 (1.00 - 3.19)	**0.047**
5-Year (n=3,629)				
Revision TKA	136 (3.7%)	66 (1.8%)	2.10 (1.56 - 2.83)	**<0.001**
Periprosthetic Joint Infection	108 (3.0%)	63 (1.7%)	1.74 (1.27 - 2.38)	**<0.001**
Aseptic Loosening	72 (2.0%)	16 (0.4%)	4.57 (2.65 - 7.87)	**<0.001**
Periprosthetic Fracture	36 (1.0%)	14 (0.4%)	2.59 (1.39 - 4.81)	**0.002**
Knee Instability	44 (1.2%)	25 (0.7%)	1.77 (1.08 - 2.90)	**0.022**
10-Year (n=3,623)				
Revision TKA	148 (4.1%)	66 (1.8%)	2.30 (1.71 - 3.08)	**<0.001**
Periprosthetic Joint Infection	113 (3.1%)	67 (1.8%)	1.71 (1.26 - 2.32)	**<0.001**
Aseptic Loosening	72 (2.0%)	15 (0.4%)	4.88 (2.79 - 8.52)	**<0.001**
Periprosthetic Fracture	41 (1.1%)	17 (0.5%)	2.43 (1.38 - 4.28)	**0.002**
Knee Instability	52 (1.4%)	24 (0.7%)	2.18 (1.34 - 3.55)	**<0.001**

*TriNetX does not report counts of <10.