Trimming the Fat: Impact of GLP-1 Receptor Agonist Therapy on Outcomes After Tibial Plateau Fracture Fixation

Amelia R Goldstein, Kenneth A Egol

INTRODUCTION: Glucagon-like peptide-1 (GLP-1) receptor agonists have emerged as promising agents in obesity management. Their systemic effects may influence post-operative recovery in orthopedic trauma. This study aimed to evaluate the impact of long-term GLP-1 therapy on radiographic and functional outcomes following tibial plateau fracture fixation across different BMI cohorts.

METHODS:

A prospective tibial plateau fracture database (2016–2024) was queried for patients on GLP-1 therapy for ≥6 months prior to fracture. Twenty-four patients met inclusion criteria (Group GLP-1), all with operatively managed Schatzker I–VI fractures and ≥6 months of follow-up. GLP-1 users were compared to three BMI-stratified, non-GLP-1 cohorts: Normal (18.5–25), Overweight (25.01–30), and Obese (≥30). Matching was based on age, fracture pattern, fixation method, Charlson Comorbidity Index, and baseline Kellgren-Lawrence grade.

Postoperative fluoroscopy was reviewed for reduction quality and implant alignment. All patients followed a standardized rehabilitation protocol. Clinical exams and imaging at routine intervals assessed knee range of motion (ROM), fracture healing, and posttraumatic osteoarthritis (PTOA). Complications and secondary interventions were recorded and included development of fracture related infection (FRI), fracture nonunion, nerve injury, need for removal of hardware, early radiographic PTOA, and need for revision surgery.

Statistical analyses were performed using one-way ANOVA for continuous variables and Chi-square tests for categorical variables. Data were analyzed using IBM SPSS Statistics (Version 21.0, Montauk, NY).

RESULTS: The mean follow-up period across all cohorts was 28.83 months. Baseline age, CCI, fracture angulation, and step-off were comparable across cohorts. Pre-injury osteoarthritis severity was significantly higher in Group A (0.96 ± 0.88) versus Groups B (0.68 ± 0.86), C (0.54 ± 0.75), and D (0.78 ± 0.74) ($p < 0.001$). Radiographic PTOA was highest in Group D (32%, $p<0.01$), while Group A had PTOA rates similar to Groups B and C ($\chi^2 \approx 0.95$, $p \approx 0.62$). Final flexion ROM differed significantly ($p<0.01$), with Group D exhibiting the lowest mobility (119.08 ± 16.47°). Group A demonstrated significantly increased nonunion rates compared to all other groups ($p<0.01$).

DISCUSSION AND CONCLUSION: GLP-1 receptor agonist use among obese patients was associated with a significantly lower incidence of PTOA and preserved knee range of motion compared to untreated obese individuals, yielding outcomes comparable to non-obese patients. However, GLP-1 usage was also associated with higher rates of nonunion. These findings suggest a complex role for GLP-1 therapy in post-fracture recovery and highlight its potential to mitigate obesity-associated joint degeneration while raising considerations about fracture healing.