Review Article

Using glucagon-Like Peptide-1 Agonists for Post-Bariatric Surgery: A Narrative Review

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Abstract

Background: Post-bariatric surgery weight regain, or lack of optimal weight loss, are two common problems after bariatric surgery. Some studies recommend the administration of glucagon-like peptide-1 (GLP-1) agonists for weight loss in these conditions. In this study, we aimed to review prior studies evaluating the effects of GLP-1 after bariatric surgery.

Materials and Methods: In this narrative review, we reviewed studies from 2015 to 2025 using the keywords "bariatric surgery," "GLP1," "Glucagon-like peptide-1," "sleeve gastrectomy," "Roux-en-Y," and "Gastric Bypass." Keywords were searched in PubMed/MEDLINE, Web of Science, EMBASE/Elsevier, Scopus, and CENTRAL. After considering the exclusion criteria, ten studies were enrolled in the review.

Results: GLP1 agonists significantly reduced weight in patients who did not experience weight loss as expected and in patients who experienced weight regain. Different types of GLP1 agonists had different effectiveness; in this respect, semaglutide had better effects than Liraglutide. Side effects of GLP1 agonists were tolerable and primarily gastrointestinal.

Conclusion: GLP1 agonists are safe and effective therapies for weight regain or suboptimal weight loss after bariatric surgery.

Keywords: Bariatric surgery, Glucagon-like peptide-1 agonists, Liraglutide, Semaglutide

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Introduction

Bariatric surgery is the most effective treatment for severe obesity, leading to significant weight loss, improved cardiovascular health, and reduced mortality risk. However, 16% to 37% of patients may experience substantial weight regain, limiting long-term benefits. Currently, there is no standard therapy for this condition, but lifestyle changes, behavioral interventions, and sometimes medication can help[1-3]. Revisional surgery may be appropriate for anatomical issues, whereas other procedures, such as distal Roux-en-Y and biliopancreatic diversion, are typically reserved for severe cases[4,5].

Glucagon-like peptide-1 (GLP-1) agonists are the most effective weight loss medications available. Liraglutide and semaglutide have well-established efficacy and safety profiles, with average weight loss of up to 15% and mild, transient gastrointestinal side effects. They also provide cardiovascular and renal benefits. However, their effectiveness in preventing

weight regain after bariatric surgery remains unclear[6-8]. In this study, we aimed to review prior studies on the effects of GLP-1 agonists on post-bariatric surgery weight regain.

Methods

In this narrative review, we aimed to assess the utility of GLP1 agonists after bariatric surgery. We reviewed studies in this regard from 2015 to 2025 with keywords of "bariatric surgery", "GLP1", "Glucagon-like peptide-1", "sleeve gastrectomy", "Roux-en-Y", and "Gastric Bypass". Keywords were searched in PubMed/MEDLINE, Web of Science, EMBASE/Elsevier, Scopus, and CENTRAL. In the searches, 110 studies were found; 19 were excluded for unmatched time (before 2015); 57 were reviews, systematic reviews, case reports, editorials, and meta-analyses; 6 articles were on GLP1 prescription before the surgery; 14 articles were incompatible with our aim; and 4 were duplicated articles. Finally, 10 studies were enrolled in the current review.

Results

We reviewed 11 articles on GLP-1 administration in the post-bariatric surgery period. In this regard, Jensen et al. assessed the effects of GLP-1 on weight regain after bariatric surgery. Fifty patients were assessed, and Liraglutide and semaglutide were prescribed for 29 and 21 patients, respectively. Weight and body mass index (BMI) were 90.5 kg and 34.0 kg/m2, respectively. The weight regain after bariatric surgery was 15.1% of total body weight. GLP1s were administered for 6 months, and after this period, a 8.8% and 2.9 kg/m2 reduction in weight and BMI, respectively, was observed, both of which were statistically significant. These rates showed that 67.4% of weight regain was reversed. This treatment had no adverse effects[9].

Mok et al. compared the effects of Liraglutide and placebo after bariatric surgery in participants with poor weight loss. Participants with a poor weight-loss response following Roux-en-Y or sleeve gastrectomy were randomly assigned to receive 3.0 mg Liraglutide or placebo. Liraglutide reduced participants' mean weight by 8.82±4.94 kg, whereas placebo reduced it by 0.54±3.32 kg ($P < .001$). Adverse events were more common in the liraglutide group (80%) than in the placebo group (50%), and the most common adverse event was gastrointestinal[10].

Like Mok et al., Hany et al. performed a study comparing the effects of Liraglutide and placebo after Roux-en-Y surgery. They found that Liraglutide had statistically better weight loss than placebo after surgery at 4 weeks (10.27±1.39 vs. 8.41±2.08), 6 weeks (12.65±1.77 vs. 10.47±2.23), 6 months (18.29±1.74 vs. 15.58±1.65), and 12 months (24.15±2.35 vs. 22.70±2.13). Changes in metabolic biomarkers were similar between the groups. Adverse events were found in 27.5% of the Liraglutide alone group[11].

Wharton et al. evaluated one hundred seventeen post-bariatric surgery patients to assess the effects of liraglutide administration after bariatric surgery (Roux-en-Y gastric bypass, sleeve gastrectomy, and gastric banding). After 7.6 ± 7.1 months of using Liraglutide, patients lost 6.3 ± 7.7 kg of weight, regardless of the type of surgery. This rate of weight loss was statistically significant. This weight loss remained substantial after 1 year of taking Liraglutide. 29.1% of patients had nausea[12].

Farías observed the effects of Liraglutide 36 months after bariatric surgery. She reported that Liraglutide significantly reduced the mean weight from baseline to 5%, 7.7%, 7.6%, 5.8%, and 5.1% at 3, 6, 12, 24, and 36 months, respectively. The mean reduction in body mass index was 14.8% at 36 months. Liraglutide was well tolerated but expensive, and some patients were unable to use it[13].

Rye et al., also evaluated the effects of Liraglutide after bariatric surgery. They found that the median percentage weight loss was 7.1% at 16 weeks and 9.7% at 28 weeks. The median BMI change was 3.5 kg/m2 at 16 weeks and 4.7 kg/m2 at 28 weeks. No major adverse events were reported[14].

Murvelashvili et al. compared the effects of semaglutide and Liraglutide after bariatric surgery. The mean weight loss at 12 months in the semaglutide group was -12.92%, compared with -8.77% in the liraglutide group; therefore, semaglutide significantly reduced weight. Semaglutide 1.0 mg weekly leads to better weight loss than Liraglutide 3.0 mg daily for post-MBS weight recurrence, regardless of the type of surgery[15].

Elhang et al. evaluated the effects of Liraglutide on weight and cardiometabolic outcomes after bariatric surgery. Patients were treated with Liraglutide for 54.10 ± 31.75 months. Both primary and revisional surgery patients experienced significant weight loss, with primary patients losing 5.97% and 6.93% of their weight at 6 and 12 months, respectively. Additionally, 52.3% and 60% lost more than 5% of their total weight at those time points. Revisional patients achieved weight losses of 6.41% at 6 months and 4.99% at 12 months, with 60% and 48%, respectively, exceeding the 5% weight-loss threshold. Liraglutide did not improve cardiometabolic outcomes for primary patients but lowered systolic blood pressure in revisional patients. The treatment was generally well tolerated, with nausea being the most common side effect[16].

Lautenbach et al. assessed the effectiveness of semaglutide after bariatric surgery, noting an average prescription duration of 64.7 ± 47.6 months. At the start of treatment, patients had a weight regain of 12.3 ± 14.4%. Total weight loss during semaglutide treatment was -6.0 ± 4.3% after 3 months and -10.3 ± 5.5% after 6 months. At 3 months, 61% of patients lost more than 5% of their weight, 16% lost more than 10%, and 2% lost more than 15%. Baseline triglyceride, alanine transaminase (ALT), and aspartate aminotransferase (AST) levels were negatively associated with a weight loss of at least 5% at the 3-month follow-up[17].

Zenno et al. conducted a study on the effects of Liraglutide in adolescents with obesity who had undergone sleeve gastrectomy. After 16 weeks of treatment, the participants experienced an average decrease in BMI of 4.3%. However, those who initially responded poorly to sleeve gastrectomy (with less than a 20% reduction in BMI) showed less weight loss while on Liraglutide. Additionally, there were significant reductions in fasting glucose and hemoglobin A1C levels. Importantly, no serious treatment-emergent adverse events were reported[18].

Discussion

In this review, we assessed the results of studies on the effects of GLP1 agonists in patients who underwent bariatric surgery. We observed that the GLP1 agonist had a significant effect on weight reduction in patients who didn't experience the expected weight loss and in those who experienced weight regain. Different types of GLP1 agonists had different effectiveness; in this respect, semaglutide had better effects than Liraglutide.

Bariatric surgery is the most effective obesity treatment, leading to significant long-term weight loss and improvement in obesity-related health issues, such as type 2 diabetes, hypertension, and dyslipidemia[19-25]. Studies indicate that it reduces the risk of major cardiovascular events and mortality. In 2019, over 600,000 surgeries were performed worldwide, with more than 256,000 in the USA, mainly focusing on sleeve gastrectomy (59%) and Roux-en-Y gastric bypass (18%). Despite its effectiveness compared to non-surgical interventions, some patients experience inadequate weight loss or regain. About 11% to 22% of patients achieve suboptimal weight loss, defined as losing less than 40% to 60% of their excess body weight within 1 to 2 years after surgery[26-31]. In this study, we reviewed articles on managing weight regain ot suboptimal weight loss after bariatric surgery by administering GLP1 agonists.

GLP-1 agonists were first developed in the 1980s with the observation of the incretin effect. The first, exenatide, received FDA approval in 2005 for the treatment of type 2 diabetes mellitus (T2DM). Since then, additional GLP-1 receptor agonists, including Liraglutide, dulaglutide, and semaglutide, have been introduced, each with distinct pharmacokinetic profiles and administration schedules[32,33].

GLP1 and GIP (glucose-dependent insulinotropic polypeptide) are both incretin hormones that are inactivated by the enzyme dipeptidyl peptidase-4 (DPP-4). They stimulate insulin secretion in response to an oral glucose load via the incretin effect. In individuals with T2DM, this response can be diminished or even absent. However, administering pharmacological levels of GLP1 can restore insulin secretion. The benefits of this therapy for T2DM include delaying gastric emptying and inhibiting glucagon production from pancreatic alpha cells when blood sugar levels are elevated. Additionally, GLP-1 receptor agonists may reduce apoptosis (cell death) in pancreatic beta cells and encourage their proliferation[34-38].

GLP-1 agonists regulate glucose levels, hunger, and

energy balance through various mechanisms in the pancreas, stomach, brain, and cardiovascular systems. Their effectiveness in managing T2DM and obesity stems from multiple actions. In the pancreas, GLP1 agonists enhance insulin release from beta cells in a glucose-dependent manner, reducing the risk of hypoglycemia. They also decrease glucagon release from alpha cells in hyperglycemic conditions, thereby improving glucose homeostasis by lowering liver glucose production[39-41].

This class of medications leads to an average weight loss of 2.9 kg compared to a placebo, along with lower systolic and diastolic blood pressure and total cholesterol. GLP1 agonists improve cardiovascular health by enhancing left ventricular ejection fraction, myocardial contractility, and blood flow while reducing infarction size and the risk of cardiovascular events. GLP-1 also increases glucose uptake in muscles, decreases hepatic glucose production, and promotes satiety. In patients with T2DM, GLP-1 analogs have been shown to reduce all-cause mortality and to lower hemoglobin A1c by 1% compared with control groups. Highly effective interventions for lowering glucose levels include high-dose Dulaglutide, Semaglutide, Tripeptide, insulin, and combination therapies[42-45].

The results of the reviewed studies demonstrated that GLP1 agonists are useful for achieving optimal weight reduction after bariatric surgery, regardless of the type of surgery.

Two types of GLP-1 agonists were mentioned in the current review: semaglutide and Liraglutide. The semaglutide and the Liraglutide are long-acting analogs of GLP-1. The Liraglutide has a half-life of 13 to 15 hours, while semaglutide lasts 165 hours due to an amino acid change and a C18 fatty acid addition[46,47]. In a phase 2 trial, once-daily semaglutide at 0.4 mg (equivalent to 2.8 mg weekly) led to significantly greater weight loss compared to Liraglutide at 3.0 mg[48]. In studies comparing the effects of Liraglutide and semaglutide, both reported that semaglutide had better weight-loss effects than Liraglutide[10,15]. Lautenbach et al. showed that semaglutide significantly reduced weight after bariatric surgery, and higher triglyceride, AST, and ALT levels were negatively associated with semaglutide-induced weight loss[17]. This issue may highlight the importance of metabolic assessment for predicting the treatment response to semaglutide for obesity, but it should be further investigated in future studies.

Conclusion

Management of weight regain or suboptimal weight loss after various types of bariatric surgery can be achieved with GLP-1 agonists. GLP-1 has tolerable side effects, which are commonly gastrointestinal, and can therefore be prescribed safely to patients.

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Conflict of interest

The authors further declare that they have no conflict of interest.

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