



# Anesthetic risks associated with the use of implantable Glucagon-like Peptide 1 (GLP-1): case report

Marcelo de Jesus Martins<sup>1</sup> , Stefania Lacerda Garcia<sup>2</sup> , Rafael Pereira Espínola<sup>2</sup> ,  
Caroline Paiva Matos Oliveira Martins<sup>3</sup> 

**How to cite:** Martins MJ, Garcia SL, Espínola RP, Martins CPMO. Anesthetic risks associated with the use of implantable Glucagon-like Peptide 1 (GLP-1): case report. *Periop. Anesth. Rep.* 2026;4:e00292025. <https://doi.org/10.61724/2965-3681/e00292025>

## ABSTRACT

Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) are widely used to manage type 2 diabetes and obesity but are associated with gastrointestinal side effects, including delayed gastric emptying. We report the case of a 38-year-old man with hypothyroidism who developed nausea, severe vomiting, and clinical and laboratory signs of dehydration after self-administering a subcutaneous semaglutide implant that lacked authorization from Brazilian national health agencies. A thorough clinical and diagnostic workup was conducted to rule out other causes such as infection or gastric pathology. Upper endoscopy was performed, and ultrasound imaging revealed a 0.3 cm hyperechoic tubular structure in the left gluteal region, corresponding to the reported implant. The device was removed under ultrasound guidance, and the patient's symptoms resolved completely within hours. This case underscores the risks of using unregulated GLP-1 RA implants and highlights the anesthetic challenges posed by delayed gastric emptying in situations where medication discontinuation is not feasible. It also reinforces the need for regulatory oversight and clear perioperative management guidelines.

## KEYWORDS

Anesthesia; obesity; risk management

## INTRODUCTION

Obesity has become a major public health concern in many countries, with its global incidence having tripled since the 1950s. At the same time, more than 31 million Americans are living with type 2 diabetes, according to the U.S. Centers for Disease Control and Prevention. These conditions are closely linked, often reducing life expectancy and increasing the risk of various health complications<sup>(1)</sup>.

GLP-1 (glucagon-like peptide-1) agonists are a class of medications that help regulate blood sugar levels by inhibiting glucagon release and slowing gastric emptying.

They are effective in treating type 2 diabetes and, at higher doses, have also shown success in managing obesity<sup>(2)</sup>. However, common side effects such as nausea, vomiting, and diarrhea highlight the importance of proper medical guidance and close multidisciplinary monitoring to avoid negative outcomes<sup>(3)</sup>.

This case report describes a patient who received a subcutaneous semaglutide implant in the gluteal region. The formulation was not properly prescribed and was produced without approval or regulation by the Brazilian Health Regulatory Agency (ANVISA).

<sup>1</sup> Hospital Português, Salvador, BA, Brasil

<sup>2</sup> Universidade Salvador, Salvador, BA, Brasil

<sup>3</sup> Universidade Federal da Bahia, Salvador, BA, Brasil



## CASE REPORT

A 38-year-old male with a history of hypothyroidism, managed with levothyroxine 125 mcg daily and no other known medical conditions, presented to the emergency department with persistent nausea and vomiting lasting approximately six hours. His symptoms did not improve with oral antiemetics, and he was admitted for intravenous hydration and antiemetic therapy.

The patient was admitted for diagnostic evaluation and symptom management. Physical examination and medical history ruled out potential causes such as infection, gastroenteritis, gastroesophageal reflux disease, trauma, or conditions associated with intracranial hypertension. Vital signs showed tachycardia and mild hypotension, with a heart rate of 100-110 bpm

and systolic blood pressure ranging from 90–100 mmHg, as shown in the attached table.

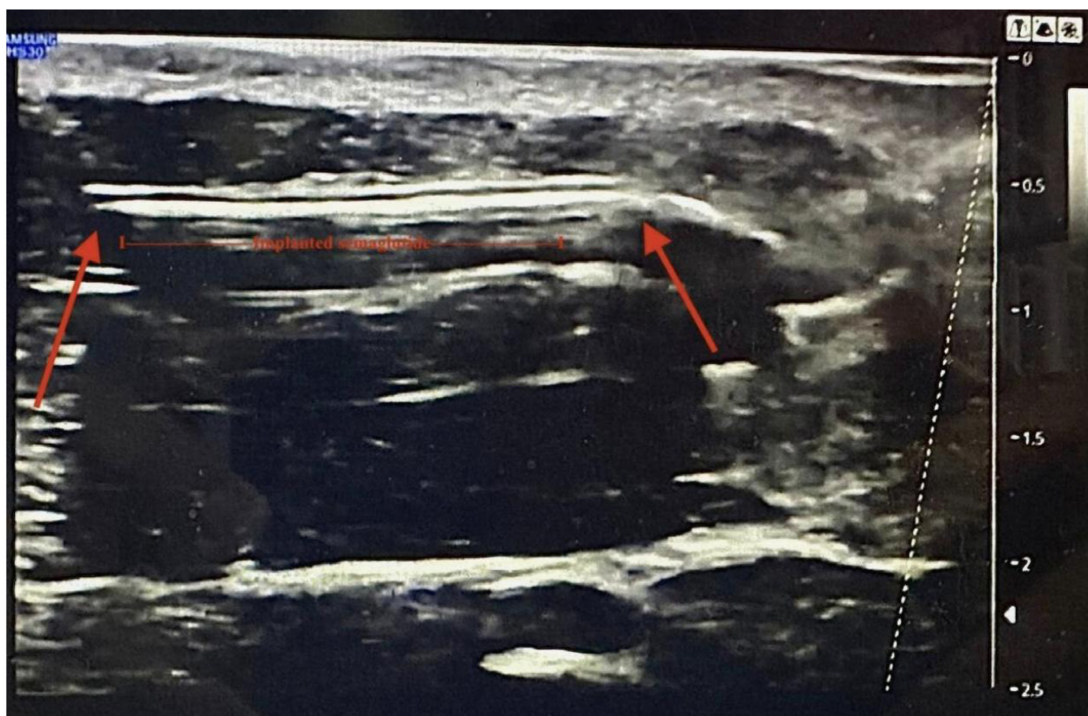
Initial laboratory tests showed no evidence of infection, with normal erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and white blood cell count. Electrolyte analysis suggested dehydration, with a hematocrit of 46%, sodium level of 145 mEq/L, and creatinine of 1.2 mg/dL (Table 1). To further investigate the symptoms, an upper gastrointestinal endoscopy was performed, revealing lacerations in the esophageal mucosa consistent with Mallory Weiss syndrome.

An important finding in the clinical history was that the patient reported receiving a semaglutide implant (Figure 1) one day prior to admission. The implant had been prescribed and prepared in a compounded, nonstandard manner by a physician at another facility.

**Table 1.** Vital Signs and laboratory results

VITAL SIGNS			LAB/RESULTS	
Admission	Day 1	Day 2	Ht	46%
BP: 100x70	BP: 115x80	BP: 120x80	Na	145 mEq/L
HR: 97 bpm	HR: 72 bpm	HR: 63 bpm	Cr	1.2 mg/dL
SpO <sub>2</sub> : 98%	SpO <sub>2</sub> : 99%	SpO <sub>2</sub> : 99%		

**Note:** Vital signs recorded at admission and on hospital days 1 and 2, including blood pressure (BP), heart rate (HR), and peripheral oxygen saturation (SpO<sub>2</sub>). Laboratory results include hematocrit (Ht), serum sodium (Na), and serum creatinine (Cr). BP is expressed in mmHg, HR in beats per minute (bpm), SpO<sub>2</sub> as percentage (%), sodium in milliequivalents per liter (mEq/L), and creatinine in milligrams per deciliter (mg/dL).



**Figure 1.** Ultrasound of the Left Gluteal Region. Ultrasound revealed a small, elongated tubular structure measuring 0.3 cm, hyperechoic, with posterior acoustic shadowing in the upper left gluteal region.

Pre-anesthetic assessment revealed no predictors of a difficult airway (Mallampati class I, good cervical mobility, and no history of gastroesophageal reflux disease). The patient had been fasting for more than 12 hours. Given the potential risk of aspiration related to GLP-1 receptor agonist use, a conscious sedation technique was selected. The patient was positioned with the head elevated, and standard safety measures were implemented, including immediate availability of suction equipment. All airway management devices were prepared, and the team remained ready to perform rapid sequence induction if conversion to general anesthesia became necessary.

For the upper gastrointestinal endoscopy, the anesthesia team performed a pre-anesthetic evaluation, completed the surgical safety checklist, and applied standard monitoring, including ECG, noninvasive blood pressure (NIBP), and pulse oximetry (SpO<sub>2</sub>). The patient had no predictors of a difficult airway (Mallampati class I) but was considered at increased risk of bronchoaspiration due to the possibility of a full stomach related to continued exposure to a GLP-1 receptor agonist (semaglutide implant).

Therefore, light conscious sedation was chosen using midazolam 1 mg and fentanyl 50 mcg, combined with topical anesthesia using 10% lidocaine spray, oxygen support was installed via nasal cannula (3 L/min). The patient weighed 70 kg. All airway management equipment was readily available in the operating room in case rapid sequence intubation became necessary.

Point-of-care gastric ultrasound was not considered at that time because the team lacked the necessary training to perform the examination. However, training in gastric ultrasound for the entire team was subsequently identified as an action item and has since been implemented.

After the checklist and pre-anesthetic evaluation, oxygen support was installed via nasal cannula (3 L/min), conscious sedation was administered with midazolam 1 mg and fentanyl 50 mcg, in addition to antiemetics (ondansetron 4 mg and metoclopramide 10 mg IV). The implant was successfully removed under ultrasound guidance, using local anesthesia with 2% lidocaine without vasoconstrictor (10 mL) as supplement, under standard aseptic technique and without complications. The patient experienced significant relief of symptoms and vital signs in the postoperative period in the subsequent hours and was discharged the following day.

## DISCUSSION

Early control of blood glucose following a diagnosis of type 2 diabetes is crucial for preventing long-term

complications and reducing mortality risk. GLP-1 receptor agonists are increasingly recommended in international guidelines due to their proven efficacy in improving glycemic control and promoting weight loss<sup>(4)</sup>. They provide an additional therapeutic option alongside lifestyle modifications, particularly for patients who are overweight or obese based on their weight and BMI. Achieving a weight reduction of 5-15% can significantly lower the risk of obesity-related complications and support sustainable long-term weight management<sup>(5)</sup>.

GLP-1 receptor agonists mimic the action of the natural incretin hormone GLP-1 and act on multiple organs to improve glycemic control and promote weight loss. In the pancreas, they increase glucose-dependent insulin secretion from  $\beta$ -cells and suppress glucagon release from  $\alpha$ -cells, thereby lowering blood glucose levels with a low risk of hypoglycemia when used alone. In the gastrointestinal tract, they delay gastric emptying, which slows glucose absorption and increases early satiety, but may also cause nausea, vomiting, and bloating, particularly during treatment initiation or dose escalation<sup>(6)</sup>.

In the central nervous system, especially at the hypothalamic level, GLP-1 receptor agonists reduce appetite and food intake while increasing satiety, contributing to weight loss. In the liver, their effects are indirect and occur through reduced glucagon levels and improved insulin action, leading to decreased hepatic glucose production

However, these medications have raised concerns, as many patients discontinue or interrupt therapy due to adverse effects. In a study by John P. H. Wilding, serious side effects occurred in 9.8% of patients, with a notable incidence of severe gastrointestinal symptoms. Nausea, vomiting, and diarrhea are the most frequently reported side effects, typically mild to moderate in intensity, transient, and tending to improve over time<sup>(7)</sup>. Although the exact mechanism remains unclear, some researchers suggest these effects are related to the drug's ability to delay gastric emptying after meals. A randomized, double-blind study found that approximately 40% of the initial glucose-lowering effect was attributable to this delay. When administered acutely, GLP-1 receptor agonists slow digestion, thereby reducing postprandial glucose excursions<sup>(8)</sup>.

This delay in gastric emptying may increase the risk of euglycemic ketoacidosis, regurgitation, and pulmonary aspiration of gastric contents during general anesthesia or deep sedation. A prospective study by Sen et al.<sup>(3)</sup>, using gastric ultrasonography, demonstrated increased gastric retention in 56% of semaglutide users, regardless of medication discontinuation prior to the procedure, suggesting that cessation alone may not eliminate the

risk. Consequently, there is growing concern regarding the anesthetic implications of GLP-1 agonists and their effects on gastric emptying.

GLP-1 receptor agonists (GLP-1 RAs) are known to delay gastric emptying, which may increase residual gastric contents despite standard fasting and raise concern for pulmonary aspiration during anesthesia. However, larger studies and pooled analyses published between 2024 and 2025 have not demonstrated a statistically significant increase in aspiration risk among GLP-1 RA users, either overall or specifically during endoscopic procedures.

The American Society of Anesthesiologists (ASA) Consensus-Based Guidance on Preoperative Management of Patients (Adults and Children) on GLP-1 Receptor Agonists recommends withholding these medications to mitigate the potential risk associated with delayed gastric emptying holding daily formulations on the day of surgery and weekly formulations for one week prior to the procedure.

Although the 2023 consensus guidance supported withholding GLP-1 RAs based on a theoretical aspiration risk, more recent evidence suggests no clear increase in actual aspiration events among users. The document emphasizes the importance of shared decision-making among the multidisciplinary team, ensuring individualized risk assessment and safety strategies to optimize outcomes and promote evidence-based perioperative care until further data become available<sup>(8)</sup> (Figure 2).

Written informed consent for publication of this case report and accompanying images was obtained from the patient. The event was reported to the hospital's quality committee and subsequently forwarded to the appropriate regulatory authorities to help prevent similar occurrences. Institutional review board approval was not required for this single case report, in accordance with institutional policy.

In summary, preoperative assessment of patients using GLP-1 receptor agonists should include identification of the specific agent, dosing schedule (daily vs. weekly), timing of the last dose, and the presence of gastrointestinal symptoms such as nausea, vomiting, bloating, or early satiety. These factors may influence anesthetic planning and airway management. When aspiration risk is considered elevated, preventive strategies include head-up positioning, cautious sedation, immediate availability of suction and

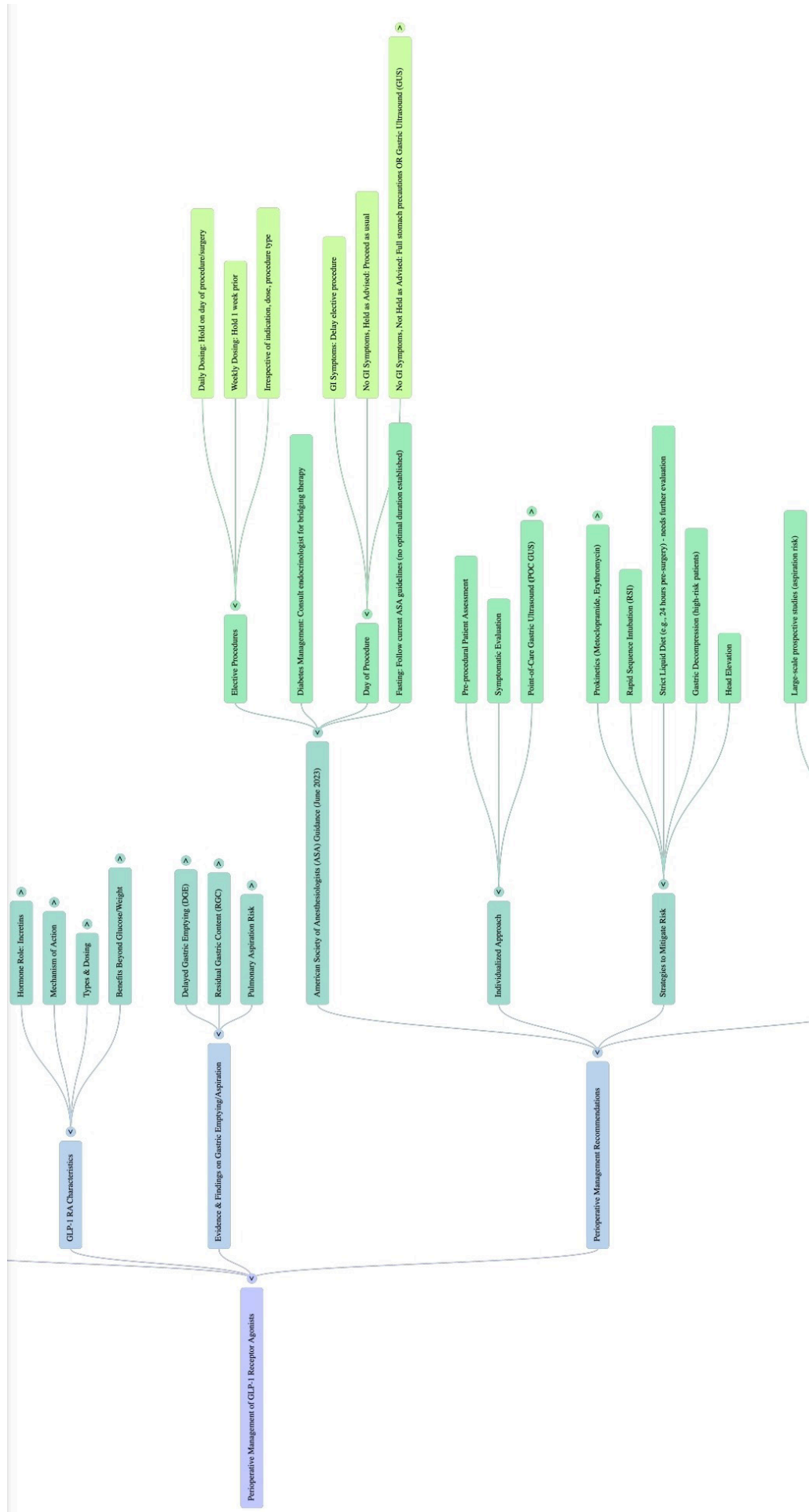
airway equipment, and readiness for rapid sequence induction. Point-of-care gastric ultrasound may be considered when available and when trained personnel are present<sup>(9)</sup>.

This case report underscores a new and uncertain challenge, as regulatory agencies have not yet approved this compound for subcutaneous implantation. Without appropriate approval and clinical guidelines, patients may be exposed to risks such as overdose, unpredictable drug absorption, and bronchoaspiration during elective or emergency procedures requiring anesthesia. Evidence guiding preoperative management of these medications to prevent regurgitation and pulmonary aspiration remains limited<sup>(10)</sup>. Therefore, new strategies must be developed for patients with implanted GLP-1 agonists, as discontinuation will not be an option. Anesthesia professionals and intensive care specialists must anticipate this emerging challenge and implement preventive measures to minimize risks associated with inadequate fasting which could lead to serious complications during sedation and anesthesia.

### Strengths and limitations of this case report

This case report highlights a rare and clinically relevant scenario involving an unregulated implantable GLP-1 receptor agonist, demonstrating a clear temporal association between drug exposure, severe gastrointestinal symptoms, and rapid resolution after removal, while also illustrating practical anesthetic decision-making in a high-risk aspiration context. Its strengths include real-world applicability and multidisciplinary management; however, limitations include its single-patient design, lack of objective gastric emptying assessment, absence of pharmacokinetic data, and limited generalizability, underscoring the need for further studies and standardized perioperative guidelines.

Taken together, this case report provides valuable insight into a rare but clinically relevant scenario, emphasizing the need for vigilance when managing patients exposed to unconventional GLP-1 delivery systems. However, its limitations underscore the necessity for larger prospective studies, standardized assessment tools such as gastric ultrasound, and clearer perioperative guidelines – particularly for patients in whom drug discontinuation is not possible.



**Figure 2.** Schematic Approach. Schematic overview of perioperative management of GLP-1 receptor agonists, including current ASA guidance, assessment of gastric emptying and aspiration risk, recommendations for elective procedures, and risk-mitigation strategies such as individualized evaluation and point-of-care gastric ultrasound.

## REFERENCES

1. Phillips A, Clements JN. Clinical review of subcutaneous semaglutide for obesity. *J Clin Pharm Ther.* 2022;47(2):184-93. <https://doi.org/10.1111/jcpt.13574>. PMID:34964141.
2. Ard J, Fitch A, Fruh S, Herman L. Weight loss and maintenance related to the mechanism of action of glucagon-like peptide 1 receptor agonists. *Adv Ther.* 2021;38(6):2821-39. <https://doi.org/10.1007/s12325-021-01710-0>. PMID:33977495.
3. Sen S, Potnuru PP, Hernandez N, Goehl C, Praestholm C, Sridhar S, et al. Glucagon-like peptide-1 receptor agonist use and residual gastric content before anesthesia. *JAMA Surg.* 2024;159(6):660-7. <https://doi.org/10.1001/jamasurg.2024.0111>. PMID:38446466.
4. Milder DA, Milder TY, Liang SS, Kam PCA. Glucagon-like peptide-1 receptor agonists: a narrative review of clinical pharmacology and implications for peri-operative practice. *Anaesthesia.* 2024;79(7):735-47. <https://doi.org/10.1111/anae.16306>. PMID:38740566.
5. Tan HC, Dampil OA, Marquez MM. Efficacy and safety of semaglutide for weight loss in obesity without diabetes: a systematic review and meta-analysis. *J ASEAN Fed Endocr Soc.* 2022;37(2):65-72. <https://doi.org/10.15605/jafes.037.02.14>. PMID:36578889.
6. Drucker DJ. Mechanisms of action and therapeutic application of glucagon-like peptide-1. *Cell Metab.* 2018;27(4):740-56. <https://doi.org/10.1016/j.cmet.2018.03.001>. PMID:29617641.
7. Wilding JPH, Batterham RL, Calanna S, Davies M, van Gaal LF, Lingvay I, et al. Once-weekly semaglutide in adults with overweight or obesity. *N Engl J Med.* 2021;384(11):989-1002. <https://doi.org/10.1056/NEJMoa2032183>. PMID:33567185.
8. Hjerpsted JB, Flint A, Brooks A, Axelsen MB, Kvist T, Blundell J. Semaglutide improves postprandial glucose and lipid metabolism, and delays first-hour gastric emptying in subjects with obesity. *Diabetes Obes Metab.* 2018;20(3):610-9. <https://doi.org/10.1111/dom.13120>. PMID:28941314.
9. Li XY, Jin Y, Feng XY, Wang RC, Chen JP, Lu B. Perioperative management of patients on GLP-1 receptor agonists: risks, recommendations, and future directions: a narrative review. *J Clin Anesth.* 2025;104:111871. <https://doi.org/10.1016/j.jclinane.2025.111871>. PMID:40378603.
10. Meier JJ. Efficacy of semaglutide in a subcutaneous and an oral formulation. *Front Endocrinol.* 2021;12:645617. <https://doi.org/10.3389/fendo.2021.645617>. PMID:34248838.

**Authors' contributions:** Marcelo de Jesus Martins contributed to conceptualization, investigation, project administration, supervision, and writing - original draft, review & editing. Stefania Lacerda Garcia contributed to conceptualization, investigation, project administration, supervision, and writing - original draft, review & editing. Rafael Pereira Espínola contributed to supervision, and writing - original draft, review & editing. Caroline Paiva Matos Oliveira Martins contributed to supervision, and writing - review & editing.

**Ethics statement:** Nothing to declare.

**Conflict of interest:** Nothing to declare.

**Financial support:** Nothing to declare.

**Submitted on:** December 17th, 2025

**Accepted on:** April 4th, 2026

### Correspondence

Marcelo de Jesus Martins  
Hospital Português  
Av. Princesa Isabel, 914 - Barra, Salvador - BA, 40140-901  
Phone: +55 (71) 99139-3736  
celoufba@gmail.com