An Evidence Based Practice Educational Module Utilizing a Risk Stratification Algorithm for Surgical Patients on GLP-1 Agonists

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Introduction

Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) mimic the functions of incretin hormones that curb appetite and increase satiety by delaying gastric emptying. GLP-1 RAs were first approved as an adjunct therapy for the management of type 2 diabetes. In 2014, GLP-1 RAs were approved for weight management in obese non-diabetic patients. Since GLP-1 RAs induce weight loss by delaying gastric emptying, patients taking GLP-1 RAs present with possible increased aspiration risk due to increased residual gastric content despite following the American Society of Anesthesiologists (ASA) preoperative fasting guidelines.

Purpose

Currently, there is no standardized protocol to address the optimal fasting times for patients on GLP-1 therapy.

ASA Fasting Recommendations

Ingested Material	Minimum Fasting Period
Clear liquids+	2 hours
Breast milk	4 hours
Infant formula	6 hours
Nonhuman milk§	6 hours
Light meal**	6 hours
Fried foods, fatty foods, or meat	Additional fasting time (e.g., 8 or more hours) may be needed

Clinical Significance

One of the primary factors contributing to a considerable amount of anesthesia-related morbidity and mortality is the aspiration of retained stomach contents. One in 2000 to 3000 elective procedures have a modest incidence of aspiration, while one in 900 urgent or emergency surgeries or one in seven cases of difficult or unsuccessful intubation might have a substantially higher incidence of aspiration. The development of associated lung ailments, such as acid-related pneumonitis and aspiration pneumonia, occurs in about half of all patients who aspirate. Aspiration pneumonia is an infectious process that arises from bacteria from aspirated contents in the lower respiratory tract. A significant death rate of 5-9% in anesthetic airway management complications is linked to perioperative aspiration of stomach contents which can have major pulmonary sequelae.

Methodology

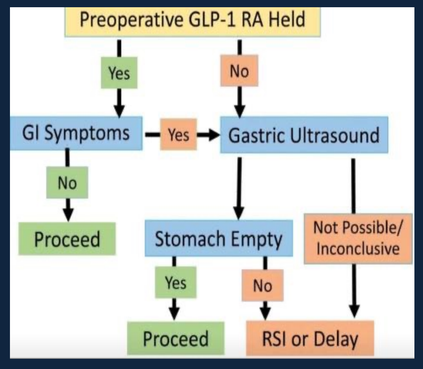
An expansive analysis was conducted as facilitated by EMBASE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and MEDLINE, PubMed, and Google Scholar.
Keywords: glucagon-like receptor agonists, GLP-1 agonists, delayed gastric emptying, semaglutide, weight loss, and aspiration pneumonia
Inclusion criteria:

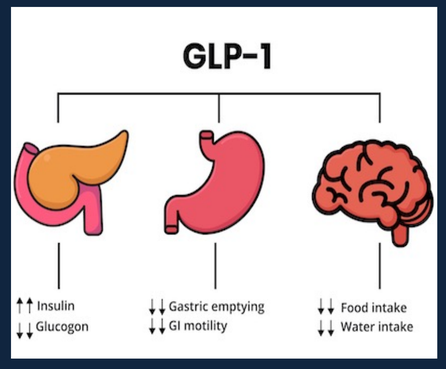
- Literature published within the last 5 years
- Full text articles
- Written in English
- Randomized controlled trials, double-blind studies
- Literature studies featured GLP-1 RAs complications related to anesthesia

Exclusion criteria:

- Systematic reviews, meta-analyses, and non-English publications.

N = 13
The Florida International University Institutional Review Board (IRB) has deemed this project Exempt. Documentation available upon request.





PICO Question

(P) In adult surgical patients taking GLP-1 agonists (I) does a risk stratification algorithm utilizing evidence-based guidelines (C) versus no risk stratification algorithm (O) decrease morbidity, mortality, aspiration, hypoxia, pulmonary edema, pneumonia, and atelectasis?

Literature Review

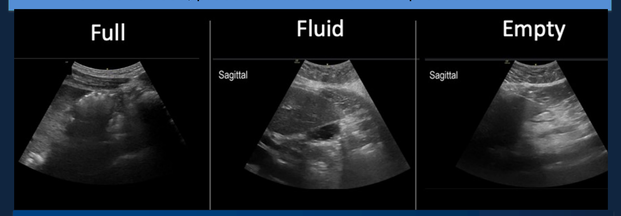
Author	Design and Objectives	Conclusion
Jones et al, (2020)	A prospective, randomized double-blind, PBO-controlled, parallel design to evaluate the effects of 8 weeks of administration of exenatide (EXE) once weekly on gastric emptying of solids and liquids (using the "gold standard" technique, scintigraphy), glucose absorption, and postprandial glycemia in healthy people.	In healthy participants, 8 weeks' administration of the "long-acting" glucagon-like peptide-1 receptor agonist EXE, slowed gastric emptying of solids and liquids substantially, with consequent reductions in glucose absorption and postprandial glycemia. The present study established that, after 8 weeks' administration, EXE once weekly slows gastric emptying of a solid/liquid meal substantially and that this is related to a delay in absorption of ingested glucose and a reduction in postprandial glycemia in healthy people. The demonstration that EXE once weekly, a long-acting GLP-1RA, delays gastric emptying is contrary to current thinking and has implications for its use in the management of type 2 diabetes.
Hjerpsted et al, (2018)	A single-center, randomized, double-blind, 2-period, placebo-controlled, crossover study conducted in compliance with the International Conference on Harmonisation Good Clinical Practice guidelines and the Declaration of Helsinki. Thirty (30) subjects with obesity (N = 30) received once-weekly subcutaneous semaglutide, dose-escalated to 1.0 mg, or placebo. After each 12-week treatment period, glucose and lipid metabolism were assessed before and after standardized meals	First-hour gastric emptying after the meal was delayed with semaglutide vs placebo (AUC0-1h; estimated treatment ratio: 0.73 [0.61, 0.87]); this may have contributed to the lower postprandial glucose increase in semaglutide-treated subjects. Overall gastric emptying (AUC0-5h) was not statistically different between treatments. Fasting and postprandial PYY responses were significantly lower with semaglutide vs placebo (P = .0397 and P = .0097, respectively).
Quast et al (2020)	A multi-center, prospective, interventional study to assess the ultrasound scanning performance by anesthetists who are non-experts in UGRA with and without the use of an assistive AI ultrasound device for interscalene, axillary, rectus sheath, adductor canal, popliteal, and erector spinae blocks. The ability to obtain the correct block view and to identify the correct sonoanatomical structures were assessed. Participants reported confidence of scanning, and experts provided a global performance rating..	Lixisenatide exerted a more pronounced (52 min) influence on gastric emptying after breakfast than liraglutide. Neither lixisenatide nor liraglutide had significant effects on esophageal reflux or motility. Gastric acid secretion appears to be slightly reduced by GLP-1 RAs. Lixisenatide and liraglutide significantly inhibited gastric emptying after 10 weeks of treatment. The short-acting GLP-1 RA lixisenatide showed a more pronounced effect, with a delay of the gastric emptying half-time of more than twice that with the long-acting GLP-1 RA liraglutide. Nevertheless, with long-acting GLP-1 RAs, the effects on gastric emptying are largely diminished during chronic treatment because of tachyphylaxis
Beam et al, (2023)	Case study of two (2) patients of GLP-agonists. One overweight nondiabetic with a BMI of 28. Another patient is obese and diabetic with a BMI of 37	Despite going more than 18 hours without eating solid food before the procedure, one patient reported feeling "full." An on-site gastrointestinal ultrasound was done, and the results showed solid gastric contents. The other patient experienced significant volume particle emesis just before she was due to be extubated, which was consistent with what she had said she had eaten days before.
Silveira et al, (2023)	A single-center retrospective electronic chart review. The primary indication for semaglutide use was predominantly promotion of weight loss (87.8%), followed by management of diabetes mellitus (12.2%). Obesity (BMI > 30 kg.m−2) was observed in 19.9% of included patients. 404 patients undergoing EGD under deep sedation. Patients were divided into two (SG = semaglutide, NSG = non-semaglutide) groups, according to whether they had received semaglutide within 30 days before the esophagogastroduodenoscopy.	Researchers found increased residual gastric volumes in patients taking GLP-1 agonists. Increased RGC was observed in 27 (6.7%) patients, being 8 (24.2%) in the SG and 19 (5.1%) in the NSG (p < 0.001). Semaglutide use and the presence of preoperative digestive symptoms (nausea/vomiting, dyspepsia, abdominal distension) were associated with increased RGC in the propensity-weighted analysis. Conversely, a protective effect against increased RGC was observed in patients undergoing esophagogastroduodenoscopy combined with colonoscopy.
Kobori et al, (2023)	A matched pair case-controlled protocol that was approved by the Committee of Ethics in the Institute of Medical Science, Asahi Life Foundation. The purpose of the present study was to investigate the association between GLP-1RA treatment and gastric residue in an esophagogastroduodenoscopy. The study population consisted of 1,128 individuals with diabetes who had esophagogastroduodenoscopy at our clinic between July 2020 and June 2022. All individuals started fasting before 09.00 hours on the previous day of the esophagogastroduodenoscopy and took nothing except for water afterward an EGD was carried out between 09.00 and 11.30 hours. Therefore, the duration of fasting for all individuals was ≥12 h, which should be enough to empty the stomach.	Among patients treated with GLP-1RA, patients with gastric residue were statistically significantly younger than patients without gastric residue. Of 1,128 patients, 17 had gastric residue in an esophagogastroduodenoscopy. The details of GLP-1RA prescribed for the 11 patients with gastric residue were liraglutide once daily 1.8 mg (2/19,10.5%), dulaglutide once weekly 0.75 mg (5/90 patients treated with dulaglutide once weekly 0.75 mg, 5.6%), semaglutide once weekly 0.5 mg (2/17 patients treated with semaglutide once weekly 0.5 mg, 11.8%) and semaglutide once weekly 1.0 mg (2/9 patients treated with semaglutide once weekly 1.0 mg, 22.2%)

Results

- Subcutaneous semaglutide, at a dose-escalated to 1.0 mg, increased retention of gastric contents in the obese non-diabetic participants up to 37% at 4 hours after ingestion of a solid meal .
- In healthy non-diabetic participants, administration of the long-acting GLP-1 agonist EXE for 8 weeks, substantially slowed gastric emptying of solids and liquids.
- Gastric emptying rate was slower in the older subjects without diabetes.
- Gastric emptying half-time was delayed by 52 min with lixisenatide and by 25 min with liraglutide.

Clinical Recommendations

- **Days before the Procedure**
  - For patients on daily dosing consider holding GLP-1 agonists on the day of the procedure/surgery. For patients on weekly dosing consider holding GLP-1 agonists a week prior to the procedure/surgery.
  - This suggestion is irrespective of the indication (type 2 diabetes mellitus or weight loss), dose, or the type of procedure/surgery.
  - If GLP-1 agonists prescribed for diabetes management are held for longer than the dosing schedule, consider consulting an endocrinologist for bridging the antidiabetic therapy to avoid hyperglycemia.
- **Day of Procedure**
  - If gastrointestinal (GI) symptoms such as severe nausea/vomiting/retching, abdominal bloating, or abdominal pain are present, consider delaying elective procedure, and discuss the concerns of potential risk of regurgitation and pulmonary aspiration of gastric contents with the proceduralist/surgeon and the patient.
  - If the patient has no GI symptoms, and the GLP-1 agonists have been held as advised, proceed as usual.
  - If the patient has no GI symptoms, but the GLP-1 agonists were not held as advised, proceed with 'full stomach' precautions



Conclusion

- Patients on GLP-1 RAs are at a higher risk for aspiration during induction of anesthesia and emergence.
- Patients present in the preoperative area with potential retained gastric contents from delayed gastric emptying.
- Despite appropriate fasting recommendations from the American Society of Anesthesiologists practice guidelines, complications from aspiration include morbidity, mortality, hypoxia, pulmonary edema, pneumonia, and atelectasis.
- The implementation of a standardized risk stratification guideline for aspiration, and fasting times will bring awareness for patients who are on GLP-1 agonists in avoiding perioperative complications.
- Education of anesthesia providers and implementation of a protocol to manage patients on GLP-1 agonists can assist anesthetists to better prepare for possible complications and improve patient safety.

References

References available upon request

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