Semaglutide와 Tirzepatide 부작용 및 내시경/수술 전 위배출지연 관리의 핵심포인트

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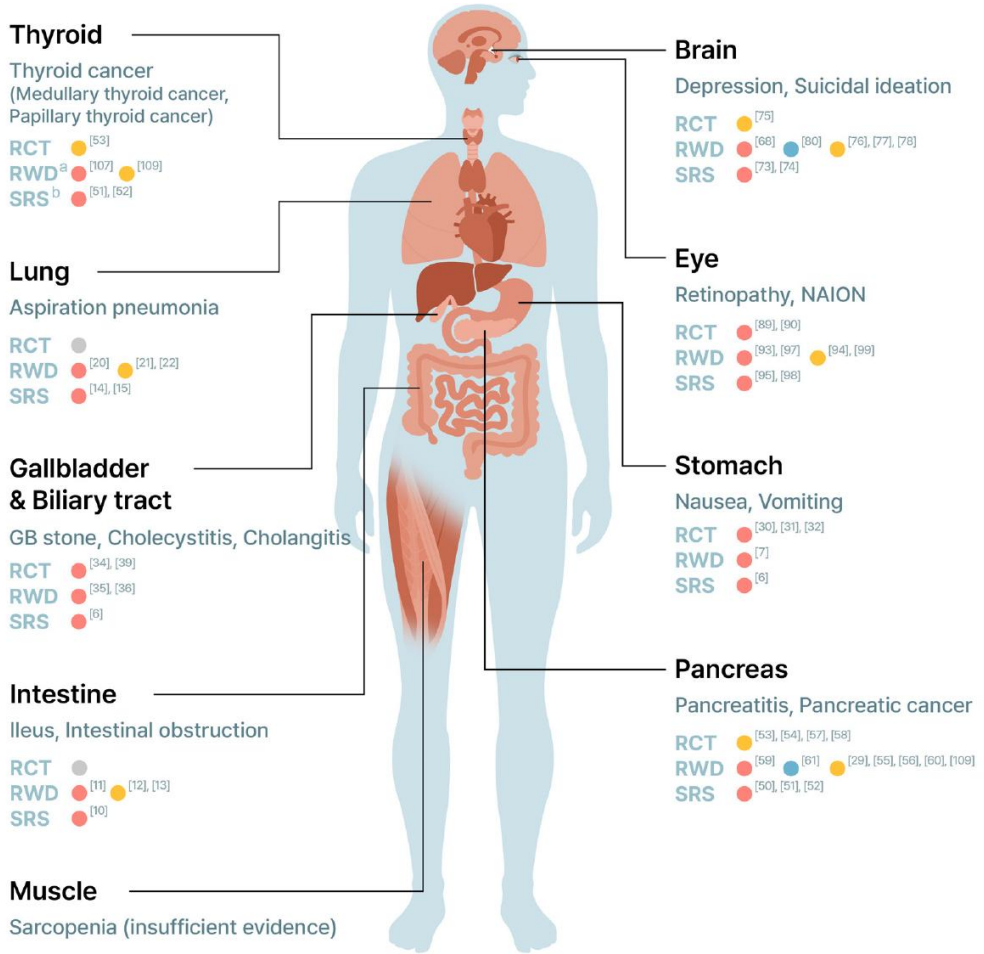
박 혜 랑

Contents

Side effect of GLP-1 RAs

- An overview of the existing literatures on the adverse effects of GLP-1 RAs.



Kim JA, Yoo HJ. Diabetes Metab J. 2025 July 1;49(4):525-541.

1. Side effect of Semaglutide

- Semaglutide 2.4 mg once weekly was generally well tolerated.

Table 3. Summary of AEs from the STEP 1 to 5 trials [2,44–48].

	STEP 1 Weight management		STEP 2[a] Weight management in T2D			STEP 3 Weight management with IBT (US only)		STEP 4 Sustained weight management			STEP 5 Long-term weight management	
	Semaglutide 2.4 mg	Placebo	Semaglutide 2.4 mg	Semaglutide 1.0 mg	Placebo	Semaglutide 2.4 mg	Placebo	Run-in (semaglutide 2.4 mg)	Semaglutide 2.4 mg (randomized period)	Placebo (randomized period)	Semaglutide 2.4 mg	Placebo
AEs, %	89.7	86.4	87.6	81.8	76.9	95.8	96.1	84.3	81.3	75	96.1	89.5
GI AEs, %	74.2	47.9	63.5	57.5	34.3	82.8	63.2	71.4	41.9	26.1	82.2	53.9
Nausea	4.2	17.4	33.7	32.1	9.2	58.2	22.1	46.8	14.0	4.9	53.3	21.7
Diarrhea	31.5	15.9	21.3	22.1	11.9	36.1	22.1	23.5	14.4	7.1	34.9	23.7
Constipation	23.4	9.5	17.4	12.7	5.5	36.9	24.5	22.2	11.6	6.3	30.9	11.2
Vomiting	24.8	6.6	21.8	13.4	2.7	27.3	10.8	15.5	10.3	3.0	30.3	4.6
Median duration of GI AEs, days												
Nausea	8	6	8	10	6	5	5	NR	NR	NR	4	2
Diarrhea	3	3	5	4	4	3	3	NR	NR	NR	5	3
Constipation	35	25	55	51	21	27	16	NR	NR	NR	58	39
Vomiting	2	1	1	2	1	2	2	NR	NR	NR	2	2
SAEs, %	9.8	6.4	9.9	7.7	9.2	9.1	2.9	2.3	7.7	5.6	7.9	11.8
AEs leading to trial product discontinuation, %	7.0	3.1	6.2	5.0	3.5	5.9	2.9	5.3	2.4	2.2	5.9	4.6
GI AEs leading to trial product discontinuation, %	4.5	0.8	4.2	3.5	1.0	3.4	0	NR	NR	NR	3.9	0.7

[a]STEP 2 was the only trial that enrolled patients with T2D.

AEs, adverse events; GI, gastrointestinal; IBT, intensive behavioral therapy; NR, not reported; SAEs, serious adverse events; T2D, type 2 diabetes.

Amaro, A., Sugimoto, D., & Wharton, S. Postgraduate Medicine, 2022 Nov 10;134(sup1),5–17.

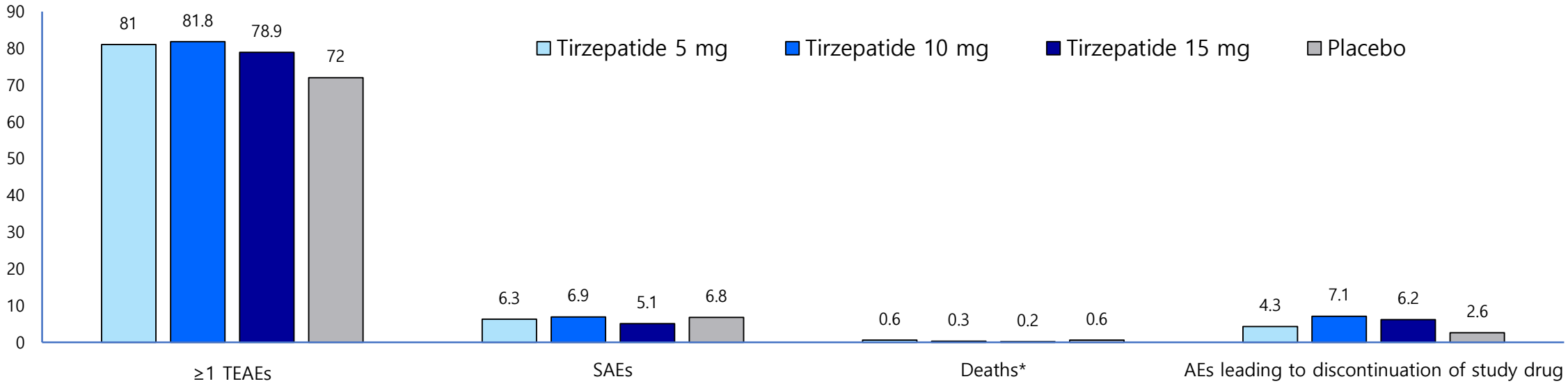
1. Side effect of Semaglutide

- Most GI events were
  - transient
  - mild-to-moderate severity
  - resolved over time
  - dose-dependent
- The median durations:
  - Nausea: 8 days
  - diarrhea: 5 days
  - vomiting: 2 days
  - constipation: 55 days
- Nausea was typically most prevalent during the **initial dose-escalation periods**

→ Gradual dose-escalation may help alleviate or prevent GI side effects.

Amaro, A., Sugimoto, D., & Wharton, S. Postgraduate Medicine, 2022 Nov 10;134(sup1),5–17.

2. Side effect of Tirzepatide in SURMOUNT-1



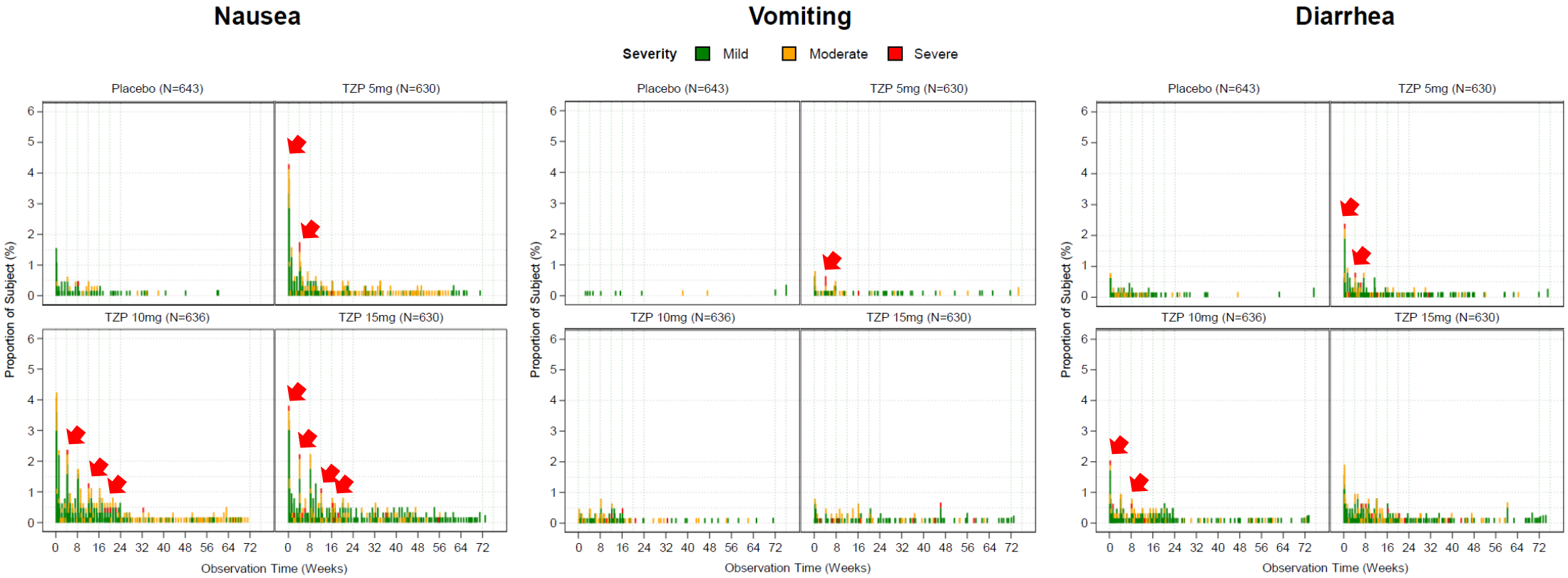
Adverse Events n (%)	Tirzepatide 5 mg N=630	Tirzepatide 10 mg N=636	Tirzepatide 15 mg N=630	Placebo N=643
Treatment-emergent adverse events occurring in ≥5% of participants in any treatment group				
Nausea	155 (24.6)	212 (33.3)	195 (31.0)	61 (9.5)
Diarrhea	118 (18.7)	135 (21.2)	145 (23.0)	47 (7.3)
Constipation	106 (16.8)	109 (17.1)	74 (11.7)	37 (5.8)
Dyspepsia	56 (8.9)	62 (9.7)	71 (11.3)	27 (4.2)
Vomiting	52 (8.3)	68 (10.7)	77 (12.2)	11 (1.7)
Abdominal pain	31 (4.9)	34 (5.3)	31 (4.9)	21 (3.3)

AE = Adverse Event; SAE = Serious Adverse Event; TEAE = Treatment-emergent Adverse Event; TZP = Tirzepatide.

Jastreboff AM, et al. *N Engl J Med*. 2022;387(3):205-216.

2. Side effect of Tirzepatide in SURMOUNT-1

- Most gastrointestinal events were transient, occurring primarily during the **dose-escalation period**, and were mostly mild to moderate in severity.



Note: Percentages are based on number of participants at risk at specific observation time

TZP = Tirzepatide.

Semaglutide vs. Tirzepatide

- Tirzepatide as Compared with Semaglutide for the Treatment of Obesity

- 72 week, open-label, randomized controlled trial (1:1) with obesity but without type 2 diabetes.
- Maximum tolerated dose of tirzepatide (10 mg or 15 mg) or semaglutide (1.7 mg or 2.4 mg)
- Discontinuation of treatment due to GI adverse events was observed **more often in the semaglutide** group (21 participants [5.6%]) than in the tirzepatide group (10 participants [2.7%]).

Variable	Tirzepatide (N=374)		Semaglutide (N=376)	Total (N=750)
	number of participants (percent)			
Discontinuation of the trial treatment because of gastrointestinal adverse events	10 (2.7)	<	21 (5.6)	31 (4.1)
Adverse events occurring in ≥5% of participants in either group†				
Nausea	163 (43.6)		167 (44.4)	330 (44.0)
Constipation	101 (27.0)		107 (28.5)	208 (27.7)
Diarrhea	88 (23.5)		88 (23.4)	176 (23.5)
Vomiting	56 (15.0)		80 (21.3)	136 (18.1)
Coronavirus disease 2019	51 (13.6)		47 (12.5)	98 (13.1)
Fatigue	39 (10.4)		46 (12.2)	85 (11.3)
Eructation	37 (9.9)		29 (7.7)	66 (8.8)
Injection-site reaction	32 (8.6)		1 (0.3)	33 (4.4)
Upper respiratory tract infection	32 (8.6)		43 (11.4)	75 (10.0)
Alopecia	31 (8.3)		23 (6.1)	54 (7.2)
Abdominal distention	27 (7.2)		24 (6.4)	51 (6.8)
Headache	27 (7.2)		27 (7.2)	54 (7.2)
Abdominal pain	24 (6.4)		26 (6.9)	50 (6.7)
Dizziness	24 (6.4)		18 (4.8)	42 (5.6)
Gastroesophageal reflux disease	23 (6.1)		40 (10.6)	63 (8.4)
Dyspepsia	22 (5.9)		28 (7.4)	50 (6.7)

Aronne, Louis J. New England Journal of Medicine, 2025, 393.16: 1655-1656.

Semaglutide vs. Tirzepatide

- Tirzepatide versus Semaglutide Once Weekly in Patients with Type 2 DM

- 40-week, open-label, parallel-group, randomized, active-controlled, phase 3 trial (1:1:1:1)
- GI adverse events were similar in the four treatment groups

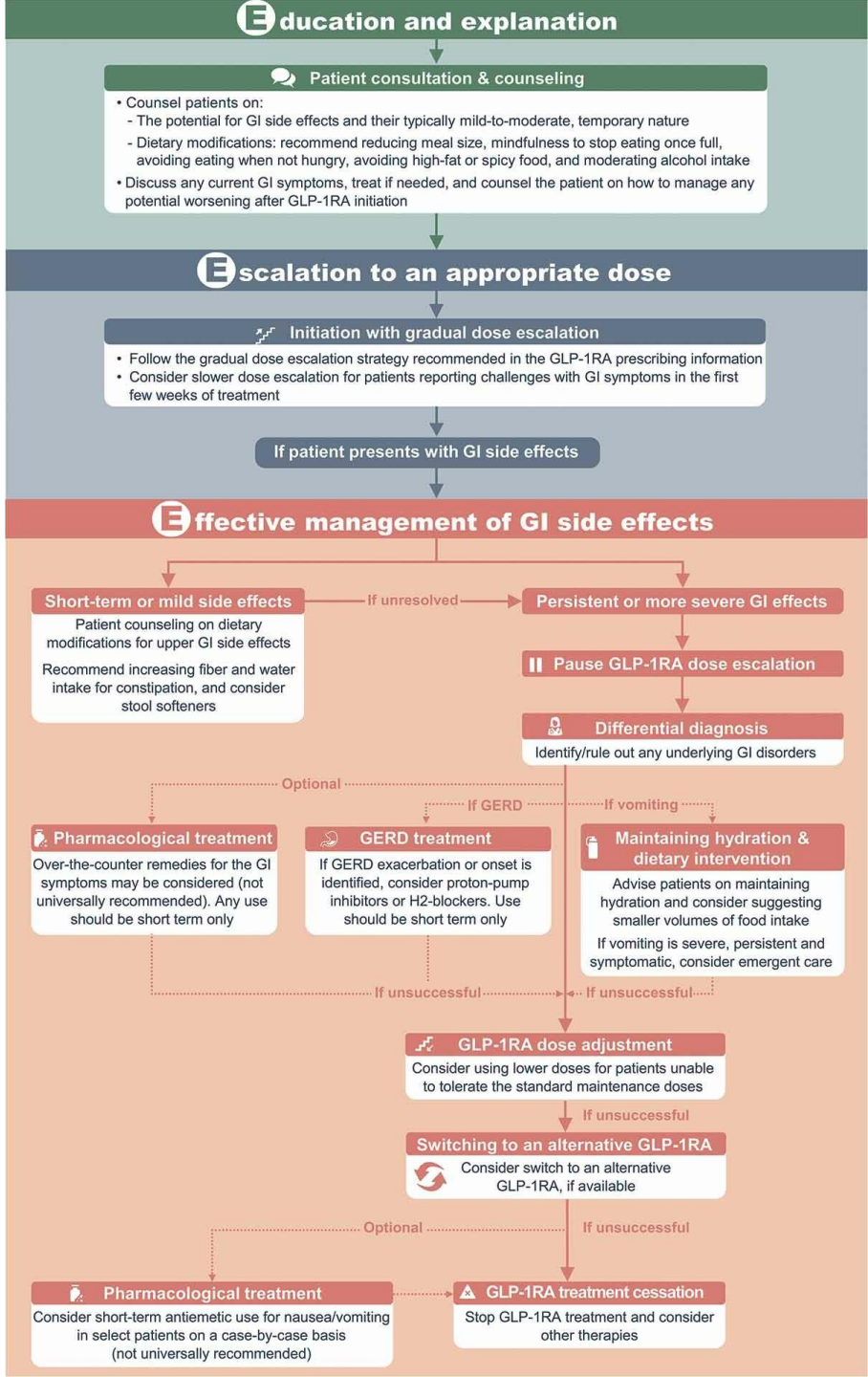
Table 2. Adverse Events and Safety.*

Event	Tirzepatide						Semaglutide		Total (N=1878)	
	5 mg (N=470)		10 mg (N=469)		15 mg (N=470)		1 mg (N=469)			
	No. of patients (%)	*No. of events*	*No. of patients (%)*	*No. of events*	*No. of patients (%)*	*No. of events*	*No. of patients (%)*	*No. of events*	*No. of patients (%)*	*No. of events*
Adverse events occurring in ≥5% of patients in any treatment group, according to preferred term										
Nausea	82 (17.4)	111	90 (19.2)	124	104 (22.1)	136	84 (17.9)	126	360 (19.2)	497
Diarrhea	62 (13.2)	120	77 (16.4)	99	65 (13.8)	102	54 (11.5)	68	258 (13.7)	389
Vomiting	27 (5.7)	35	40 (8.5)	56	46 (9.8)	61	39 (8.3)	53	152 (8.1)	205
Dyspepsia	34 (7.2)	—	29 (6.2)	—	43 (9.1)	—	31 (6.6)	—	137 (7.3)	—
Decreased appetite	35 (7.4)	—	34 (7.2)	—	42 (8.9)	—	25 (5.3)	—	136 (7.2)	—
Constipation	32 (6.8)	—	21 (4.5)	—	21 (4.5)	—	27 (5.8)	—	101 (5.4)	—
Abdominal pain	14 (3.0)	—	21 (4.5)	—	24 (5.1)	—	24 (5.1)	—	83 (4.4)	—
All gastrointestinal adverse events	188 (40.0)	—	216 (46.1)	—	211 (44.9)	—	193 (41.2)	—	808 (43.0)	—

N Engl J Med 2021;385:503-15.

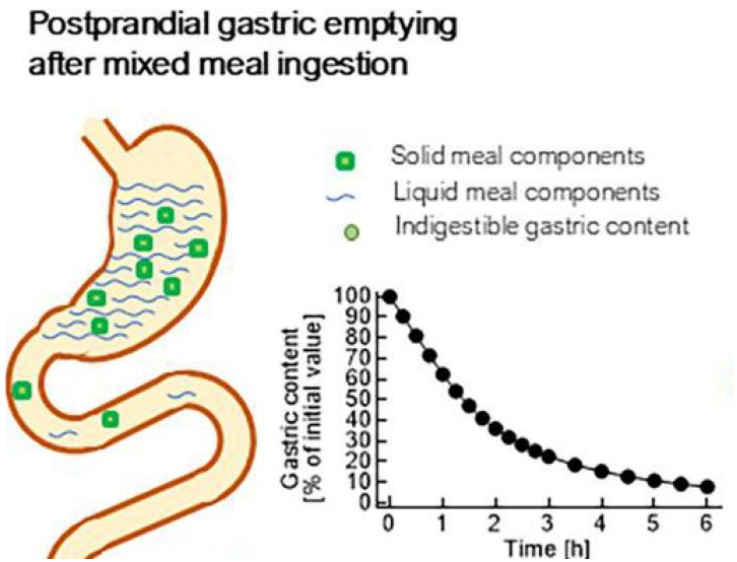
Managing the gastrointestinal side effects of GLP-1 receptor agonists in obesity: recommendations for clinical practice

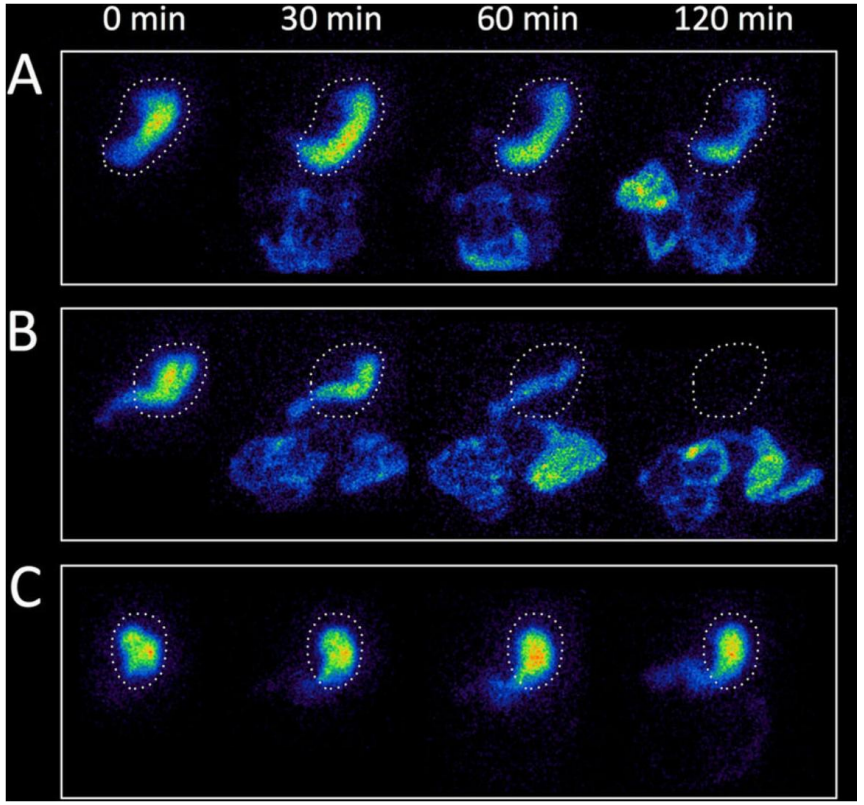
- The three ‘E’s
  - **E**ducation and explanation
  - **E**scalation to an appropriate dose
  - **E**ffective management of GI side effects
    1. Differential diagnosis
    2. Maintaining hydration and dietary intervention
    3. Pharmacological treatment
    4. Dose adjustment : lowering
    5. Switching to an alternative GLP-1RA



3. Delayed gastric emptying

- Standard fasting (6–8h) ≠ Empty stomach
- $T^{1/2}$ for liquid gastric emptying : 23 minute
- Solid-food gastric emptying
  - > 60% retention at 2 hours
  - > 10% retention at 4 hours





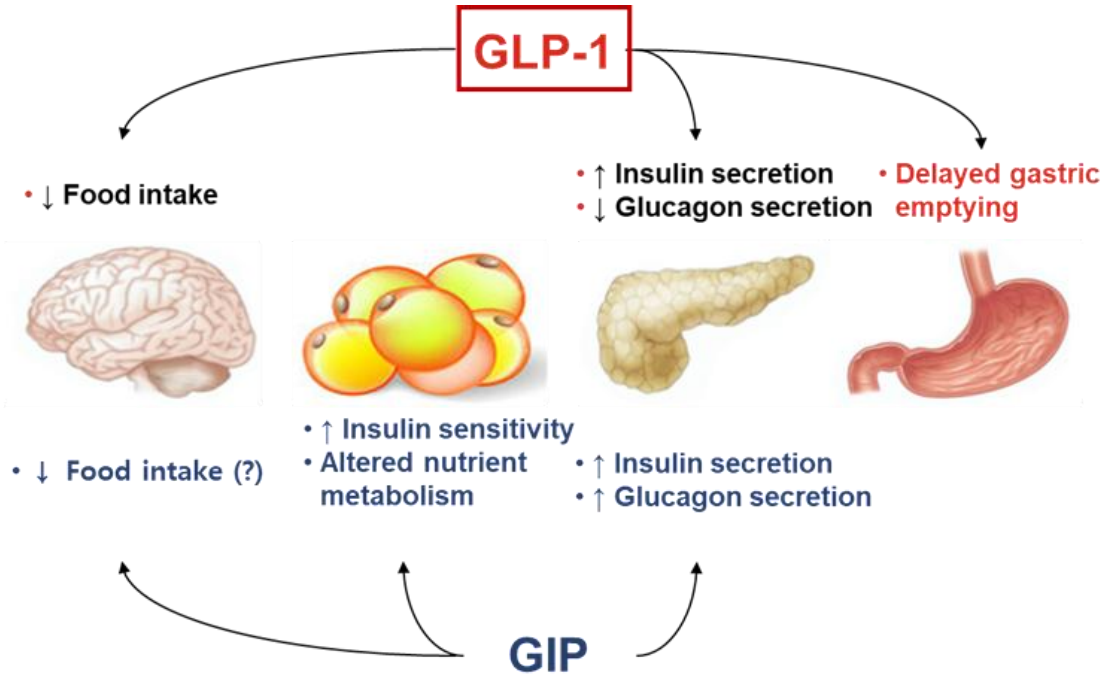
Normal

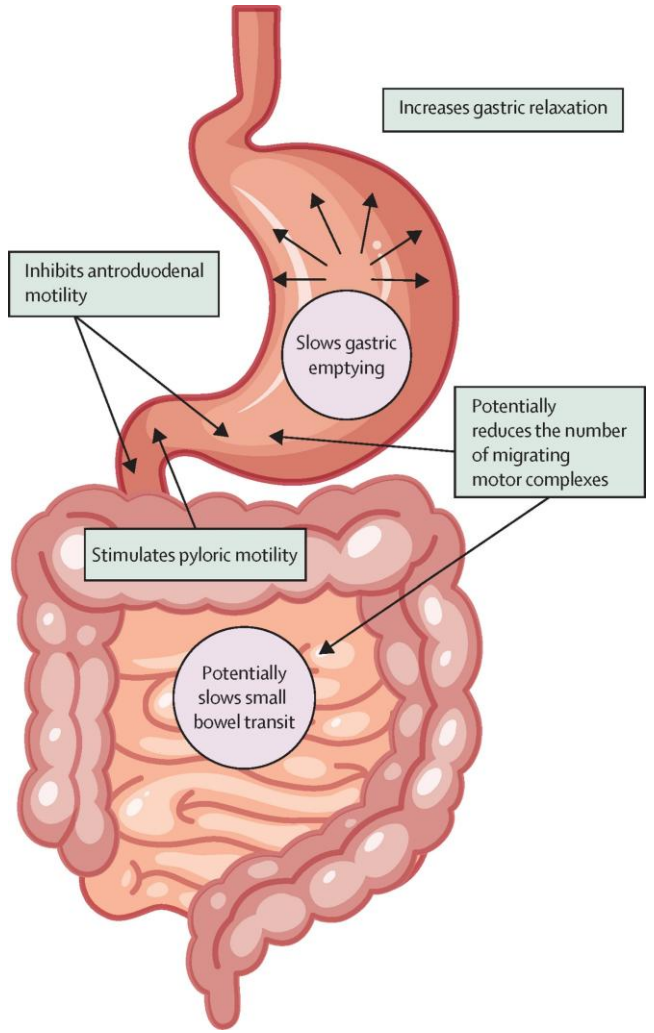
Parkinson's Disease

s/p Vagotomy

P Borghammer et al. Imaging Parkinson's disease below the neck. npj Parkinson's Disease;2017 Apr;3:15
Ryan J. Jalleh et al. The Journal of Clinical Endocrinology & Metabolism, 2025, Vol. 110, No. 1

Mechanism of delayed gastric emptying





← vagal afferent nerves

* In a dose-dependent manner

Jalleh, Ryan J., et al. The lancet Gastroenterology & hepatology, 2024, 9.10: 957-964.

Clinical risks of delayed gastric emptying

- Gastroparesis
- Intestinal obstruction
- Residual gastric contents
- Aspiration pneumonia

Gastroparesis

- Random sample of 16 million patients (2006 2020) from a large health claims database
- GLP-1 RA : liraglutide, semaglutide

Table 2. Risks of Biliary Disease, Pancreatitis, Bowel Obstruction, and Gastroparesis Among Users of GLP-1 Agonists vs Bupropion-Naltrexone

Outcomes	GLP-1 agonists, HR (95% CI)[a]		Bupropion-naltrexone
	Crude	Adjusted[b]	
Primary analysis			
Biliary disease	1.48 (0.88-2.47)	1.50 (0.89-2.53)	1 [Reference]
Pancreatitis	10.33 (1.44-74.40)	9.09 (1.25-66.00)	1 [Reference]
Bowel obstruction	5.16 (1.27-21.00)	4.22 (1.02-17.40)	1 [Reference]
Gastroparesis	3.31 (1.04-10.50)	3.67 (1.15-11.90)	1 [Reference]

Sodhi M, Rezaeianzadeh R, Kezouh A, Etminan M. JAMA. 2023;330(18):1795–1797.

Intestinal obstruction

- Incretin-based drugs(GLP-1 RA & DPP4i) were reported over 4.5 times more frequently than other diabetes medications[1].
- GLP-1 RAs increased the incidence of intestinal obstruction compared with SGLT-2i. (hazard ratio [HR], 1.69; 95% confidence interval [CI], 1.04 to 2.74)[2]

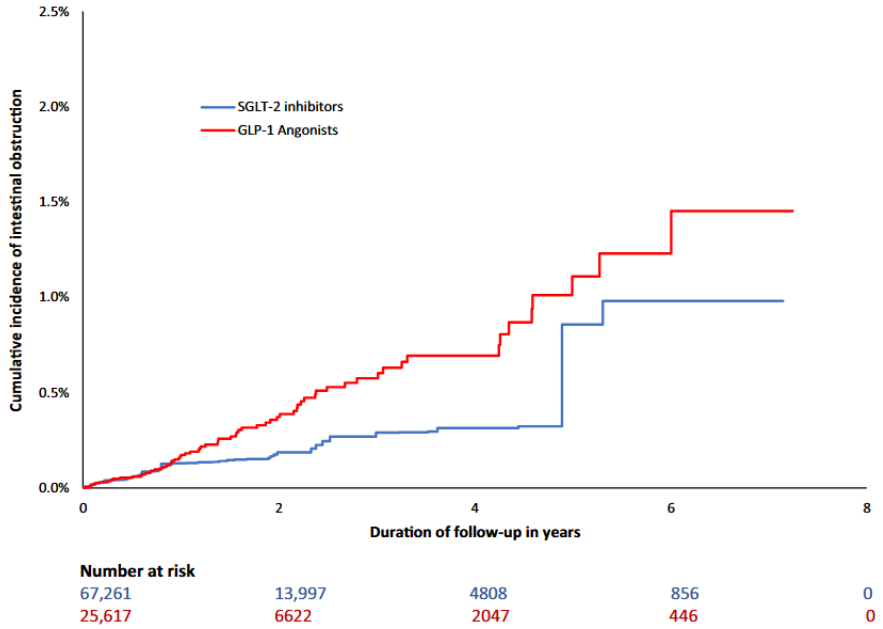
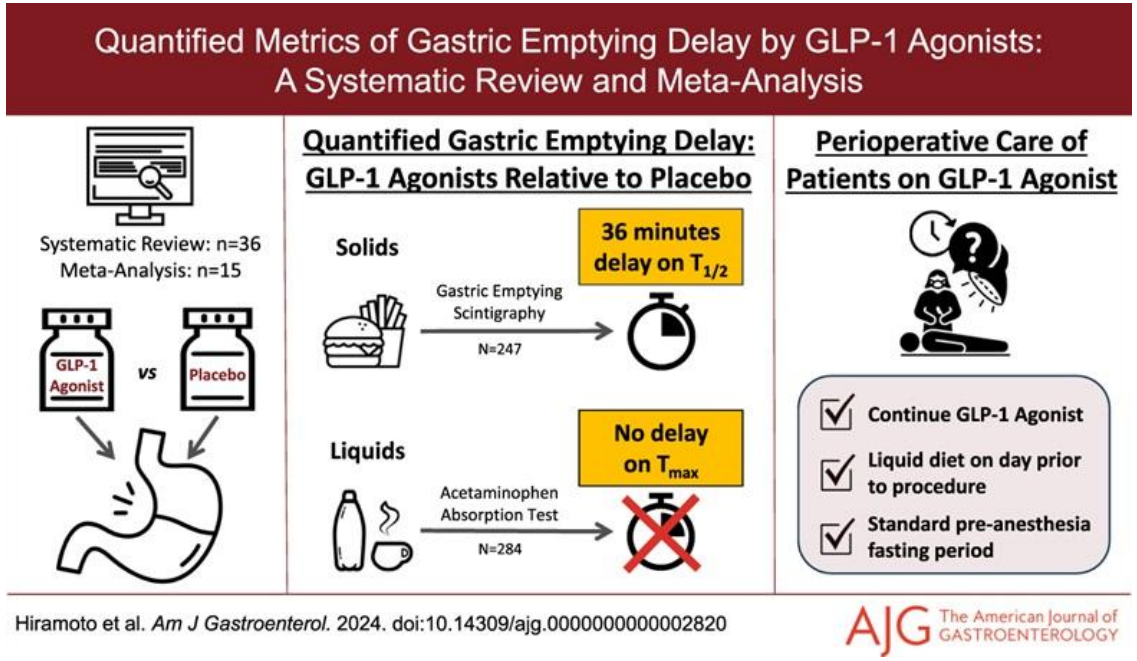


Figure 1 Weighted cumulative incidence curves of intestinal obstruction for glucagon-like peptide 1 receptor agonists vs. sodium-glucose cotransporter-2 inhibitors.

1. Gudin B, et al. Therapie 2020 Nov 22;75:641-7. 2. Faillie JL, et al. Clin Pharmacol Ther 2022;111:272-82.

Residual gastric contents

- No substantial differences in gastric emptying when using reflective of liquid emptying.
- Data on solid gastric emptying over time remain unknown.
- The type of GLP-1 RA, mechanism of action, and treatment duration did not impact gastric emptying (P > 0.05).



Hiramoto and McCarty et al. The American Journal of Gastroenterology, 2024 June;119(6):1126-1140.

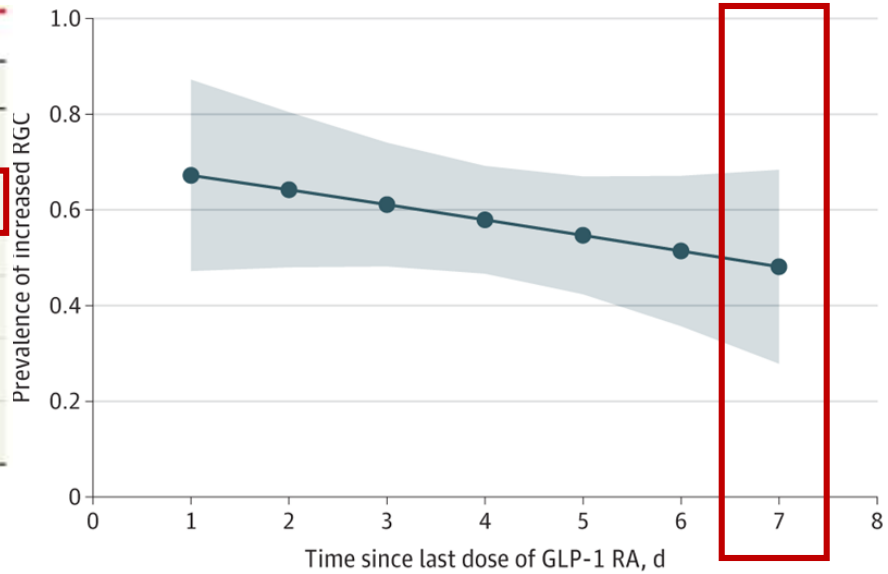
Residual gastric contents

- Cross-sectional study of 124 patients who fasted for the guideline-recommended duration
- Once-weekly GLP-1 RA : semaglutide, dulaglutide, tirzepatide
- Fasting for at least : clear liquids(2h), light meal(6h), full/heavy meal(8h)

→ Patients taking a GLP-1 RA had a higher prevalence of increased RGC despite fasting for the guideline-recommended duration.

Table 2. Association Between GLP-1 RA Use and Increased Residual Gastric Content

	Unadjusted analysis			Adjusted analysis[a]	
	Control group (n = 62)	GLP-1 RA group (n = 62)	Unadjusted prevalence ratio (95% CI)	Average treatment effect, % (95% CI)	Adjusted prevalence ratio (95% CI)
Increased residual gastric content, No. (%)[b]	12 (19)	35 (56)	2.92 (1.67-5.08)	30.5 (9.9-51.2)	2.48 (1.23-4.97)
Sensitivity analyses					
Overlap weighting with all covariates[a]	NA	NA	NA	28.4 (14.4-55.9)	2.25 (1.22-4.16)
Multivariable logistic regression with all covariates[a]	NA	NA	NA	28.3 (14.6-54.6)	2.22 (1.22-4.05)
Primary analysis with time since last oral intake of solids[c]	NA	NA	NA	29 (7.6-50.4)	2.34 (1.20-4.55)



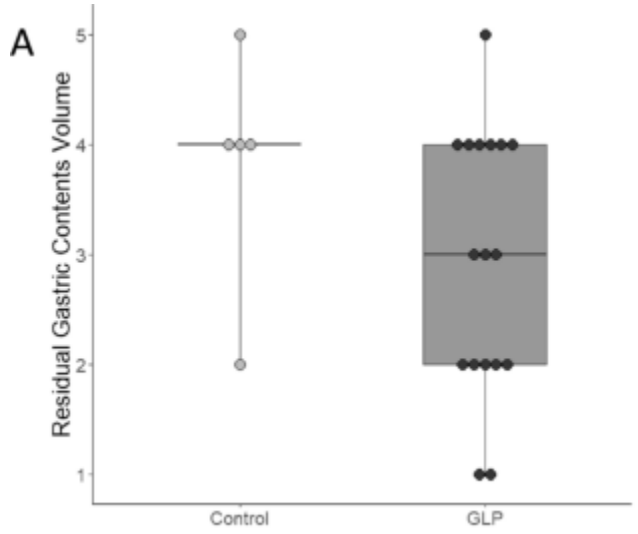
Sen S, Potnuru PP, Hernandez N, et al. JAMA Surg, 2024 Mar 6;159;(6):660-667

Residual gastric contents

- Reviewed the EMR of EGD procedure under anesthesia *(propofol, general anesthesia)*
- Excluded procedures with nurse-administered sedation *(midazolam, fentanyl)*
- GLP-1 RA : semaglutide, dulaglutide, tirzepatide, liraglutide
- Fasting for a minimum of eight hours

Table 2 Estimation of the association between glucagon-like peptide-1 agonist and residual gastric contents

	Odds ratio (95% confidence interval)	*P* value
Crude model		
Model 1: Unadjusted	4.8 (1.6 to 14.5)	0.005
Primary analysis		
Model 2: Adjusting for prespecified prognostic covariates[a]	5.8 (1.7 to 19.3)	0.004
Sensitivity models		
Model 3: Adjusting for prognostic covariates[a] and fasting duration	5.8 (1.7 to 19.7	0.005
Model 4: Adjusting for prognostic covariates,[a] including diabetic and indication covariates[b]	6.3 (1.6 to 21.1)	0.005
Model 5: Penalized regression[c] adjusting for prognostic covariates,[a] including diabetic and indication covariates[b]	4.6 (1.6 to 13.1)	0.005
Model 6: Specification of primary analysis using jackknife estimation[d]	5.2 (1.6 to 16.7)	0.006



Wu, F., et al. Can J Anesth, 2024 Mar 14;71,958–966.

Residual gastric contents

Small

Medium

Large

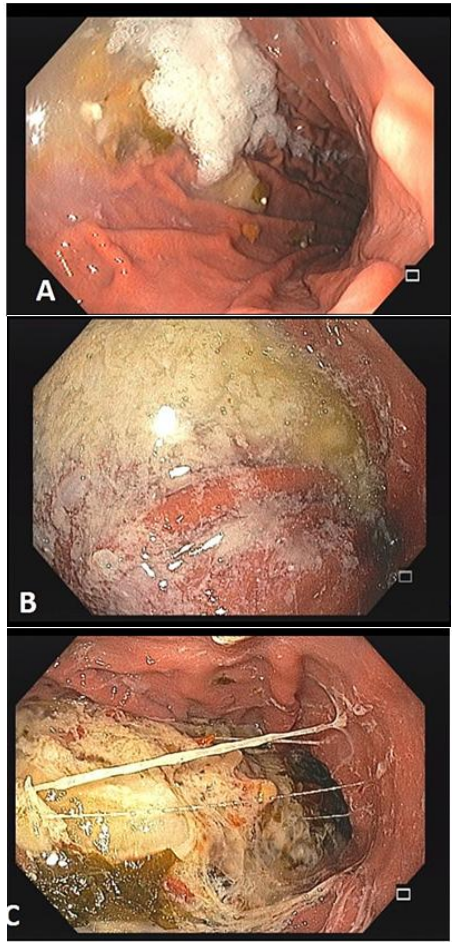


Table 2
Summary of propensity weighted analysis.

	Propensity weighted analysis (A)		
	Estimate (PR)	95% CI	P-value
Semaglutide use	5.15	1.92–12.92	<0.001
Digestive symptoms	3.56	2.2–5.78	<0.001
Colonoscopy combined with upper endoscopy	0.25	0.16–0.39	<0.001
	Propensity weighted analysis (B)		
	Estimate (PR)	95% CI	P-value
Semaglutide use and digestive symptoms	16.5	9.08–34.91	<0.001
Semaglutide use and no digestive symptoms	9.68	5.6–17.66	<0.001
No Semaglutide use and digestive symptoms	4.94	1.32–15.77	0.0098
Colonoscopy combined with upper endoscopy	0.26	0.16–0.39	<0.001

Fasting +
24h liquid diet

Silveira SQ et al. J Clin Anesth 2023 Aug;87:111091.

Aspiration pneumonia

Case Report

Pulmonary aspiration of gastric contents in two patients taking semaglutide for weight loss

- During laryngoscopy, a large volume of regurgitated particulate gastric content including undigested food was observed.
- A chest radiograph was ordered, showing bilateral infiltrates with fluid in the dependent segment of the right lower lobe.

Semaglutide, delayed gastric emptying, and intraoperative pulmonary aspiration: a case report

- Large quantities of liquid and solid material were encountered in the stomach.
- Intubation → A bronchoscope was inserted through the endotracheal tube and revealed a moderate quantity of liquid and solid material resembling the gastric content.

Avraham SA, et al. Anaesthesia Reports 2024, 12, e12278.
Klein SR, Hobai IA. Can J Anaesth 2023 Mar 28;70:1394-6.

July - September 2023 | Potential Signals of Serious Risks/New Safety Information Identified by the FDA Adverse Event Reporting System (FAERS)

Aspiration	Alopecia	Suicidal ideation
Glucagon-like peptide-1 (GLP-1) receptor agonists	Glucagon-like peptide-1 (GLP-1) receptor agonists	Glucagon-like peptide-1 (GLP-1) receptor agonists
• Adlyxin (lixisenatide)	• Adlyxin (lixisenatide)	• Adlyxin (lixisenatide)
• Byetta (exenatide)	• Byetta (exenatide)	• Byetta (exenatide)
• Bydureon (exenatide)	• Bydureon (exenatide)	• Bydureon (exenatide)
• Bydureon BCise(exenatide)	• Bydureon BCise (exenatide)	• Bydureon BCise (exenatide)
• Mounjaro (tirzepatide)	• Mounjaro (tirzepatide)	• Mounjaro (tirzepatide)
• Ozempic (semaglutide)	• Ozempic (semaglutide)	• Ozempic (semaglutide)
• Rybelsus (semaglutide)	• Rybelsus (semaglutide)	• Rybelsus (semaglutide)
• Saxenda (liraglutide)	• Saxenda (liraglutide)	• Saxenda (liraglutide)
• Soliqua 100/33 (insulin glargine and lixisenatide)	• Soliqua 100/33 (insulin glargine and lixisenatide)	• Soliqua 100/33 (insulin glargine and lixisenatide)
• Trulicity (dulaglutide)	• Trulicity (dulaglutide)	• Trulicity (dulaglutide)
• Victoza (liraglutide)	• Victoza (liraglutide)	• Victoza (liraglutide)
• Wegovy (semaglutide)	• Wegovy (semaglutide)	• Wegovy (semaglutide)
• Xultophy 100/3.6 (insulin degludec and liraglutide)	• Xultophy 100/3.6 (insulin degludec and liraglutide)	• Xultophy 100/3.6 (insulin degludec and liraglutide)
• Zepbound (tirzepatide)		• Zepbound (tirzepatide)

https://www.fda.gov/drugs/fdas-adverse-event-reporting-system-faers/july-september-2023-potential-signals-serious-risksnew-safety-information-identified-fdaadverse

4. Guidelines for delayed gastric emptying before EGD/Op

- Guidelines for pre-operate
  - American Society of Anesthesiologists (ASA) 2023 / 2024
  - American Society for Metabolic and Bariatric Surgery (ASMBS) 2024
  - Association of Anaesthetists (AA) 2025
  - Society for Perioperative Assessment and Quality Improvement (SPAQI) consensus
  - American Academy of Orthopaedic Surgeons (AAOS) 2025 annual meeting

- Guidelines for endoscopy
  - American Gastroenterological Association (AGA) 2024
  - American Society of Gastrointestinal Endoscopy (ASGE) 2025

STOP → Risk-based Management

Guidelines for operate – ASA 2023, 2024

June 29, 2023

American Society of Anesthesiologists Consensus-Based Guidance on Preoperative Management of Patients (Adults and Children) on Glucagon-Like Peptide-1 (GLP-1) Receptor Agonists

October 29, 2024

Most Patients Can Continue Diabetes, Weight Loss GLP-1 Drugs Before Surgery, Those at Highest Risk for GI Problems Should Follow Liquid Diet Before Procedure

New Multi-society Clinical Practice Guidance Released

Guidelines for operate – ASA 2023

Day(s) Prior to 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.

Joshi, Girish P., et al. Last updated: 2023 June

Guidelines for operate – ASA 2023

Day of the 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.

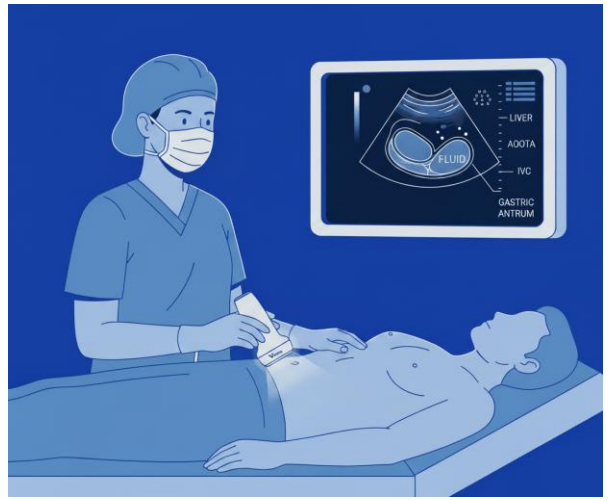
- If the patient has no GI symptoms, and the GLP-1 agonists have been held as advised, proceed as usual.

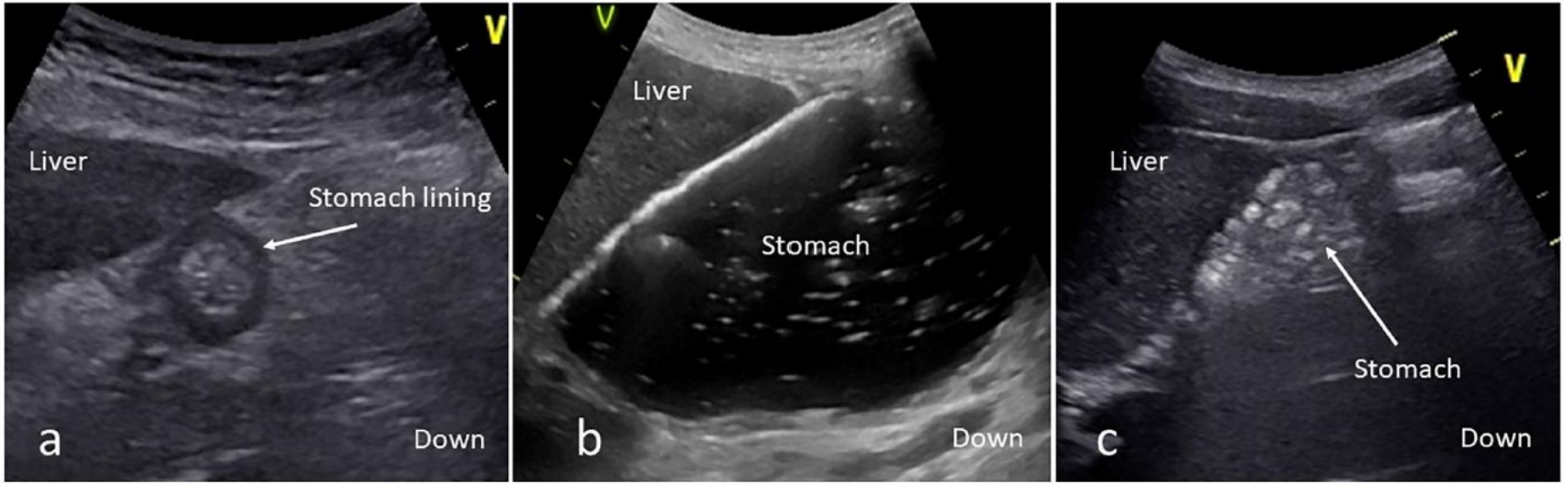
- If the patient has no GI symptoms, but the GLP-1 agonists were not held as advised, proceed with 'full stomach' precautions or consider evaluating gastric volume by ultrasound, if possible and if proficient with the technique. If the stomach is empty, proceed as usual. If the stomach is full or if gastric ultrasound inconclusive or not possible, consider delaying the procedure or treat the patient as 'full stomach' and manage accordingly. Discuss the concerns of potential risk of regurgitation and pulmonary aspiration of gastric contents with the proceduralist/surgeon and the patient.

- There is no evidence to suggest the optimal duration of fasting for patients on GLP-1 agonists. Therefore, until we have adequate evidence, we suggest following the current ASA fasting guidelines.[15,16]

Joshi, Girish P., et al. Last updated: 2023 June

Point-of-care (POC) gastric ultrasound





Empty stomach | Full stomach with liquid | Full stomach with solid

Valla FV et al. Front. Pediatr. 2022 June;10:903944.

Guidelines for operate – ASA 2024

Most patients should continue taking their GLP-1 RAs before elective surgery.

Consider the following guidance for patients at **highest risk**:

- Patients in the **escalation phase** of GLP-1 drugs (early in treatment) are more likely to have delayed stomach emptying. The escalation phase (when the patient is given increasing doses of the GLP-1 drug) typically lasts four to eight weeks, depending on the drug and the reason it has been prescribed. *Elective surgery should be deferred and only proceed once the escalation phase has passed and GI side effects have dissipated.*
- Patients who **have GI symptoms**, including nausea, vomiting, abdominal pain, shortness of breath or constipation *should wait until their symptoms have dissipated* before proceeding with elective surgery.
- Patients on a **higher dose** of the GLP-1 drug typically have more GI side effects and should follow a *liquid diet for 24 hours before the procedure.*
- Patients with **other medical conditions** that slow stomach emptying, such as **Parkinson's disease** may further modify the perioperative management plan.

Guidelines for operate – ASMBS(AGA) 2024

ASMBS guidelines/statements

Multisociety clinical practice guidance for the safe use of glucagon-like peptide-1 receptor agonists in the perioperative period

Tammy L. Kindel, M.D., Ph.D.[a,*], Andrew Y. Wang, M.D.[b], Anupama Wadhwa, M.D.[c,d], Allison R. Schulman, M.D., M.P.H.[e], Reem Z. Sharaiha, M.D., M.Sc[f], Matthew Kroh, M.D.[g], Omar M. Ghanem, M.D.[h], Shauna Levy, M.D., M.S.[i], Girish P. Joshi, M.D.[c], Teresa L. LaMasters, M.D.[j], representing the American Gastroenterological Association, American Society for Metabolic and Bariatric Surgery, American Society of Anesthesiologists, International Society of Perioperative Care of Patients with Obesity, and the Society of American Gastrointestinal and Endoscopic Surgeons

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Received 30 August 2024; accepted 31 August 2024

Guidelines for operate – ASMBS(AGA) 2024

Recommendation 1 : Use of GLP-1RAs in the perioperative period should be based on shared decision making of the patient with procedural, anesthesia, and prescribing care teams.

a) Care teams should consider the following variables as elevating the risk of delayed gastric emptying and aspiration with the periprocedural use of GLP-1RA:

1. **Escalation phase**
2. **Higher dose**
3. **Weekly dosing**
4. **Presence of gastrointestinal symptoms**: **nausea, vomiting, abdominal pain, dyspepsia, and constipation.**
5. **Medical conditions**: **bowel dysmotility, gastroparesis, and Parkinson's disease.**

Guidelines for operate – ASMBS(AGA) 2024

b) GLP-1RA therapy may be continued pre-operatively in **patients without elevated-risk of delayed gastric emptying and aspiration** based on Recommendation 1a.

Risk of withholding of GLP- 1RAs : a hazardous, metabolic disease state, like hyperglycemia.

Bridging therapy: resource-intensive, cost or insurance prohibitive, and risk other adverse side effects like hypoglycemia.

Finally, **withholding GLP-1RA perioperatively only for patients with the diseases of overweight and obesity,** without an indication as described in Recommendation 1a, could constitute overweight and obesity bias, which **should be avoided.**

c) The duration to hold therapy is unknown.

At this time, it is suggested to follow the original guidance of the ASA, **holding the day of surgery for daily formulations, and a week prior to surgery for weekly formulations.**

Guidelines for operate – ASMBS(AGA) 2024

Recommendation 2. The safe use of GLP-1RAs in the perioperative period should include efforts to minimize the aspiration risk of delayed gastric emptying.

a) Preoperative diet modification(**preoperative liquid diet for at least 24 h**) can be utilized in patients when there is concern for delayed gastric emptying based on clinical symptom review as described in Recommendation 1a.

b) When clinical concern for retained gastric contents exists on the day of the procedure, **point-of-care gastric ultrasound** could be used to assess aspiration risk.

c) When clinical concern for retained gastric contents exists or is confirmed on the day of the procedure, providers should engage patients in a shared-decision-making model and consider the benefits and risks of **rapid sequence induction(RSI)** of general anesthesia for tracheal intubation to minimize aspiration risk versus procedure cancellation.

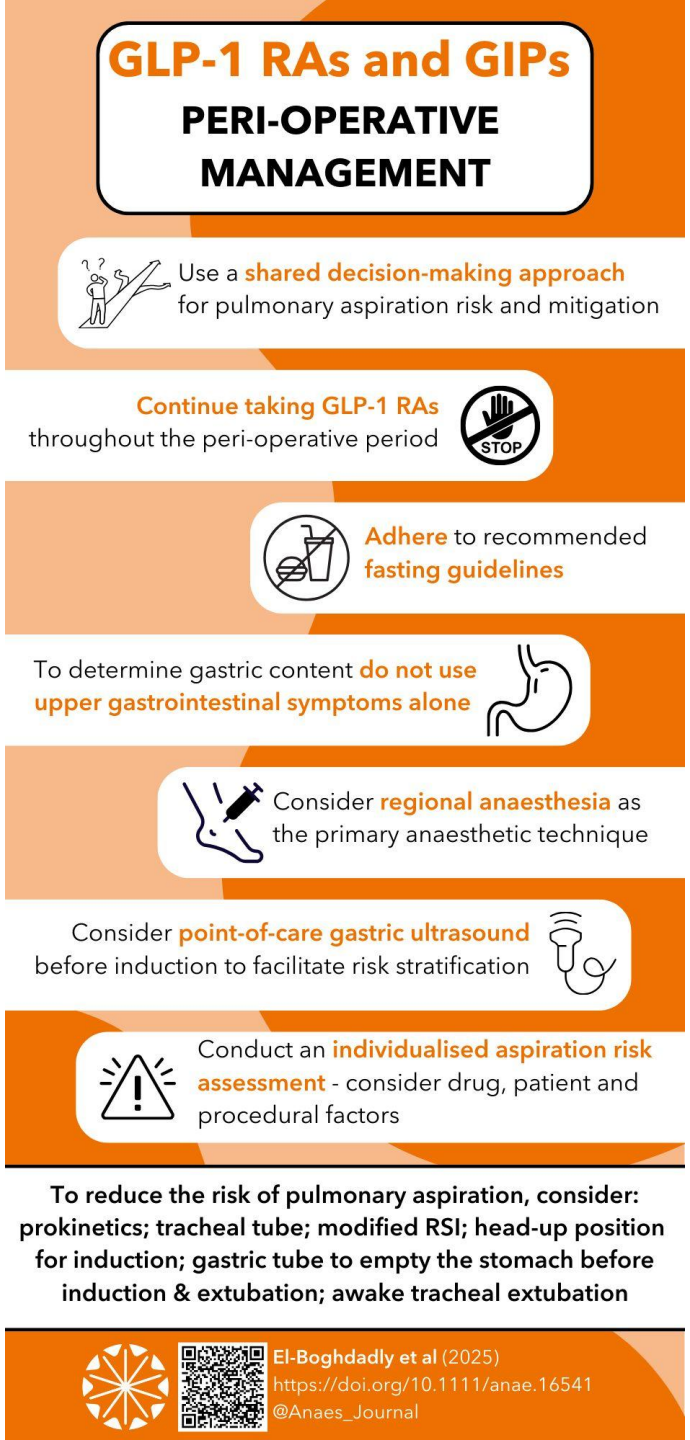
Guidelines for operate – AA (UK) 2025

Guidelines

Elective peri-operative management of adults taking glucagon-like peptide-1 receptor agonists, glucose-dependent insulinotropic peptide agonists and sodium-glucose cotransporter-2 inhibitors: a multidisciplinary consensus statement

A consensus statement from the Association of Anaesthetists, Association of British Clinical Diabetologists, British Obesity and Metabolic Surgery Society, Centre for Perioperative Care, Joint British Diabetes Societies for Inpatient Care, Royal College of Anaesthetists, Society for Obesity and Bariatric Anaesthesia and UK Clinical Pharmacy Association

To reduce the risk of pulmonary aspiration, consider prokinetics



Guidelines for operate – SPAQI consensus

CLINICAL PRACTICE

Perioperative management of patients taking glucagon-like peptide 1 receptor agonists: Society for Perioperative Assessment and Quality Improvement (SPAQI) multidisciplinary consensus statement☆

Adriana D. Oprea[1,*], Laura J. Ostapenko[2], BobbieJean Sweitzer[3,4], Angela Selzer[5], Joan M. Irizarry-Alvarado[6], Maria D. Hurtado Andrade[7,8], Carlos E. Mendez[9], Kristen D. Kelley[10], Erin Stewart[11], Claudia R. Fernandez Robles[1], Ryan M. Chadha[12], Michael Camilleri[8], Ruchi Mathur[13], Guillermo E. Umpierrez[14] and David L. Hepner[15]

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☆Co-sponsored and endorsed by the American Association of Clinical Endocrinology (AACE).

Guidelines for operate – SPAQI consensus

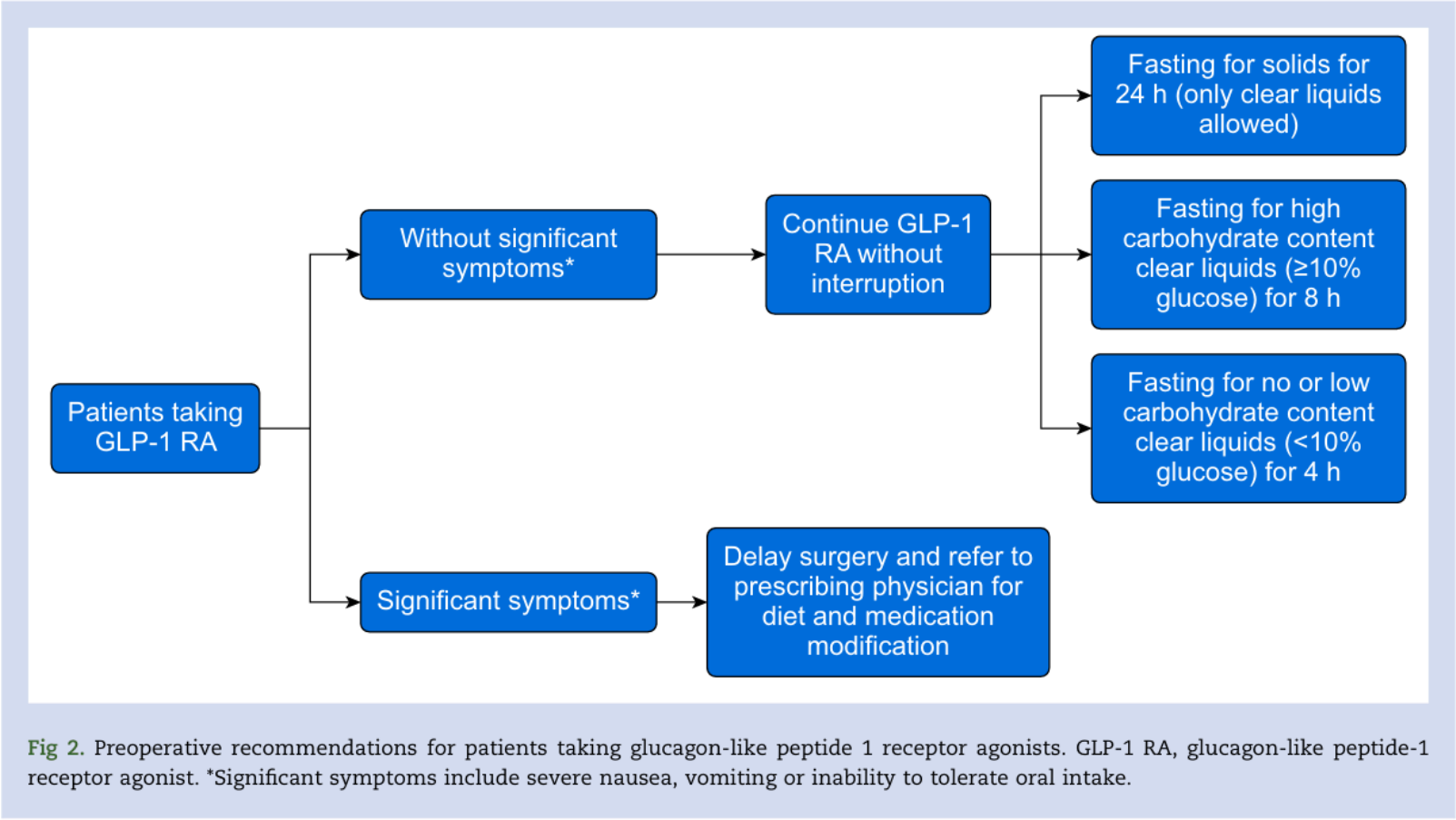


Fig 2. Preoperative recommendations for patients taking glucagon-like peptide 1 receptor agonists. GLP-1 RA, glucagon-like peptide-1 receptor agonist. *Significant symptoms include severe nausea, vomiting or inability to tolerate oral intake.

Oprea AD, et al. British Journal of Anaesthesia. 2025;135(1):48-78.

Guidelines for operate – SPAQI consensus

- Eating slowly, consuming small and low-fat meals, and increasing fiber
- Avoiding water 30 min before, during, and 30 min after eating
- if symptoms do not resolve with dietary modification, use of medications such as anti-emetics, H2-blockers, proton pump inhibitors, and stool softeners can help.
- If symptoms continue despite these measure, dose de-escalation is considered because the incidence and severity of adverse effects are dose-dependent.
- If symptoms do not improve after 2 weeks, a more aggressive de-escalation approach or medication discontinuation needs to be considered.
- Symptoms should resolve after four half-lives

  (semaglutide, tirzepatide: 1 week x 4 → **4 week**) of medication discontinuation.

Oprea AD, et al. British Journal of Anaesthesia. 2025;135(1):48-78.

American Academy of Orthopaedic Surgeons (AAOS) 2025 annual meeting

"Optimal Timing for Cessation of GLP-1 Agonist Before Elective Total Hip and Knee Arthroplasty (TKA & THA)"

→ Discontinuing GLP-1 agonists at least **14 days** before total joint replacement surgery is optimal to reduce the risk of delayed emergence from anesthesia, aspiration events, aspiration pneumonitis and conversion to intubation.

Table 1. Multivariate Analysis for Delayed Emergence from Anesthesia

	OR[a]	95% CI	*P*-value
30 days	1.03	0.84-1.18	0.4906
14 days	1.06	0.95-1.22	0.1673
7 days	1.11	0.97-1.31	0.0977
5 days	1.59	1.34-1.82	0.005*
3 days	1.84	1.67-2.19	<0.001*
1 day	2.23	1.82-2.49	<0.001*
None	2.73	2.44-3.23	<0.001*

Note. Controlled for age, sex, race, and past medical history. OR=odds ratio. CI=confidence interval
[a]Reference group: non-Ozempic users

Table 2. Multivariate Analysis for Aspiration Event

	OR[a]	95% CI	*P*-value
30 days	1.02	0.96-1.23	0.2952
14 days	1.09	0.92-1.26	0.0981
7 days	1.24	1.07-1.40	0.002*
5 days	2.53	2.21-3.08	<0.001*
3 days	3.09	2.77-3.41	<0.001*
1 day	4.96	4.53-5.29	<0.001*
None	5.14	4.81-5.39	<0.001*

Note. Controlled for age, sex, race, and past medical history. OR=odds ratio. CI=confidence interval
[a]Reference group: non-Ozempic users

Table 3. Multivariate Analysis for Aspiration Pneumonitis

	OR[a]	95% CI	*P*-value
30 days	0.99	0.77-1.31	0.6324
14 days	1.04	0.89-1.34	0.2347
7 days	1.12	0.87-1.29	0.0779
5 days	1.29	1.02-1.49	<0.001*
3 days	1.46	1.21-1.67	<0.001*
1 day	2.74	2.38-3.05	<0.001*
None	2.82	2.43-3.11	<0.001*

Note. Controlled for age, sex, race, and past medical history. OR=odds ratio. CI=confidence interval
[a]Reference group: non-Ozempic users

Table 4. Subgroup Multivariate Analysis for Conversion to Intubation

	OR[a]	95% CI	*P*-value
30 days	1.02	0.83-1.31	0.8234
14 days	1.003	0.98-1.29	0.7314
7 days	1.39	1.06-1.56	0.0343*
5 days	2.09	1.76-2.36	<0.001*
3 days	4.68	4.40-4.97	<0.001*
1 day	6.37	5.92-6.72	<0.001*
None	6.96	6.38-7.47	<0.001*

Note. Controlled for age, sex, race, and past medical history. OR=odds ratio. CI=confidence interval
[a]Reference group: non-Ozempic users

Chokshi SN, et al. Presented at: American Academy of Orthopaedic Surgeons; March 10-14, 2025; San Diego, CA. Accessed Jan 30, 2026.

Compare guidelines

Guideline	Recommendation	Key Concept
ASA 2023	Daily GLP-1 RA → **Same-day hold** Weekly GLP-1 RA → **hold for 1 week**	Concern for delayed gastric emptying and aspiration risk
ASMBS (AGA) 2024	**Most patients can continue** GLP-1 RA before elective procedures	**Shared decision-making** and **individualized risk assessment**
SPAQI consensus 2025	**Symptom-based** risk stratification	**Risk-based peri-op management**

Summary of recommendations

Table 1. Modified Summary Recommendations from the Multisociety Clinical Practice Guidance on Periprocedural Use of GLP-1RAs

Recommendation 1	Standardized preoperative assessment for risk of delayed gastric emptying (yes/no): 1. Presence of gastrointestinal symptoms suggesting delayed gastric emptying; recent dose increases, higher doses, and weekly administered medications may increase the risk of gastrointestinal symptoms 2. Medical conditions beyond GLP-1RA usage, which may also delay gastric emptying
Recommendation 2	Selective preoperative care plan based on delayed gastric emptying assessment and shared decision-making: 1. Continue GLP-1RA therapy preoperatively if there is no concern for delayed gastric emptying 2. If elevated risk of delayed gastric emptying exists: a. Recommend liquid only diet for at least 24 h before procedure with usual recommended fasting protocol, or b. Evaluation of the feasibility of medication bridging if GLP-1RAs need to be discontinued
Recommendation 3	On the day of procedure, reassess for delayed gastric emptying and mitigate risk if clinical concern: 1. Proceed with procedure as planned if there is no concern for delayed gastric emptying 2. If elevated risk of delayed gastric emptying exists: a. Consider point-of-care gastric ultrasound and/or b. Consider rapid sequence induction of general anesthesia, if appropriate c. Minimize procedure cancellation when possible

GLP-1RA, glucagon-like peptide-1 receptor agonist.

- However, it is not an evidence-based guideline.
- This approach emphasizes shared decision-making and provides recommendations for balancing continuation of GLP-1RA therapy perioperatively for surgery and procedures.

Joshi, et al. Anesthesiology 141(6):p 1208-1209, December 2024.

Aspiration Risk: Surgery < Endoscopy

Procedure	Sedation / Anesthesia	Airway Protection	Aspiration Risk
General surgery	General anesthesia	**Endotracheal intubation**	Lower after airway protection
Upper endoscopy	Deep sedation / propofol	No secured airway	Potentially higher
Colonoscopy	Moderate or deep sedation	No secured airway	Low

- Why GLP-1 RA Matters More in Endoscopy ?

→ Increased risk, especially in procedures without airway protection

Guidelines for endoscopy
- Multi-society statement 2023

August 11, 2023

No data to support stopping GLP-1 agonists prior to elective endoscopy

As patient safety will always be paramount, and in the absence of actionable data, we encourage our members to exercise best practices when performing endoscopy on patients on GLP-1 receptor agonists.

AASLD/ACG/AGA/ASGE/NASPGHAN Multisociety Statement; 2023
https://gastro.org/news/gi-multi-society-statement-regarding-glp-1-agonists-and-endoscopy/

Guidelines for endoscopy – AGA 2024

CLINICAL PRACTICE UPDATES

AGA Rapid Clinical Practice Update on the Management of Patients Taking GLP-1 Receptor Agonists Prior to Endoscopy: Communication

Jana G. Hashash,[1] Christopher C. Thompson,[2] and Andrew Y. Wang[3]

Hashash et al. Clinical Gastroenterology and Hepatology 2024;22:705–707

Guidelines for endoscopy – AGA 2024

- Standard perioperative fasting : 8-hour solid-food and 2-hour liquid
- No GI symptoms : nausea, vomiting, dyspepsia, or abdominal distention

→ we advise proceeding with upper and/or lower endoscopy

- GI symptoms (+)

→ Transabdominal ultrasonography

  - if there is sufficient clinical expertise and the equipment is available
  - but evidence to support this modality in standard practice is lacking

- Delaying endoscopy may have negative clinical consequences

→ Rapid-sequence intubation is a consideration

  - however, this may not be possible in most ambulatory or office-based endoscopy settings

- Liquid diet the day before sedated procedures may be a more acceptable strategy

Guidelines for endoscopy – ASGE 2025

POSITION STATEMENT

ASGE American Society for Gastrointestinal Endoscopy

American Society for Gastrointestinal Endoscopy position statement on periendoscopic management of patients on glucagon-like peptide-1 receptor agonists and sodium-glucose cotransporter-2 inhibitors

Reem Z. Sharaiha, MD, MSc,[1] Alpana P. Shukla, MD,[1] Sudipta Sen, MD, FASA,[2] Walter W. Chan, MD, MPH,[3] David T. Broome, MD,[4] Diana Anca, MD,[5] Wasif Abidi, MD, PhD,[6] Neil Marya, MD,[7] Thiruvengadam Muniraj, MD, PhD, FRCP,[8] Nirav Thosani, MD, MHA,[9,*] Allison R. Schulman, MD, MPH[4,10,*]

This document was reviewed and approved by the Governing Board of the American Society for Gastrointestinal Endoscopy.

Sharaiha and Shukla et al. Gastrointestinal Endoscopy, 2025 Feb;101.2:285-294.

Guidelines for endoscopy – ASGE 2025

Statement 1. The ASGE recommends immediate preprocedure evaluation for GI symptoms (severe nausea, vomiting, regurgitation when lying supine, abdominal bloating, abdominal distention, and abdominal pain) suggestive of possible delayed gastric emptying for all patients on GLP-1RAs.

Statement 2. The ASGE recommends a detailed discussion regarding possible risk of aspiration with all patients on GLP-1RAs undergoing endoscopic evaluation.

Statement 3. The ASGE suggests a liquid diet 24 hours before endoscopic procedure for all patients on GLP-1RAs.

Guidelines for endoscopy – ASGE 2025

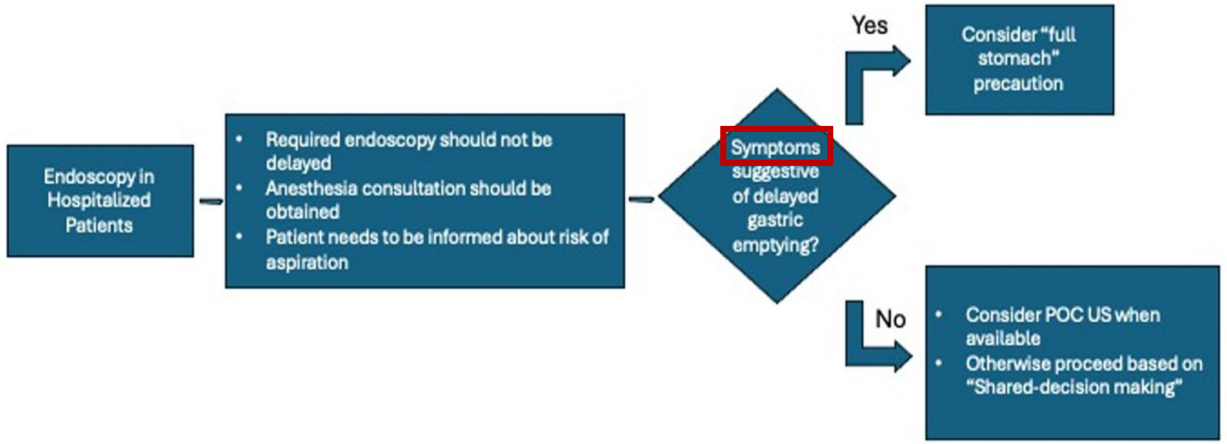
- Urgent or emergent endoscopic procedures in hospitalized patients

Statement 4. The ASGE recommends against delaying required diagnostic or therapeutic urgent or emergent endoscopy for hospitalized patients who are on GLP-1RAs.

Statement 5. The ASGE suggests obtaining an anesthesia consult for hospitalized patients who are on GLP-1RA medication requiring urgent or emergent endoscopy.

A. *If a patient has symptoms suggestive of delayed gastric emptying, the ASGE suggests using aspiration, "full stomach" precautions (general anesthesia with a rapid sequence induction and intubation with cuffed endotracheal tube), or avoid deep sedation.*

B. *If a patient does not have symptoms suggestive of delayed gastric emptying, point of care gastric US, when available, may be used to determine the gastric volume.*



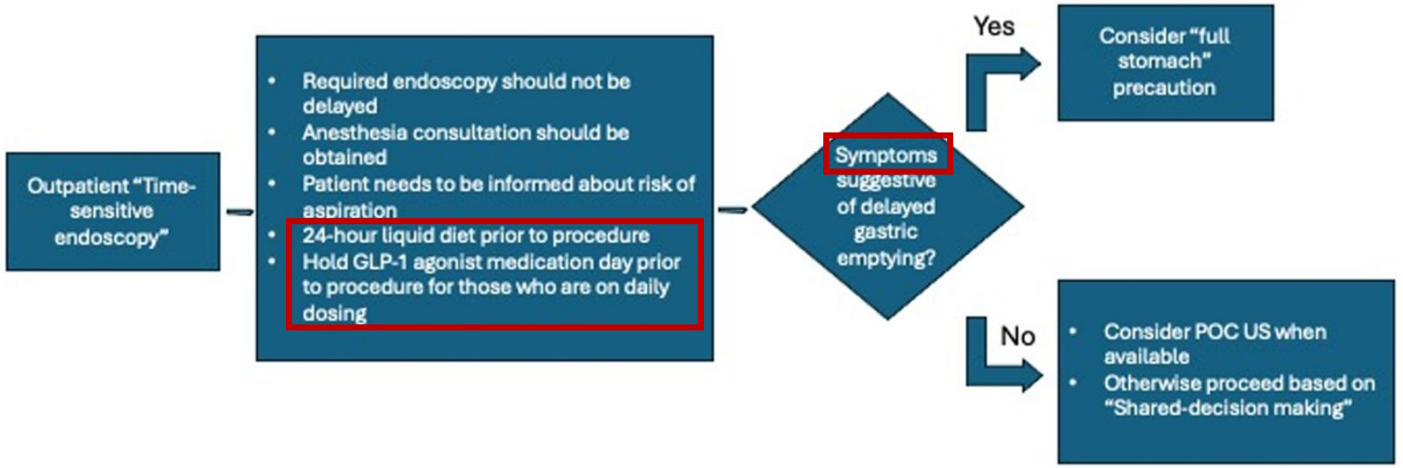
Guidelines for endoscopy – ASGE 2025

- Time-sensitive outpatient endoscopic procedures

Statement 6. The ASGE recommends against delaying time-sensitive outpatient diagnostic or therapeutic endoscopy for patients who are on GLP-1RAs.

Statement 7. The ASGE suggests anesthesia consultation for patients who are on GLP-1RAs requiring time-sensitive outpatient endoscopy.

Statement 8. The ASGE suggests holding GLP-1RAs 24 hours before the procedure for patients who are on daily dosing of GLP-1RAs and require outpatient time-sensitive endoscopy.



Guidelines for endoscopy - ASGE 2025

- Elective endoscopic procedures

Statement 9. The ASGE suggests holding GLP-1RAs before elective endoscopy procedures for patients who are on GLP-1RAs as follows:

A. *For patients who are on daily dosing, the ASGE suggests holding GLP-1RAs at least 24 hours before the procedure.*

B. *For patients who are on weekly dosing, the ASGE suggests holding GLP-1RAs at least 7 days before the procedure.*

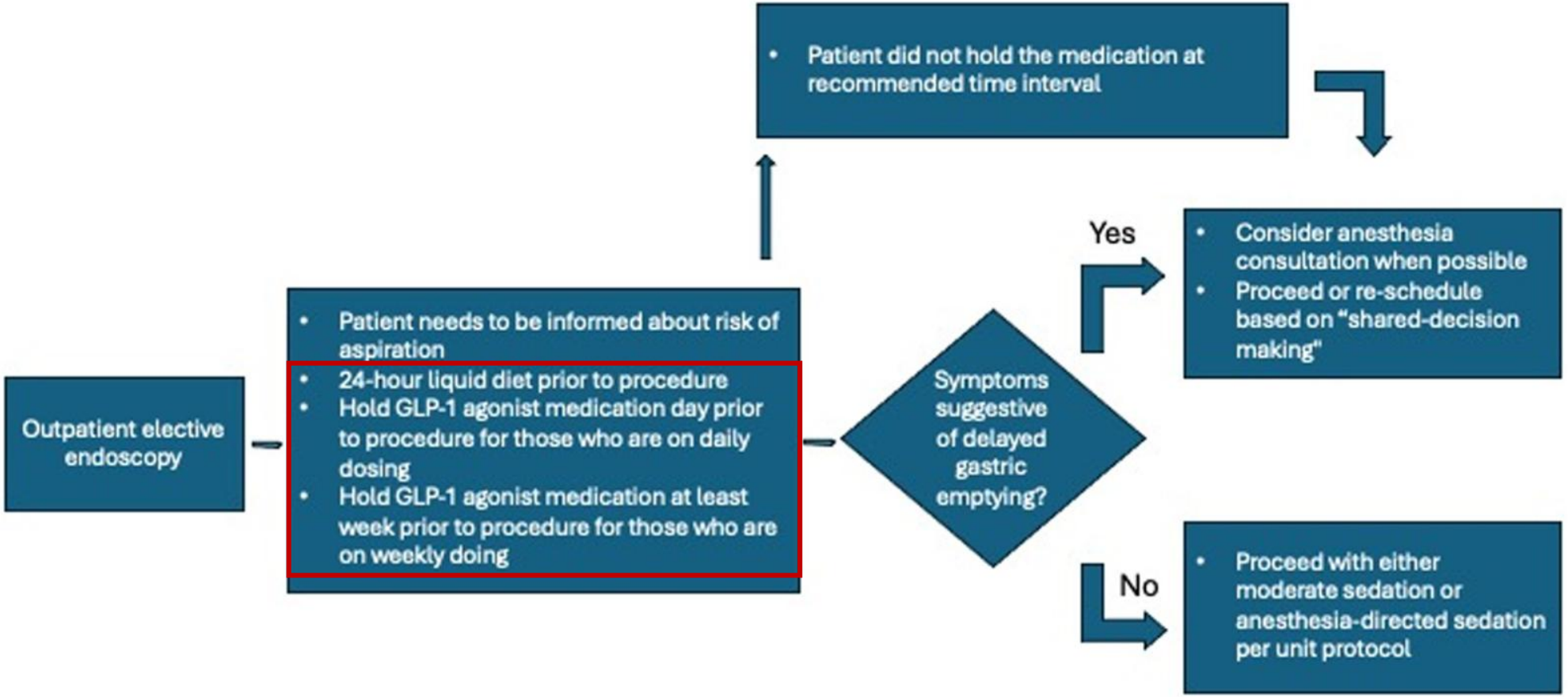
C. *The ASGE suggests moderate sedation or anesthesia-directed sedation for patients who have stopped GLP-1RAs at the recommended time interval and have no symptoms suggestive of delayed gastric emptying.*

D. *The ASGE suggests anesthesia consultation and multidisciplinary discussion for patients who either did not stop GLP-1RAs at the recommended time interval or have symptoms suggestive of delayed gastric emptying despite holding medication appropriately.*

Sharaiha and Shukla et al. Gastrointestinal Endoscopy, 2025 Feb;101.2:285-294.

Guidelines for endoscopy - ASGE 2025

- Elective endoscopic procedures



Summary

일괄 중단 → "**Risk stratification**"

- **Low Risk :** No GI Symptoms, Low or stable dose

→ 일반 금식 + **GLP-1 RA 지속**

- **High-risk**
  - **All endoscopic patients**
  - GI Sx : severe nausea, vomiting, regurgitation, abdominal bloating/distention/pain
  - Dose escalation phase
  - High dose
  - Other medication/disease : Parkinson's disease, Diabetic gastroparesis, vagotomy, opioid
  - Gastroparesis past Hx

→ **24h liquid diet** → POC gastric US 고려, **필요시 연기**