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# ACG Clinical Guideline: Gastroparesis

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# Gastroparesis

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## **Definition:**

- A syndrome of delayed gastric emptying in the absence of mechanical obstruction with cardinal symptoms including early satiety, postprandial fullness, nausea, vomiting, bloating, and upper abdominal pain.
- The pathophysiologic mechanisms of gastroparesis are multifactorial, including antroduodenal hypomotility, pylorospasm, impaired gastric accommodation, and visceral hypersensitivity

# Epidemiology

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➤ Female to male ratio :-

3-4 : 1

➤ Type 1 diabetics (40%) .

➤ Type 2 diabetics (10–20%)

## Clinical features:

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- **Chronic nausea and vomiting:**

Vomit undigested food up to 4hrs after eating.

Increased frequency and severity in DG.

- **Early satiety:** very full very quickly.
- **Post prandial fullness:** very full after eating and continue for long time.

- **Upper abdominal pain:**

Vague, burning or crampy.

Worsen with eating.

Nocturnal.

- **Bloating or belching.**
- **Dyspepsia.**
- **Weight loss.**
- **Peripheral N. with DM.**

# Etiology

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## **A. Idiopathic: Most common cause (IG) 36% .**

- No detectable underlying abnormality for the delayed gastric emptying .
- More common in middle aged women .

## **B. Diabetes mellitus: diabetic gastroparesis (DG) 29%.**

- T1DM has worse clinical presentation
- Requires diabetic neuropathy .

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### **C. Post surgical (13%)**

- Gastric resection with vagal nerve injury.
- Fundoplication or bariatric surgery that involves gastroplasty or bypass procedures.

### **D. Medications:**

- Opiates, TCAs, CCBs, dopamine agonists, progesterone and clonidine.
- The antirejection drug as cyclosporine and Tacrolimus .

## E. Neurological:

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- Parkinson's disease, multiple sclerosis.

## F. Rheumatological:

- Scleroderma: deposition of collagen.
- Amyloidosis: deposition of amyloid protein.

## G. Viral infection

- Viruses such as cytomegalovirus, Epstein–Barr virus, and varicella zoster may develop a form of autonomic neuropathy (**generalized or selective cholinergic dysautonomia**) that includes gastroparesis.

**H- Other causes** Spinal trauma , Mesenteric ischemia , Hypothyroidism.



# Diagnosis

## **I. Rule out mechanical obstruction:**

- Imaging( CT scan , barium).
- Upper endoscopy.

## **2. Detect delayed gastric emptying:**

- Scintigraphy.
- Wireless motility capsule (WMC).
- Breath testing.

### **Rules for gastric emptying tests:**

- Stop medications that affect gastric emptying for 48–72 h.
- Relative euglycemia (blood glucose <200 mg/dl) is achieved in diabetics to obtain a reliable parameters.

# 1-Scintigraphy

- The gold standard test for measurement of gastric emptying .
- A solid-phase meal is considered as the standard “sulfur colloid-labeled egg sandwich”.
- Standard imaging at 0, 1, 2, and 4 h.
- Measurement of liquid gastric emptying in addition to solid emptying, has been advocated as a means of increasing sensitivity

Prior to test :

- Stop medication delay gastric emptying 48 – 72hrs.
- Maintain good blood glucose < 200 mg/dl.

**Positive if:**

- >60% of gastric content remain after 2hrs.
- >10% after 4hrs.
- 10-15% mild ..... 15-35% moderate.....>35% sever.

## 2-Wireless Motility Capsule (WMC)

- The principle of this test is based on the precipitous rise in pH as the capsule empties from the acidic gastric lumen into the bicarbonate-rich duodenum.
- Gastric emptying is determined when there is a rapid increase in the pH recorded indicating emptying from the acidic stomach to the alkaline duodenum.
- Correlation between gastric emptying time of the WMC and gastric emptying at 4 h by scintigraphy should be done.

## 3-Breath testing

- Based on the principle that the rate of gastric emptying of  $^{13}\text{C}$  substrate incorporated in the solid test meal is reflected by breath excretion of  $^{13}\text{CO}_2$ .
- premeal breath samples are collected after an 8-hour fast, followed by additional samples collected over 4 hours after eating the test meal.
- GEBT can be safely used in pregnant , breast- feeding women and in children.
- Both WMC and breath testing require further validation before they can be considered as alternates to scintigraphy for diagnosis of gastroparesis.

## D. D.

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- Rumination syndrome.
- Cyclic vomiting syndrome .
- Cannabinoid hyperemesis.

## Rumination syndrome:

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- Repetitive, effortless regurgitation of recently ingested food into the mouth followed by re-chewing and re-swallowing or expectoration of food.
- not preceded by nausea or retching .
- Initiated by stimulation of the palate with the tongue.
- Occurs within 15 min of starting a meal, in contrast to vomiting from gastroparesis, which occurs later in the postprandial period.
- More common in infants and the developmentally disabled.

## Cannabinoid hyperemesis

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- occurs in patients with prolonged history (2-10 years) of nearly daily high-dose cannabis use and resolves with cessation .

## Cyclic vomiting syndrome:

- Recurrent episodes of nausea and vomiting lasting hours to days separated by symptom-free periods of variable lengths.
- Each episode is similar.
- Vomiting often starts abruptly, although a prodrome of nausea and abdominal pain can occur.
- Typically, gastric emptying in CVS is normal or rapid; however, 14% of a large series of patients had delayed gastric emptying



# Management:

- i. CONSERVATIVE
- ii. PHARMACOLOGICAL
- iii. INTRAPYLORIC BOTULINUM TOXIN INJECTION
- iv. GASTRIC ELECTRICAL STIMULATION
- v. SURGICAL

# I-Conservative:

A- Maintaining oral nutrition is the goal of therapy.

B-Dietary modification:

- The initial step of dietary modification involves cooking non digestible fiber and mechanically homogenizing solids to a small particle size.
- Avoid insoluble fibers, alcohol, smoking.
- low-fat and fiber content .
- Small meal size is advisable 4–5 times a day.
- Increasing the liquid nutrient .
- Maintain good hydration and electrolyte balance .

C-Glycemic control

## D-Enteral Nutrition

- In severe gastroparesis, enteral or parenteral nutrition may be needed.
- Enteral feeding preferred over parenteral nutrition for many reasons as costs, complications and ease of delivery.
- Trial of naso-jejunal feeding should be done if failed feeding jejunostomy tube is indicated.
- Small intestinal motility can be assessed before placement of jejunostomy tube with manometry, WMC, and small intestinal scintigraphy.

### **Complications**

- Infection, thrombosis
- Tube migration.
- Dislodgement .

# Pharmacological:

## A. Prokinetic agents:

Are the first-line therapy for treatment of gastroparesis. they enhance gastric emptying and reduce gastroparesis symptoms

### I- Metoclopramide:

- Central and peripheral dopamine receptor antagonist.
- available in liquid oral, nasal spray, and parenteral (IV or subcutaneous) formulations
- liquid formulation is preferred , 5-10 mg 3 times per day, 15 minutes before meals .

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- Not used more than 12 wks with 10-day interruptions every 3 months.
  - During the drug holidays, patients are instructed to adhere strictly to a liquid diet.

**The most common side effects occur because** metoclopramide crosses the blood-brain barrier causing extrapyramidal symptoms as

- anxiety, agitation, somnolence
- dystonia.
- parkinsonism.
- dyskinesia .
- QT interval prolongation.

## 2. Domperidone:

- peripherally acting dopamine D2 receptor antagonist similar to metoclopramide.
- Equally efficacious but with less CNS side effects because domperidone does not cross the blood-brain barrier.
- The starting dose is 10-20 mg 3 times daily and at bedtime.

### The most common adverse:

- Prolong corrected QT.
- Cardiac arrhythmias, a baseline electrocardiogram is recommended.
- Increased prolactin levels.

### 3. Macrolides

- Macrolides such as erythromycin, azithromycin, and clarithromycin are motilin receptor agonists with a prokinetic property.
- They accelerate gastric emptying and improved symptoms .
- When given orally > 4 weeks it associated with tolerance and with QT prolongation.
- In hospitalized patients, IV erythromycin (infused over 45 minutes) at 1.5 mg/kg to 3.0 mg/kg 3 times per day.
- Long-term use of antibiotics may be associated with complications including antibiotic resistance and potential infections such as Clostridioides difficile toxin– induced colitis or antibiotic-induced diarrhea.

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#### 4- 5-HT<sub>4</sub> receptor agonists as :-

- cisapride was efficacious but it was withdrawn because of increased risk of cardiac arrhythmias.
- Prucalopride is approved for the treatment of chronic constipation, but not for gastroparesis.



## B. Anti emetic

- Antiemetics acting on different mechanisms have been used at Dosed of 4 mg to 8 mg every 8 hours
- ondansetron is a 5-hydroxytryptamine 3 receptor antagonist
- Prochlorperazine
- promethazine
- and scopolamine
- The synthetic cannabinoid, is also used, but there is risk of hyperemesis on withdrawal.
- The neurokinin-1 receptor antagonist aprepitant (approved for chemotherapy-induced emesis)

## C- Analgesic

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- Narcotic opiate analgesics should be stopped.
- Neuromodulators such as amitriptyline and nortriptyline are often considered first-line treatment for functional abdominal pain
- Tramadol, gabapentin, pregabalin, may be alternatives for pain.

# Pyloric Interventions

- Manometric studies of patients with DG show *increased* pyloric tone and contractions, a phenomenon termed as “pylorospasm.”
- interventions directed at the pylorus, including botulinum toxin injection, pyloric dilation and/or stenting, and surgical or endoscopic pyloromyotomy.
- Botulinum toxin is a potent inhibitor of neuromuscular transmission.
- repeated injection with high-dose botulinum toxin may induce pyloric fibrosis over time, thus reducing the feasibility of future interventions such as pyloromyotomy.

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## **Gastric peroral endoscopic myotomy (G-POEM)**

- Is a novel pyloric intervention that has become increasingly popular as a promising treatment for refractory gastroparesis.
- Accessing the pyloric muscle from the gastric luminal side with an endoscopy, G-POEM cuts predominantly the circular muscle layer while leaving the longitudinal muscle intact to avoid perforation.

# Gastric Electrical Stimulation (GES)

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- By using high-frequency electrical pulses delivered to the smooth muscles of the stomach, aims to modulate the afferent pathway and reduce gastroparesis symptoms in patients with refractory gastroparesis .
- GES improve vomiting but not gastric emptying or quality-of-life .
- Another novel experimental devices have been developed to activate the antral muscles by directly stimulating the efferent vagal fibers or by centrally stimulating the afferent vagus nerve.
- It is non invasive self-administered stimulation devices applied to the vagus nerve in the neck .

# Medications in development

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- Relamorelin (Allergan) is a penta-peptide ghrelin receptor agonist with evidence of strong prokinetic potency.
- Trazpiroben (Takeda) is a dopamine D2/D3 receptor antagonist with minimal brain penetration. It improve postprandial symptoms in patients with idiopathic or diabetic gastroparesis.

## Alternative Therapy

- Acupuncture is one of the most well-studied Eastern medicine therapies but further studies are needed to assess its clinical benefit.

# SURGICAL TREATMENTS

- VENTING GASTROSTOMY.
- GASTROJEUNOSTOMY.
- PYLOROPLASTY.
- GASTRECTOMY.
  - Complete or subtotal gastrectomy was applied most often for gastroparesis that followed gastric surgery for peptic ulcer disease.
  - In carefully selected patients, major gastric surgery can relieve distressing vomiting from severe gastroparesis and improve quality of life .
  - The risk of malnutrition and weight loss following gastrectomy has to be weighed relative to the symptom relief.
  - Subtotal gastrectomy with Roux-Y reconstruction may be needed for gastric atony secondary to PSG .

## Suspected gastroparesis

Step 1: Diagnosis: 4 h Gastric emptying by scintigraphy

Step 2: Exclude iatrogenic disease

Dietary: low fat, low fiber diet

Glycemic control among diabetics

Step 3: Pharmacological Rx:

- Prokinetics: metoclopramide, erythromycin, domperidone
- Antiemetics: anti-histamine<sub>1</sub> receptors; 5-HT<sub>3</sub> antagonists

Step 4: Nutritional support: Enteral formula

Step 5: Non-pharmacological Rx

Pyloric injection of botulinum toxin

Venting gastrostomy, feeding jejunostomy

Parenteral nutrition

Gastric electrical stimulation

Pyloroplasty

Partial gastrectomy



A purple rectangular tag with a hole on the left side is the central focus. The words "Thank you!" are written on it in a black, cursive font. The tag is placed on a light-colored wooden surface with a visible grain. Three white daisies with yellow centers are scattered around: one in the foreground to the right of the tag, and two in the background, one slightly to the left and one to the right. A light-colored string is looped around the tag and extends towards the top left of the frame.

Thank  
you!