

# Gastroparesis Presenting with a Rare Case of Mechanical Bowel Obstruction via Strangulation by Gastric Stimulator Electrodes

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<b>Background</b>	Gastroparesis is a debilitating motor disorder of the upper gastrointestinal tract, leading to chronic symptoms and often a poor quality of life. Gastric electrical stimulation (GES) is a reasonable surgical therapy for patients with therapy-refractory gastroparesis. While GES generally has a low complication rate, with device infection being most common, we present a rare but significant complication: mechanical bowel obstruction secondary to strangulation by gastric stimulator electrodes.
<b>Summary</b>	A 50-year-old female, who underwent GES implantation in 2020 for gastroparesis, presented to our emergency department with a one-week history of abdominal pain, bloating, and nausea, which was atypical for her previous gastroparesis exacerbations. Imaging demonstrated proximal dilation of the cecum and ascending colon, concerning for colonic volvulus. Due to a relatively benign abdominal examination and the patient's multiple medical comorbidities, a decompressive colonoscopy was attempted. The colonoscopy was unsuccessful, necessitating exploratory laparotomy, which revealed right colon strangulation by the GES electrodes. An ileocolonic anastomosis was performed, and the patient had an uncomplicated postoperative recovery.
<b>Conclusion</b>	The sudden presentation of a patient with an unfamiliar or novel treatment modality, such as the gastric pacemaker, must raise suspicion for unusual complications. In this case, the patient experienced symptoms for approximately one week before diagnosis. Although standard protocols were followed, bowel obstruction, while rare, is a known complication of GES. Increased vigilance is warranted to promptly diagnose or exclude this complication, potentially improving patient outcomes. Some studies suggest that left upper quadrant device placement and lead tacking to the abdominal wall may reduce complications involving intestinal obstruction. However, further research is needed to determine effective preventative measures and their impact on patient outcomes.
<b>Key Words</b>	gastric; complications; large bowel obstruction; hemicolectomy

**DISCLOSURE STATEMENT:**

The authors have no relevant financial relationships to disclose.

**FUNDING/SUPPORT:**

The authors have no relevant financial relationships or in-kind support to disclose.

**RECEIVED:** April 23, 2023

**REVISION RECEIVED:** June 25, 2023

**ACCEPTED FOR PUBLICATION:** August 24, 2023

**To Cite:** Ahmed SR, Funkhouser AL, Fuller DL, Crawford DP. Gastroparesis Presenting with a Rare Case of Mechanical Bowel Obstruction via Strangulation by Gastric Stimulator Electrodes. *ACS Case Reviews in Surgery*. 2025;5(2):20-24.

## Case Description

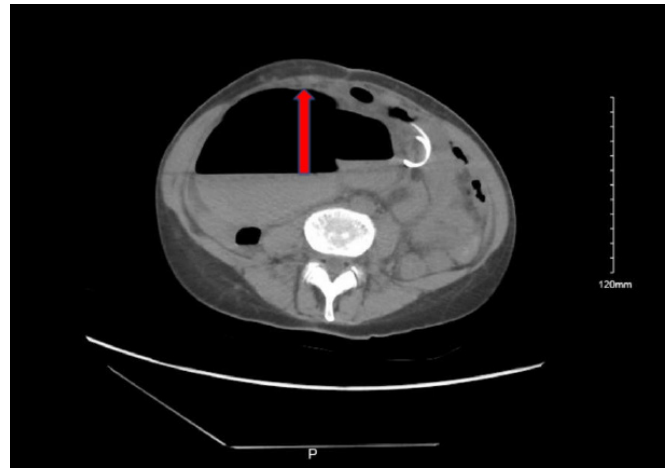
The patient is a 50-year-old female with a past medical history significant for gastroparesis, cholecystectomy, multiple medical allergies, and a known pericardial effusion. She had a history of recurrent gastroparesis exacerbations and underwent gastric electrical stimulation (GES) implantation in 2020.

Her gastroparesis had been relatively well-controlled until July 2022, when she presented to our emergency department (ED) with a one-week history of new-onset abdominal pain, bloating, nausea, and emesis. This presentation differed from her prior gastroparesis episodes. In the ED, a CT abdomen/pelvis without contrast revealed a markedly dilated transverse colon with significant stool burden, but no evidence of frank obstruction. Vitals were stable, and laboratory values were within normal limits. Given a relatively benign abdominal examination and reported normal bowel movements, her symptoms were attributed to gastroparesis, and she was discharged without surgical consultation.

The following day, her GES amplitude was increased during an outpatient appointment with her GES surgeon, without symptom improvement. Persistent abdominal pain, bloating, and worsening emesis led her to seek further medical attention the next day.

Outpatient evaluation by her gastroenterologist revealed significant dehydration and cachexia. The patient also reported right-sided abdominal pain. She denied hematochezia, melena, diarrhea, fever, or chills. Due to persistent symptoms, her gastroenterologist referred her back to the ED for further evaluation. In the ED, repeat CT abdomen/pelvis without contrast demonstrated a marked increase in cecal and proximal ascending colon distention, up to 11 cm in diameter, concerning for colonic volvulus (Figure 1). Given her relatively benign abdominal examination and multiple medical comorbidities, a decompressive colonoscopy was attempted to avoid laparotomy.

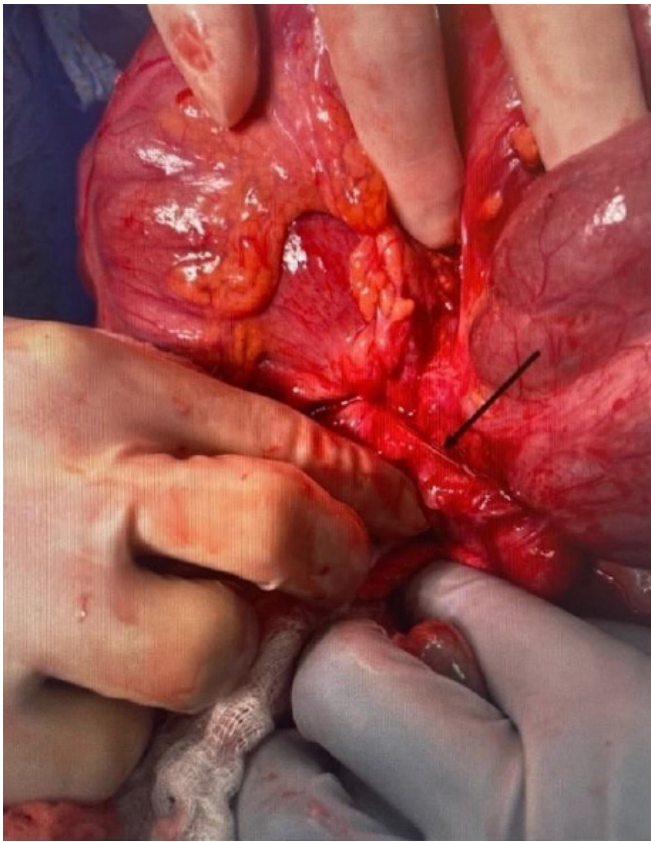
**Figure 1.** Preoperative Non-contrast CT Abdomen/Pelvis Demonstrating Marked Cecal and Proximal Ascending Colon Distention. Published with Permission



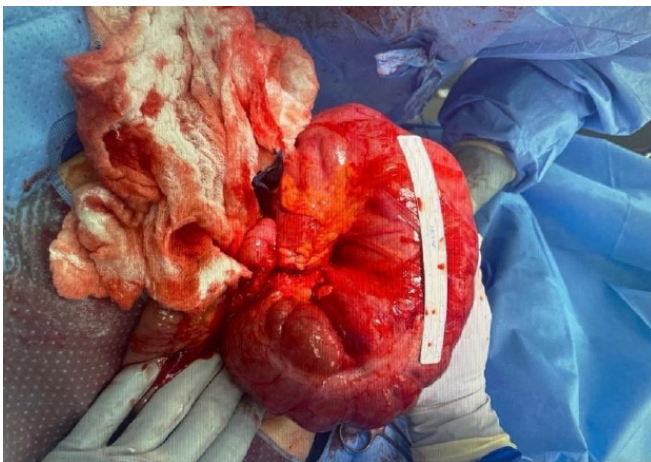
Unfortunately, the colonoscopy failed to achieve adequate decompression as we were unable to pass the scope across the hepatic flexure. The procedure did not reveal any significant pathology aside from mild diverticulosis. Given the failed decompression attempt, an emergency laparotomy was necessary.

After admission to the operating room, the abdomen was opened with a midline laparotomy, revealing serous ascites in the abdominal cavity. The colon was protuberant and significantly dilated with multiple redundant loops. Notably, the cecum lacked lateral attachments and was highly mobile. During adhesiolysis, the GES leads were identified, forming a redundant loop through which the right colon had herniated (Figure 2). The mesentery of the right colon was twisted through this loop, and the involved portion of the colon was significantly dilated and near perforation, as indicated by the torn serosa (Figure 3). Adhesions tethering the bowel to the GES leads were lysed, and the bowel was reduced. Due to the non-viability of this portion of the colon, resection was performed.

**Figure 2.** Stimulation Leads (black arrow) Strangulating Parts of Right Colon. Publication with Permission



**Figure 3.** Significantly Dilated Right Colon with Multiple Redundant Loops. Published with Permission



The GES leads were subsequently freed, did not involve any other bowel segments, were still visible entering the stomach, and appeared to be properly secured. A side-to-side, functional end-to-end ileocolonic anastomosis was performed. To prevent further herniation around the GES leads, the leads were sutured to the right anterior abdominal wall with three 2-0 silk sutures. Postoperatively, the patient's recovery was unremarkable. She was discharged on postoperative day 4 following the return of bowel function and tolerance of oral intake.

A follow-up day clinic visit two weeks later revealed the patient to be in good health, tolerating most foods, and even experiencing some weight gain. Her nausea had significantly improved, and she was scheduled to see her gastric pacemaker surgeon for a settings review. The patient's overall postoperative course has been unremarkable, and she continues to do well.

## Discussion

Gastroparesis is a chronic, often debilitating neuromuscular disorder affecting the upper gastrointestinal tract. It manifests as delayed gastric emptying (GE) in the absence of mechanical obstruction at the gastric outlet. Patients with gastroparesis commonly report post-prandial fullness/early satiety, nausea, vomiting, epigastric pain, and bloating.<sup>1</sup>

Gastroparesis significantly impairs quality of life and imposes a substantial burden on the healthcare system. Based on symptoms and delayed gastric emptying on scintigraphy, the age-adjusted prevalence of definite gastroparesis per 100,000 persons is 9.6 for men and 38 for women.<sup>2</sup>

While diabetes was previously considered the primary cause of gastroparesis, only about 1-5% of diabetics develop the condition.<sup>3</sup> Other etiologies include connective tissue disorders, prior infection, post-surgical complications, and mesenteric ischemia. However, in the majority of gastroparesis patients (idiopathic gastroparesis), no definitive cause was identified.<sup>4</sup>

Current treatment options for gastroparesis are limited and can be categorized as non-invasive or minimally invasive/invasive. Non-invasive approaches include dietary modifications for mild cases and medications for symptom control. Metoclopramide is the only U.S. Food and Drug Administration (FDA)-approved medication for gastroparesis, although it is associated with significant side effects.<sup>5</sup>

In cases where dietary adjustments and medical management fail to provide adequate relief for patients with severe symptoms, a surgical procedure known as gastric electric stimulator (GES) implantation can be considered. This laparoscopic or robotic-assisted surgery involves placing two leads into the gastric muscularis propria. The ends of these leads are then connected to a pulse generator that delivers low-energy, high-frequency electrical pulses to stimulate gastric motility. Following surgery, minor adjustments to the stimulation parameters may be necessary.<sup>6</sup>

Though there are no absolute contraindications to gastric neurostimulation, patients who are immunosuppressed may not be optimal candidates due to the risk of postoperative infection. Additionally, chronic opioid use can hinder the effectiveness of the device and is considered a negative prognostic factor.<sup>7</sup> Furthermore, the GES procedure itself has inherent risks and complications. The most common adverse effects include skin erosion/wound dehiscence, postoperative hematomas and seromas, and device migration/flipping. Over time, lead perforation and erosion can occur, though this is uncommon and typically results in device malfunction. A rare but serious complication is intestinal obstruction, wherein leads can become entangled around the intestines, causing varying degrees of blockage, which can be life-threatening.<sup>6</sup>

Intestinal obstruction as a GES complication is sparsely reported. The first case of small bowel obstruction due to strangulation by GES electrodes requiring emergency surgery was published in 2015.<sup>8</sup> Another case report in October 2022 described mechanical small bowel obstruction secondary to a gastroesophageal pacemaker lead, which was resolved by assisted laparoscopy.<sup>9</sup> No definitive predictors or risk factors have been identified in these reports. While no definitive predictors for this complication have been established, some research suggests that placing the gastric pacemaker in the left upper quadrant may reduce intra-abdominal lead length and potentially decrease complication rates. Additionally, tacking of the leads to the parietal peritoneum with sutures might offer a preventive measure.<sup>6</sup>

Our case underscores the importance of considering unusual presentations in patients with gastric stimulators. Symptoms that might mimic gastroparesis could lead to a delay in diagnosing and treating intestinal obstruction. Fortunately, despite the initial diagnostic delay, our patient underwent the necessary surgery and made a full recovery without complications.

## Conclusion

While gastric electrical stimulation offers a promising treatment for intractable gastroparesis, it is not without potential complications. For patients with a GES device who experience a sudden onset of epigastric or abdominal pain, nausea, or vomiting, clinicians should maintain a high index of suspicion for complications related to this novel surgical treatment. Prompt diagnosis and intervention are crucial to minimize morbidity. We highlight the importance of considering bowel obstruction and strangulation, although rare, within the differential diagnosis for patients with a GES device presenting with acute GI symptoms to provide them with timely operative intervention.

## Lessons Learned

Gastric electrical stimulators are associated with a range of potential complications. Rare complications, such as mechanical bowel obstruction, can occur and carry a significant risk of morbidity. Clinicians must be vigilant in recognizing warning signs to facilitate prompt diagnosis and management of these potentially serious complications.

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