



Gastric Peroral Endoscopic Myotomy in a Patient with Long-Standing Gastroparesis.

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Abstract:

Gastroparesis is a chronic motility disorder characterized by slow gastric emptying. It causes unpleasant symptoms that results in poor quality of life. Current treatments include symptomatic management with antiemetics and prokinetic medications, surgical treatment through pyloric myotomy, surgical pyloroplasty, gastric pacemaker, and endoscopic treatments like pyloric injection of botulinum toxin, transpyloric stents, and gastric peroral endoscopic myotomy (G-POEM). Metoclopramide is the only medicine approved by U.S. Food and Drug administration for gastroparesis and it can cause serious side effects. G-POEM is an advanced, minimally invasive endoscopic intervention for the treatment of gastroparesis. This procedure has demonstrated noteworthy improvements in symptoms and is now considered the preferred approach for permanent treatment of gastroparesis. This article discusses the case of gastroparesis in a 67-year-old female who was treated by G-POEM, which subsequently resulted in a significant reduction in her gastroparesis cardinal symptom index (GCSI) score and resolution of most of her symptoms.

Keywords: *gastric peroral endoscopic myotomy (G-POEM), gastroparesis cardinal symptom index (GCSI)*

Case

The patient is a 67-year-old female with a long-standing history of gastroparesis associated with Sjogren's syndrome. For years, she received symptomatic management consisting of domperidone 10 mg tablet twice daily to improve gastrointestinal motility. Despite domperidone treatment, she continued to have symptoms of nausea and vomiting, but improved bloating and early satiety. Due to her strong family history of cardiovascular diseases and minimal symptom improvement, the patient decided to stop taking domperidone to avoid its increased risk of life-threatening arrhythmias. However, her nausea and vomiting gradually got worse, and she began to experience bloating and post-prandial fullness with a gastroparesis cardinal symptom index (GCSI) score of 4 which corresponded with severe gastroparesis. Given her long-standing gastroparesis and increased risk of re-starting domperidone therapy, gastric peroral endoscopic myotomy (G-POEM) was recommended.

The G-POEM procedure was performed under general anesthesia. Esophagogastroduodenoscopy (EGD) was

performed to ensure there were no active ulcers in the stomach or duodenum. Since she was on a liquid diet for two days prior to the procedure there was no retained food noted. Eight ml of saline mixed with methylene blue and one ml of 1:10,000 epinephrine was injected into the greater curvature 5 cm from the pylorus. It was injected into the submucosal space to lift the mucosa from the muscularis propria (Fig. 1). A mucosal incision was made using triangular tip knife (TT-J knife, Olympus, America) using ENDOCUTQ setting (ERBE), (Fig. 2). Submucosal dissection was done using spray coagulation current until the pyloric ring was reached (Fig. 3). Pyloromyotomy was done using Insulated tip knife (IT knife, Olympus) (Fig. 4). The myotomy was extended for another centimeter and half into the greater curvature of the stomach. After good hemostasis, the mucosal incision was closed using through-the-scope 17 mm clips (Boston Scientific) (Fig. 5).

The patient was kept in the hospital overnight for observation and for a post-operative gastrograffin swallow study to assess for a leak. One day following the procedure, the patient complained of mild post-surgical abdominal pain but was recovering well overall. A gastrograffin swallow study conducted the morning after the procedure did not show any leak. The patient was discharged home on as needed ondansetron, and pantoprazole. At the two-week follow-up appointment, the patient reported improved vomiting, bloating, and gastric fullness but continued having mild nausea with a GCSI score of 1.



Figure 1: Injection of saline mixed with methylene blue and epinephrine into the submucosal space to lift the mucosa from the muscularis propria at the greater curvature five cm from the pylorus.



Figure 2: Mucosal incision made showing submucosal tunnel.



Figure 3: Submucosal dissection continued until the pyloric ring was reached.



Figure 4: Pylorus reached with beginning of pyloromyotomy



Figure 5: The mucosal incision was closed using through-the-scope 17 mm clips.

Discussion

Gastroparesis is a chronic debilitating motor disorder of the stomach characterized by slow emptying without structural or mechanical obstruction¹. This delay in gastric emptying and subsequent compromise in gastrointestinal motility is due to various etiologies which involve the abnormal functioning of the gastric smooth muscle cells, pacemaker cells, or the pyloric sphincter². Most cases of gastroparesis are idiopathic. However, commonly implicated etiologies include a long-standing history of diabetes, post-surgical implications which involve injuring the vagus nerve, post-infectious complications due to Norwalk virus, rotavirus or Epstein-Barr virus, medication-induced gastroparesis, and autoimmune etiologies like systemic sclerosis or Sjogren's syndrome³. The most common symptomatic manifestations of gastroparesis include nausea, vomiting, post-prandial fullness, bloating, and sometimes weight loss⁴. The gastroparesis cardinal symptom index (GCSI) score is used to assess the severity of gastroparesis in a patient. GCSI score consists of a total of nine symptoms subdivided into three symptomatic groups: postprandial fullness/early satiety including stomach fullness, inability to finish meals, frequent fullness after eating, and loss of appetite; nausea/vomiting symptoms including nausea, retching, and vomiting, and bloating symptoms including bloating and visible enlargement of the abdomen, and the total composite score is obtained by averaging those 3 subgroups⁵.

To establish a diagnosis of gastroparesis, most patients will initially undergo basic laboratory testing, including a basic metabolic panel, complete blood count, liver function tests, and amylase and lipase levels, along with cross-sectional imaging of the abdomen and pelvis to rule out various etiologies and mechanical obstruction⁶. Along with imaging studies, upper GI endoscopy can help rule out mechanical obstruction and

peptic ulcer disease. While the clinical exam is valuable for diagnosing gastroparesis, it is imperative that mechanical obstruction and malignancy are ruled out before continuing to manage the patient for gastroparesis. Despite these tests, if the underlying cause is not elucidated as obstruction or malignancy, then scintigraphy gastric emptying studies (GES), which is considered the gold standard, is used to diagnose gastroparesis⁷. In these studies, a radioisotope-containing solid meal is consumed and retention of its contents in the stomach is measured after four hours. Based on the degree of retention, gastroparesis is diagnosed, and its severity is determined as either mild (<15% retention), moderate (15% to 35% retention), and severe (>35% retention)⁸. In patients who want to avoid radiation exposure, a gastric emptying breath test (GEBT) can also be used which involves adding a stable isotope into spirulina and measuring it in patient's breath using spectroscopy. Furthermore, another method under investigation to evaluate gastroparesis while avoiding radiation includes gastric ultrasonography which can be used to assess changes in antral wall motion and estimate gastric emptying based on antral sizes⁹.

Most first-line treatments for gastroparesis focus solely on symptomatic management through dietary modifications and using antiemetics and prokinetic medications. Metoclopramide and Domperidone are some commonly used prokinetic medications for symptomatic management of gastroparesis¹⁰. These medications work by blocking dopamine (D2) receptors in the GI tract to increase motility. However, the dosages of these prokinetic medications need to be monitored due to their various adverse effects like dystonia, hyperprolactinemia, and QT prolongation. Furthermore, per current FDA guidelines, Domperidone use is restricted in the United States, and it is under review as an investigational drug due to its increased risk of cardiac arrhythmias and hyperprolactinemia¹¹.

In their research paper, Mearin et al. depicted the role of prolonged, sustained pyloric contractions in patients with gastroparesis¹². This publication opened the door for numerous therapeutic surgical and endoscopic procedures which target these pyloric contractions. Some of these procedures include endoscopic dilation, pyloric myotomy, surgical pyloroplasty, pyloric injection of botulinum toxin, and transpyloric stents^{13,14}. Unfortunately, given the invasive nature of these procedures and their inability to establish long-term efficacy, the application of these procedures is limited in clinical practices¹⁵. In recent years, advances in endoscopic submucosal dissection gave way to the development of unique endoscopic tunneling techniques which demonstrate increased therapeutic potential. These techniques were successfully used in humans by Inoue and his colleagues in 2010. Ever since their publications, these therapeutic procedures have been used to treat numerous functional esophageal motility diseases¹⁶. Building up on templates provided by endoscopic myotomy, the feasibility of endoscopic pyloromyotomy or gastric peroral endoscopic myotomy

(G-POEM) was explored with its first successful application in humans demonstrated by Khashab et al. in 2013. This article discussed performing the first human G-POEM in a 27-year-old woman with refractory gastroparesis secondary to diabetes mellitus. Following the procedure her symptoms dramatically improved and she continued to see symptom resolution 12 weeks post procedure¹⁷. In a case series conducted by Shlomovitz et al., G-POEM was performed in 7 patients with gastroparesis, and symptomatic improvement was observed in 6 out of those 7 patients. Furthermore, normal gastric emptying at 4 hours was noted in 5 of those 7 patients 3 months post procedure¹⁸. A study by Rodriguez et al. showcased a total of 100 patients undergoing G-POEM at a high-volume center for the treatment of gastroparesis. The study compared GCSI score prior to the procedure and 90 days post-procedure and found statistically significant improvement in GCSI from an average of 3.82 before the procedure to 2.53 after the procedure ($p = 0.001$)¹⁹. Additionally, Podboy et al. conducted a meta-analysis of ten studies which demonstrated data on a total of 325 patients who underwent G-POEM procedure demonstrating 100% technical success and clinical success in 68%-90% of patients²⁰.

Non-surgical minimally invasive G-POEM is a novel, safe treatment for patients with refractory or chronic gastroparesis. In this article, we present a case of a G-POEM procedure which resulted in a significant improvement of refractory gastroparesis in an elderly female patient. There were no adverse events, the patient only stayed overnight in the hospital, symptoms of gastroparesis were significantly improved following G-POEM, and there was no significant pain associated with this procedure.

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