

Delayed Intrathoracic Gastric Perforation after G-POEM for Treating Post-Operative Refractory Gastroparesis—A Case Report and Review of Literature

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Case report

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Delayed intrathoracic gastric perforation after G-POEM for treating post-operative refractory gastroparesis: a case report and review of literature

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Abstract

Background: Gastric peroral endoscopic pyloromyotomy(G-POEM) is introduced as a strategy to treat post-operative refractory gastroparesis. An intrathoracic gastric perforation is a rare complication of G-POEM.

Case presentation: This report described the case of a patient who suffered with an intrathoracic gastric perforation about 10 days after a G-POEM procedure. A review of the PUBMED literature indexed in English with the key words of perforation and G-POEM was performed and the results were considered. The results indicated that delayed perforation was a rare complication after G-POEM. Overeating may cause the severe intrathoracic gastric dilation and perforation. Furthermore, successful nonsurgical management after G-POEM complicated by delayed perforation could be a highly feasible option, if intensive conservative treatments were used.

Conclusions: Delayed perforation after G-POEM treating post-operative refractory can lead to severe mediastinal and thoracic infections. Fully prepared before the G-POEM procedure and effective suture instrument during the procedure may reduce the incidence of perforations. If perforation occurs after G-POEM, conservative treatment can be chosen if a patient's general situation allows. However, the choice of surgical treatment must not be ignored if the patient's overall condition deteriorates.

Keywords: Gastroparesis, Gastric peroral endoscopic pyloromyotomy, Intrathoracic gastric perforation, Delayed perforation, Complication, Case report

Background

Gastroparesis is a chronic disorder whose feature is the symptoms of delayed gastric emptying, such as nausea and vomiting, without mechanical obstruction[1]. Major causes of gastroparesis are diabetic, postsurgical, and idiopathic[2, 3]. Severe consequences for nutritional and their psychological status may be caused by this disease. Indeed, medical treatments are ineffective over time and can also cause adverse events and tachyphylaxia[4-6]. So far, various interventional therapies have also been frustrating. Gastric peroral endoscopic pyloromyotomy (G-POEM) is now introduced as a strategy to treat refractory gastroparesis. Mucosal perforation and bleeding are the major adverse events. Complications that occur during the G-POEM procedure can be treated endoscopically (clips). However, delayed perforation is difficult or impossible to treat with clips. Here we present a case of a patient with an intrathoracic gastric perforation, about 10 days after he underwent a G-POEM procedure for the treatment of post-operative refractory gastroparesis. In addition, we analyzed and summarized the characteristics and treatments of this complication with a review of the previous cases.

Case presentation

A 64-year-old man underwent right thoracal and upper abdominal double incisions for surgery of squamous-cell carcinoma of the lower esophagus about 5 years ago. He had daily symptoms of nausea, vomiting, early satiety, and postprandial fullness a year ago. His symptoms worsened markedly over the previous 1 month. He was diagnosed with refractory gastroparesis following examination that included a upper gastrointestinal angiography , upper gastrointestinal endoscopy and ultrasonic gastric motility test. The symptoms could not be controlled with dietary and medical therapy. He was admitted to the Affiliated Renmin Hospital of Jiangsu University. We treated him by performing G-POEM. The procedure was performed with the patient under general anesthesia. A high-definition gastroscope (GIF-Q260J, Olympus, Tokyo, Japan) , carbon dioxide insufflation and a dual knife (Olympus, Tokyo, Japan) were used during the procedure. VIO 300D (ERBE Elektromedizin, GmbH, Tübingen, Germany) was provided to be power supply for electrical cutting and coagulating

tissue. The techniques used in during endoscopic pyloromyotomy were similar to which were needed during esophageal peroral endoscopic myotomy (POEM). The beginning mucosal incision was carried out on the greater curvature of the gastric antrum. A premixed methylene blue/glycerol fructose solution was used to create a submucosal bleb 5 cm proximal to the pylorus on the greater curvature of the gastric antrum. A 2 cm longitudinal mucosal incision was then made with a Dual knife. The technique for establishing a submucosal tunnel was similar to that in endoscopic submucosal dissection (ESD) or POEM. With the extension of submucosal tunnel, the mucosal layer should not be damaged during dissection. Then, the cut of the muscle bundles was started at 2 cm near the pylorus. Larger vessels encountered in the submucosa were coagulated with a coagulation forceps (Coagrasper, FD-411QR; Olympus) on effect 5 in soft coagulation mode at 60W (ERBE). Endoscopic clips (ROCC-D-26-195, MicroTech, Nanjing, China) were then used to close the mucosal entry (Fig. 1). The patient fasted on the first day after the G-POEM procedure, then was approved to resume the intake of an oral liquid diet followed by initiation of a soft diet. The patient was given intravenous antibiotics for 48 hours and was discharged 7 days after G-POEM. At 10 days after G-POEM, the patient was re-admitted to our department with difficulty breathing and acute onset of abdominal, chest pain after after a full meal. Physical examination showed a respiratory rate of 30 per minute. Auscultation of the chest revealed a reduction in the right breathing sounds. Computed tomography (CT) scan showed right thoracic stomach and right pleural effusion (Fig. 2A). Gastroscopy showed that the clips were detached and the mucosa was torn (Fig. 2B). A nasojejunal tube and a nasogastric tube were placed (Fig. 2C). A chest drainage was also placed to remove the purulent fluid. Enteral nutrition and intravenous antibiotic therapy were given. Gastrointestinal radiography showed no contrast medium leakage on postoperative day (POD) 34. As a result, oral feeding was initiated, and the patient was discharged on POD 56.

Discussion and conclusions

G-POEM has become a therapeutic intervention to refractory gastroparesis since it was first described by Chaves DM *et al* in 2014[7]. The efficacy and safety of the

procedure have been reported in many previous studies[8, 9]. There have also been reports on adverse events such as delayed bleeding, mucosal tears , or perforation[10, 11] . Delayed gastric perforation, which occurs after the procedure is rare, and only one human case reported in the literature were searched on PubMed , the clinical features treatment and outcomes were summarized in Table 1.

The stomach is in the chest after the surgery of squamous-cell carcinoma of the lower esophagus. Here, we describe the rare case of the delayed intrathoracic gastric perforation after G-POEM. Delayed perforation was defined as the perforation had not been detected during and just after the G-POEM procedure, but subsequent symptoms and CT scan showed perforation. The intrathoracic gastric perforation can result in pneumothorax, mediastinitis, thoracic infections and pleural fluid.

Mediastinitis and thoracic infections are severe complications. The primary cause is either the perforation of the mucosa or dislodgement of the endoscopic clips. On the basis of the studies of the similar procedure POEM, most perforations occurring in POEM procedures are usually closed with clips. There is a high probability of endoscopic suturing perforation if it happens during G-POEM procedure. But in our case, the perforation is occurred 10 days after G-POEM, such countermeasure is not possible because of mucosal edema.

In our case, we found that the clips slipped and perforated at the location of G-POEM during endoscopy. Excessive activity after a full meal increased the intragastric pressure, which may cause the clips to slip. To prevent the clips slipping, the clips with increased jaw span can be used such as the Resolution Clip (Boston Scientific, Marlborough, USA) or the over-the-scope clips (OTSC, Ovesco Endoscopy AG, Tubingen, Germany). The development of endoscopic suturing techniques such as OverStitch (Apollo Endosurgery, Austin, USA) and clips with endoloops may also reduce the incidence of delayed perforations[12, 13]. Perforation can lead to serious consequences in a patient with anatomical changes after surgery. So these methods should be considered during the procedure. The perforation can cause the acute episodes of pain. The mediastinal shift and the pressure atelectasis of the right lung may cause the dyspnea. In this case, the symptoms of the patient were improved with

conservative therapy and emergency surgery was avoided. However, Hedberg HM et al reported one case of perforation on POD 1 treated with laparoscopic surgery. In conclusion, delayed perforation after G-POEM treating post-operative refractory can lead to severe mediastinal and thoracic infections. Therefore, preventive measures with extreme caution should be taken to prevent perforation. Fully prepared before the G-POEM procedure and effective suture instrument during the procedure may reduce the incidence of perforations. If perforation occurs after G-POEM, conservative treatment can be chosen if a patient's general situation allows. However, the choice of surgical treatment must not be ignored if the patient's overall condition deteriorates.

Abbreviations

G-POEM: Gastric peroral endoscopic pyloromyotomy; POEM : Peroral endoscopic myotomy; ESD: Endoscopic submucosal dissection; POD: Postoperative day; CT: Computed tomography

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Not applicable.

Authors' contributions

Dai SL, Sun ZY and Yao J cared for the patient and performed the surgeries described in this report. Dai SL and Yao J constructed the conception and design of this report. The material preparation, data collection, and analysis were performed by Dai SL, Sun ZY, Shi Y, Wang T, Xu YP, Yao J. All authors read and approved the final manuscript.

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Availability of data and materials

All the original data supporting our research are described in this article.

Ethics approval and consent to participate

The study was approved by the ethics committee of Affiliated Renmin Hospital of Jiangsu University. The patient gave consent to participate.

Consent for publication

Informed consent was obtained from all individual participants included in the study.

Competing interests

The authors declare that they have no competing interests.

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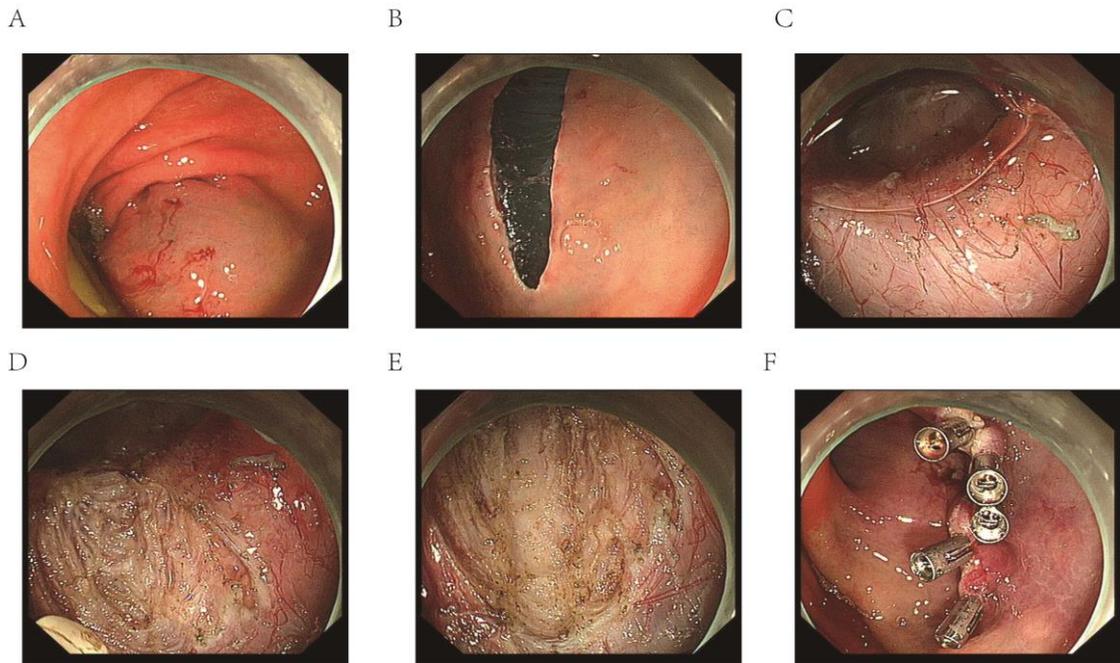


Figure 1. G-POEM procedure: (A) injection and creation of submucosal bleb and 5cm from the pylorus in the posterior wall of the antrum; (B) Longitudinal mucosal incision; (C) Creation of submucosal tunnel; (D,E) myotomy of the pyloric and antral muscular layers; (F) mucosal access closure by metal clips.



Figure 2. Images of CT-scan and gastroscopy at 10 days after operation. (A) CT-scan showed right thoracic stomach, right pleural effusion and complete atelectasis of the right lung. (B,C) Gastroscopy showed an ulcer in the posterior wall of the antrum 3cm away from the pylorus. A nasojejunal tube was placed.

Author	Age (y),Gender	Time of onset	Main symptom	Treatment	Patient outcome at time of report
Present study	64, Male	POD 10	Abdominal pain, chest pain and difficulty breathing	conservative treatment	recovery
Hedberg HM, et al.[10]	73, Male	POD 1	severe upper abdominal pain	addressed laparoscopically	recovery

Table 1. Case reports of perforation after G-POEM reported in the literature

Figures

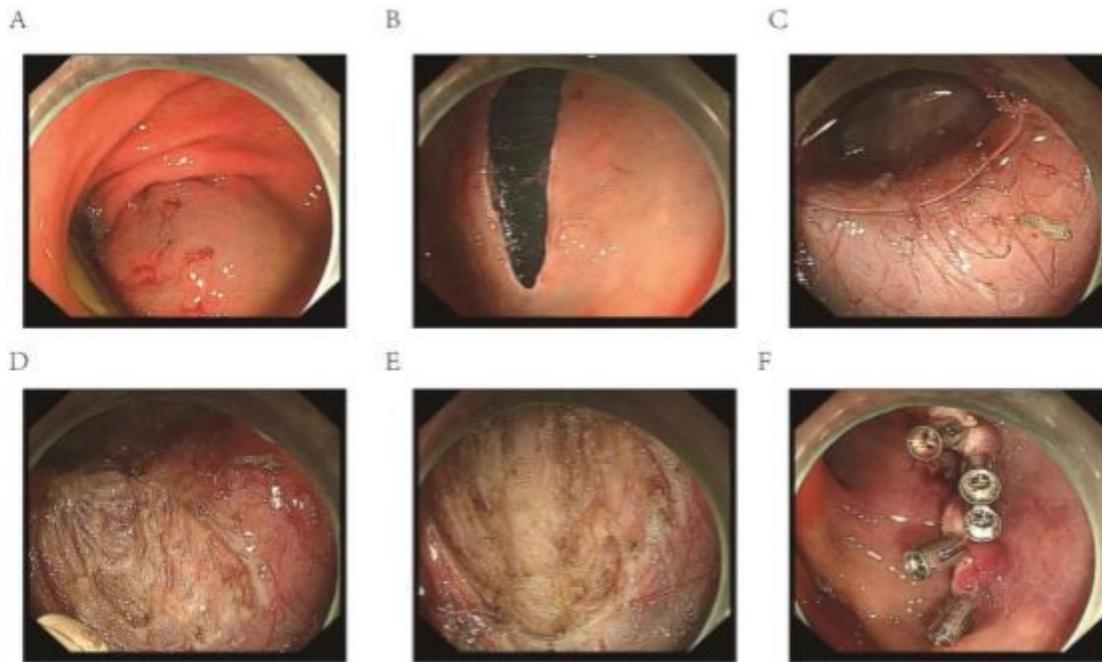


Figure 1

G-POEM procedure: (A) injection and creation of submucosal bleb and 5cm from the pylorus in the posterior wall of the antrum; (B) Longitudinal mucosal incision; (C) Creation of submucosal tunnel; (D,E) myotomy of the pyloric and antral muscular layers; (F) mucosal access closure by metal clips.

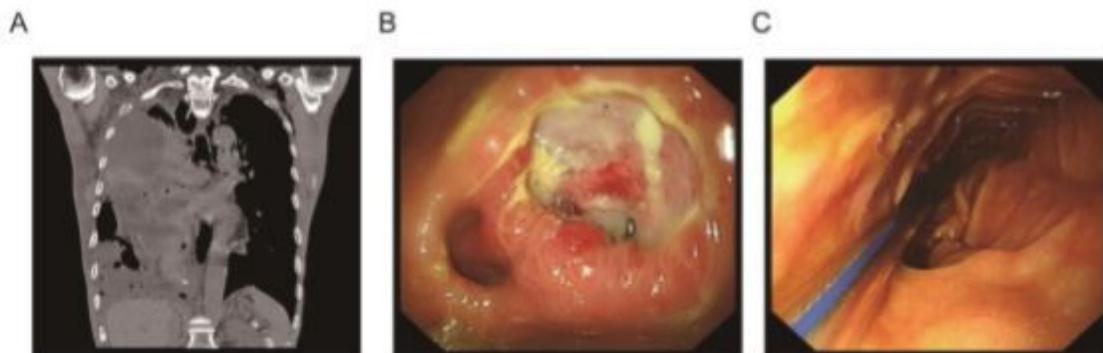


Figure 2

Images of CT-scan and gastroscopy at 10 days after operation. (A) CT-scan showed right thoracic stomach, right pleural effusion and complete atelectasis of the right lung. (B,C) Gastroscopy showed an ulcer in the posterior wall of the antrum 3cm away from the pylorus. A nasojejun tube was placed.