Gastric peroral endoscopic myotomy for delayed gastric conduit emptying after pharyngo-laryngo-esophagectomy: a case report

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Case report

In September 2016, a 64-year-old man with intrathoracic oesophageal cancer underwent neoadjuvant chemoradiotherapy and minimally invasive esophagectomy with no pyloroplasty. The gastric conduit was placed in the posterior mediastinum. Pathology revealed a moderately differentiated squamous cell carcinoma (ypT2N1M0) with clear margins. One year later he underwent surgery for isolated right cervical lymph node recurrence and tolerated a normal diet after surgery with no gastrointestinal symptoms. At 22 months after the second surgery, the patient developed dysphagia and a cervical oesophageal cancer was identified. Completion pharyngo-laryngo-esophagectomy (PLE) with resection of the residual cervical oesophagus, pharyngo-laryngectomy, and reconstruction with a segment of free jejunum interposed between the neopharynx and gastric conduit was performed. After surgery, the patient developed delayed gastric conduit emptying (DGCE) and reported regurgitation of undigested food soon after diet introduction. There was a persistently high nasogastric output, and non-ionic contrast study showed hold-up of contrast at the level of pylorus (Fig 1a). The patient's symptoms persisted and he relied on nasoduodenal feeding despite prokinetic agents and pyloric balloon dilatation.

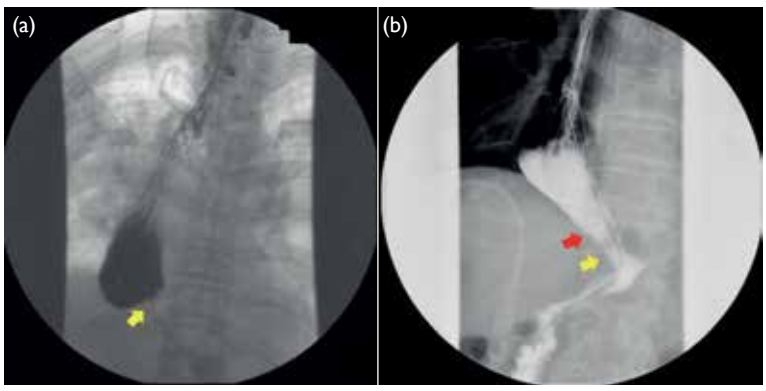

FIG 1. (a) Contrast study after pharyngo-laryngo-esophagectomy showing contrast hold-up at level of pylorus (yellow arrow). (b) Contrast study after gastric peroral endoscopic myotomy showing free emptying of contrast, with endoclips (red arrow) and pylorus (yellow arrow) visible

Gastric peroral endoscopic myotomy (G-POEM) was performed in February 2020, 4 months after completion PLE. The procedure was performed with the patient in a supine position and under general anaesthesia with endotracheal intubation via end tracheostomy. A high-definition gastroscope (GIF-H190; Olympus, Tokyo, Japan) fitted with a conical shaped transparent cap (DH-28GR; Fujifilm, Tokyo, Japan) and carbon dioxide insufflation were used. After submucosal injection of a mixture of normal saline and indigo carmine at the posterior wall of the gastric conduit, 5 cm proximal to the pylorus, a 2-cm longitudinal mucosal incision was made with DualKnife J (Olympus) using Endocut Q mode (effect 3, cut-duration 2, cut-interval 4) [VIO® 300D; Erbe, Tübingen, Germany]. The endoscope entered the submucosal space to dissect a tunnel caudally until the pyloric ring was well exposed (Fig 2a). Pyloromyotomy was performed and the circular muscle ring completely divided and flattened (Fig 2b). Haemostasis was achieved and the mucosal opening closed with repositioning clips (Single Use Hemoclip; Mednova, Zhejiang, China) [Fig 2c]. The surgery time was 120 minutes and rapid contrast passage to the duodenum was demonstrated on postoperative contrast study (Fig 1b). He resumed an oral diet thereafter.

Discussion

Pharyngo-laryngo-esophagectomy was first reported by Ong and Lee in 1960[1] and is regarded as standard treatment for hypopharyngeal and

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FIG 2. Intra-operative photographs showing pyloric ring muscle well exposed (a) before and (b) after pyloromyotomy, and (c) mucosal incision closed with endoclips

cervical oesophageal cancer. Chemoradiotherapy has gained popularity as an alternative therapeutic strategy to preserve the larynx, but salvage PLE due to incomplete response or cancer recurrence is not uncommonly required.[2] Post-PLE DGCE is underreported and the incidence is unknown. Patients frequently complain of bloating, regurgitation, and poor oral intake. According to unpublished results from our prospectively collected database, DGCE was documented in five of 20 patients with PLE for cervical oesophageal cancer over the past 10 years. Of these five patients, pyloroplasty was performed in two, of whom symptoms improved with prokinetic agents alone in one, and endoscopic pyloric balloon dilation was required in the other. For those without pyloric drainage, two patients were managed by G-POEM. The remaining patient was an 83-year-old man on prolonged tube feeding who had pneumonia and died 10 weeks after the surgery.

The pathogenesis of DGCE after PLE may differ to that after oesophagectomy without pharyngo-laryngectomy although data are lacking. Experience in the management of DGCE after oesophagectomy (without pharyngo-laryngectomy) serves to guide treatment of post-PLE DGCE. Proposed contributing factors include gastropyloric denervation, dysfunctional gastric peristalsis and use of the whole stomach for reconstruction.[3,4]

The application of G-POEM in PLE patients has not been reported. We report a patient with prior oesophagectomy who developed DGCE only after completion PLE. Symptoms resolved after G-POEM. We postulate that removal of the upper oesophageal sphincter in PLE limits build-up of intragastric pressure, compounding DGCE. Pyloromyotomy reduces pyloric channel pressure and expedites gastric emptying, G-POEM accomplishes this as a minimally invasive method. We hypothesise that gastric conduit emptying after PLE can be viewed as a two-stage process. In the first stage, the food bolus passes passively from the proximal stomach to the antrum. In the second stage, food is evacuated from the antrum through the pylorus to the duodenum. A sufficient pressure gradient within the gastric conduit is required to overcome pyloric resistance. Resection of the pharynx and larynx results in equalisation of pressure between the gastric conduit and the atmosphere. The stomach is also exposed to negative intrathoracic pressure. The outflow resistance due to the intact pylorus assumes more importance after PLE since the paretic stomach fails to build up internal pressure. This explains why symptoms of delayed emptying in our patient emerged only after the pharyngo-laryngectomy, not after the initial oesophagectomy.

Pyloroplasty and pyloromyotomy have both been shown effective and safe drainage procedures for gastric conduit after oesophagectomy.[5] The G-POEM disrupts the pylorus and improves gastric emptying, theoretically achieving the same outcome and serving as a salvage option for DGCE after PLE. We perform G-POEM according to the same principle applied to POEM for achalasia. The submucosal tunnel is dissected close to the muscle layer for precise pyloromyotomy. Secure mucosal closure permits early diet resumption. However, the aim of pyloromyotomy is to overcome the outlet obstruction without alleviating gastroparesis. Despite improved gastric emptying, symptoms of our patient were not completely eliminated. Patients need to make dietary adjustments to accommodate the new conduit over time while maintaining satisfactory nutrition and body weight.

To the best of our knowledge, this is the first report of successful management of DGCE after PLE by G-POEM. A pyloric drainage procedure is advocated since resection of the upper oesophageal sphincter, an integral part of PLE, limits pressure build-up and food emptying within the gastric conduit.

Author contributions

Concept or design: FSY Chan, S Law.
Acquisition of data: FSY Chan.
Analysis or interpretation of data: FSY Chan.
Drafting of the manuscript: FSY Chan.
Critical revision of the manuscript for important intellectual content: All authors.

All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

As an editor of the journal, VLY Chow was not involved in the peer review process. Other authors have disclosed no conflicts of interest.

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Ethics approval

The study was approved by the Institutional Review Board of The University of Hong Kong/Hospital Authority Hong Kong West Cluster (Ref: UW 16-2023). Consent from patient was obtained.

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