

## Greater curvature myotomy is a safe and effective modified technique in per-oral endoscopic myotomy (with videos)

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**Background:** Per-oral endoscopic myotomy (POEM) for achalasia with esophagocardiomyotomy in the lesser curvature (LC myotomy) is now established and accepted widely. However, in some cases LC myotomy is precluded by previous procedures, such as Heller myotomy, or by other anatomic considerations that obscure the normal dissection planes. It may also be difficult to identify the esophagogastric junction (EGJ), which can result in an incomplete gastric myotomy and poor rates of symptom relief. On the other hand, the angle of His is always located in the greater curvature of the stomach and serves as a consistent, definite landmark of the gastric side.

**Objective:** To evaluate esophagocardiomyotomy in the greater curvature (GC myotomy) as an alternative POEM technique in cases where a prior LC myotomy or supervening anatomic constraints make identification of the EGJ technically challenging.

**Design:** Prospective.

**Setting:** Single-center study.

**Patients:** Twenty-one achalasia patients who received POEM with GC myotomy.

**Interventions:** POEM.

**Main Outcome Measurements:** Efficacy and safety of GC myotomy measured in terms of reduction in lower esophageal sphincter (LES) pressures, improvement in Eckardt scores, and development of intraoperative or postoperative adverse events.

**Results:** Identification of the EGJ was achieved in all cases, resulting in a mean gastric myotomy length of  $2.6 \pm 1.1$  cm. Mean LES pressure and Eckardt symptom scores decreased significantly ( $21.2 \pm 7.3$  vs  $10.5 \pm 2.7$  mm Hg, 5 [2-8] vs 1 [0-5], respectively) ( $P < .01$ ). Endoscopic evidence of gastroesophageal reflux was identified in 52% of patients (11/21) postmyotomy; however, only 9.5% (2/11) were symptomatic, and these patients were successfully controlled with proton pump inhibitors. No severe adverse events were encountered.

**Limitations:** Single center.

**Conclusions:** GC myotomy is a promising, safe modification of the POEM technique and may be especially useful in cases of redo POEM, POEM post-Heller myotomy, or when the EGJ is difficult to recognize because of supervening anatomic constraints. (Gastrointest Endosc 2015;81:1370-7.)

(footnotes appear on last page of article)



This video can be viewed directly from the GIE website or by using the QR code and your mobile device. Download a free QR code scanner by searching “QR Scanner” in your mobile device’s app store.

Achalasia is an esophageal motility disorder characterized by impaired lower esophageal sphincter (LES) relaxation.<sup>1,2</sup> Several treatments have been widely accepted, including medical management, injection of botulinum toxin, pneumatic balloon dilatation, and surgical Heller myotomy. Heller myotomy has the highest success rate but is the most invasive.<sup>3</sup>

In 2010, Inoue et al<sup>4</sup> introduced per-oral endoscopic myotomy (POEM), a novel less-invasive procedure for endoscopic esophagocardiomyotomy in clinical cases of achalasia based on previous work by Pasricha et al.<sup>5</sup> Since then, POEM has been performed worldwide and has been reported as a promising treatment for achalasia from many institutions.<sup>6-14</sup> At this time, the technique for the original POEM procedure is well established and efficacy widely accepted.

In standard Heller myotomy, esophagocardiomyotomy is usually performed on the anterior surface of the esophagus and stomach<sup>15,16</sup> because of the technical ease of approaching the esophagogastric junction (EGJ) from the ventral side of the patient. The original POEM procedure seeks to mimic this approach; an advantage is that the natural antireflux barrier created by the sling fibers at the angle of His are not disrupted by esophagocardiomyotomy in the lesser curvature (LC myotomy) (Fig. 1). Preservation of this antireflux mechanism is paramount in the prevention of postprocedural gastroesophageal reflux (GER) symptoms after POEM.<sup>17-20</sup>

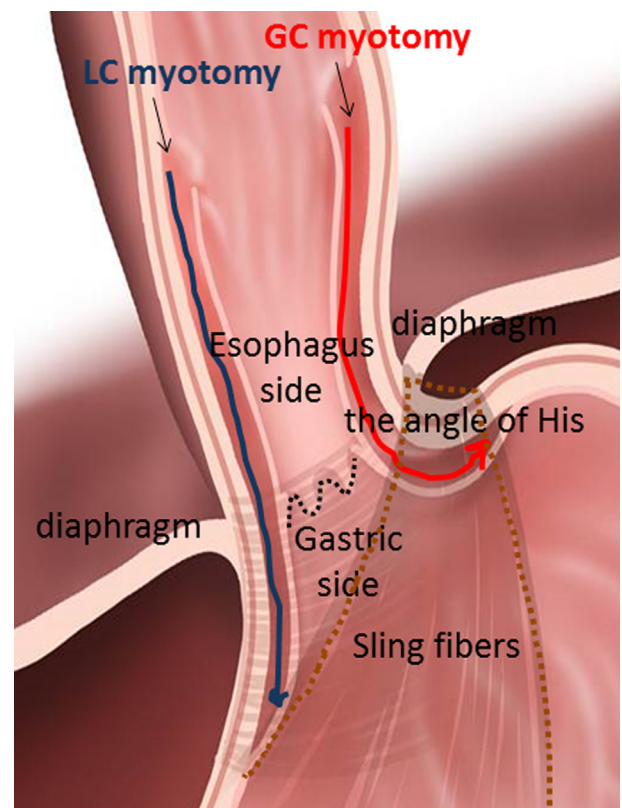
With these concepts in mind, esophagocardiomyotomy in the original POEM procedure had been devised in the anterior lesser curvature side (2 o'clock axis) and has shown good results.<sup>4,6-14,21</sup> Recently, several reports proposed modifications in the original POEM technique that showed benefit in certain cases, thereby expanding the application of POEM as treatment.<sup>22-25</sup> We previously reported an advantage of POEM is that it allows the endoscopist to choose the axis of myotomy, which is particularly useful in avoiding the previous myotomy scar while performing redo esophagocardiomyotomy.<sup>26</sup> Vigneswaran et al<sup>27</sup> reported that a similar modification was feasible as a reoperation after Heller myotomy.

In cases with anatomic alterations caused by disease progression or fibrosis because of previous balloon dilatation or esophagocardiomyotomy, identification of the EGJ can be challenging. Considering that the angle of His is always located in the greater curvature of the stomach, it serves as a reliable landmark of the gastric side of the EGJ (Fig. 1). Esophagocardiomyotomy of the greater curvature (GC myotomy) performed in the 8 o'clock axis may be a promising modification in cases where identification of the gastric side of the EGJ is expected to be anatomically difficult to identify. However, at present, there are no reports evaluating this modification in technique. The purpose of this study is to assess the safety and efficacy of GC myotomy as an alternative to the original POEM technique.

## METHODS

### Patients

The POEM procedure received approval from the institutional review board of Showa University Northern



**Figure 1.** Anatomy of the EGJ, the angle of His, and the sling fibers. The angle of His is created by the collar of sling fibers (enclosed with brown dots) and is located in the greater curvature side of the stomach. During GC myotomy (red arrow), the angle of His appears as a sharp notch in the submucosal space followed by curvature of the submucosal tunnel toward the left. Comparison with LC myotomy (blue arrow).

Yokohama Hospital (approval number 0805-02, issued on August 15, 2008) and the University Hospital Medical Information Network Japan database (number UMIN-000001901). Written informed consent was obtained from all patients who underwent POEM, and all patients were registered.

All patients diagnosed with achalasia who received POEM with GC myotomy at Showa University Northern Yokohama Hospital between September 2008 and November 2013 were included in this study. Candidates for POEM with GC myotomy included patients with esophageal diverticula, varices, prior endoscopic submucosal dissection located in the anterior esophagus, or prior POEM with LC myotomy, all of which preclude tunneling in the anterior esophagus because of altered anatomy and scarring. Seven patients from our previous publication of POEM after failed surgical esophagocardiomyotomy<sup>26</sup> were included in the present study of 21 GC myotomy cases; they were previously labeled as “posterior axis” myotomies but were actually GC myotomies according to a more precise definition (see below) that separates the posterior axis into greater curve (8 o'clock axis) and pure posterior (5-6 o'clock axis) locations.

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