

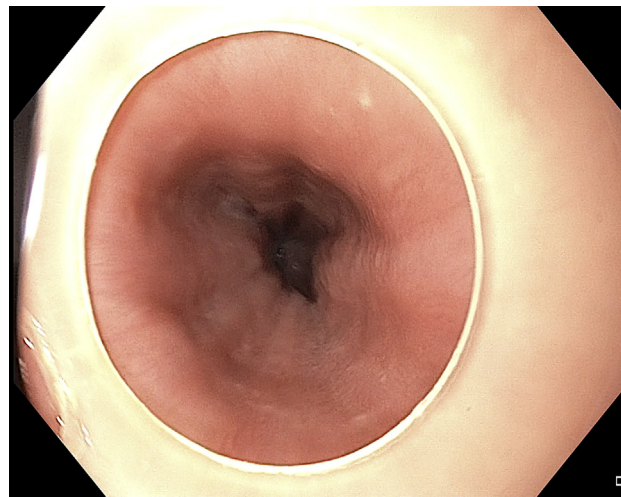


## High-resolution manometry-guided endoscopic myotomy in a case with jackhammer esophagus

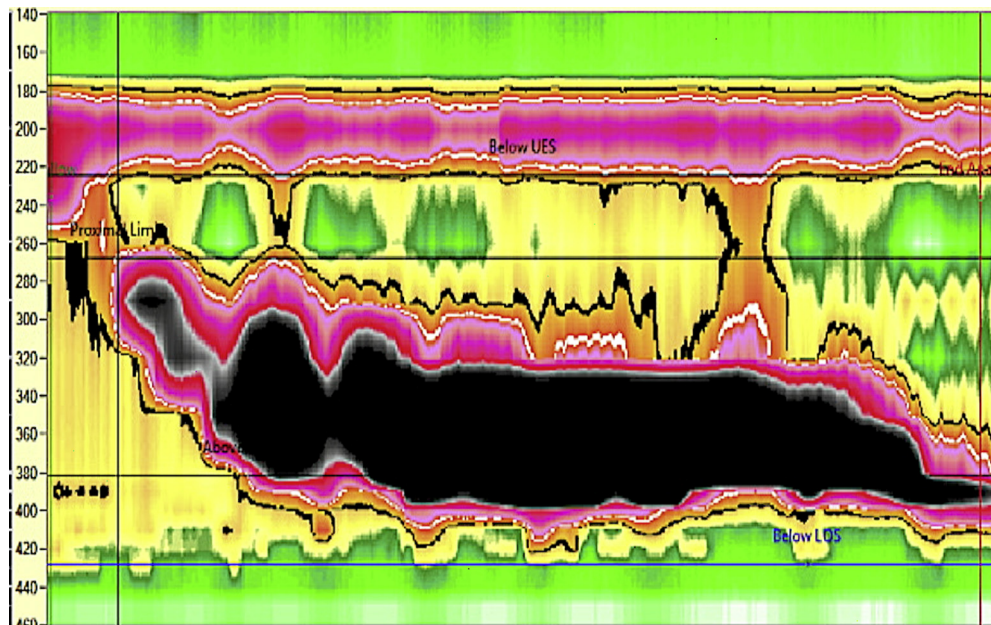
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A 35-year-old man presented with a 3-year history of intermittent chest pain, dysphagia, and regurgitation (Eckardt score: 5). Gastroscopy and barium esophagogram revealed a

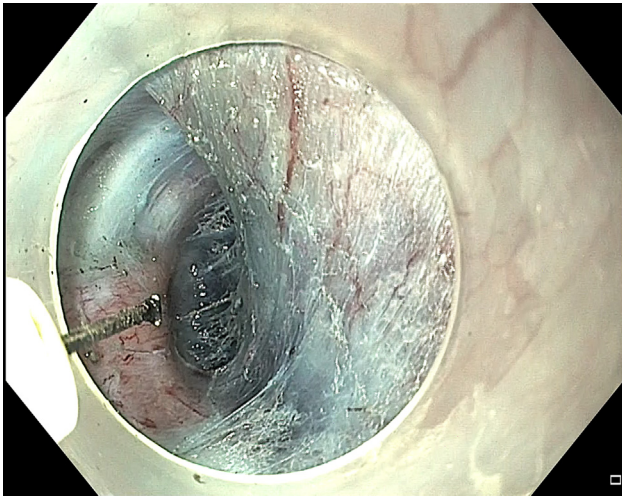
normal-diameter esophagus with tertiary contractions in the mid and lower esophagus and no resistance at the gastroesophageal junction (GEJ) (Fig. 1). High-resolution manometry



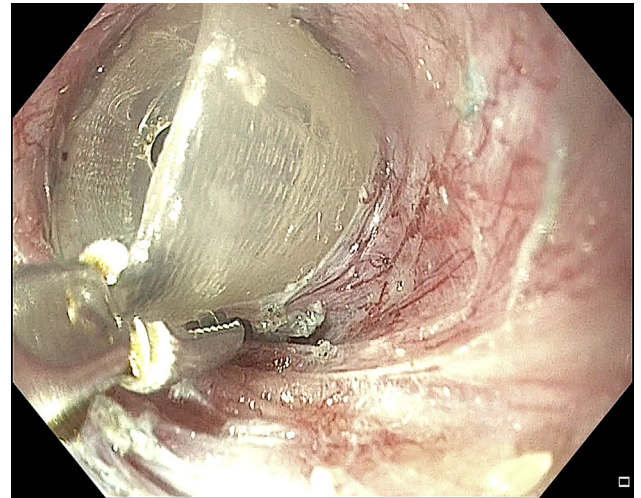
**Figure 1.** Gastroscopy revealing spastic esophageal contractions before peroral endoscopic myotomy.



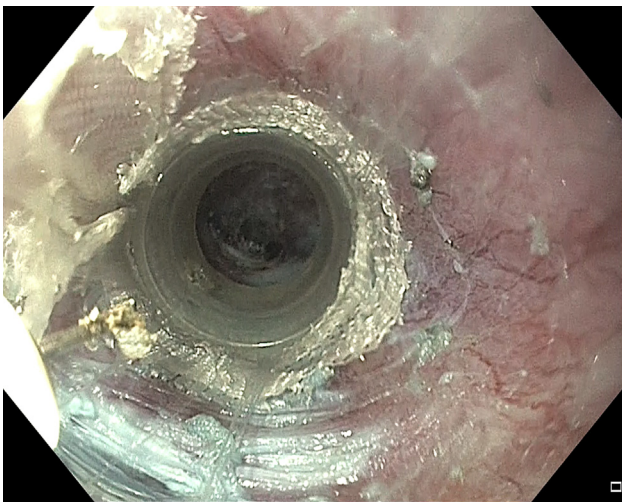
**Figure 2.** High-resolution esophageal manometry revealing the diagnosis of jackhammer esophagus.



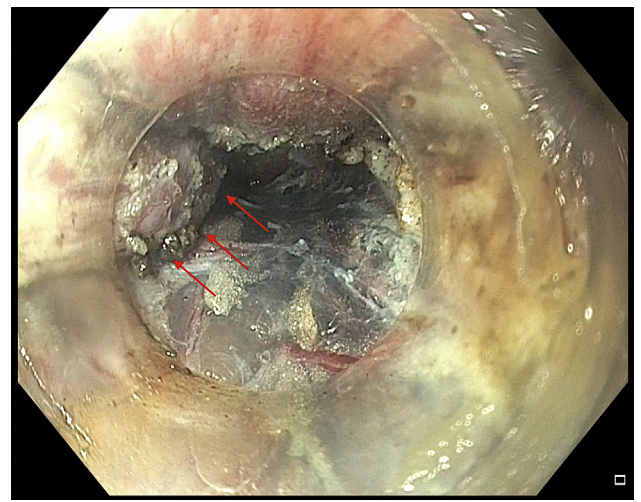
**Figure 3.** Spastic esophageal contractions visualized during submucosal tunneling.



**Figure 5.** Removal of the distal attachment using rat-tooth forceps.



**Figure 4.** Inadvertent detachment of distal attachment during tunneling within a spastic segment.



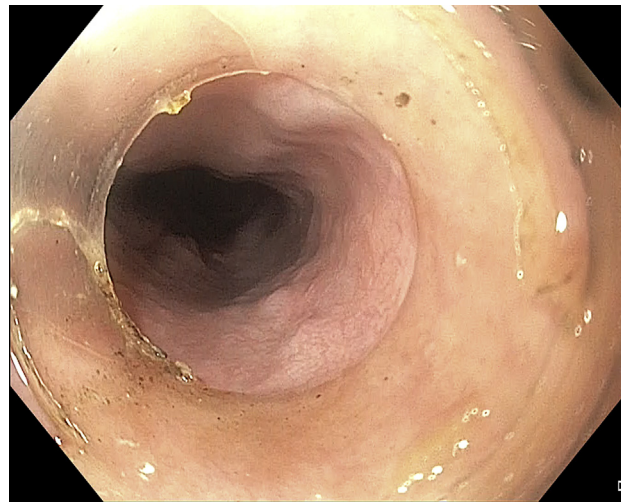
**Figure 6.** Preserved sling fibers visible on the gastric side of the tunnel after completion of myotomy (red arrows).

(HRM) showed a high distal contractile integral of 28,013 mm Hg/s/cm in >20% swallows, with a normal integrated relaxation pressure (12.8 mm Hg) and distal latency (7 seconds), suggestive of jackhammer esophagus (JHE) (Fig. 2). There was no significant relief of symptoms with medical therapy, including oral proton pump inhibitors and calcium channel blockers.

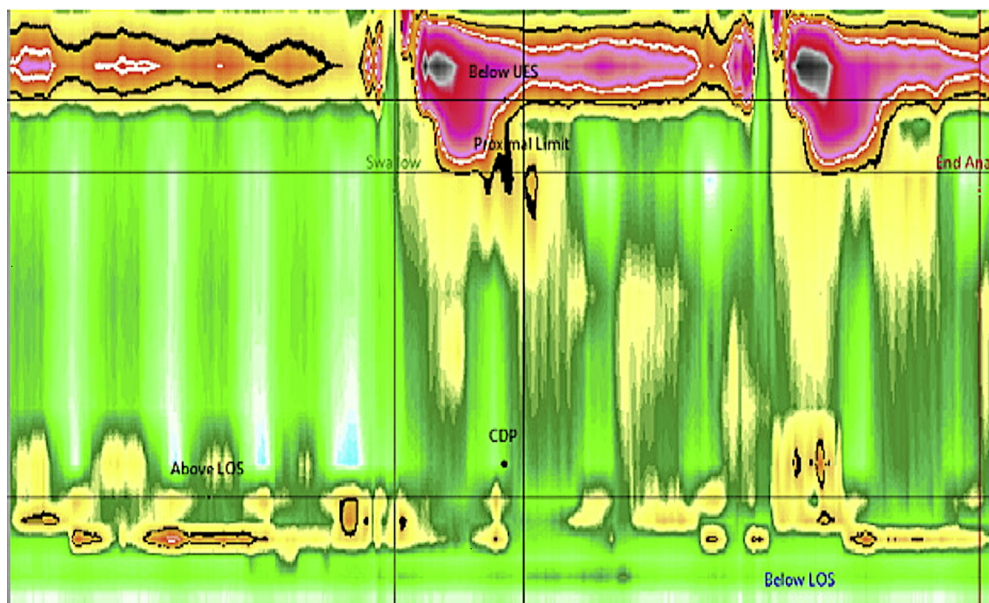
In this case, we performed peroral endoscopic myotomy (POEM) using the information provided by HRM. POEM was performed using an endoscope equipped with water jet (Olympus GIF HQ 190; Olympus Corp, Tokyo, Japan) and tapered-tip transparent cap (DH-28GR; Fujifilm, Tokyo, Japan) fitted onto the distal end.

The steps of POEM procedure were as follows:

1. The length of the spastic esophageal segment was calculated by identifying the proximal border of the spastic segment and GEJ on manometry (42 – 28 cm = 14 cm).
2. A mucosal incision was performed 2 to 3 cm proximal to the upper margin of spastic contractions seen on HRM (ie, 25 cm using triangular tip jet [Olympus]).
3. Submucosal tunneling was performed in the usual fashion and extended to 2 cm beyond the GEJ (Fig. 3). Inadvertent dislodgement of the distal attachment was encountered during tunneling owing to narrow and spastic segments (Fig. 4). The cap was removed using rat-tooth forceps (Fig. 5).
4. After completion of the submucosal tunnel, myotomy was started from 27 cm onward (ie, 2 cm below the incision and 1 cm above the presumed onset of spastic esophagus). Selective circular and full-thickness myotomy was performed in the upper and lower part of the tunnel, respectively. The myotomy was oriented toward the right side of the tunnel at and beyond the GEJ to preserve sling fibers (Fig. 6).



**Figure 7.** Gastroscopy after peroral endoscopic myotomy revealing resolution of spastic esophageal contractions.



**Figure 8.** High-resolution manometry revealing complete disappearance of spastic esophageal contractions after peroral endoscopic myotomy.

5. After completion of myotomy, the mucosal incision was closed using several endoclips.

At 3-month follow-up, there was complete resolution of symptoms (Eckardt score: 0). Post-POEM HRM revealed complete disappearance of the spastic contractions and a significant decrease in distal contractile integral (pre-POEM: 28,013 mm Hg/s/cm; post-POEM 213 mm Hg/s/cm) (Figs. 7 and 8). Median integrated relaxation pressure after POEM was 9.7 mm Hg. Evaluation for gastroesophageal reflux revealed mild erosive esophagitis (grade A) and a lax GEJ, occasional heartburn with regurgitation, and increased esophageal acid exposure (12.1%). The patient was prescribed proton pump inhibitors until the next evaluation.

JHE is a rare spastic esophageal motility disorder characterized by a distal contractile integral of  $>8000$  mm Hg/s/cm in more than 20% of swallows.<sup>1</sup> JHE is especially difficult to treat with conventional modalities, including Heller's myotomy and pneumatic dilatation. Recently, POEM has emerged as an effective treatment in these cases with the advantage of its ability to perform long esophageal myotomy.<sup>2</sup> The selection of the length of esophageal myotomy is paramount for optimal outcomes in these cases.

In [Video 1](#) (available online at [www.VideoGIE.org](http://www.VideoGIE.org)), we demonstrate the complete resolution of clinical symptoms as well as manometric abnormalities in a patient who

underwent POEM guided by HRM. The inclusion of the GEJ in the myotomy is debatable in these cases. However, in some cases of JHE, the manometric diagnosis may change to achalasia with time, thereby increasing the risk of dysphagia if GEJ is not included in the myotomy.<sup>3,4</sup> The risk of post-POEM gastroesophageal reflux may be reduced by avoiding sling fibers during POEM.<sup>5</sup>

## ACKNOWLEDGEMENT

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## DISCLOSURE

*All authors disclosed no financial relationships.*

*Abbreviations: GEJ, gastroesophageal junction; HRM, high-resolution manometry; JHE, jackhammer esophagus; POEM, peroral endoscopic myotomy.*

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