



Modified technique of peroral endoscopic myotomy using transnasal ultra-slim gastroscope in a child with achalasia cardia

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BACKGROUND

Endoscopy in infants and children requires different equipment because of the difference in size and weight as compared to adults. Most pediatric upper endoscopies are performed using small-diameter gastroscopes because children have a narrow cricopharyngeal sphincter and esophageal lumen. The small working channel of these endoscopes presents a challenge to perform endotherapy, when standard adult gastroscopes are often necessary.¹ Peroral endoscopic myotomy (POEM) is an established treatment for achalasia cardia (AC) in children.² This video demonstrates POEM in a child using an ultra-slim transnasal (TN) gastroscope and alternative accessories because POEM using standard gastroscope was not feasible (Video 1, available online at www.giejournal.org).



Figure 1. Barium swallow showing dilated esophagus with hold-up at the gastroesophageal junction classical of achalasia cardia.

CASE

An 18-month-old female child presented with regurgitation, cough, and failure to thrive for 1 year. Her birth weight was 3.2 kg; her weight at presentation was 6.6 kg and her body mass index was 13.5 kg/m². A barium swallow (Fig. 1) revealed a dilated esophagus, and an upper endoscopy revealed tight lower esophageal sphincter (LES) indicative of AC. High-resolution manometry was performed with the patient under conscious sedation using ketamine. The patient was administered 1 mL of water swallows, and high-resolution manometry demonstrated raised LES pressure, failure of LES relaxation, and pan-esophageal pressurization confirming type II AC (Fig. 2).

Abbreviations: AC, achalasia cardia; LES, lower esophageal sphincter; POEM, peroral endoscopic myotomy; SM, submucosal; TN, transnasal.

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POEM was planned, but we encountered technical challenges. Although a standard gastroscope (GIF-H190; Olympus, Tokyo, Japan) could pass the cricopharynx in normal circumstances, it could not be passed across with the distal cap attached. The TN gastroscope with a 5.7-mm distal tip diameter (GIF-XP190; Olympus) was used, with a distal cap customized from the proximal (flat) end of a 5.5-mm endotracheal tube (Fig. 3). Standard POEM knives were incompatible with the 2.2-mm working channel of the TN scope. Therefore, a tip of a thin 25-mm polypectomy snare (sheath diameter 2 mm) (SnareMaster SD-221U-25; Olympus) and 6F cystotome (G-Flex, Nivelles, Belgium) (Fig. 4) were used for dissection.

POEM was performed with the patient under general anesthesia with endotracheal intubation and carbon dioxide insufflation (Video 1). First, a standard gastroscope was introduced without the distal cap. Submucosal (SM) elevation was achieved by injecting normal saline stained with methylene blue through a 22-gauge needle. A gastro-scope was exchanged for a TN scope with a custom distal attachment. A snare tip was used to perform mucosal incision and SM dissection. An additional SM injection was achieved using the inner sheath of an injection needle without needle tip, which was passable through the TN

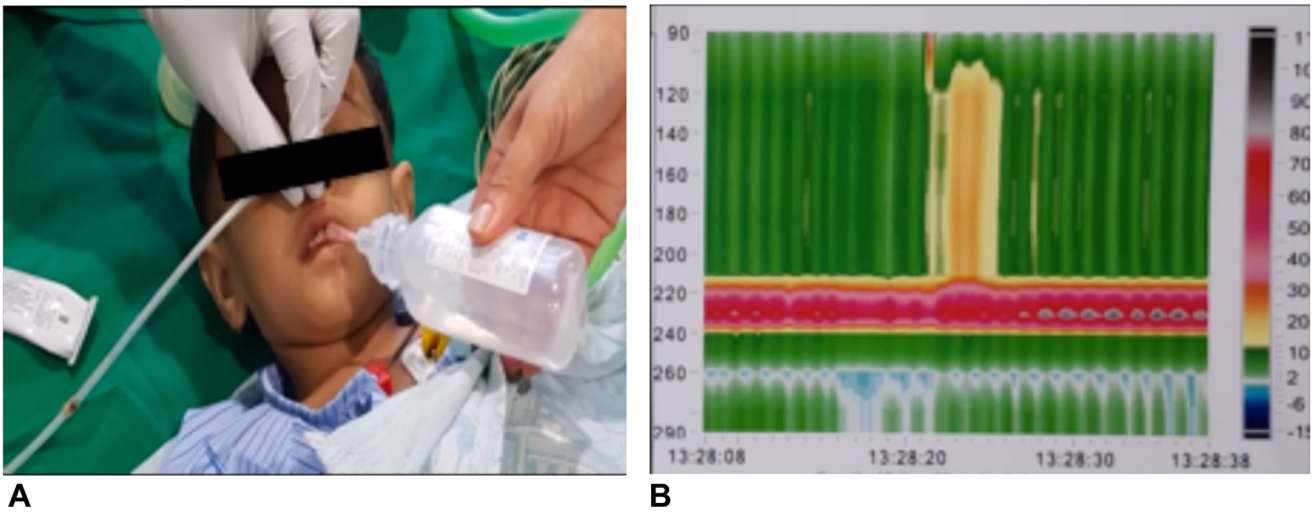


Figure 2. A, Child undergoing high-resolution manometry under conscious sedation. B, High-resolution manometry tracing demonstrating type II achalasia cardia.



Figure 3. Ultra-slim transnasal gastroscope attached with the custom-made distal transparent attachment refashioned from a 5.5-mm endotracheal tube.

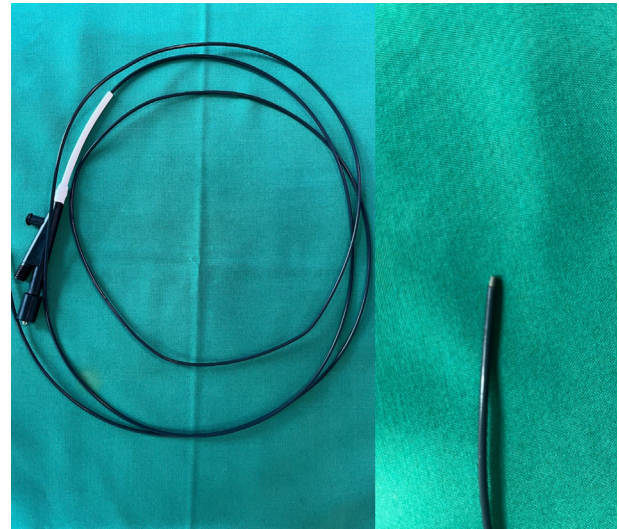


Figure 4. Six-French cystotome (G-Flex, Germany).

scope. Repeated instrument exchanges were inconvenient. Therefore, a 6F cystotome, which permitted simultaneous injection and dissection, was used. SM dissection was performed using forced coagulation effect 2, 40 watts (Vio200D; ERBE, Tübingen, Germany). An SM tunnel was extended across the gastroesophageal junction for 1 cm. Thereafter, a 6-cm posterior full-thickness myotomy (5 cm esophageal, 1 cm gastric) was performed using a snare tip. Hemostasis was confirmed. A TN scope was replaced by a regular gastroscope without distal attachment, and 4 endoclips were applied for mucosal closure.

The total procedure time was 70 minutes. Oral feeds were commenced on the subsequent day and the patient was discharged on the second day. At the 4-week follow-up, 2.5-kg weight gain, no dysphagia, and no contrast retention on a barium swallow were reported for the child (Figs. 5 and 6).

DISCUSSION

This video demonstrates a modified technique to successfully perform POEM in a small child using a TN gastroscope and alternative accessories. Because of space constraints, we were unable to use the standard gastroscope. A customized distal cap attachment allowed us to use the TN gastroscope. Standard knives could not be used, and therefore a snare tip and 6F cystotome were used. Use of the snare tip was described earlier³; however, we found it inconvenient as multiple instrument exchanges were needed for injection and dissection. The 6F cystotome was an efficient alternative to save procedure time. It is important to note that the use of 6F cystotome, snare, and distal cap were off-label applications. Certain challenges or limitations



Figure 5. Post-peroral endoscopic myotomy barium swallow at 4 weeks demonstrating an open lower esophageal sphincter and no hold-up of contrast.

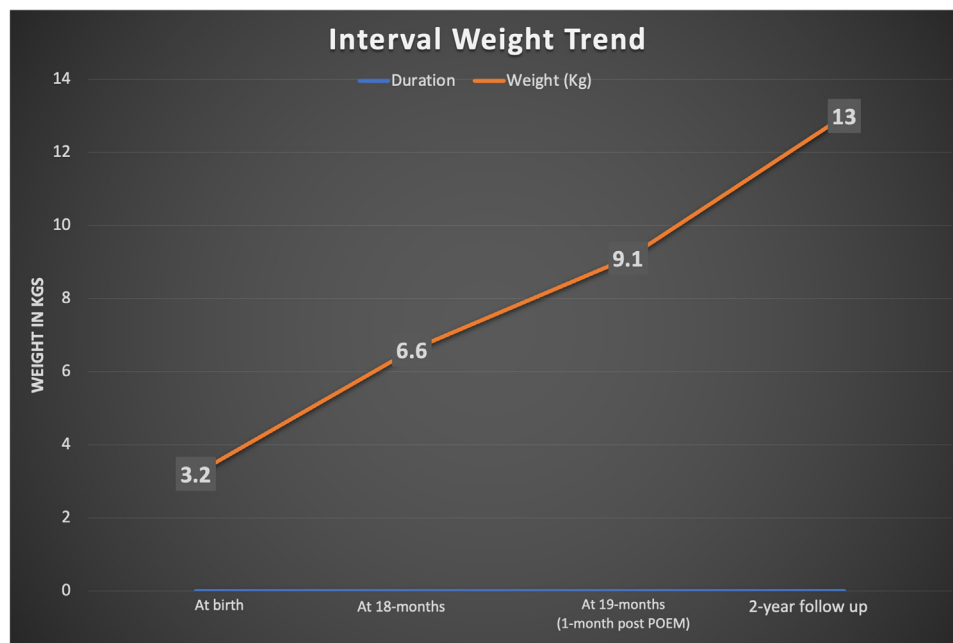


Figure 6. Graph demonstrating weight gain after peroral endoscopic myotomy.

require highlighting; entry into the SM tunnel was challenging because of limited SM injection within the limited space; endoscope exchange resulted in a delay causing partial dissipation of SM elevation; and the TN scope was floppy, making it difficult to push into the tunnel. Another potential challenge was hemostasis. The TN gastroscope does not

have a flushing port and does not permit passage of standard coagulation forceps. Small-caliber vessels encountered during SM dissection were therefore pre-coagulated prior to division to avoid bleeding. Also, a 6F cystotome is not widely available in all countries, so the snare tip remains the only available option.

In conclusion, this video demonstrates that, in small children when standard POEM is not feasible, modified POEM using this described technique can be safely and effectively performed.

DISCLOSURE

All authors disclosed no financial relationships.

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