



Handmade snare-assisted endoscope tip-bending angulation booster

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BACKGROUND

Endoscopic interventions require accurate and precise control of the endoscope tip. Flexible endoscopy depends heavily on steering the endoscope tip in the desired direction. Control depends on pull wires attached at the tip just beneath its outer protective sheath and passing back through the length of the instrument shaft to the 2 angulation control wheels (for up/down and right/left movement). The endoscope tip response depends on a cable pulling system, which is known to deliver a significantly nonlinear response that eventually reduces control. The study by Rozeboom et al¹ suggests that the majority of clinically used endoscopes are not optimally tuned to reach maximal bending angles and demonstrate adequate tip responses.²

Adequate up-angulation is mandatory to complete both gastric endoscopic submucosal dissection in retroflexed position and antireflux mucosal ablation (ARMA) and antireflux mucosectomy (ARMS) procedures for endoscopic antireflux therapy (EARTH). Up-angulation function of the endoscope is often insufficient because of wear and tear of the endoscope. To solve this issue, mechanical repair by tightening the traction wire is necessary, which usually takes several days to weeks. To solve this common problem we face in our daily practice, we developed a simple, quick, cheap, effective, and reproducible solution. In this report, we present a handmade snare-assisted endoscope tip-bending angulation booster (angulation booster).

PROCEDURE

Evaluation of therapeutic endoscope

Evaluation of the angulation range of an endoscope in comparison with manufacturer-prescribed angulation is

Abbreviations: angulation booster, handmade snare-assisted endoscope tip-bending angulation booster; ARMA, antireflux mucosal ablation; ARMS, antireflux mucosectomy; EARTH, endoscopic antireflux therapy.

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necessary to predict possible difficulty during the procedure. In our center, if the angulation of the evaluated endoscope for our desired procedure is not enough, we usually prepare a new endoscope (with better angulation); we also sometimes use a multipoint bending endoscope (which is not always readily available in some centers); and lastly, we still use the same evaluated endoscope but with an angulation booster.

Preparation of materials

For this method, we prepare the following (Fig. 1): gastroscop (GIF-H290T; Olympus, Tokyo, Japan), endoscopic snare (Smart Snare Hex25, TOP Corporation, Tokyo, Japan, or Snare Master 25 mm, Olympus), silk thread (NA11SW, Nescosuture, Tokyo, Japan), distal attachment of choice, vinyl tape, and a pair of scissors.

Construction of angulation booster

To construct an angulation booster, first, the tip of the retracted endoscopic snare flexible sheath was fixed with vinyl tape approximately 10 cm away from the tip of the therapeutic gastroscop (Fig. 2). Then, the endoscopic snare was opened to expose the snare loop that was connected to an end of the control wire (Fig. 3). After that, silk thread was passed inside the snare loop (Fig. 4) and then fixed by simple knots at the distal tip of the therapeutic gastroscop (Fig. 5).

Proper angulation booster technique

To use this angulation booster (Video 1, available online at www.videogie.org), first, the endoscope is in neutral position with the attached endoscopic snare open (Fig. 6). Then, we usually proceed with our procedure as planned and maximize the angulation that our therapeutic endoscope can offer without assistance. If additional angulation is not needed, we leave the endoscopic snare open. However, in cases where additional tip-bending angulation is needed, we slowly and carefully retract the snare loop and keep the tension to achieve our desired angulation (based on manufacturer-prescribed angulation) (Fig. 7).

CASE

A 76-year-old woman with proton pump inhibitor-refractory GERD, even after a previous ARMS procedure that yielded inadequate shrinkage of the gastric cardia,

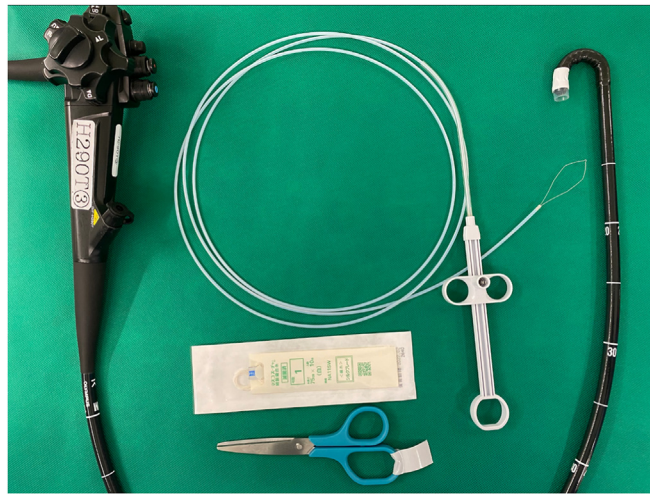


Figure 1. Preparation of materials.

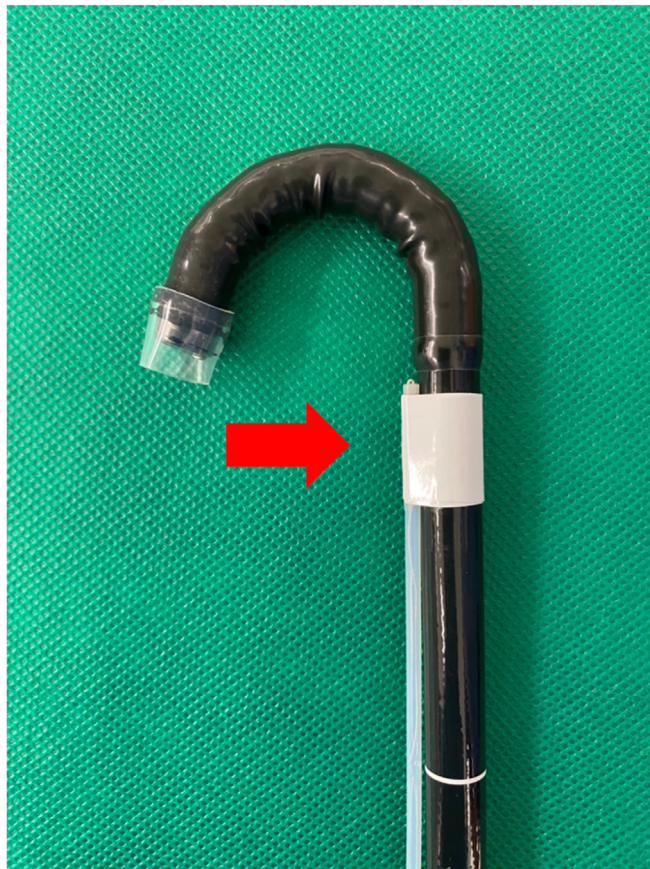


Figure 2. Construction of an angulation booster: Tip of the retracted endoscopic snare flexible sheath was fixed with vinyl tape approximately 10 cm away from the tip of the therapeutic gastroscope.

underwent redo EARTH through ARMA. While performing ARMA in the gastric cardia using the therapeutic endoscope with inadequate up-angulation, we performed mucosal abla-

tion using an electrosurgical knife from the distal to proximal side to compensate with the poor angulation of the endoscope. To perform more precise and accurate ablation, we

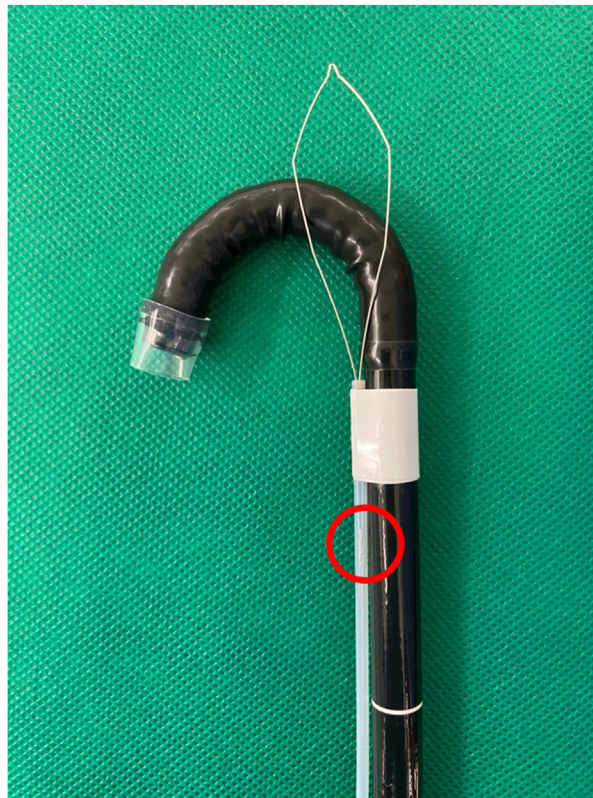


Figure 3. Construction of an angulation booster: Endoscopic snare was then opened to expose the snare loop.

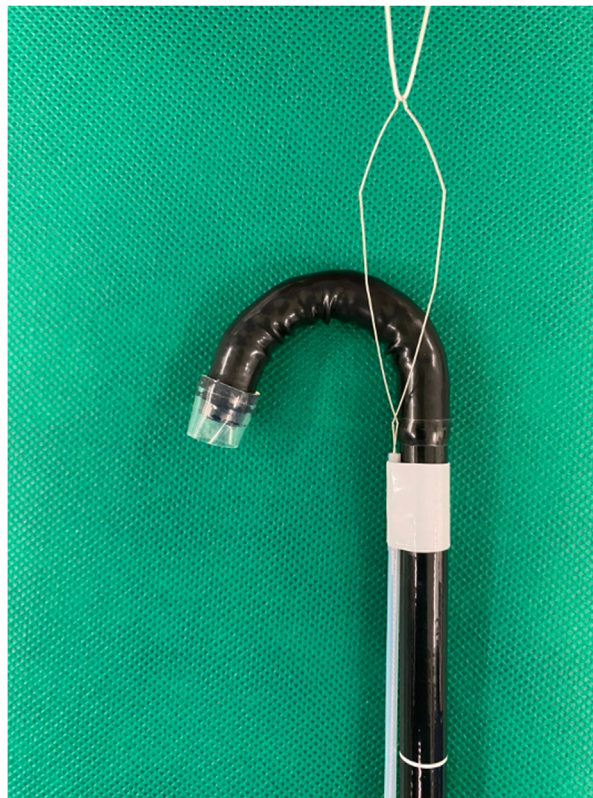


Figure 4. Construction of an angulation booster: Silk thread was passed inside the snare loop.



Figure 5. Construction of an angulation booster: The snare was fixed using thread by creating simple knots at the distal tip of the therapeutic gastroscope.



Figure 6. Endoscope is in neutral position with the attached endoscopic snare open.

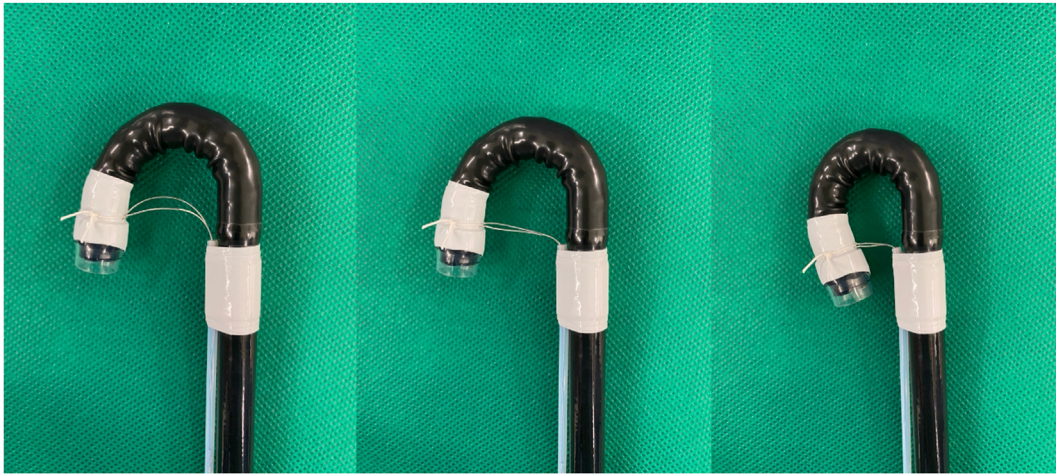


Figure 7. Proper angulation booster technique.

decided to create a handmade snare-assisted endoscope tip-bending angulation booster.

OUTCOME

With this method, we achieved improved tip-bending angulation. It provided us a good operative field of view, and we were able to perform more accurate and precise ablation. With appropriate angulation, it also allowed us to properly evaluate the depth and surface area of the ablated mucosa, which is essential in the ARMA procedure. With this technique, we were able to achieve adequate up-angulation function of the endoscope, as prescribed by the manufacturer, with the assistance of the attached endoscopic snare. No reported endoscope damage, endoscope malfunction, or breakage of the snare were encountered during and after the procedure. Please note that this method is not approved by the manufacturer; it may void any warranties or service contracts with the endoscope manufacturers.

In summary, the majority of clinically used endoscopes are not optimally tuned to reach maximal bending angles because of wear and tear and demonstrate adequate tip re-

sponses. Endoscopic interventions require accurate and precise control of the endoscope tip. The angulation booster helped in achieving adequate bending directions, as prescribed by the manufacturer, in clinically used endoscopes with nonoptimal bending angles. This technique provides a simple, quick, cheap, effective, and reproducible solution.

DISCLOSURES

Dr Inoue is an advisor for Olympus Corporation and TOP Corporation. He has also received educational grants from Olympus Corporation and Takeda Pharmaceutical Co. The other authors disclosed no financial relationships.

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