



Use of a novel helical tack system for the management of challenging upper gastrointestinal defects

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Background and Aims: Increasingly, gastroenterologists are being asked to assist in the closure of defects. Although there are several available tools that can be used for defect closure, there remains a need for devices that are easy to use, effective, and durable. The aim of this case series is to demonstrate the use of a novel helical tack system in the closure of upper GI defects.

Methods: Two cases of challenging upper GI defects were identified. One case involved a perforated duodenal ulcer, and the other involved a nonhealing marginal ulcer. In both cases, the helical tack system was used for defect closure.

Results: In both cases, defect closure was achieved using the helical tack system; however, 2 series of tacks were required in each case. There were no adverse events. Neither patient has required additional surgical or endoscopic interventions.

Conclusions: The helical tack system is a new device that may be useful for the closure of challenging upper GI defects. Additional comparative studies are needed to better understand the advantages and disadvantages of this system relative to other closure tools. (VideoGIE 2022;7:85-8.)

INTRODUCTION

Devices such as clips, injectable agents, and suturing tools have all been studied as methods to endoscopically manage defects.¹ However, further technological developments are necessary to improve ease of use and to manage more difficult closures. A recently introduced helical tack system offers endoscopists a new method for closing defects.² The system can be deployed through an endoscope or colonoscope and uses up to 4 tacks connected with a polypropylene suture. The tacks are drilled into the submucosa and muscularis propria adjacent to a defect; once in place, the tacks are cinched together to achieve closure. In this report, we present 2 cases in which the helical tack system managed a duodenal perforation and a persistent marginal ulcer.

CASE 1: DUODENAL PERFORATION

A 69-year-old woman presented with severe abdominal pain. An abdominal radiograph demonstrated air under the diaphragm concerning for perforation (Fig. 1).

This patient underwent an exploratory laparotomy that revealed a perforated ulcer thought to be within the duodenal sweep. No adjacent omentum was present for

a Graham patch; therefore, the falciform ligament was used for repair. After the procedure, the patient had persistent pain, and an upper GI series demonstrated a persistent duodenal leak (Fig. 2). The GI team was consulted for consideration of endoscopic closure. On endoscopic examination, a perforation was identified in the duodenal sweep (Fig. 3).

The helical tack system was used for closure of the duodenal perforation (Fig. 4). Given the size of the defect, 4 tacks were insufficient to close the perforation, and a second set of tacks was required (Fig. 5). A follow-up upper GI series confirmed successful closure (Fig. 6).

In the days after the procedure, the patient was discharged from the hospital and has required no further endoscopic or surgical interventions. Several months after the procedure, the patient was seen in the surgery clinic and reported no complaints.

CASE 2: MARGINAL ULCER CLOSURE

A 48-year-old man status post Roux-en-Y gastric bypass presented to the GI clinic with worsening epigastric abdominal pain. The patient had previously undergone an endoscopy that demonstrated a subcentimeter marginal ulcer. At the time, he denied smoking or nonsteroidal

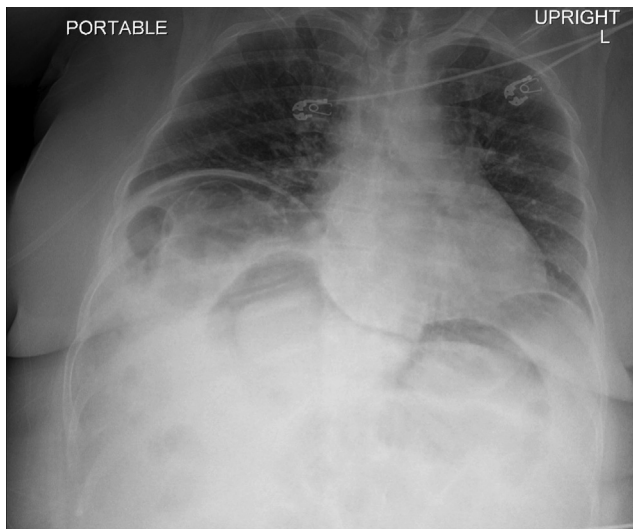


Figure 1. Abdominal radiograph demonstrating pneumoperitoneum.

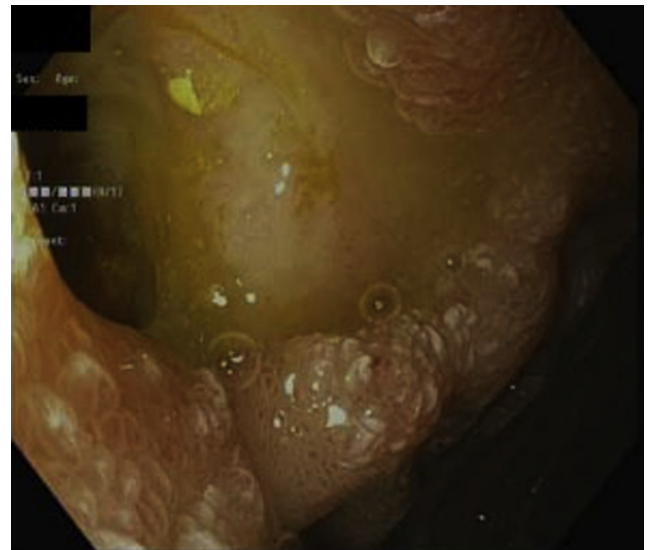


Figure 3. Endoscopic confirmation of a duodenal perforation.

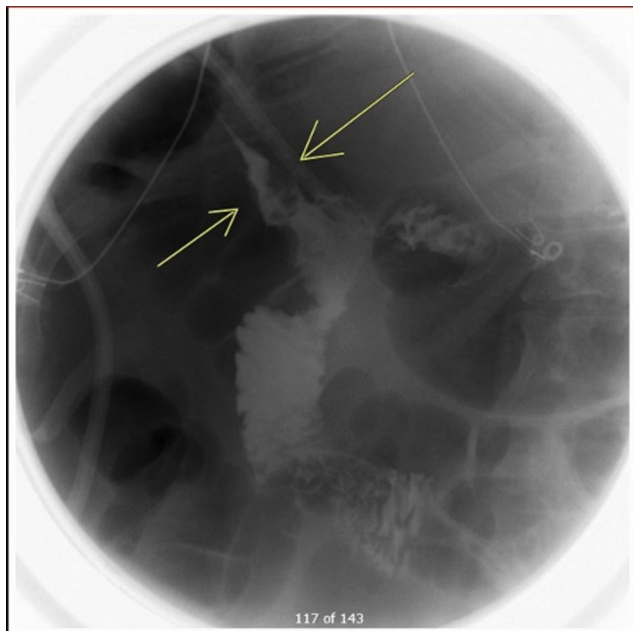


Figure 2. Upper GI series demonstrating a persistent leak in the duodenum postoperatively.

anti-inflammatory drug use, and there was no evidence of a gastrogastric fistula. He was started on open-capsule acid suppression therapy. Because the patient was experiencing worsening pain despite these measures, he underwent endoscopy, which demonstrated that the marginal ulcer had enlarged (Fig. 7).

Initial attempts to perform the repair were made difficult by the location of the ulcer. After our first attempt, 4 helical tacks were placed along the edges of the ulcer; however, closure was not optimal (Fig. 8). Thus, we placed a cap on the endoscope and were able to obtain

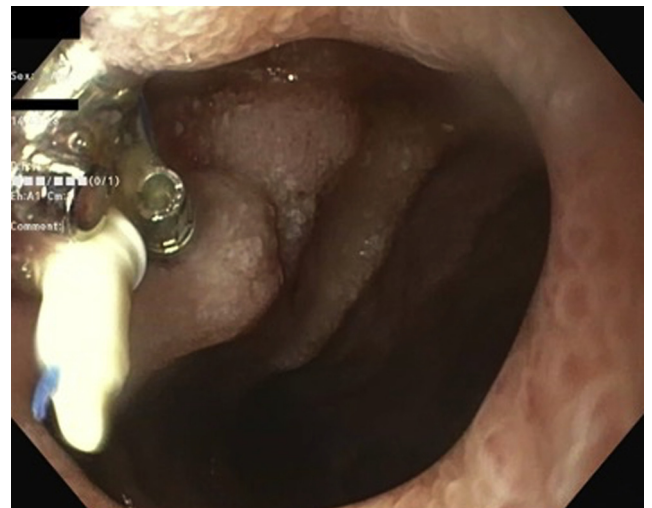


Figure 4. Endoscopic image demonstrating incomplete closure after initial deployment of 4 tacks.

better visualization, which greatly assisted in closure of the ulcer (Fig. 9).

In the months after the procedure, the patient has done well and has had improvement in abdominal pain symptoms. The patient was offered repeat endoscopy, but he declined because his abdominal pain had resolved (Video 1, available online at www.giejournal.org).

CLINICAL IMPLICATIONS AND CONCLUSIONS

Previously, the helical tack system has been demonstrated to be useful in managing submucosal dissection and mucosal resection defects.^{1,3} In this report, we demonstrate the utility of the helical tack system for indications in the upper GI tract—duodenal perforation

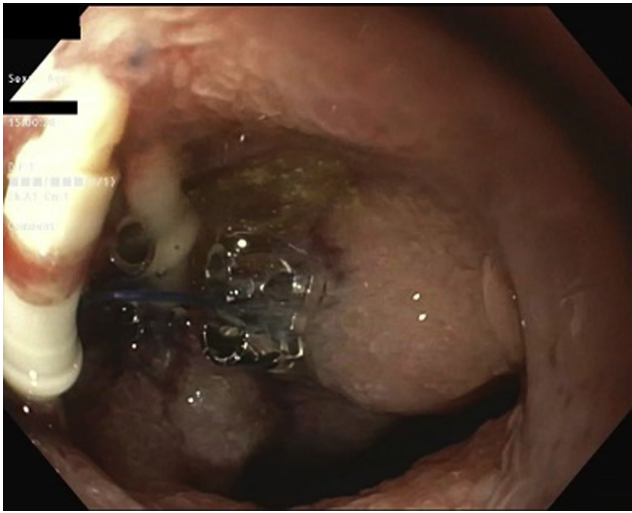


Figure 5. Endoscopic image demonstrating complete closure of the perforation after 2 sets of tacks were deployed.



Figure 7. Endoscopic visualization of a marginal ulcer.



Figure 6. Upper GI series after successful endoscopic closure, demonstrating no persistent leak.



Figure 8. Endoscopic image demonstrating incomplete closure of a marginal ulcer.

and marginal ulcer repair. In both cases, 2 sets of tacks were required to achieve successful closure, but in follow-up both patients have done well and have not required additional interventions.

Compared to using previous endoscopic suturing devices or other closure tools, the advantage of using the helical tack system is that it allows for the closure of defects in tight spaces or in challenging positions, such as in the duodenal sweep. However, a disadvantage of using the helical tack system is that the tacks often do not reach the level of the muscularis propria and may fall off. Once tacks are released or if they fall off, they cannot be reattached. This can lead to suboptimal closure.

When comparing how to approach closure of upper GI pathology and colonic defects (eg, those occurring after endoscopic submucosal dissection) using the helical tack system, it is important to consider how upper GI and colonic resection present. Upper GI defects (eg, perforations) will often present with inflamed tissue along the periphery, which can make durable closure challenging. Thus, suturing devices are often needed to appose healthy tissue along the edges of a defect. This is less of a concern immediately after resection.

The new helical tack system provides a safe and effective alternative to the current arsenal available to gastroenterologists asked to perform defect closures. Comparative studies are needed to fully understand the benefit of the helical tack system relative to other techniques.

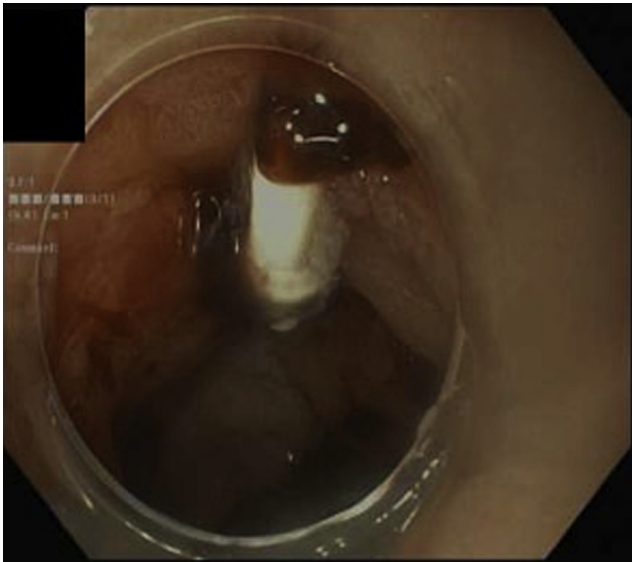


Figure 9. Endoscopic image demonstrating complete closure of the marginal ulcer.

DISCLOSURE

Dr Marya is a consultant for Boston Scientific. All other authors disclosed no financial relationships.

REFERENCES

1. Li Y, Wu JH, Meng Y, et al. New devices and techniques for endoscopic closure of gastrointestinal perforations. *World J Gastroenterol* 2016;22: 7453-62.
2. Hernandez A, Marya NB, Sawas T, et al. Gastrointestinal defect closure using a novel through-the-scope helix tack and suture device compared to endoscopic clips in a survival porcine model (with video). *Endosc Int Open* 2021;9:E572-7.
3. McCarty TR, Aihara H. Hybrid endoscopic submucosal dissection with novel helix tacking system for defect closure. *VideoGIE* 2021;6: 446-9.

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