REVIEW ARTICLE

Enhancing stent length and stability with a novel through-the-scope suturing platform: a case series

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Background and Aims: Fully covered self-expandable metal stents are commonly used for managing GI adverse events like perforations, leaks, fistulas, and strictures. Although effective, stent length and migration can be a limitation when dealing with larger defects. Over-the-scope clips and over-the-scope suturing can be used to mitigate migration risk; however, their role is limited for stent-to-stent suturing to create longer stents. We present a novel application of through-the-scope suturing (TTSS) system for creating longer stents to manage larger GI defects.

Methods: We demonstrate using a video case series the applicability of TTSS for fixing multiple coaxially placed stents to create a longer stent and simultaneously anchor them to underlying GI wall to mitigate stent migration.

Results: We illustrate our success in managing 3 cases of large esophageal and/or gastric pathologies (stenosis and leak) using the TTSS system to create longer stents through stent-in-stent fixation.

Conclusions: TTSS is a novel endoscopic suturing platform that is compatible with most endoscopes and can be navigated to challenging narrow and angulated location, giving it an advantage over over-the-scope suturing/over-the-scope clips. Our case series demonstrates that stent-in-stent fixation of multiple fully covered self-expandable metal stents to create longer stents using the TTSS system is an effective technique when managing larger GI defects. (VideoGIE 2024;9:348-52.)

INTRODUCTION

Fully covered self-expandable metal stents (FCSEMSs) are used commonly for managing GI adverse events like perforations, leaks, fistulas, and strictures. Stent length and its migration can be a limitation when dealing with larger defects.[1] Devices, including over-the-scope clips (OTSCs) and over-the-scope suturing (OTSS), have been used to mitigate the migration risk, but their larger size and diameter can limit their use in difficult and narrow spaces in the GI tract[2] (Fig. 1).

Abbreviations: FCSEMSs, fully covered self-expandable metal stents; OTSCs, over-the-scope clips; OTSS, over-the-scope suturing; TTSS, through-the-scope suturing.

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Recently, a through-the-scope suturing (TTSS) system (X-Tack; Apollo Endosurgery, Austin, Tex, USA) has been introduced, which can overcome these limitations (Fig. 2). TTSS can be used with any endoscope with a working channel of 2.8 mm, and it operates by anchoring sutures with tacks to the muscular layer of the GI tract. TTSS offers easy maneuverability through difficult locations and can be used to fix multiple FCSEMSs to bridge larger defects or strictures. Here, we demonstrate a novel approach for fixing 2 FCSEMSs together in place using the TTSS system.

CASE 1

A 75-year-old man with recurrent pancreatic adenocarcinoma presented with dysphagia and weight loss. He had previously undergone chemoradiotherapy, a distal pancreatectomy, and splenectomy followed by a partial pancreatectomy, partial gastrectomy, and cholecystectomy for his pancreatic cancer. An EGD showed severe intrinsic malignant continuous stenosis from the middle esophagus extending into the gastric cardia and proximal body. The stenosis was stented using a 20-mm × 150-cm FCSEMS, and the stent was fixated proximally with OTSS (Video 1,

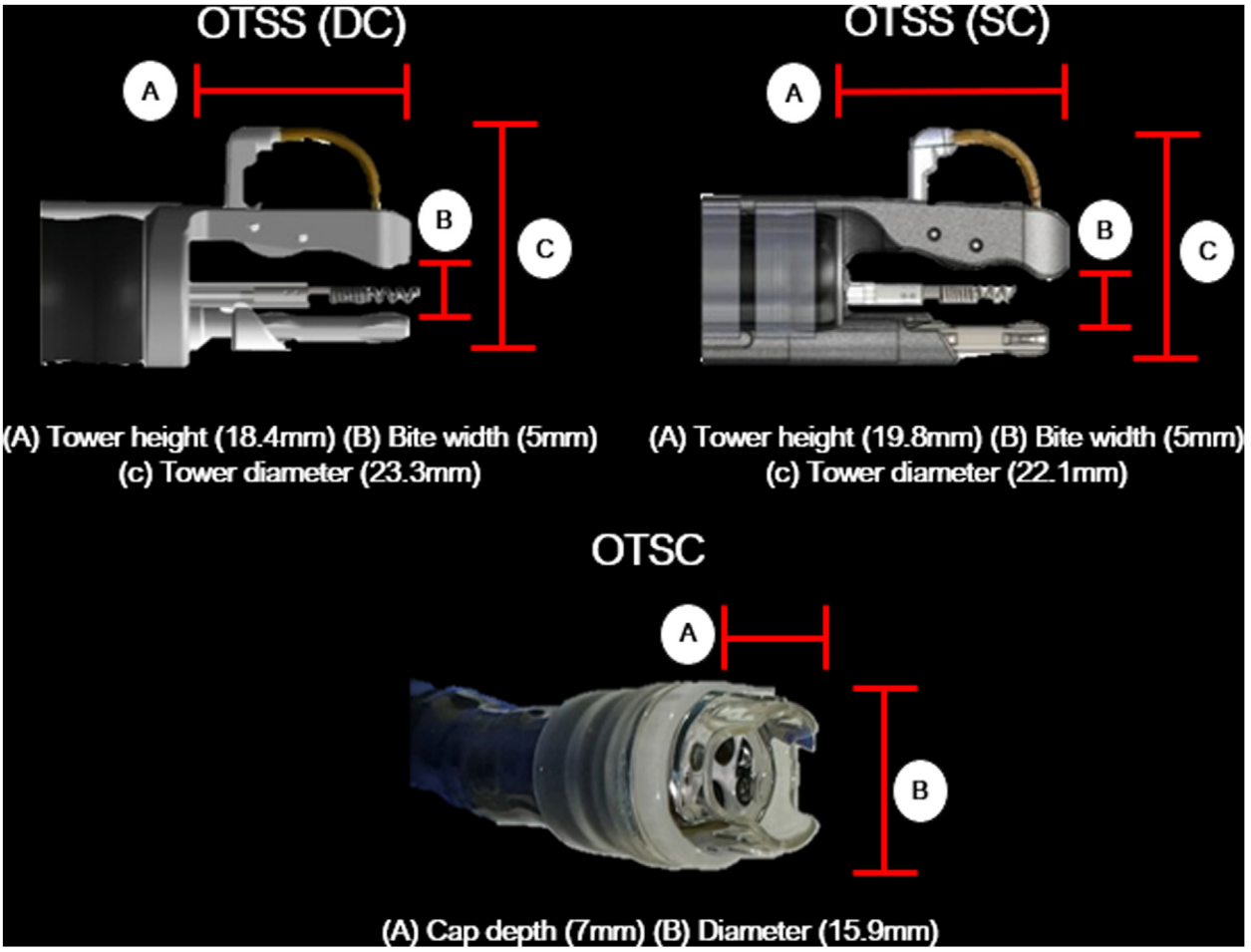

Figure 1. *Top:* Over-the-scope suturing devices: double channel (*left*) and single channel (*right*). **A,** Tower height. **B,** Bile width. **C,** Tower diameter. *Bottom:* Over-the-scope clip. **A,** Cap depth. **B,** Diameter.

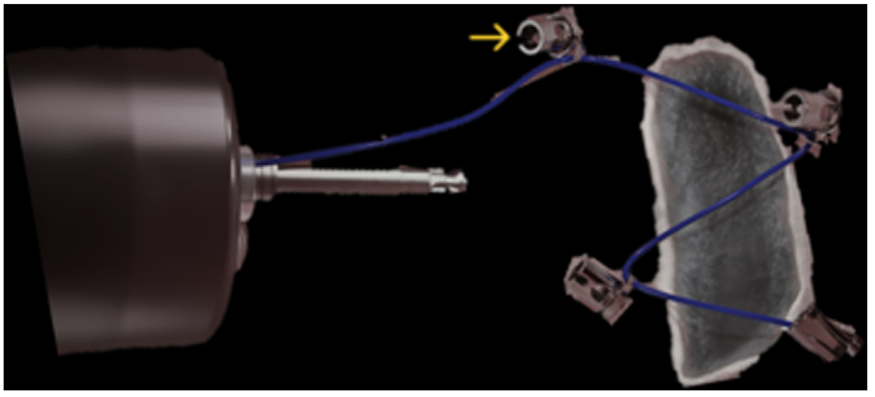

Figure 2. Through-the-scope suturing system with X-tack (*tip of yellow arrow*).

available online at www.videogie.org). CT scans and a repeat EGD were performed for recurrent dysphagia 4 days later, which showed distal migration of the FCSEMS into the gastric lumen. Stent-in-stent fixation using a TTSS device was performed to reduce migration and create a longer stent to bridge the stenosis (Figs. 3 and 4; Video 1). Two continuous stents with fixation of overlapping parts were used to bridge the long stenosis. An abdominal x-ray 1 week later confirmed the appropriate position of the stent in the stomach across the gastroesophageal junction (Fig. 5). The

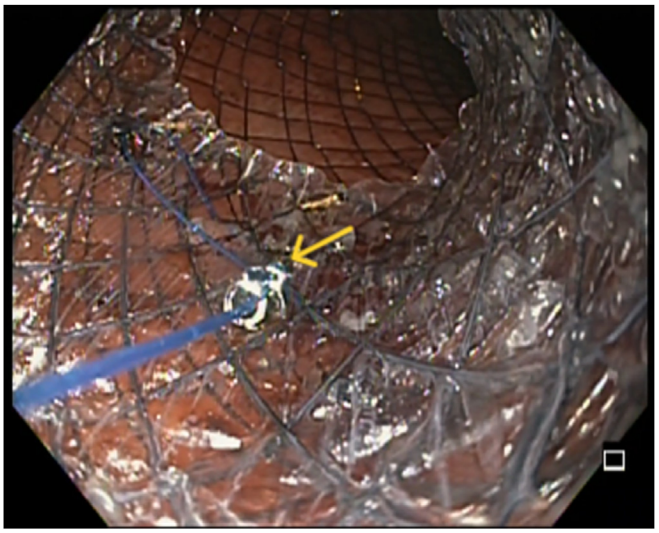

Figure 3. Overlapping fully covered self-expandable metal stent with 1 tack deployed (*tip of yellow arrow*) to fixate the overlapping part of the stent into the gastric wall.

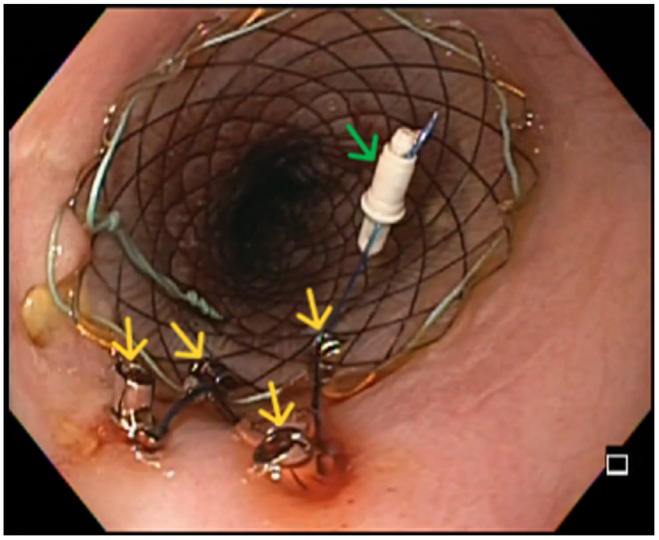

Figure 4. Proximal fixation of a fully covered self-expandable metal stent into the esophageal wall with 4 tacks (*yellow arrows*) and placement of a cinch (*green arrow*) to hold the sutures in place.

patient tolerated oral feeds and was discharged with hospice care with plans for palliative chemotherapy.

CASE 2

A 62-year-old man with history of hypertension and recent diagnosis of an esophageal neuroendocrine tumor presented with dysphagia. Position emission tomography showed metastasis. An EGD showed a completely obstructing mass in the proximal-to-distal esophagus. The stenosis was stented using a 22-mm × 150-cm FCSEMS with proximal suturing of the stent using OTSS. He was started on chemotherapy. A repeat EGD was performed 12 days after the procedure for worsening dysphagia, and it showed inadequate bridging of the esophageal stenosis. A decision was made to perform stent-in-stent fixation using a TTSS device to bridge the stenosis (Fig. 6). After the procedure, his dysphagia improved, and he tolerated oral intake (Video 1). At the patient's 2-month follow-up, the stents remained patent (Fig. 7), and he was transitioned to hospice care without any follow-up planned.

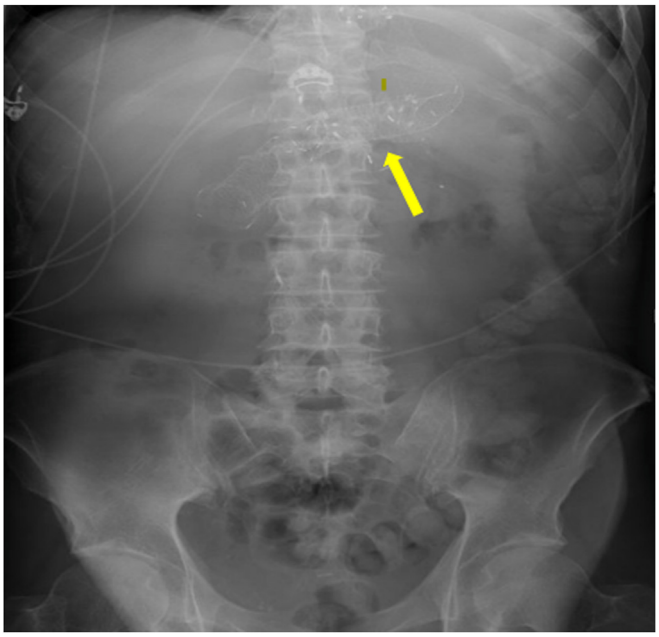

Figure 5. Abdominal x-ray 1 week after fully covered self-expandable metal stent placement confirms appropriate positioning of the stents from the gastroesophageal junction to the stomach (*tip of yellow arrow*).

Figure 6. Fixation of 2 overlapping fully covered self-expandable metal stents fixated into the esophageal wall with multiple tacks and 2 cinches seen.

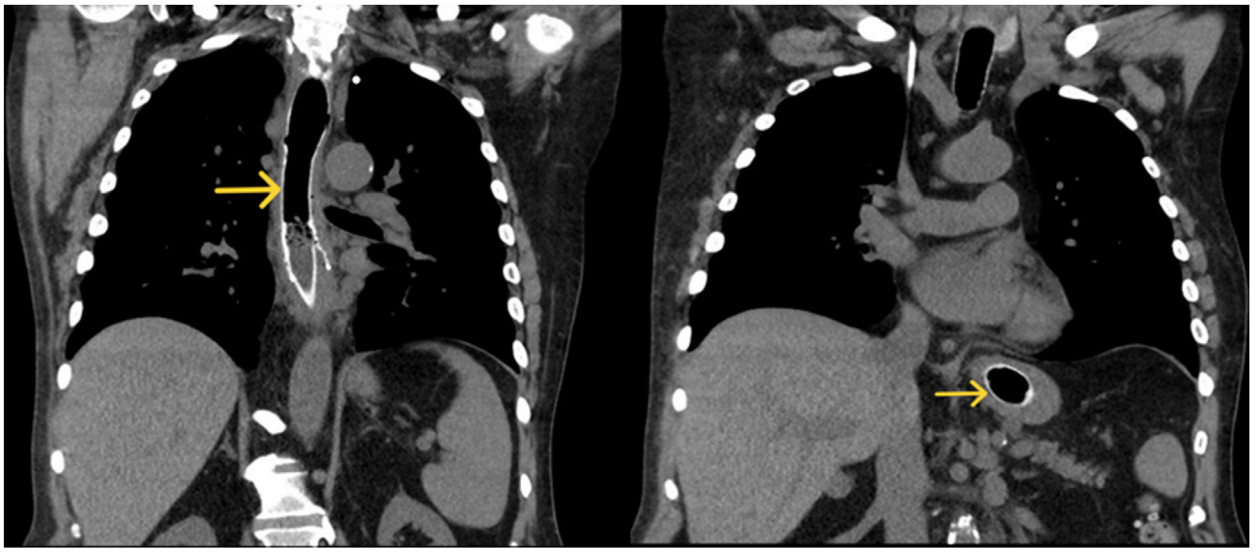

Figure 7. CT scan at 2 months' follow-up showing patent fully covered self-expandable metal stent from the esophagus to the gastric body (*yellow arrows*).

CASE 3

A 45-year-old woman with a sleeve gastrectomy complicated by a gastric leak presented with abdominal pain and emesis. A CT scan demonstrated a contained leak along the posterior-medial aspect of the gastric sleeve with mixed gas and fluid collection (Fig. 8). The patient underwent drainage of the collection using a lumen-apposing metal stent. A septotomy was performed later due to intrinsic compression caused by extensive fibrosis and multiple fistulous tracts in the stomach. Two FCSEMSs were placed in tandem from the esophagus-to-distal stomach to bridge the defect. The proximal esophageal stent was sutured proximally using the OTSS device to prevent migration. Repeat EGD 4 days later showed migration of the distal stent into the gastric antrum. The distal FCSEMS was repositioned inside the proximal stent followed by suturing of the overlapping parts of both stents using the TTSS device (Fig. 9). Repeat EGD 3 months later confirmed complete resolution of the gastric leak, and fistulas and the stents were removed.

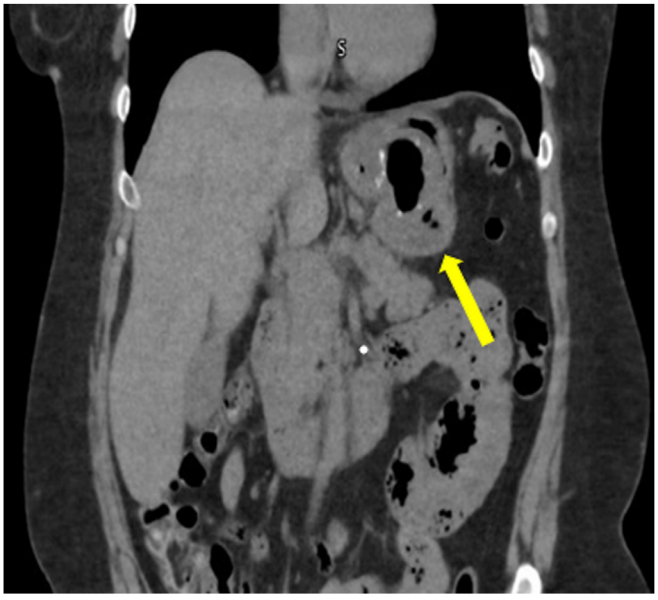

Figure 8. CT scan showing a contained leak along the posterior-medial aspect of the gastric sleeve with mixed gas and fluid collection seen (*tip of yellow arrow*).

METHODS

After deployment of the 2 FCSEMSs in a tandem fashion with overlapping segments, stent-in-stent endoscopic suturing using the TTSS device is performed. The overlapping parts of the stents are fixed to each other with tacks and cinched. Additionally, tacks can be placed at the proximal end of the stent to fix it to the esophagus to prevent migration (Video 1).

DISCUSSION

Uncovered esophageal self-expandable metal stents can be used for palliation in malignant cases[3,4] and are less prone to migration, but its obstruction from tissue overgrowth and subsequent challenges in removal offset its benefits. Therefore, FCSEMS has emerged as the preferred choice for the treatment of both benign and malignant dysphagia due to ease of removability at any time after placement. Over-the-scope devices such OTSS (single and double channel) and OTSCs can be used to fix the proximal portion of FCSEMSs to prevent migration.[5,6] However, in cases of longer GI defects or strictures in which multiple stents may be required, the larger outer diameter and limited flexibility of these devices can limit its applicability for stent-to-stent suturing. In such cases, TTSS is valuable, as it is compatible with most

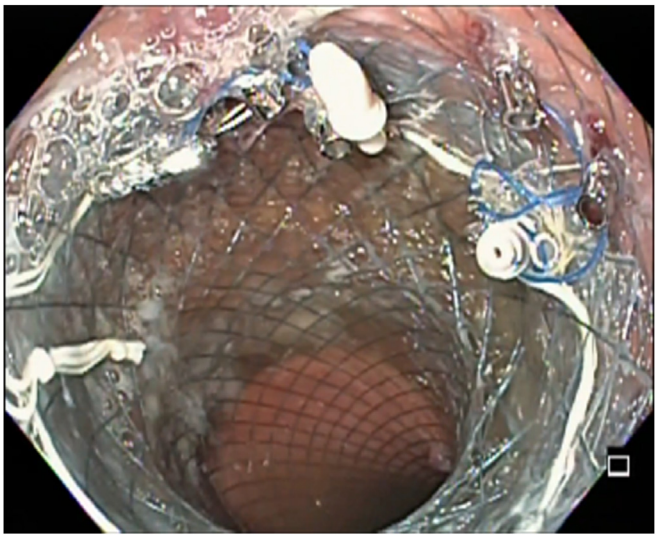

Figure 9. Overlapping fully covered self-expandable metal stents that are fixated into the esophageal wall using 4 tacks each at 2 separate sites within the overlapping area with 2 cinches placed.

endoscopes. It can be maneuvered through challenging locations and can perform fixation of stents either to prevent migration or for stent elongation.

In contrast to OTSS and OTSC, TTSS is unique as it can be passed through any endoscope with a working channel of 2.8 mm and therefore be navigated to any area of GI tract approachable by an endoscope. This device-endoscope combination allows for its maneuverability to narrow and angulated areas, including overlapping parts of coaxially placed esophageal FCSEMSs allowing for stent-to-stent fixation as shown in our case series. Additionally, it facilitates endoscopic suturing without the need to change to bigger channel therapeutic endoscopes, thereby reducing procedure time and overall cost. Although OTSS and OTSC have shown reduction in the migration rates of esophageal stents,[5,6] over-the-scope devices are difficult to pass through the stent due to their stiff distal attachment and larger outer diameter. Therefore, it cannot be used for stent-to-stent suturing for the purpose of creating longer stents. One of the limitations of TTSS compared with OTSS/OTSC is lack of full-thickness stitch; however, there are no studies comparing migration rates of FCSEMSs fixed with these devices.

TTSS is a novel endoscopic suturing platform that is compatible with most endoscopes and can be navigated to challenging narrow and angulated locations, giving it an advantage over OTSS/OTSC. Our case series demonstrates how stent-in-stent fixation of multiple FCSEMSs to create longer stents using the TTSS system is an effective technique when managing larger GI defects.

DISCLOSURE

The authors disclosed no financial relationships relevant to this publication.

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