



## Emerging therapies in translational endoscopy: new frontiers in endoscopic submucosal dissection

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### INTRODUCTION

The field of therapeutic endoscopy is evolving with a variety of new endoscopic surgical procedures. One such procedure, endoscopic submucosal dissection (ESD), has proven efficacy, yielding high margin-negative ( $R_0$ ) resection rates with low rates of adverse events and recurrence.<sup>1</sup> However, the technical complexity, long procedure duration, and steep learning curve associated with ESD have led to relatively slow adoption. Although there has been an increased trend in devices and tools that may assist with ESD, there remains a paucity of advances in endoscopic technology, which are much needed given these known barriers.

### EMERGING THERAPIES AND DEVICES

In this video ([Video 1](#), available online at [VideoGIE.org](#)), we describe 5 novel endoscopic devices to assist with tissue resection and approximation related to the ESD procedure. These devices hold the potential to improve the safety of dissection, margin preservation, defect closure, procedure duration, and learning curve.

### DISSECTION DEVICES

#### Axially paralleled endoscopic submucosal dissection knife

The axially paralleled ESD knife (Beijing Compont Medical Devices, Beijing, China) is a novel electrocautery-enhanced knife that is used to assist with tissue resection and submucosal dissection. The knife consists of heat-conducting wire, which can be rotated in a 360-degree fashion. One advantage to this knife is that it is neutrally positioned parallel to mucosal tissue, allowing for safe dissection in 1 plane and reducing the risk of perforation. This device is not cleared by the U.S. Food and Drug Administration (FDA) ([Fig. 1A and B](#)).

#### Disposable, cautery-enhanced endoscopic scissor device

This novel endoscopic scissor (Ensizor; Slater Endoscopy, Miami Lakes, Ann Arbor, Fla, USA) allows for 360-

degree rotation and electrocautery (monopolar) or non-electrocautery enhanced mucosal resection and/or submucosal dissection. This device has a benefit in preserving margins in narrow submucosal dissection planes. In addition, this knife can assist with the removal of foreign bodies such as retained sutures. This device has been cleared by the FDA ([Fig. 2A and B](#)).

### TRACTION DEVICES

#### Traction-assisted endoscopic submucosal dissection device

The clip band traction device (Micro-Tech Endoscopy USA Inc, Mich, USA) consists of a 360-degree, rotatable, 10-mm clip attached to 2 silicone bands that allow for the creation of traction during ESD. The first silicone band allows for clip placement to the proximal site of the lesion, and the second rubber band is clipped to the contralateral wall of the colon to provide traction. Once traction is applied, the submucosal space is exposed and ESD can be performed safely. This device received recent FDA clearance ([Fig. 3A and B](#)).

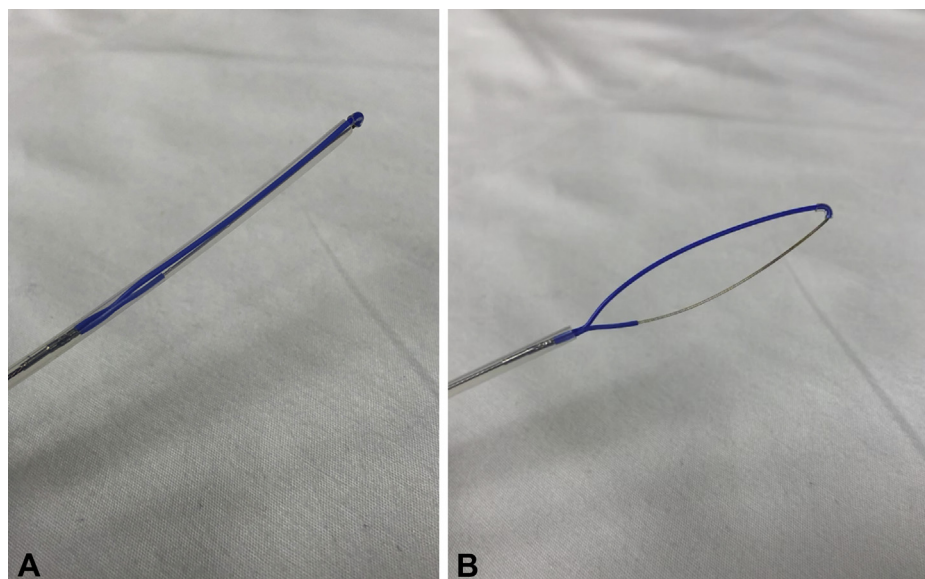
### CLOSURE DEVICES

#### Multiclip applicator device

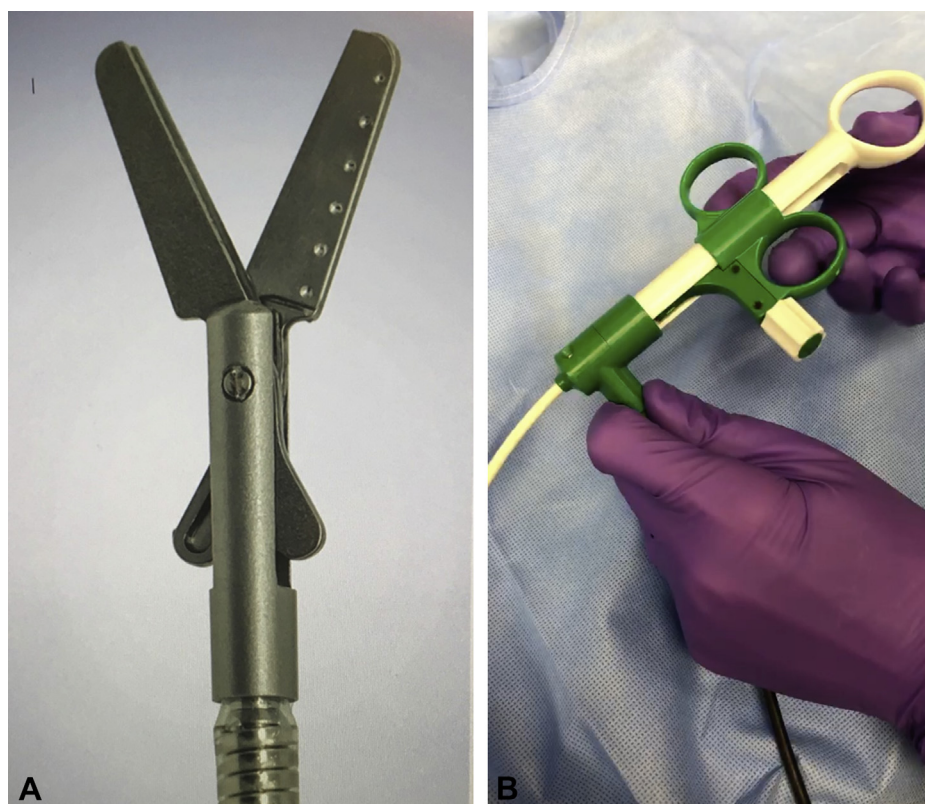
The multiclip applicator (Micro-Tech Endoscopy USA Inc) consists of a handle, a control knob, and a flexible catheter that houses three 10-mm clips that can be used for tissue approximation and defect closure. To deploy each clip, the control knob is rotated clockwise until the clip is deployed. To advance the second or third clip and prepare for deployment, the control knob is rotated in a counterclockwise fashion. The device allows for 360-degree rotation and for back-to-back deployment of the 3 coils. This device has also recently been cleared by the FDA ([Fig. 4A and B](#)).

#### Novel endoscopic suturing device

This novel suturing device (EnVision Endoscopy, Somerville, Mass, USA) can be attached to any flexible endoscope and consists of a distal attachment, which houses a circular needle, and a proximal actuator with 2 Bowden



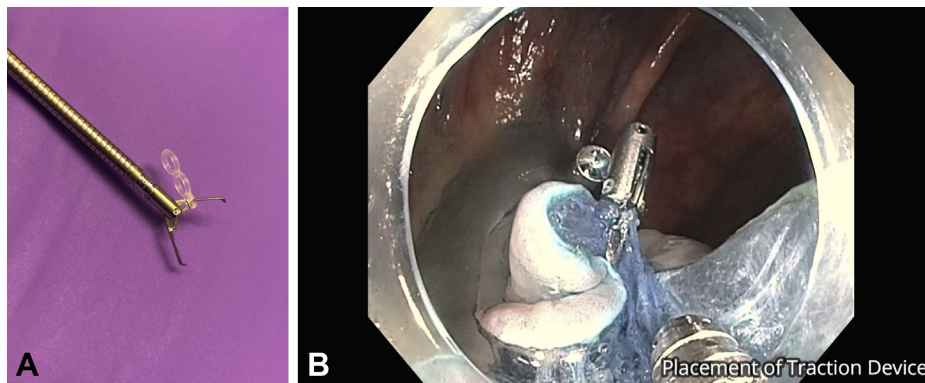
**Figure 1.** **A**, Axially paralleled endoscopic submucosal dissection knife in neutral closed position. **B**, Axially paralleled endoscopic submucosal dissection knife in opened position. The exposed wire allows for current-driven submucosal tissue dissection. The blue sheath protects the remainder of the tissue from thermal injury.



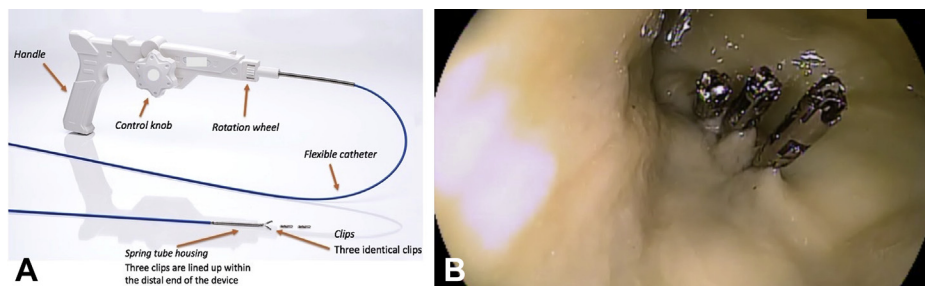
**Figure 2.** **A**, Novel, disposable, monopolar electrocautery enhanced endoscopic scissors with a rotatable handle. **B**, Unique blade design allows for safe mucosal or submucosal dissection and for the removal of retained sutures.

cables connecting these components. The unique needle drive mechanism simplifies the suturing process and allows knot tying with or without a separate cinch system.

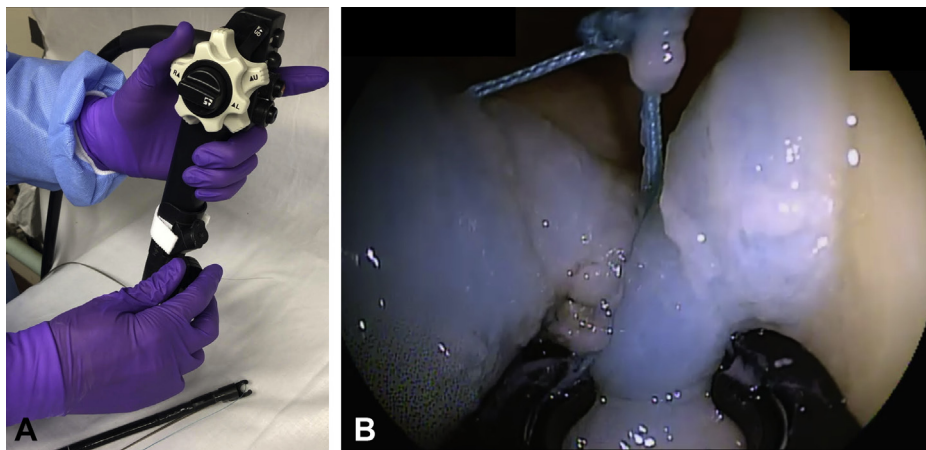
This suturing device can allow for tissue approximation and defect closure. This device is not FDA cleared (Fig. 5A and B).



**Figure 3.** **A**, Clip band traction device consisting of 360-degree-rotatable, 10-mm clip attached to 2 silicone bands. **B**, Proximal clip anchors the first silicone band to the proximal lesion, and the distal clip anchors the mucosal flap to the contralateral wall, allowing the creation of a safe submucosal space for dissection.



**Figure 4.** **A**, The multiclip applicator consists of a handle and a flexible catheter that houses three 10-mm clips allowing for 360-degree rotation and for back-to-back deployment of coils. **B**, Successful placement of 3 clips using multiclip applicator for the closure of post-ESD defect side.



**Figure 5.** **A**, Endoscopic suturing device consisting of a distal attachment, which houses a circular needle, and a proximal actuator with 2 Bowden cables connecting these components. **B**, Endoscopic suturing device positioned to allow first bite into mucosa for defect closure.

## CONCLUSIONS

The devices demonstrated in this video are novel and emerging endoscopic instruments that may assist in overcoming the limitations encountered with current ESD practices. These tools hold the potential to improve the safety of dissection, margin preservation, defect closure, and procedure duration while still allowing for en bloc and R<sub>0</sub>

resection rates. As these devices achieve FDA approval, further clinical studies are warranted.

## ACKNOWLEDGMENTS

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## DISCLOSURE

*Dr Jirapinyo is a consultant for Endogastric Solutions and GI Dynamics and has received research support from Apollo Endosurgery and Fractyl. Dr Aihara is a consultant for Olympus America, Boston Scientific, and Fujifilm. Dr Thompson is a consultant for Apollo Endosurgery, Boston Scientific, Medtronic, Fractyl, GI Dynamics, Olympus America, and USGI Medical; is a board member of EnVision Endoscopy; and has received research support from Apollo Endosurgery, Aspire Bariatric, GI Dynamics, Olympus America, and USGI Medical. All other authors disclosed no financial relationships.*

*Abbreviations: ESD, endoscopic submucosal dissection; FDA, Food and Drug Administration.*

## REFERENCE

1. Wang J, Zhang XH, Ge J, et al. Endoscopic submucosal dissection vs endoscopic mucosal resection for colorectal tumors: a meta-analysis. *World J Gastroenterol* 2014;20:8282-7.

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