

A novel method for efficient closure of large mucosal defects using nylon loops combined with titanium clips after endoscopic submucosal dissection

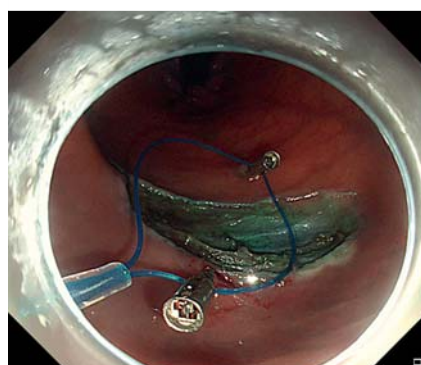
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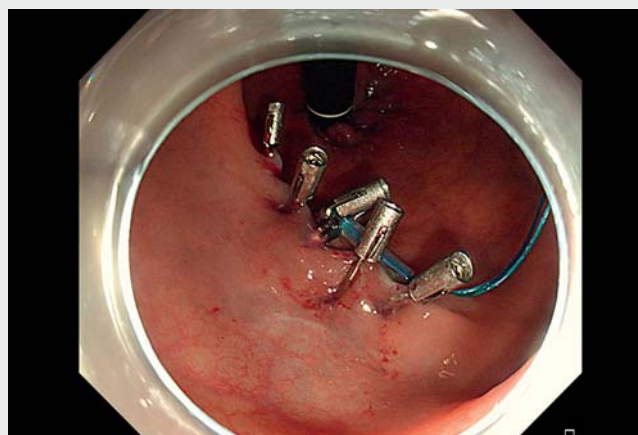
► **Fig. 1** Complete dissection of the lesion, leaving a large mucosal defect.



► **Fig. 2** One titanium clip with a nylon loop was fixed at the midpoint of one side of the incision margin.



► **Fig. 3** Another titanium clip with the nylon loop was fixed at the midpoint of the opposite side of the incision margin.



► **Video 1** The application of nylon loop combined with titanium clips in a real case of large mucosal defect closure after endoscopic submucosal dissection.

Endoscopic submucosal dissection (ESD) is an effective treatment for early-stage gastrointestinal cancer [1, 2]. However, difficult site lesions (e.g., colon flexion, right-side colon) and large mucosal defects (greater than 5 cm) result in post-ESD defect closures as an ongoing challenge in clinical practice [3]. Therefore, we report a novel method for the efficient closure of large mucosal defects after ESD using nylon loops combined with titanium clips.

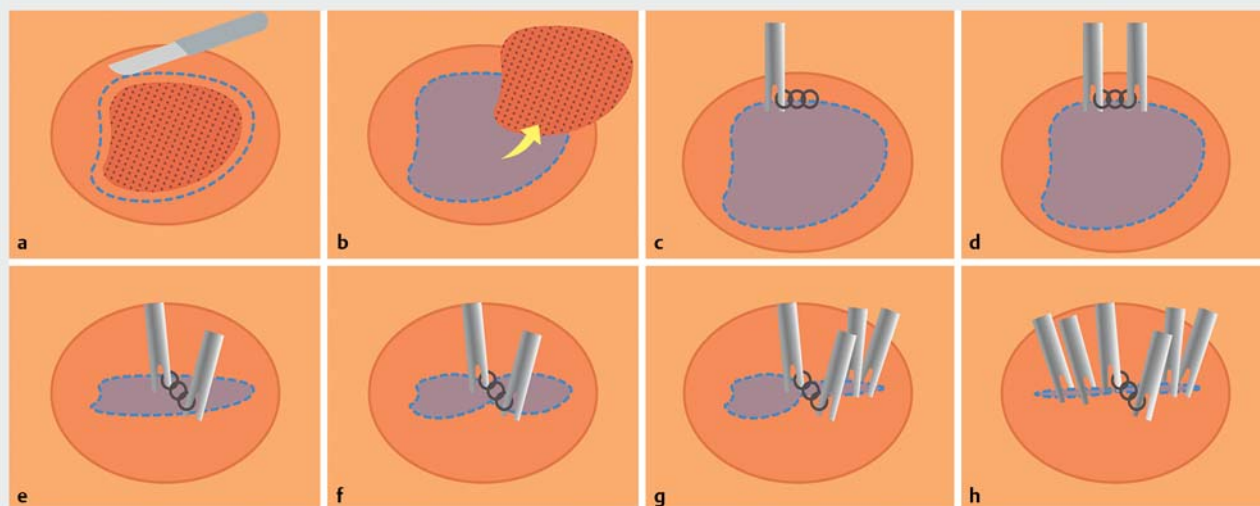
We demonstrate the application of this method in a real case of post-ESD large defect closure (► **Video 1**). An 80-year-old man was found to have a circumferential 1/3 perineal lateral developmental tumor in the left posterior wall of the rectum 4–7 cm from the anal orifice with a pathology of high-grade intraepithelial neoplasia. The operation procedure was as follows. After complete debriement of the lesion by ESD (► **Fig. 1**), one titanium clip with a nylon loop was fixed at the midpoint of one side of the incision margin (► **Fig. 2**). Another titanium clip was fixed at the midpoint of the opposite side of the incision margin (► **Fig. 3**), and



► **Fig. 4** The nylon loop was gathered, and the oval-shaped defect was transformed into a “figure-eight-shaped” defect.

then the nylon loop was gathered to transform the oval-shaped defect into a “figure-eight-shaped” defect (► **Fig. 4**). The remaining defect was closed with an appropriate amount of additional titanium clips.

This method was applied to 50 patients with lesions ranging from 1/3–1/2 of the circumference of the bowel, and the mean closure time was 12.6 minutes. The mean number of titanium clips was



► **Fig. 5** Schematic diagram for efficient closure of large mucosal defects using a combination device of a titanium clip combined with multiple nylon rings after endoscopic submucosal dissection (ESD). **a** ESD was performed to remove early-stage gastrointestinal cancer. **b** Complete dissection of the lesion, leaving a large mucosal defect. **c** One titanium clip with multiple nylon rings was fixed at the midpoint of one side of the incision margin. **d** Another titanium clip was fixed at the midpoint of the opposite side of the incision margin. **e** The number of nylon rings between two titanium clips is determined by the size of the mucosal defect. **f** The oval-shaped defect was transformed into a “figure-eight-shaped” defect. **g–h** Additional titanium clips were added to the remaining defect until it was completely closed.

7.4, saving endoscopic closure time and the number of titanium clips compared to previous studies [4]. In addition, based on this, we have further developed a combination device consisting of a titanium clip and multiple nylon rings (► **Fig. 5**), for which a patent application has been submitted in China. The device can further reduce the endoscopic closure time to 7 minutes, significantly improving the efficiency of endoscopic closure of large mucosal defects.

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Competing interests

The authors declare that they have no conflict of interest.

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