



# Endoscopic hand-suturing after per-anal endoscopic myectomy for deep T1 carcinoma in the lower rectum

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## BACKGROUND

The standard treatment for deep submucosal invasive (T1) colorectal carcinoma is surgical resection with lymph node dissection according to the Japanese Society for Cancer of the Colon and Rectum 2022 guidelines.<sup>1</sup> However, endoscopic resection (ER) with or without chemoradiotherapy is performed when patients have unfavorable background factors, especially older age and serious adverse events, to prevent conditions that cause a decline in activities of daily living, such as anal, urination, and sexual dysfunction, due to surgical resection, including intersphincteric resection and stoma creation. Per-anal endoscopic myectomy (PAEM)<sup>2</sup> is a novel ER method in which the region between the inner circular and outer longitudinal muscles in the lower rectum is resected. PAEM is expected to resect deep T1 rectal carcinomas with negative vertical margins. When ER is achieved, it is desirable to close the ulcer to prevent adverse events such as perforation and bleeding. Endoscopic hand-suturing (EHS) using an endoscopic flexible needle holder and sutures (SutuArt; Olympus, Tokyo, Japan) was developed to close large mucosal defects.<sup>3</sup> We present a case in which EHS after PAEM for deep T1 carcinoma in the lower rectum was successfully performed for preventing adverse events (Video 1, available online at [www.videogie.org](http://www.videogie.org)).

## CASE PRESENTATION

A 64-year-old man underwent colonoscopy. Borrmann type 1 carcinoma and Paris type 0-IIa+IIc carcinoma were detected in the upper rectum and lower rectum, respectively (Figs. 1 and 2). The upper rectal lesion was diagnosed as T2 carcinoma. The lower rectal lesion was

*Abbreviations: EHS, endoscopic hand-suturing; ER, endoscopic resection; PAEM, per-anal endoscopic myectomy.*

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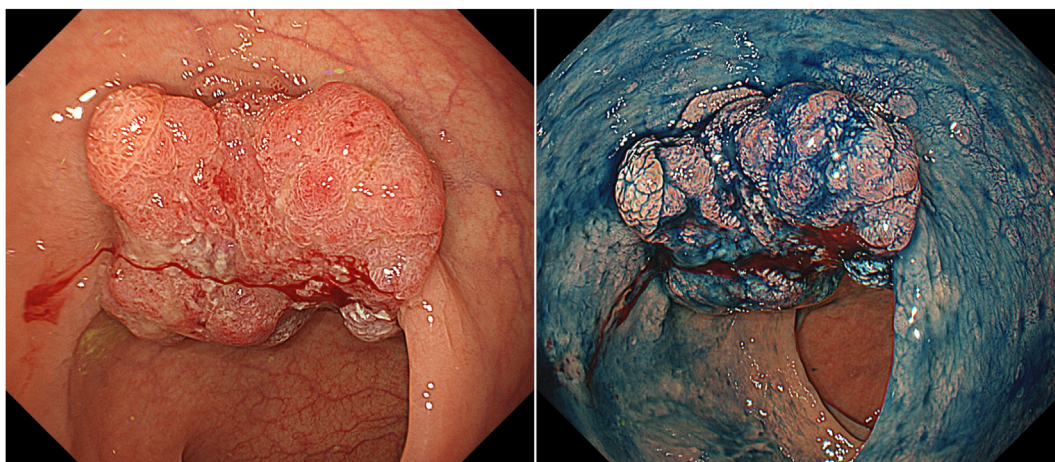
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diagnosed as deep T1 carcinoma based on a combination of endoscopic and EUS findings. Although both tumors were indicated for surgical resection, the patient refused artificial anal colostomy, so we decided to perform ER for the lower rectal lesion before surgical resection for the upper rectal lesion. As for the lower rectal lesion, EUS showed that the distance between the lesion and the muscle layer was too short (0.8 mm); therefore, PAEM was performed for complete resection (Fig. 3).

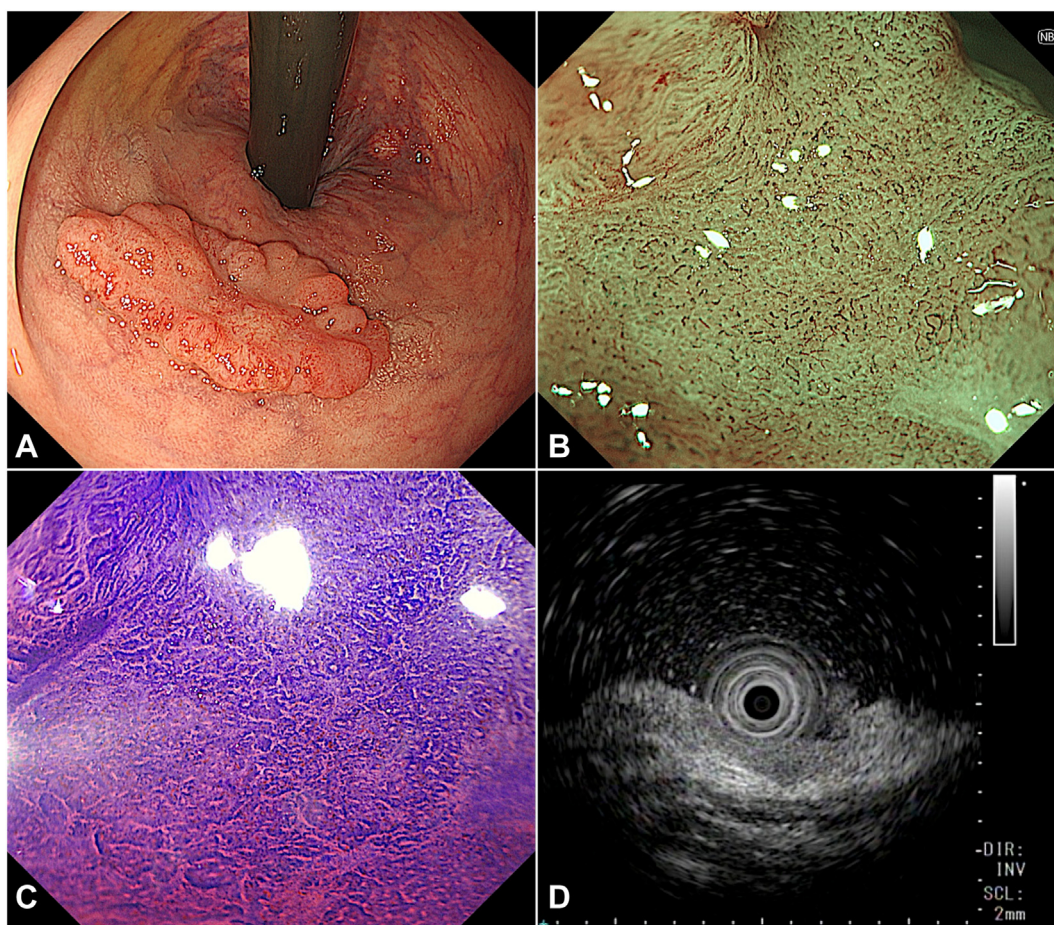
First, using the retroflexion technique, we created a mucosal flap by incising the mucosa and dissecting the submucosal layer from the oral side using DualKnife J (Olympus). Then, the inner circular muscle was incised just below the lesion, and the gap between the inner circular and outer longitudinal muscle was dissected. Finally, a circumferential incision was made and en bloc resection was completed.

Subsequently, to prevent adverse events and tumor cell implantation<sup>4</sup> from the upper rectal carcinoma, we performed EHS using SutuArt developed for endoscopic use and V-Loc 180 absorbable barbed suture (VLOCL0604; Covidien, Mansfield, Mass, USA), which is generally used for surgical procedures (Fig. 4), after washing thoroughly with saline solution. The suture was grasped with the SutuArt close to the tail of the needle so that the needle dangled freely outside the body, and it was carefully delivered into the rectum with it inside the hood. After freeing the suture and grasping the needle at the optimal site (approximately one-third the distance from the tail of the needle), the first stitch was placed on the anal side of the mucosal margin of the defect by retroflexion technique. After tightening the first suture, continuous submucosal-to-submucosal layer suturing was started from the anal side to the oral side in the longitudinal direction at an interval of approximately 5 mm. After every 2 or 3 stitches, the suture was pulled and tightened as needed. After the V-Loc 180 absorbable is tightened, it does not unravel because it is a barbed suture. Following complete and tight suturing of the ulcer, the suture was cut, and the procedure was considered complete. The duration of suturing was approximately 50 minutes.

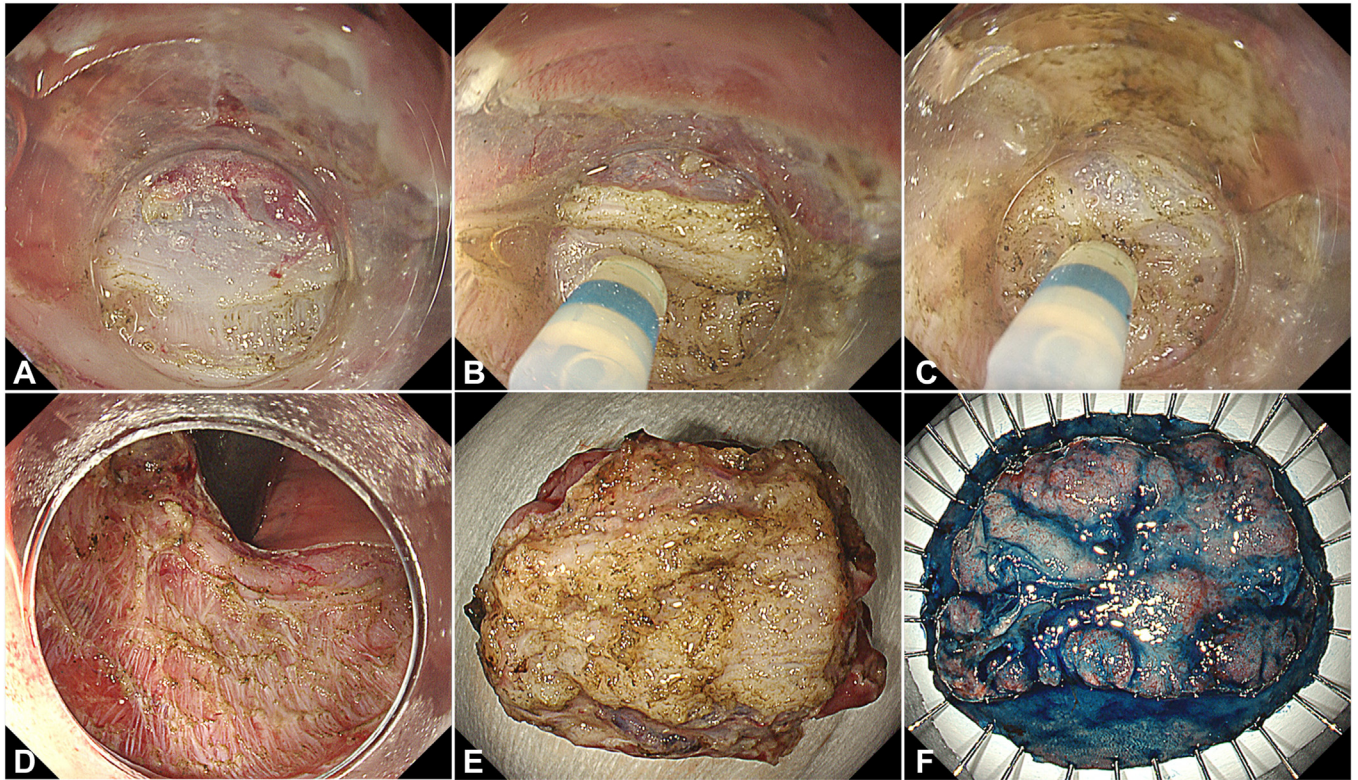
The patient did not receive any antibiotics and was discharged on postoperative day 6 without any adverse events. The final pathologic finding was deep T1 (submucosal invasion depth: 2160  $\mu$ m) adenocarcinoma with negative horizontal and vertical margins and no lymphovascular invasion (Fig. 5). Approximately 2 months after the endoscopic treatment, the patient underwent robot-assisted low anterior



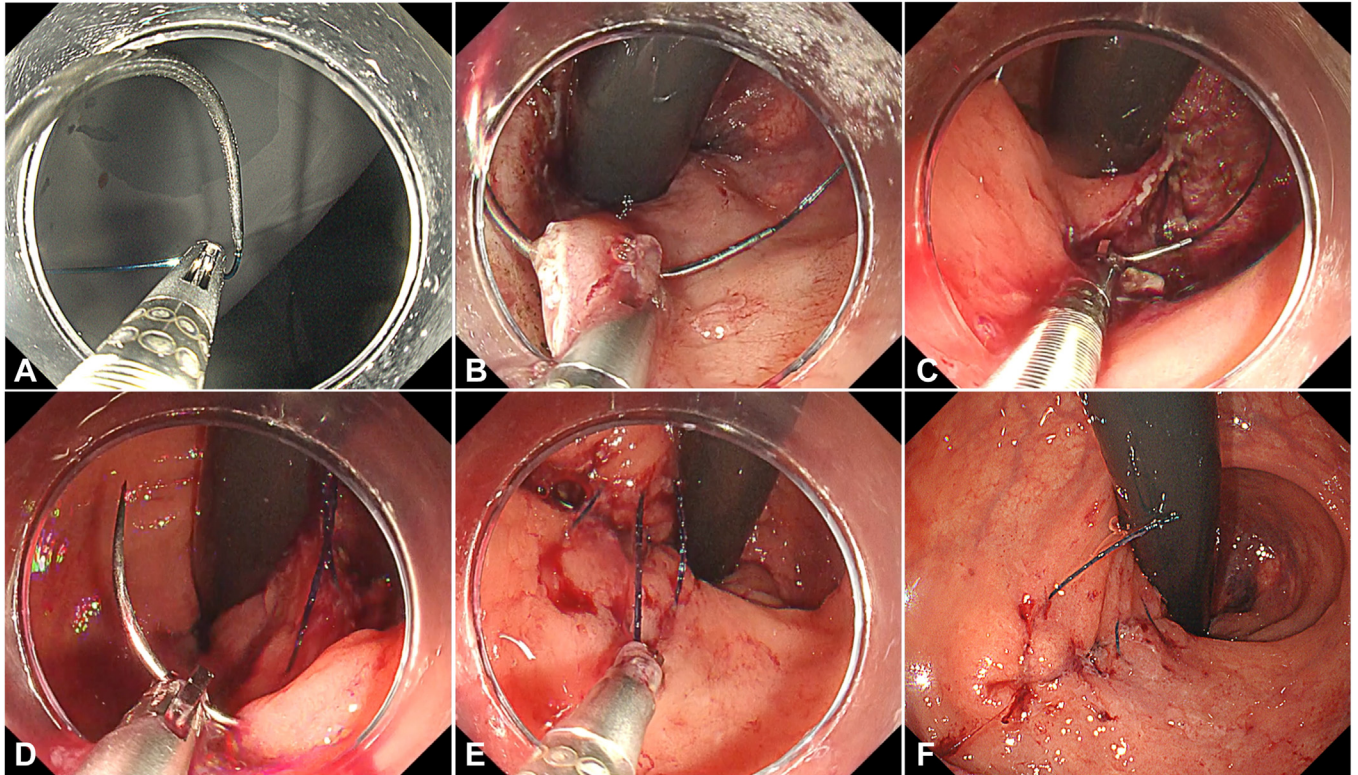
**Figure 1.** Borrmann type 1 tumor in the upper rectum.



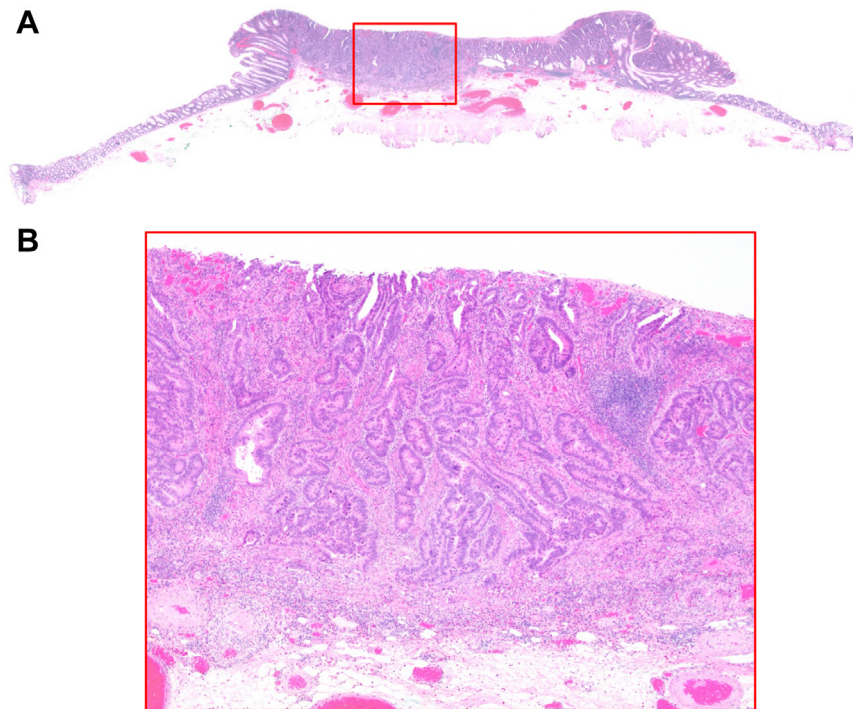
**Figure 2.** Endoscopic images of the tumor in the lower rectum. **A**, Paris type 0-IIa+IIc tumor. **B**, Narrow-band imaging showing Japan NBI Expert Team classification type 2B. **C**, Crystal violet staining showing Kudo type VI high-grade pit pattern. **D**, EUS image of hypoechoic lesion invading the deep submucosal layer.



**Figure 3.** Per-anal endoscopic myectomy procedure. **A**, The outer longitudinal muscle is visible after incision of the inner orbicularis muscle. **B**, Dissection is performed at the gap between the inner circular and outer longitudinal muscle. **C**, Dissection of the muscle gap is continued. **D**, Ulcer after per-anal endoscopic myectomy. **E**, Resected specimen from the submucosal and muscle layer side. **F**, Resected specimen from mucosal side.



**Figure 4.** Endoscopic hand-suturing. **A**, The suture is kept inside the hood and delivered into the rectum. **B**, The first stitch is placed on the anal side of the mucosal margin of the defect. **C**, The opposite side of the mucosal margin of the defect is stitched. **D**, The needle is pulled out. **E**, The defect is tightened by pulling the suture. **F**, Endoscopic hand-suturing is complete.



**Figure 5.** Pathologic image of tumor resected via per-anal endoscopic myectomy. **A**, Resected specimen includes the inner orbicularis muscle (H&E, orig. mag.  $\times 4$ ). **B**, Deep submucosal invasive carcinoma (H&E, orig. mag.  $\times 40$ ).

resection for advanced carcinoma in the upper rectum. At the time of writing this report, the patient was being followed without any adverse events or recurrences.

## DISCUSSION

We successfully completed EHS after PAEM for deep T1 carcinoma. Theoretical indications for endoscopic suturing do not include any limit for the size of mucosal defects; therefore, endoscopic suturing is assumed to be suitable for suturing mucosal defects that are too large to undergo clip closure. In addition, because complete suturing of a post-ER ulcer can be achieved by tightly tying the suture, it may be useful for preventing implantation. Although there are various types of endoscopic suturing methods, available devices vary depending on the country or region. For example, Overstitch (Apollo Endosurgery, Austin, Tex, USA), a widely used system, is not available in Japan; SutuArt is currently available. Overstitch can facilitate mechanical suturing in a short time; however, the suture is not barbed and needs to be cinched. By contrast, EHS is manual and requires delicate work; however, it can be performed with a barbed suture, which can be tightened as needed. Moreover, EHS allows flexible movement and fine control of the suturing depth, thus showing greater similarity to surgical suturing than does suturing using Overstitch. The present case was managed by a highly experienced endoscop-

ist and an assistant who received adequate training on an ex vivo hands-on model. We believe that sufficient training using a model is necessary to master this technique.

## DISCLOSURE

The authors disclosed no financial relationships relevant to this publication. This study was supported by departmental resources.

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