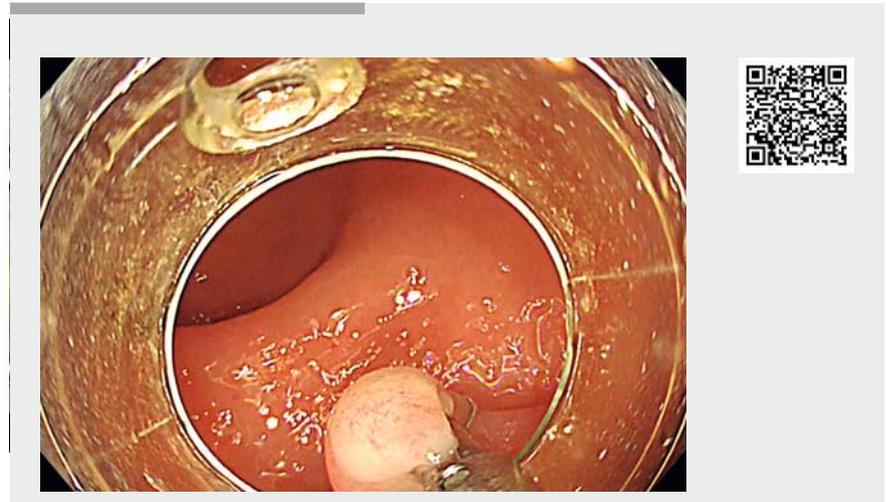


Cut the weeds and dig up the roots: clip-and-snare assisted endoscopic mucosal resection of a rectal neuroendocrine tumor

Endoscopic submucosal dissection (ESD) has been the preferred treatment of small gastrointestinal neuroendocrine tumors (NETs) (≤ 10 mm) without muscularis propria invasion [1]; however, the requirements of special instruments and complex skills have limited its widespread application [2]. In this regard, we developed a simple clip-and-snare assisted endoscopic mucosal resection (CS-EMR) technique for complete removal of a rectal NET (► **Video 1**).

A 35-year-old man was referred for endoscopic treatment of a small rectal NET (6 mm). Because the NET was seen on colonoscopy to have a flat subepithelial surface (► **Fig. 1 a**) and was evaluated on endoscopic ultrasonography (EUS) as not showing invasion of the muscularis propria, CS-EMR was used to achieve complete resection. As the transparent cap-covered single-channel endoscope, along with a pre-anchored snare, entered the rectum to target the tumor, a clip was inserted through the working channel of the endoscope and was used to grasp the mucosa adjacent to the tumor (► **Fig. 1 b**). When the NET had been well lifted by the clip and transformed into a “pedicle polyp,” the snare was released from the endoscope and completely enveloped the root of the NET (► **Fig. 1 c**). The NET was fully excised using a blended electrosurgical current (► **Fig. 1 d**), leaving a clean surgical wound (► **Fig. 1 e**). The wound was immediately closed by the lifting clip and application of a further clip (► **Fig. 1 f**). Histological examination of the resected specimen revealed a G1 NET with negative margins (► **Fig. 2**). Unlike the previously reported grasp-and-snare EMR, which requires a dual-channel endoscope to deploy a snare and



► **Video 1** Clip-and-snare assisted endoscopic mucosal resection of a rectal neuroendocrine tumor. A reopenable clip is used to lift the flat lesion away from the muscularis propria, allowing a preloaded snare to encircle the resulting “polyp” root below the clip and endoscopically resect it. The surgical wound is closed by clips.

a biopsy forceps through each channel [3], this CS-EMR needs only a single-channel endoscope. Unlike with the “underwater” EMR technique, which may be affected by blind vision once bleeding occurs [4], the CS-EMR has no risk of causing bleeding before resection. Therefore, the easy and safe CS-EMR technique is a promising alternative to replace ESD in the treatment of small NETs.

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Competing interests

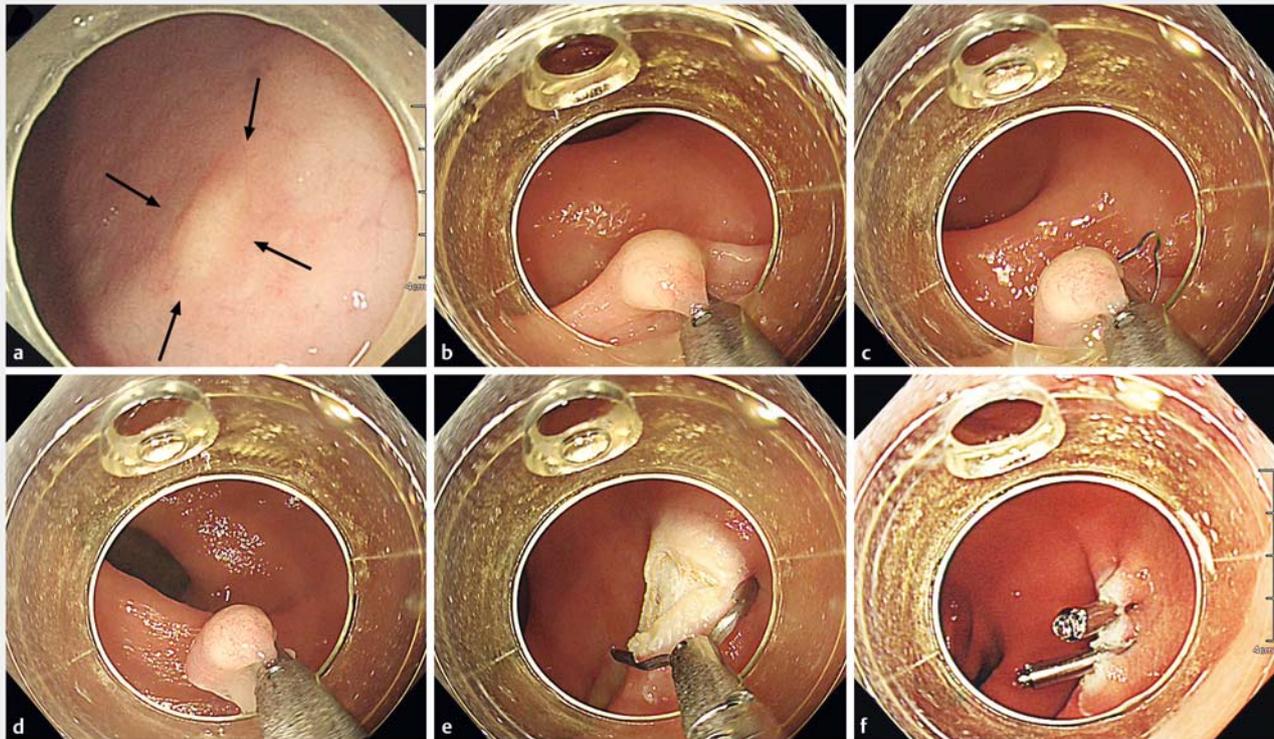
The authors declare that they have no conflict of interest.

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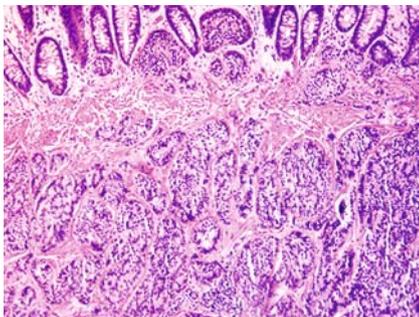
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► **Fig. 1** Endoscopic treatment of a rectal neuroendocrine tumor (NET) using the clip-and-snare assisted endoscopic mucosal resection (CS-EMR) technique. **a** Colonoscopy showed a subepithelial lesion (arrows) with typical NET features of poorly protruded surface and superficial yellowish mucosa. **b** The clip gently clamped and pulled the lesion toward the endoscope to separate it from the muscularis propria. **c** The snare was advanced beneath the clip and tightly trapped the root of the lesion. **d** The lesion was resected with standard polypectomy settings. **e** A clean surgical wound was displayed. **f** The surgical wound was perfectly closed with only two clips.



► **Fig. 2** Histological appearance confirming the resected specimen as a G1 neuroendocrine tumor with negative margins.

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