

Underwater endoscopic mucosal resection for recurrences after previous piecemeal resection of colorectal polyps (with video)

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Background: Conventional endoscopic treatment of a recurrent adenoma after piecemeal EMR (PEMR) of a colorectal laterally spreading tumor (LST) is technically difficult with low en bloc resection rates because of the inability to snare fibrotic residual.

Objective: To assess the feasibility of salvage underwater EMR (UEMR) for the treatment of recurrent adenoma after PEMR of a colorectal LST.

Design: Retrospective, cross-sectional study.

Setting: Single, tertiary-care referral center.

Patients: Patients who have recurrent adenoma after PEMR of colorectal LST (≥ 2 cm).

Interventions: UEMR versus EMR.

Main Outcome Measurement: En bloc resection rate, endoscopic complete removal rate, recurrence rate on follow-up colonoscopy, adjunctive ablation rate with argon plasma coagulation (APC) during salvage procedure, and independent predictive factors for successful en bloc resection and endoscopic complete removal.

Results: Eighty salvage procedures (36 UEMRs vs 44 EMRs) were analyzed. En bloc resection rate (47.2% vs 15.9%, $P = .002$) and endoscopic complete removal rate (88.9% vs 31.8%, $P < .001$) were higher in the UEMR group than in the EMR group. APC ablation of visible residual during salvage procedure was lower in UEMR group than EMR group (11.1% vs 65.9%, $P < .001$). Recurrence rate on follow-up colonoscopy was significantly lower in the UEMR group than the EMR group (10% vs 39.4%, $P = .02$). UEMR was an independent predictor of successful en bloc resection and endoscopic complete removal.

Limitations: Retrospective, single-center study.

Conclusions: UEMR can be a useful and feasible technique as a salvage procedure for recurrent colorectal adenoma after PEMR. (Gastrointest Endosc 2014;80:1094-102.)

Resection of large sessile or flat colorectal polyps (≥ 2 cm), also called lateral spreading tumors (LSTs), can be performed en bloc by endoscopic submucosal dissection

(ESD) or by piecemeal EMR (PEMR), depending on the size, availability of technical expertise, and location of a particular lesion.¹ ESD enables resection of most mucosal

Abbreviations: APC, argon plasma coagulation; CI, confidence interval; ESD, endoscopic submucosal dissection; LST, laterally spreading tumor; OR, odds ratio; PEMR, piecemeal EMR; UEMR, underwater EMR.

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neoplasms and tumors with superficial submucosal invasion regardless of size and shape and has the advantage of low local recurrence rates compared with PEMR.^{2,3} However, ESD for colorectal lesions has several disadvantages including significant technical difficulty, longer procedure times, and an increased risk of perforation compared with conventional PEMR.^{2,4} PEMR, therefore, remains a popular modality for endoscopic management of colorectal LSTs, especially in Western countries where expertise in ESD is not widely available.^{2,5,6} However, this approach is associated with a significant risk of recurrence, likely because of microscopic areas of residual tumor at the borders between resected pieces. Adenoma recurrence rates as high as 50% have been reported after PEMR for colorectal LST.^{3,7-12} There is a paucity of published data on the efficacy and safety of additional salvage endoscopic interventions for recurrent adenomas after PEMR.

Treatment of a recurrent adenoma after PEMR for colorectal LST is technically challenging. Fibrosis that develops at the resection site after PEMR prevents elevation of recurrent lesions with submucosal fluid injection. Submucosal injection during conventional EMR may paradoxically hinder attempts to grasp the lesion with a snare because the surrounding normal mucosa elevates around the nonlifting lesion, thereby increasing the propensity of the snare to slip over the lesion as it is closed. ESD is also difficult to perform in this setting because submucosal fibrosis makes it difficult to separate the adherent recurrence from the underlying muscle. Risks of specimen fragmentation or perforation are consequently high. Previous studies report low successful en bloc resection rates for recurrent adenomas after PEMR, regardless of whether EMR (39%) or ESD (56%) is used.¹¹

Underwater EMR (UEMR) is a new technique for piecemeal resection of large colorectal polyps that eliminates the need for submucosal injection.^{13,14} The UEMR technique was inspired by the observation on EUS that with partial distention of the colon with water, the colonic muscularis propria remains circular, whereas the mucosa and submucosa involute. The colonic folds seen underwater correspond to involuted mucosa and submucosa that appear to float over the muscularis propria and can safely be grasped and snared without perforating the muscle.¹³ Although the UEMR technique was developed for initial treatment of colon adenomas, not treatment of recurrences, anecdotal experience with the technique led us to hypothesize that UEMR would facilitate snaring and removal of recurrent adenomas with fibrosis after PEMR.

METHODS

Patients

This was a retrospective, cross-sectional study. The study was approved by the Stanford University Institu-

Take-home Message

- Underwater EMR (UEMR) is a promising technique for salvage treatment of adenomas that recur after piecemeal resection.
- Compared with EMR of these difficult lesions, UEMR is associated with a higher en bloc resection rate, a higher endoscopically complete resection rate, and fewer recurrences.

tional Review Board. Electronic records of all patients referred to an interventional colonoscopy clinic for recurrence after PEMR of colorectal LSTs between January 2009 and March 2014 were reviewed. During this period, conventional EMR was performed until May 2012, when UEMR was introduced, and UEMR was performed for recurrent lesions after May 2012.¹³ Recurrent lesions smaller than 8 mm were excluded as they could easily be removed by hot biopsy forceps if difficulty with snare polypectomy was encountered.

Procedures

All procedures were performed on an outpatient basis. The colonoscopies were performed by an endoscopist with extensive experience in EMR who has performed more than 1000 EMR procedures. Colonoscopies were performed with the patient under conscious sedation with nurse-administered intravenous midazolam and fentanyl. Procedures were performed by using a high-definition colonoscope (Pentax EC-3490L; Pentax, Montvale NJ or Olympus pcfH180; Olympus, Center Valley, Pa) with a high-definition processor (Pentax EPK-I HD or Olympus CV-180 Exera). A cap (Olympus D-201) was placed on the distal end of the colonoscope to facilitate endoscopic resection in both groups. Lesion size was estimated by opening a snare of known dimensions adjacent to the lesion. Location of the lesion was categorized as proximal (cecum to splenic flexure) or distal (descending colon to rectum). Lesion morphology was described by using the Paris classification.¹⁵

Conventional EMR was performed by using a stiff snare (Traxtion; US Endoscopy, Mentor, Ohio, or SD-230 or SD-210; Olympus) after submucosal injection of saline solution or 1.5% hyaluronate. Both solutions were mixed with a few drops of indigo carmine for staining. Caution settings were not standardized.

UEMR was performed in a uniform, standardized fashion according to the referential study.¹³ After reaching the recurrent adenoma, air was evacuated from the affected segment of lumen by suctioning through the colonoscope. Subsequently, between 500 mL and 1 L of sterile water was infused until adequate luminal filling was achieved for lesion visualization, without over distention. The margins of the recurrent lesion were identified by using high-definition narrow-band imaging or i-Scan;

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