Underwater EMR of adenomas of the appendiceal orifice (with video)

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Background and Aims: EMR of adenomas involving the appendiceal orifice (AO) is controversial because of a high risk of perforation and incomplete resection. We evaluated the feasibility, safety, and outcomes of underwater EMR (UEMR) without submucosal injection for the treatment of adenomas involving the AO.

Methods: This was a prospective, observational study of a standardized UEMR technique without submucosal injection for adenomas involving the AO in 27 consecutive patients meeting inclusion and exclusion criteria. Surveillance colonoscopy included biopsy sampling of the EMR site and base of the AO. Main outcome measurements include technical success, histology, resection time, adverse events, and follow-up data.

Results: Over 42 months, UEMR of adenomas involving the AO (rim, 5 patients; inside, 22 patients) was attempted in 27 consecutive patients. Median adenoma size was 15 mm (range, 8 to 50). UEMR was successful in 24 patients (89%). Four patients were referred to surgery, 3 with UEMR failure because of an inability to exclude the adenoma extending into the appendix at the index procedure and 1 with invasive adenocarcinoma in the UEMR specimen. The median resection time was 3 minutes (range, 1 to 75). Adverse events consisted of postpolypectomy syndrome in 2 patients (7%). There was no perforation, bleeding requiring transfusion, or appendicitis. Final histology was tubular adenoma (7), tubulovillous adenoma (4), sessile serrated adenoma (15), and invasive adenocarcinoma (1). Twenty-one of 23 patients (91%), not referred to surgery, had follow-up colonoscopy with biopsy sampling of the resection site after a median of 29 weeks (range, 12 to 139) after resection. Residual adenoma was found in 2 of 21 patients (10%).

Conclusion: On an intention-to-treat basis, UEMR without submucosal injection enabled safe and complete endoscopic resection of AO lesions. Close surveillance for residual or recurrence is warranted. (Clinical trials registration number: NCT01750619.)

(footnotes appear on last page of article)

EMR of polyps involving the appendiceal orifice (AO) is technically challenging and carries a high risk of perforation because of a thin wall and the absence of the muscularis propria at the insertion of the appendix.[1] When we use the standard EMR technique, insufflation of the lumen with gas further thins out the wall, and submucosal injection may not create the desired "lift" effect.[2] We previously reported on underwater EMR (UEMR) of large sessile colorectal and duodenal adenomas without the need for saline solution injection.[3,4] Similar to our observation that adenomas appear to "float" in a relatively contracted lumen filled with water, we observed that the AO appears to prolapse into the cecal lumen, making it more accessible for EMR. We performed a pilot observational study to determine if the underwater method facilitates and enables the safe removal of AO polyps.

This video can be viewed directly from the GIE website or by using the QR code and your mobile device. Download a free QR code scanner by searching "QR Scanner" in your mobile device's app store.

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METHODS

Patients

Between August 2011 and January 2015 a prospective observational study was conducted with consecutive

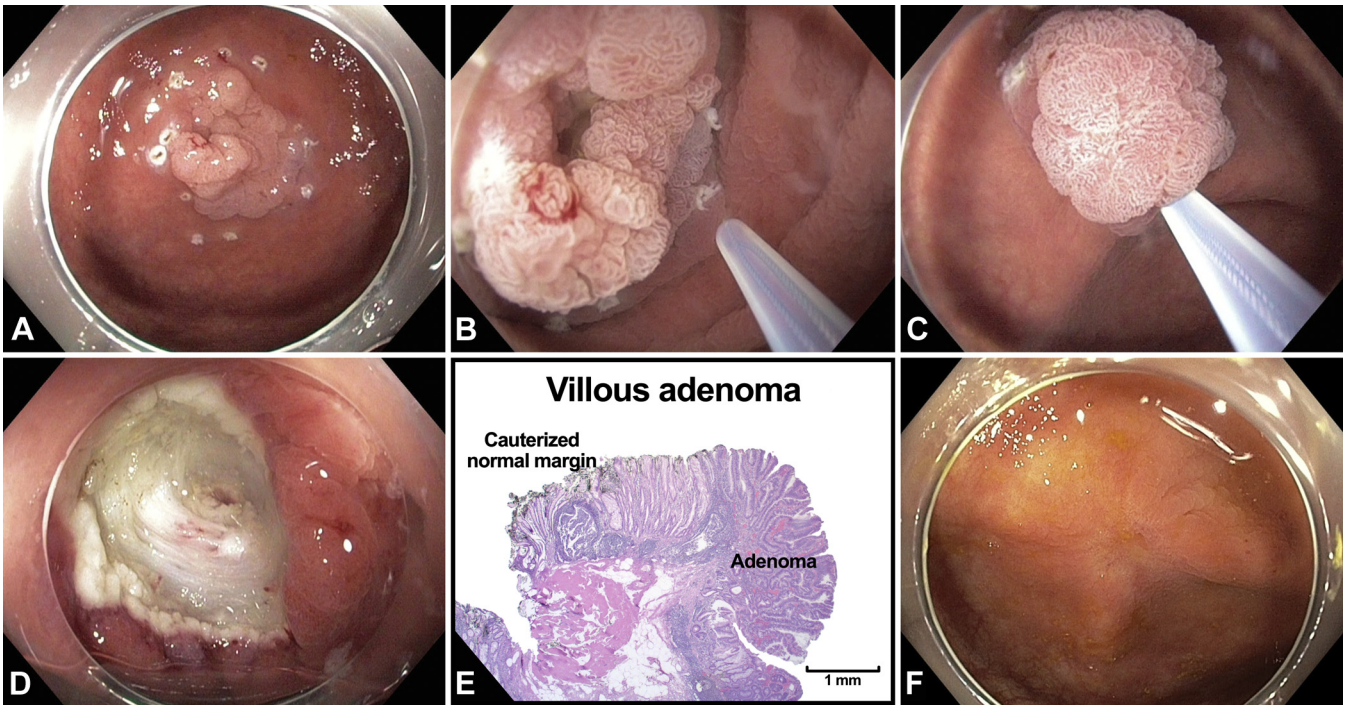

Figure 1. Endoscopic images showing underwater en bloc resection of a 15-mm appendiceal orifice (AO) adenoma, granular-type, Is + IIa, extending into the AO. **A,** View with gas insufflation showing diathermic markings around the perimeter. **B,** View with water submersion showing lesion contracted and "floating" with snare positioned along the perimeter. **C,** View with water submersion showing snare closed at the base of the lesion. **D,** View with gas insufflation after resection. **E,** Histopathology showing a villous adenoma. **F,** Appearance at 6-month follow-up. Biopsy specimens from the postresection scar site were negative for adenoma.

patients undergoing UEMR of AO adenomas. Inclusion criteria for the study cohort were (1) location at the rim of or extending into the AO, (2) confirmed adenoma on prior biopsy sample or suspected adenoma on endoscopy, (3) benign appearance on high-definition endoscopy without stigmata of malignancy (ulceration, bleeding, induration, Kudo pit pattern[5]), and (4) sessile/laterally spreading, non-pedunculated polyp.

The study protocol was approved by our Institutional Review Board. All patients provided separate informed consent for the procedure and for inclusion in the study.

Procedures

All procedures were performed on an outpatient basis. Patients received deep sedation administered by an anesthesiologist. Endoscopy was performed with a high-definition colonoscope equipped with an auxiliary water jet (GIF-H190AL; Olympus Medical, Center Valley, Pa). A translucent cap (model D-201-15004; Olympus Medical) was mounted on the tip of the endoscope. The Paris endoscopic classification of superficial neoplastic lesions was used.[6] Adenoma size was measured using an open snare. Successful UEMR was defined as complete resection confirmed by the endoscopic absence of adenomatous tissue after inspection with high-definition white-light and narrow-band imaging (Fig. 2B). Resection time was defined as the time from insertion of the snare to complete resection of the lesion. Bleeding was defined as "early" if it occurred within 24 hours and "delayed" if it occurred more than 24 hours after completion of the endoscopic procedure. Procedural bleeding was not recorded as an adverse event if endoscopic hemostasis was successful.

UEMR technique

The UEMR technique (Figs. 1, 2, Video 1, available online at www.giejournal.org) was developed by K.F.B. and performed in a uniform, standardized fashion. Sterile water was infused until complete lumen filling was achieved (Fig. 2A). For lesions larger than 15 mm, diathermic markings with argon plasma coagulation or the tip of a closed snare were made within 1 to 2 mm of the edge of the adenoma using a 7F probe (.8 flow, 30 Watts; Erbe, Marietta, Ga) (Fig. 1A). EMR was performed with a stiff-wire snare (15 mm and 25 mm AcuSnare; Cook Medical, Winston-Salem, NC; or Captivator II; Boston Scientific, Marlborough, Mass) using blended current (DRYCUT, effect 5, 60 Watts, Erbe) (Figs. 1B, C, Fig. 2C). The snare, which exited at the 6 o'clock position, was opened and positioned to include normal mucosa at the margins identified by the diathermic dots. A "torque and crimp" technique was used to maximize tissue capture: the opened snare was pushed flush against the bowel wall and torqued to engage a pleat of tissue. The snare was closed and current applied to transect the captured