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INNOVATION FORUM AND EXPERIMENTAL ENDOSCOPY

Underwater Endoscopic Mucosal Resection of Large Duodenal Adenomas (Video) [☆]

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Abstract

Background and aims: Endoscopic mucosal resection (EMR) is a well-established method for the removal of neoplastic polyps throughout the GI tract. EMR typically involves insufflation of the lumen using air or CO₂, followed by submucosal lifting of a polyp to minimize the risk of deep tissue injury and perforation, followed by hot-snare polypectomy. Underwater endoscopic mucosal resection (UEMR) is a new technique that uses water to enable lesion visualization in a lumen that is not distended by air or CO₂, followed by piecemeal hot-snare resection of large mucosally-based neoplasms. UEMR does not require submucosal injection to create a fluid cushion. Very few published examples of UEMR in the duodenum exist. This video case series describes the use of UEMR for the resection of several large duodenal adenomas.

Procedure: Underwater endoscopic mucosal resection was utilized for the removal of several large duodenal adenomas.

Results: Three duodenal lesions ranging from 1.8 cm to 5 cm were successfully resected by UEMR. The mean time for resection was 18 min. There were no adverse events.

Conclusions: UEMR is an efficacious technique for the resection of large mucosally-based neoplasms of the duodenum.

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Video related to this article

Video related to this article can be found online at <http://dx.doi.org/10.1016/j.vjgien.2015.02.002>.

1. Background

- Endoscopic mucosal resection (EMR) is a well-established method for removing mucosally-based neoplasms from

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the insufflated luminal GI tract [1,2]. EMR traditionally requires submucosal injection to create a fluid cushion that lifts a mucosally-based lesion off of the muscularis propria, thereby enabling safe and effective mucosal resection. While EMR (or saline-assisted polypectomy) reduces the risk of perforation, it requires additional devices (such as injector needles) and likely adds time to already complex procedures.

- UEMR is a new technique that uses water immersion to visualize mucosally-based lesions in the decompressed luminal GI tract without use of air or CO₂ insufflation. A low-profile cap is used to aid in underwater visualization and manipulation of mucosal folds. Because the lumen is not markedly distended, the adenomatous mucosal folds are invaginated and not flattened against the muscularis propria, which is the premise behind the efficacy and safety of the UEMR technique. As a result, UEMR enables the safe resection of large mucosally-based lesions without submucosal lifting.

2. Aim of the study

- To describe and illustrate the technique of UEMR for the resection of duodenal adenomas.

3. Patients and methods

- Case series
- Inclusion criteria: patients undergoing UEMR of duodenal lesions

4. Statistical analysis

- This was a descriptive study but mean values were reported.

5. Technical review

5.1. Study Materials, endoscopic equipment and devices

- Diagnostic gastroscope with waterjet affixed with a low-profile, soft, distal-attachment cap (Olympus America, Center Valley, PA)
- A 15-mm crescent-shaped “Duck-bill” snare (Cook Medical, Winston-Salem, NC)
- ERBE VIO 300D electrosurgical generator set at DryCut 60 W for UEMR (ERBE, Marietta, GA)

6. Endoscopic procedure

- The method of UEMR for colorectal and duodenal polyps was first described by Dr. Kenneth F. Binmoeller and colleagues [3,4] and later by Dr. Andrew Y. Wang and colleagues [5,6].
- This case series utilized UEMR to resect large duodenal adenomas, which did not involve the major or minor papillae.

7. Results

- Three successful cases of duodenal adenoma resection utilizing UEMR technique
- No adverse events
- Mean time for duodenal adenoma resection was 18 min

8. Discussion

These cases demonstrate the successful resection of duodenal adenomas using UEMR. There have been very few published series about UEMR, but these articles have demonstrated that it is effective, safe, and easily learned [3,4,6]. Binmoeller et al. demonstrated successful removal of 100% of colorectal lesions [4] and 92% of duodenal lesions [3]. Wang et al. [6] demonstrated a success rate of 97.7% by using UEMR to resect large colorectal polyps. The only adverse events reported from UEMR of colorectal lesions have been delayed bleeding. In the only series published on UEMR for duodenal lesions, Binmoeller et al. [3] demonstrated a 25% risk of delayed bleeding (3/12 cases performed).

To date, all data about UEMR have come from expert endoscopists at single centers, so it is not known if these very positive results would be reproducible in most settings by other endoscopists. Further multicenter studies are required to examine if this promising technique is generalizable.

9. Take-home messages

UEMR is a safe and efficacious technique for removal of duodenal polyps and should be considered as an alternative to conventional saline-assisted EMR.

10. Tips and tricks

- Use of a transparent low-profile distal attachment cap is essential to proper visualization during UEMR.
- While any snare could be used for UEMR, a crescent-shaped snare enables better approximation of curved or straight portions of a polyp as compared to a traditional oval-shaped snare.

11. Scripted voiceover

Voiceover text

The following demonstrates 3 cases of duodenal polyp resection utilizing underwater EMR, “UEMR”. Binmoeller and colleagues first described UEMR in the colon and rectum in the journal *Gastrointestinal Endoscopy* in 2012, and its use in the duodenum in that same journal in 2013. Our group has further described UEMR in the colon and rectum in the journal *Surgical Endoscopy* in 2014.

Lesion 1

A 15-mm duck-bill snare and DryCut current at 60 W using an ERBE generator was used for all piecemeal UEMR.

Voiceover text

The first case demonstrates resection of a 4-cm lesion in the third part of the duodenum.

CO₂ is removed and water infused until filling of the lumen is achieved. The water is used only to enable visualization and by leaving the lumen decompressed the neoplastic mucosal tissue can safely be resected off the muscularis propria.

Using a duck-bill snare the polyp is removed in a piecemeal fashion using cutting current.

Procedures were done with a high-definition forward-viewing gastroscope with waterjet capability that was fitted with a soft, low-profile, transparent cap.

The crescent shape of the duck-bill snare enabled easy grasping of polyp borders. Depending on the lesion either the curved or the straight side of the snare was used for traction.

As the lumen is filled with water oozing from small vessels cannot clot, which enables easier treatment of these vessels should bleeding not cease spontaneously.

Care was taken to avoid any mucosal islands during piecemeal UEMR.

UEMR is successfully completed in 6-and-a-half minutes.

Lesion 2

The second case demonstrates UEMR of a 1.8 cm lesion located on the lateral wall of the second portion of the duodenum. This is a difficult location to work on with both a forward viewing endoscope and a duodenoscope. UEMR decompresses the lumen and mucosal folds come towards the endoscope. This makes resection at these difficult locations easier.

As previously demonstrated, after carbon dioxide is removed and water infused UEMR is completed in a piecemeal fashion.

In this case, UEMR is completed in 8 min.

Three-month follow-up EGD shows well-healed mucosa without obvious evidence of dysplasia with use of white light as well as NBI. Biopsy confirmed no residual adenoma.

Lesion 3

The last case demonstrates resection of a 5-cm lesion in the second part of the duodenum. It encompassed one-third of the duodenal wall. NBI was consistent with adenoma.

Using the duck-bill snare UEMR was completed in a piecemeal fashion.

In all cases, ins and outs were carefully recorded, and in each case the ins and outs were nearly matched with less than 500 ml of water administered per the upper GI tract by the conclusion of each procedure. This is important, as water intoxication has been described in upper GI tract following UEMR.

UEMR was successfully completed in 40 min, and the use of white light and NBI showed no residual adenoma.

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Conflict of interest

Dr. Wang has no relevant conflicts of interest regarding this research or this manuscript, but he does disclose that he received research support from Cook Medical on the topic of metal biliary stents. Dr. Flynn has no conflicts of interest to disclose.

Human and animal rights

The work described in this article has been carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans. The risks, benefits, and alternatives of UEMR were discussed with each of these patients prior to his or her procedure. Informed consent was obtained prior to all UEMR procedures.

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