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Contents

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EXPERT RECOMMENDATIONS

MINIREVIEWS

ORIGINAL ARTICLE

Clinical and Translational Research

Retrospective Cohort Study

Retrospective Study

Observational Study

World Journal of Clinical Cases

Semimonthly Volume 8 Number 14 July 26, 2020

Contents

World Journal of Clinical Cases

Semimonthly Volume 8 Number 14 July 26, 2020

Contents

World Journal of Clinical Cases

Semimonthly Volume 8 Number 14 July 26, 2020

Contents

ABOUT COVER

Editorial Board Member of *World Journal of Clinical Cases*, Dr. Iva Brčić finished medical studies at the Medical University of Graz and received her MD degree in 2003. She received her doctoral degree in 2006 at the same institution. In 2007, she enrolled in the pathology residency program at the University Hospital Center Zagreb. In 2012, she passed her board exam and, until 2015, worked as a staff pathologist at the University Hospital Center Zagreb. From 2015, she is working as the University Assistant at the Medical University of Graz. At the end of 2017, she joined the bone and soft tissue team and spent 4-mo observership at the University of Miami, FL, USA. Her ongoing research interests include bone and soft tissue neoplasms.

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CASE REPORT

Underwater endoscopic mucosal resection for neoplasms in the pyloric ring of the stomach: Four case reports

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Author contributions: Kim DH and Park SY conceived and designed the study, reviewed the literature, and contributed to manuscript drafting; Park CH and Kim HS contributed to manuscript drafting; Choi SK reviewed the cases and edited the manuscript; all authors issued final approval for the version to be submitted; all authors approved the manuscript for publication.

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Abstract

BACKGROUND

Tumors located in the pylorus are technically more complex to resect by endoscopic resection, as the anatomical characteristics of this region can affect the adequate assessment of margins and performance of the procedure. We reported the results of underwater endoscopic mucosal resection (UEMR) of benign mucosal neoplasms located in the pyloric ring.

CASE SUMMARY

This case series describes 4 patients with 4 mucosal neoplasms located in the pyloric ring. The diameter of each neoplasm was less than 15 mm. We performed UEMR for the lesions. Water immersion enabled slight floating of the lesions, resulting in easy identification. We achieved en bloc resection with a snare and electrosurgical unit. All procedure were performed within 3 min without adverse events. Pathologic examination showed low-grade dysplasia with clear resection margins in one case and hyperplastic polyps in three cases.

CONCLUSION

UEMR can be an effective and safe treatment method for neoplasms in the gastric pyloric ring.

Key words: Duodenoscopy; Endoscopic mucosal resection; Neoplasm; Pylorus; Stomach; Case report

Core tip: We present four patients who underwent underwater endoscopic mucosal resection (UEMR) for the resection of neoplasms in the pyloric ring. UEMR for neoplasms

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in the pyloric ring has benefits similar to those of UEMR for colonic neoplasms: (1) Superficial lesions float into the snare as protruding lesions in underwater conditions; (2) UEMR decreases thermal damage; (3) Submucosal vessels usually remain within the resection wound, as the resection plane is superficial; and (4) The pyloric narrow lumen is constantly distended, retaining enough working space. Our case series suggested the potential of UEMR for treating neoplasms in the pyloric ring.

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INTRODUCTION

Performing endoscopic resection for tumors located in the pyloric ring is technically more difficult, as the anatomical characteristics of this region can affect the adequate assessment of margins and the working space for the procedure. Moreover, peristaltic movements of the peripyloric muscles are aggravated by submucosal injection or thermal stimuli during endoscopic procedures, preventing meticulous dissection of the lesion. These technical difficulties may be associated with incomplete resection of tumors and an increase in local recurrence and adverse events. Recently, underwater endoscopic mucosal resection (UEMR) was suggested by Binmoeller *et al*[1], which has been used in the treatment of challenging lesions in the duodenum and colorectum near the appendiceal orifice and dentate line; UEMR has shown good treatment results with a high complete resection rate and low adverse event rate[2-5]. UEMR has also been adapted for recurrent or residual lesions after endoscopic resection[6,7]. Here, we reported our experience of using UEMR for benign mucosal neoplasms located in the pyloric ring. To our knowledge, it is the first report on the effectiveness of UEMR for tumors in the pyloric ring.

CASE PRESENTATION

Chief complaints

Gastric neoplasms on pyloric ring.

History of present illness

Four patients diagnosed with gastric neoplasms on pyloric ring through screening endoscopy.

History of past illness

All four patients had no underlying disease that could promote bleeding or medications to promote bleeding.

Physical examination upon admission

All patients had no abnormal findings on physical examination.

Laboratory examinations

In all patients, hemoglobin level, platelet count, activated partial thromboplastin time, and prothrombin time were all within normal range.

Process of performing underwater endoscopic mucosal resection

We performed UEMR for 4 patients with 4 mucosal neoplasms located in the pyloric ring. For moderate sedation, balanced sedation was performed in case 1, 3 and 4. Patients received initial intravenous induction of 25 mg pethidine and 0.05 mg/kg midazolam. After 2 min, intravenous propofol (10-20 mg increments) was given repetitively, to achieve an adequate sedation level. In case 2, the endoscopic procedure was consciously performed with an initial intravenous bolus administration of 25 mg

pethidine. We used cap-assisted duodenoscopy with narrow-band imaging and a water jet pump device (GIF HQ290, Olympus). All endoscopic procedures were performed with the patient in the left lateral decubitus position. The stomach and the duodenal bulb were initially collapsed by aspiration, followed by instillation of 200-400 mL of water into the antrum and duodenal bulb. After performing UEMR, we removed instilled water as soon as possible to reduce the risk of aspiration pneumonia. The diameter of each neoplasm was less than 15 mm. We achieved *en bloc* resection with a crescent-type snare (Olympus device) and electrosurgical unit (VAIO 300D, ERBE Co. Ltd., Tubingen, Germany) with a high-frequency generator in all 4 patients. The settings of the VAIO 300D were as follows: Endocut-Q, effect 2, incision time 3, and incision interval 5. In a 48-year-old woman (Case No. 1), a 10-mm sized Yamada type III polyp on the pyloric ring of the stomach could not be entirely visualized using forward-viewing endoscopes (Figure 1). However, water infusion enabled slight floating of the lesion, and it was easily identified and grasped using a snare. A 64-year-old woman (Case No. 2) presented with a 7-mm sized Yamada type II polyp on the pyloric ring of the stomach. UEMR was performed in the same way as in the first case. In a 50-year-old man (Case No. 3), water infusion enabled slight floating of the lesion, and it was easily grasped using a snare (Figure 2). Finally, in a 60-year-old woman (Case No. 4), a 10-mm sized Yamada type II polyp was successfully removed by UEMR. All procedures were performed within 3 min without adverse events. Pathologic examination showed low-grade dysplasia with a clear resection margin in Case No. 3 and hyperplastic polyps in the other three cases (Table 1).

FINAL DIAGNOSIS

Mucosal neoplasm in the pyloric ring of the stomach.

TREATMENT

Underwater endoscopic mucosal resection.

OUTCOME AND FOLLOW-UP

UEMR was successfully performed within 3 min without adverse events in 4 patients with a mucosal neoplasm in the pyloric ring. All patients were discharged without any adverse events after the procedure.

DISCUSSION

It is difficult to achieve complete resection of tumors located in the pyloric ring using conventional endoscopic mucosal resection (EMR) or endoscopic submucosal dissection (ESD) due to limited working space, incomplete visualization using forward-viewing endoscopes, and peristaltic contractions of the lesion. These technical difficulties may lead to an increase in local recurrence[8]. To overcome incomplete visualization of the entire tumor or to determine the distal tumor margin, retroflexion maneuvers in the duodenum are suggested for the management of tumors in the pyloric ring. Another option is transnasal endoscope-assisted endoscopic resection, which enables submucosal tissue retraction to visualize the cutting line and increase the rate of complete resection[8-10]. However, these techniques need highly advanced endoscopic skills and facilities.

Our case series suggested the potential of UEMR for the treatment of neoplasms located in the pyloric ring. UEMR, with a relative short procedure time and low rate of adverse events, does not require high technical skills in endoscopic procedures[6]. UEMR for the management of neoplasms in the pyloric ring has benefits similar to those of UEMR for colorectal neoplasms: (1) Superficial lesions float into the snare as protruding lesions in underwater conditions; (2) UEMR decreases the thermal damage to the gastrointestinal wall, which helps prevent delayed perforation; and (3) The resection plane in UEMR is superficial; thus, the submucosal vessels usually remain within the resection wound, whereas in conventional EMR, the submucosal vessels are

Table 1 Patient characteristics

Case No.	Age (yr)/sex	Neoplasm diameter	Yamada classification	Location of the lesion	Procedure time (s)	*En bloc* resection	Pathology
1	48/Female	10 mm	III	LC-AW	129	Yes	Hyperplastic polyp
2	64/Female	7 mm	II	PW	169	Yes	Hyperplastic polyp
3	50/Male	10 mm	I	GC	147	Yes	Low-grade dysplasia
4	60/Female	10 mm	II	PW	144	Yes	Hyperplastic polyp

AW: Anterior wall; GC: Great curvature; LC: Lesser curvature; PW: Posterior wall.

disrupted[2]. Moreover, the narrow pyloric lumen is constantly distended, resulting in sufficient working space.

Even though our case series included patients with neoplasms less than 15 mm in diameter located in the pyloric ring, UEMR for mucosal neoplasms involving the pyloric ring can be expected to have advantages over conventional EMR or ESD. Further studies are needed to elucidate the effectiveness and safety of UEMR for larger mucosal neoplasms located in the pyloric ring.

CONCLUSION

UEMR can be an effective and safe treatment method for lesions in the pyloric ring of the stomach. Further studies are needed to elucidate the effectiveness and safety of UEMR for variable-sized mucosal neoplasms in the pyloric ring.

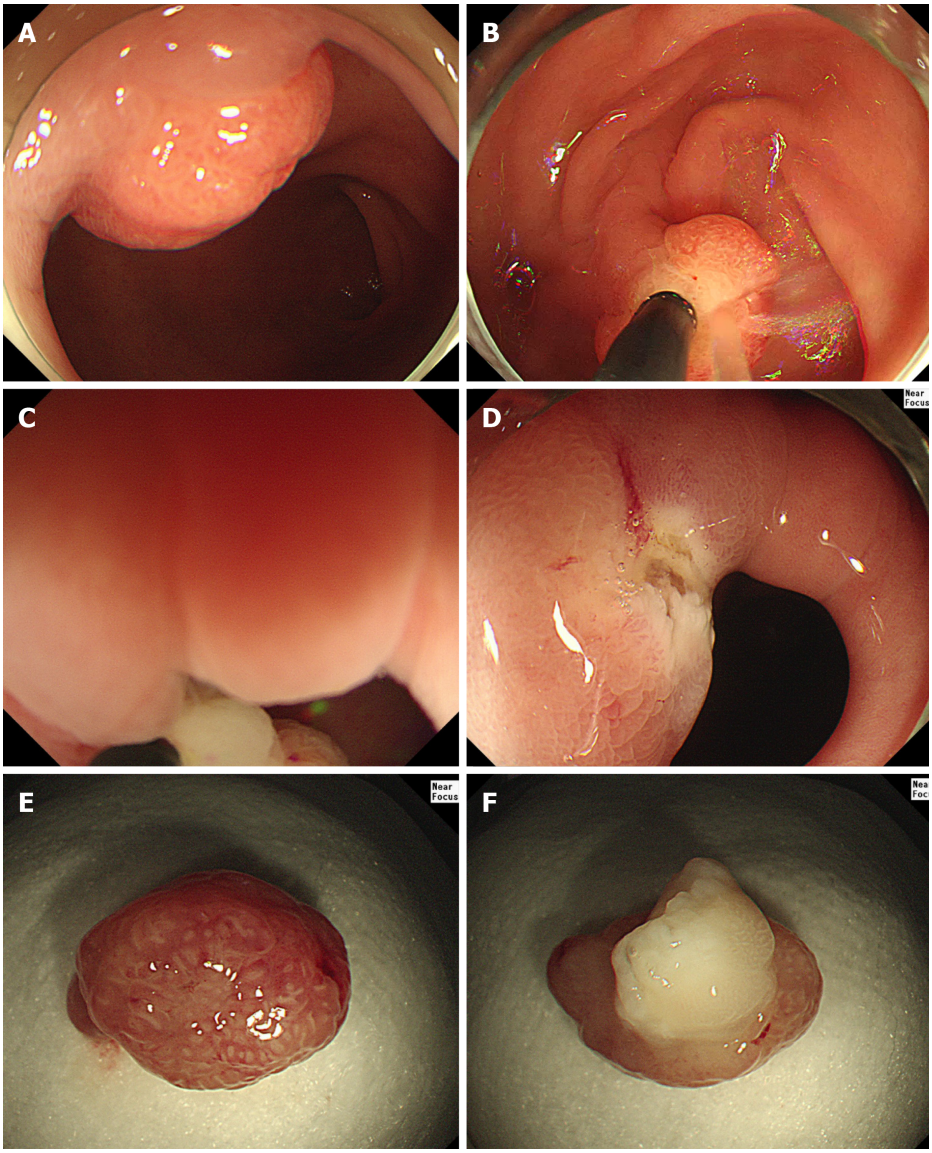

Figure 1 Underwater endoscopic mucosal resection in the first case. A: Endoscopic view of the polyp in the pyloric ring; B: Filling water around the lesion; C: Snaring of the lesion in water; D: Endoscopic view of the resected area after endoscopic resection; E: The head portion of the resected polyp; F: The stalk portion of the resected polyp.

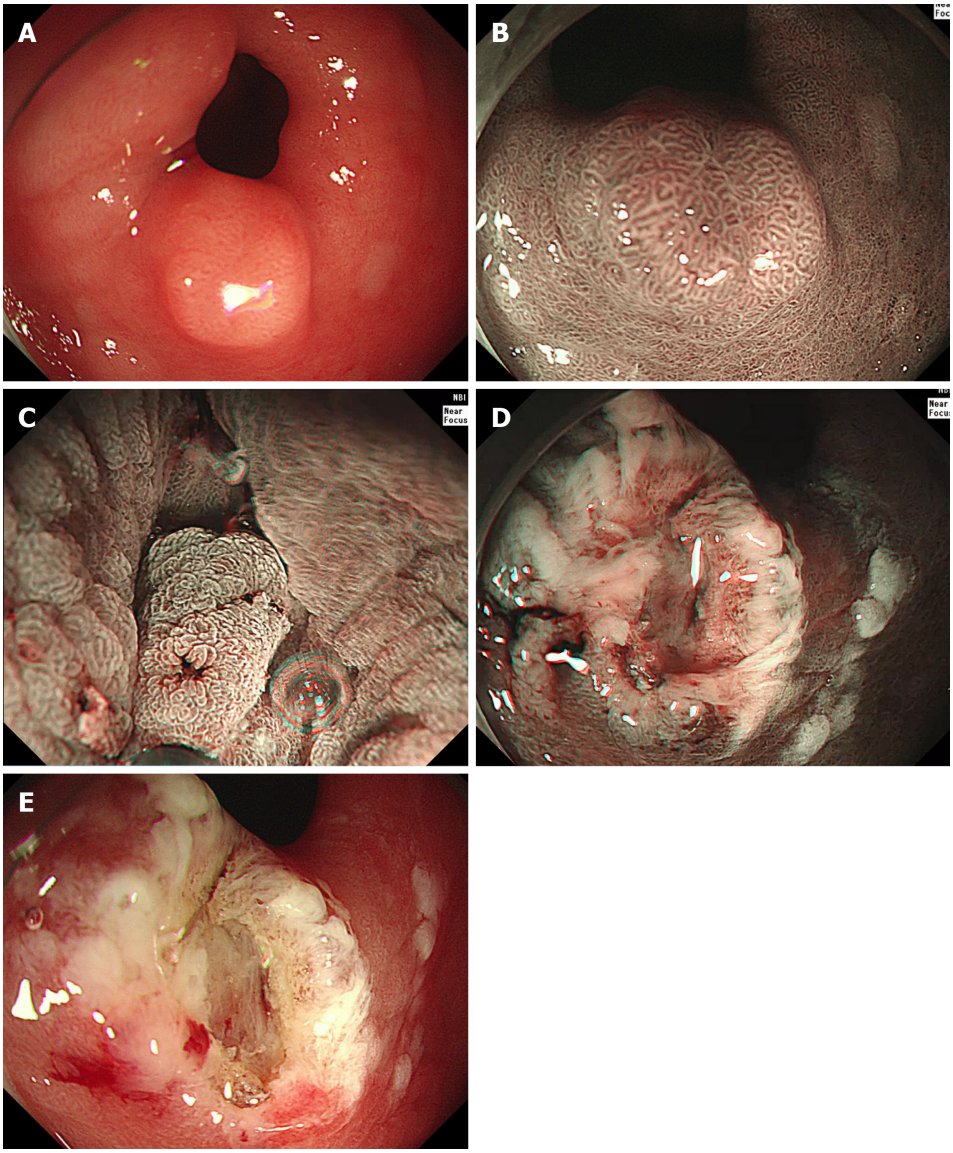

Figure 2 Underwater endoscopic mucosal resection in the third case. A: Endoscopic view of the neoplasm in the pyloric ring; B: Endoscopic view of the neoplasm in the pyloric ring under narrow-band imaging; C: Snaring of the lesion in water under narrow-band imaging; D: Endoscopic view of the resected area after endoscopic resection under narrow-band imaging; E: Endoscopic view of the resected area after endoscopic resection.

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