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Case Report

Endoscopic closure of duodenal perforation using an endoloop anchored by hemoclips

Jong Min Yun, Kyunghyun Kim, and Tae-Geun Gweon*

ABSTRACT

Perforation is one of the most serious adverse events related to endoscopic gastrointestinal (GI) procedures. Through-the-scope endoscopic clipping is the first-line therapy for GI perforation. However, conventional hemocclipping is inappropriate for large or anatomically complex perforations. Endoloop closure assisted by hemoclips has shown favorable efficacy for GI perforation. Here, we report a case of duodenal perforation treated using an endoloop anchored by hemoclips.

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Keywords: Clip; Duodenum; Intestinal perforation; Loop

Introduction

Perforation is one of the most serious adverse events related to endoscopic gastrointestinal (GI) procedures. Recent developments in endoscopic instruments have eliminated the need for surgical treatment of GI perforation.¹ Through-the-scope endoscopic clipping is the first-line therapy for GI perforation. However, conventional hemocclipping is not appropriate for large or anatomically complex perforations. Although over-the-scope-clipping (OTSC) has been shown to have favorable efficacy for the treatment of GI perforation, OTSC is relatively costly, and it may not be available at all hospitals. Endoscopic treatment of duodenal perforation is challenging because of its anatomical complexity. Moreover, duodenal perforation poses a high risk of morbidity and mortality. The endoloop closure technique assisted by hemoclips has shown favorable efficacy for GI perforation.^{2,3} However, this technique has rarely been investigated for duodenal perforation.⁴ Here, we report a case of duodenal perforation treated using an endoloop anchored by hemoclips.

Case Report

A 66-year-old female was referred for the treatment of a duo-

denal neuroendocrine tumor (NET). A biopsy scar was noted at the duodenal bulb (Fig. 1). A submucosal injection was attempted prior to band ligation, but it yielded unsatisfactory results because of scar formation. After the submucosal injection, the target lesion was suctioned and ligated with a band (Fig. 2), then and polypectomy was then performed using a snare. A deep defect was noted at the polypectomy site. We tried hemocclipping the perforated site, but failed to close the defect (Fig. 3). However, the failed hemoclips were not removed because of concerns about bleeding after hemoclip removal. We switched to a gastroscope with two working channels (GIF-2TQ260M; Olympus, Tokyo, Japan). We inserted an endoloop through the right working channel and a hemoclip through the left working channel. The endoloop was placed between the teeth of the clip. The first hemoclip was applied outside the distal margin of the perforation at a distance of 5 mm from the outer margin. The second and third hemoclips were placed on the left and right sides of the perforation, respectively. Before clip closure, the endoloop was placed between the teeth of the clips in the same manner as used for the first hemoclip. Thus, the applied hemoclips and endoloop made a triangle outside the perforated lesion. The endoloop was tightened and applied successfully (Fig. 4). The time spent on perforation closure was 30 minutes. There was no visible leakage at the perforation

Division of Gastroenterology, Department of Internal Medicine, College of Medicine, The Catholic University of Korea, Seoul, Korea

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* Corresponding author. Division of Gastroenterology, Department of Internal Medicine, Bucheon St. Mary's Hospital, College of Medicine, The Catholic University of Korea, 327 Sosa-ro, Wonmi-gu, Bucheon 14647, Korea.

E-mail address: gweontae@naver.com (T.-G. Gweon).

Jong Min Yun and Kyunghyun Kim contributed equally to this work as first authors.

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Fig. 1. A biopsy scar was noted at the duodenal bulb.

Fig. 3. Two hemoclips failed to close the defect.

Fig. 2. The lesion was ligated with a band after a submucosal injection.

Fig. 4. The perforated lesion was closed without leakage after the application of an endoloop anchored by hemoclips.

site. Chest posteroanterior radiography showed free air present in the abdomen. The patient was not permitted any food or water for 3 days. An upper GI series performed 4 days after the procedure showed no evidence of leakage (Fig. 5), and the patient was allowed to commence eating. Follow-up endoscopy was performed 6 days after the procedure and showed a shallow ulceration without perforation (Fig. 6). The clips and endoloop had detached and could not be observed. The patient was discharged on the day after the follow-up endoscopy. A histologic examination confirmed a grade 2 NET (size, 2 mm; invasion depth, mucosa). Follow-up endoscopy was performed 1 month after the initial procedure and showed an ulcer scar at the duodenal bulb.

Discussion

We report successful treatment of a duodenal perforation using an endoloop and hemoclips. This technique can be used as a rescue treatment for duodenal perforation in cases where hemo-

clipping fails.

In this patient, a submucosal injection could not properly separate the mucosal layer from the submucosal tissue. Modified endoscopic mucosal resection (EMR) techniques such as ligation, cap-assisted, or precutting EMR have shown comparable outcomes to endoscopic submucosal dissection (ESD) in terms of complete resection of rectal NET.^{5,6} Hence, because the complication rate of ESD of duodenum is high,^{7,8} we chose ligation EMR as the therapeutic modality in this patient.

Duodenal perforation should be treated very cautiously because of its high morbidity and mortality. In this case, conventional through-the-scope hemoclippping was attempted as the first-line treatment but failed. The lumen at the perforated site formed a right-angled, perpendicular shape. The shape of the perforation was round. Through-the-scope hemoclippping is more feasible for linear perforations. Full-thickness GI perforation is technically demanding. If approximation of the GI tract wall cannot

Fig. 5. Upper gastrointestinal radiograph series showed no leakage.

Fig. 6. Follow-up endoscopy performed 7 days after the procedure revealed a shallow ulceration. The clips and endoloop were not observed.

be achieved by hemoclips, a zipper technique (clipping from the margin of perforation) might be indicated.

OTSC with endoscopic suturing is the favored therapeutic modality for GI perforation. Animal studies have shown that OTSC can close gastric perforations up to 20 mm in diameter and colonic perforations up to 30 mm.⁹ However, the medical costs of OTSC and the endoscopic suturing system are relatively high, and the endoscopic suturing system is not available in Korea. At the time of this procedure, OTSC was not available in our hospital.

Endoloop treatment is indicated to prevent bleeding of a large pedunculated polyp.¹⁰ The size of endoloops ranges from 10 to 40 mm, which can cover a larger defect, and the size of the endoloop can be chosen according to the size of the defect. Endoscopic closure using an endoloop and hemoclips, known as purse-string closure, has been evaluated for various types of GI perforations.^{3,4} Endoscopic closure has several advantages compared with surgical treatment. In addition to reducing medical costs, avoiding surgery might prevent medicolegal problems.

Duodenal perforation should be treated as soon as possible. The endoscopic treatment of perforation can be achieved in the same session as the initial endoscopic procedure, which minimizes the lead time from perforation to its closure. The patient in this case did not show peritonitis after closure of the perforation, and was discharged 7 days after the procedure.

In conclusion, we successfully treated an iatrogenic duodenal perforation by an endoloop and hemoclip. This technique might be considered as a feasible treatment option for duodenal perforation.

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Conflicts of Interest

No potential conflict of interest relevant to this article was re-

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ORCID

Jong Min Yun, <https://orcid.org/0000-0003-0962-1535>

Kyunghyun Kim, <https://orcid.org/0000-0003-2561-4706>

Tae-Geun Gweon, <https://orcid.org/0000-0002-0884-7228>

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