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CASE REPORT

Endoscopic hemostasis using gel immersion endoscopy for duodenal ulcer and a sigmoid colon polyp: A novel gel injection method

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Abstract

Gel immersion endoscopy (GIE) has gained prominence for securing a good visual field. Traditionally, OS-1 jelly (Otsuka Pharmaceutical Factory) has been used for GIE. However, due to the presence of electrolytes, it is unsuitable for endoscopic hemostasis using a monopolar device. Therefore, VISCOCLEAR (Otsuka Pharmaceutical Factory), a new gel that does not contain electrolytes, has been developed. Moreover, unlike water or saline, VISCOCLEAR does not readily mix with blood, making it effective in visualizing gastrointestinal bleeding. We report two cases in which GIE was performed using a novel gel injection method.

Introduction

OS-1 jelly (Otsuka Pharmaceutical Factory, Tokyo, Japan) has been used previously for gel immersion endoscopy (GIE).[1] However, the gel contains electrolytes. Because the monopolar radiofrequency ablation power supply system is incompatible with its use, VISCOCLEAR (Otsuka Pharmaceutical Factory), a new gel without electrolytes, was developed.[2] VISCOCLEAR is composed of xanthan gum, locust bean gum, concentrated glycerin, and purified water. It has viscoelastic properties that suppress the diffusion and flow of blood and stool, allowing for a physically transparent space in front of the endoscopic field of view, leading to a good visual field. In cases of gastrointestinal bleeding, GIE using VISCOCLEAR is useful when conventional methods such as gas insufflation, gas suction, and underwater techniques fail to provide a good visual field. Endoscopic surgeries using gas insufflation and suction techniques may be difficult because of patient discomfort and difficulty in visualizing the bleeding point due to the mixing of water and blood. However, GIE without gas insufflation can reduce patient discomfort by decreasing intestinal pressure. Additionally, it provides a good visual field, facilitating endoscopic hemostasis for occult gastrointestinal bleeding.[3] VISCOCLEAR is contraindicated in patients with a history of hypersensitivity to this ingredient or suspected gastrointestinal perforation; however, no apparent adverse events have been reported, and GIE is becoming increasingly popular in the future. Although few studies have assessed gel injection methods (GIM), we propose a novel GIM using a secondary water delivery tube (MAJ-855, Olympus, Medical Systems Co., Tokyo, Japan). The new gel can be injected manually via an endoscopic forceps channel or a large accessory channel using a BioShield irrigator (US Endoscopy, Mentor, OH, USA). A recent method proposed injecting the new gel through a water pump (Fig. 1a), but it was not preferred because of its heterogeneous viscosity.[4]

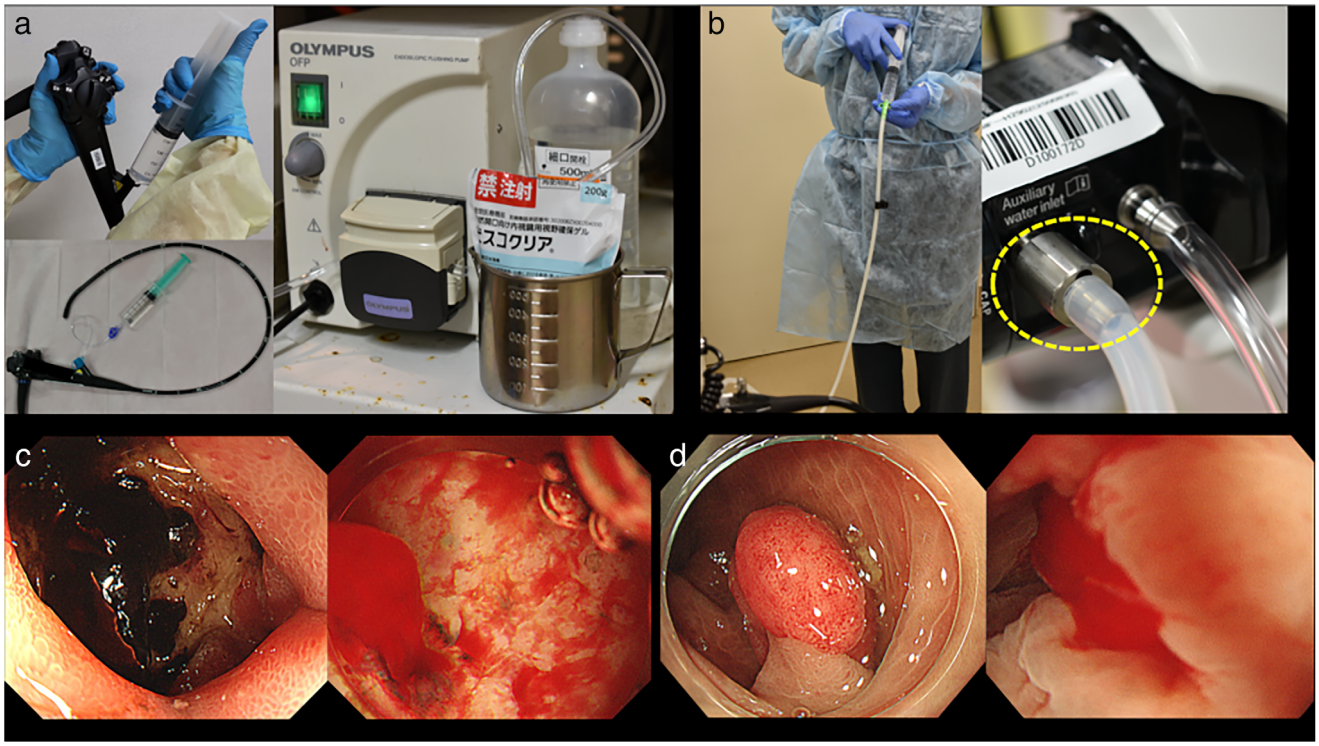

Figure 1 (a) In this method, the new gel is injected manually through an endoscopic forceps channel. Gel injection method (GIM) incorporating a large accessory channel with a BioShield irrigator. GIM using a water pump. (b) The new GIM, wherein the gel is injected through a secondary water delivery tube, can be performed with all types of endoscopes that can use a water pump. The yellow circle indicates the connection for the secondary water delivery tube. (c) A duodenal ulcer with an adherent clot is observed on the anterior surface of the duodenal bulb. A good visual field is secured by injecting the new gel through a secondary water delivery tube. (d) A polyp (0-Ip) measuring 15 mm is observed in a bend of the sigmoid colon. A good visual field is secured by injecting the new gel through a secondary water delivery tube.

In the cases presented in this report, we attempted to identify the bleeding point by manually injecting the new gel through the endoscopic forceps channel. A good visual field was obtained; however, when the endoscope was inserted, the visual field became muddy, hindering identification of the bleeding point. Moreover, the BioShield irrigator at our hospital does not have a large accessory channel. However, we secured a good visual field and successfully achieved endoscopic hemostasis for gastrointestinal bleeding using a novel method of injecting the new gel through a secondary water delivery tube (Fig. 1b).

Case report

Case 1. An 81-year-old woman was referred to our hospital because of melena. She was clinically diagnosed with a duodenal ulcer several years prior but remained untreated because she was asymptomatic. Additionally, she could not undergo a blood transfusion for religious reasons. Her vital signs were normal on admission, but severe anemia (red blood cells: 186×10^4/L, hemoglobin level: 6.4 g/dL) was observed. Since duodenal ulcer bleeding was suspected based on abdominal computed tomography, urgent esophagogastroduodenoscopy was planned, which revealed a duodenal ulcer with an adherent clot on the anterior surface of the duodenal bulb. After the adherent clot was removed using biopsy forceps, a vessel with active bleeding was visualized. Endoscopic hemostasis was achieved. However, the bleeding point was submerged in blood on the dependent side, making endoscopic hemostasis difficult. First, we flushed the area near the bleeding point with saline solution through a water pump; however, the visibility remained poor because of the immediate mixing of the saline solution and blood. When the new gel was injected through an endoscopic forceps channel, a good visual field was obtained. However, gel injection and endoscopic hemostasis cannot be performed simultaneously because of the single endoscopic forceps channel opening. As a last resort, the new gel was injected through a secondary water delivery tube, securing a good visual field (Fig. 1c) and allowing endoscopic hemostasis through clipping of the actively bleeding visible vessel (Video S1, Supporting information). Two clips (EZ Clip, HX-610-090S, Olympus) and 200 mL of new gel were used. The patient's condition improved, and she was discharged without requiring blood transfusion on the sixth day of hospitalization.

Case 2. A 57-year-old woman was referred for a sigmoid colon polyp located at the bend of the sigmoid colon that hindered conventional endoscopic mucosal resection (EMR). Therefore, we performed an underwater EMR. After resection, active bleeding

was observed on the resected surface, but it was difficult to identify the bleeding point because of the narrow lumen and poor endoscope maneuverability. Although we flushed the bleeding area with saline solution using a water pump, a good visual field could not be secured because of the mixing of water and blood. By injecting the new gel through a secondary water delivery tube, we successfully separated water from the blood, and maintained a good visual field (Fig. 1d) to identify the bleeding point. Two clips (EZ Clip, HX-610-135, Olympus) and 200 mL of new gel were used. The patient's condition improved. The patient was discharged the day after admission. There were no postoperative complications such as bleeding.

Discussion

A literature search for "Gel immersion endoscopy" in PubMed revealed nine cases published over 10 years.[1-3,5-10] Of these, seven were reported in 2021. GIE provides good outcomes in various conditions, including gastrointestinal bleeding, colonic diverticular bleeding, and rectal ulcers. It is applied to endoscopic treatments such as EMR and endoscopic submucosal dissection.[5-9] Therefore, the use of the new GIM for endoscopic diagnostics is expected in the near future. However, studies on this method are limited. To the best of our knowledge, this is the first report of a novel GIM using a secondary water delivery tube. There are four main methods for injecting the new gel. Typically, it is injected manually via an endoscopic forceps channel or large accessory channel with a BioShield irrigator. In the first case, a good visual field was secured. However, when the endoscopic device was inserted, the visual field became muddy and it was difficult to identify the bleeding point. In the second case, although the new gel could be injected while manipulating the endoscopic device, it had certain disadvantages such as the proximity of the endoscopist and the caregiver, air bubble formation due to device removal, and high cost (approximately $10/unit). The new gel can be injected through a water pump, which can be operated by a single endoscopist, and a good visual field can be achieved by adjusting the hydrostatic force of the pump. However, this practice has several issues, including the inability to demonstrate the original quality of the new gel owing to non-uniform viscosity, air bubble formation, and the high cost associated with the increased use of the new gel (approximately $20/200 mL). Since no large accessory channel was available with the BioShield irrigator at our hospital, we attempted a novel GIM using a secondary water delivery tube to secure a good visual field and succeeded in achieving endoscopic hemostasis. There are five advantages to using a secondary water delivery tube. First, a good visual field is maintained. Second, the gel could be injected regardless of the channel size of the endoscopic forceps. Unlike the large accessory channel with a BioShield irrigator, for which an endoscopic forceps channel of ≥3.2 mm is recommended, the new gel does not overflow from even small endoscopic forceps channels. Third, the total length of the secondary water delivery tube was 1150 mm, allowing a greater distance between the endoscopist and assistant. Fourth, secondary water delivery tubes are highly resistant and autoclavable, thereby reducing medical costs. Fifth, the preparation is simple, requiring only an endoscope with a secondary water delivery tube, locking syringe (50 mL), and new gel. Our cases showed that GIE may be suitable for lesions with a high risk of bleeding. However, since this study only reported two cases, further research is needed. In conclusion, this novel GIM using a secondary water delivery tube is useful for achieving endoscopic hemostasis of gastrointestinal bleeding.

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Supporting information

Additional supporting information may be found in the online version of this article at the publisher's website:

Video S1. Successful gel immersion endoscopic hemostasis using a secondary water delivery tube for duodenal ulcer bleeding.