The use of the cap and underwater technique as an aid in endoscopic diagnosis and treatment of upper gastrointestinal bleeding: case series

Fernando Lander Mota, MD, Deborah Marques Centeno, MD, Fernando J. S. de Oliveira, MD, Eduardo M. A. Pereira Jr, MD, Sarah Madeira Jacinto, MD, Pedro H. A. F. Cardoso, MD, Savério T. N. Armellini, MD, Marco Aurélio D’Assuncao, MD

Background and Aims: Upper GI bleeding (UGIB) is a medical emergency associated with elevated mortality and significant costs to the health care system. EGD is currently the method of choice for the diagnosis and management of these conditions. However, the location of bleeding lesions and technical difficulties in achieving endoscope stability may challenge even the most experienced endoscopists. Herein, we demonstrate the use of the cap and underwater technique as a helpful aid in these situations.

Methods: We present a case series of 4 patients with acute UGIB who underwent EGD with suboptimal endoscopic visualization or technical difficulties in identifying the source of bleeding. A transparent plastic cap was attached to the distal tip of the gastroscope, and the water immersion technique (underwater) was used for endoscopic re-evaluation of the bleeding site.

Results: Three patients presented with duodenal bleeding, and 1 was diagnosed with diffuse bleeding from the esophagus. The clear and accurate identification of the source of bleeding and effective hemostasis were possible after cap and underwater technique evaluation in all patients.

Conclusion: The use of the cap and underwater technique is a simple, safe, and low-cost strategy that improves the identification and control of UGIB in locations with poor visibility and technical challenges during endoscopic evaluation. (VideoGIE 2021;6:518-21.)

INTRODUCTION

Upper GI bleeding (UGIB) is a medical emergency associated with elevated morbidity and mortality and significant costs to the health care system. EGD is an accurate and efficient method for the management of these conditions. However, some scenarios can be challenging even to the most experienced endoscopists. Several factors can pose technical difficulties that may prolong procedure time or even make it impossible (eg, the presence of hematic residues and clots at the gastric chamber). Furthermore, some regions examined may represent technical difficulties due to specific characteristics of the local anatomy. Bleeding lesions located at the posterior wall of the bulb or between intestinal folds and lesions at the esophagogastric transition (owing to its tangential endoscopic view) are some examples.

We report a case series of 4 patients with UGIB in which the use of a plastic cap associated with the water immersion technique (underwater) was fundamental for the accurate diagnosis and successful treatment of the source of bleeding.

METHODS

Four patients were admitted to our department presenting signs and symptoms of acute UGIB. EGD was performed after clinical stabilization. All procedures were carried out with the patients under general anesthesia with orotracheal intubation, according to institutional protocol that aims to prevent bronchoaspiration in patients with high risk of gastric residues. At first, a standard EGD was performed. All procedures were performed with the use of an injection water pump to allow proper cleaning of the visual field and gastric chamber. Sterile distilled water was used in all cases (total volume of 250-500 mL). This decision was made because saline solution is known to interfere with thermal hemostatic methods; dissipating electric current and decreasing its effectiveness. A transparent, hard, plastic cap measuring 2.2 × 1.0 cm was
used in all cases. The decision to attach the plastic cap was made after the identification of technical difficulties that could be better overcome with this device.

RESULTS

Four patients with UGIB were selected. Three patients presented with duodenal bleeding (1 in the bulb and 2 in the second portion of duodenum), and 1 had the source of bleeding located in the distal esophagus.

Patient 1
An 81-year-old man undergoing chemotherapy for a metastatic rectal neuroendocrine tumor underwent an EGD for digestive hemorrhage externalized by melena. During the endoscopic examination of the second portion of the duodenum, fresh clots were identified, removed, and mobilized into the gastric chamber. The underwater evaluation showed suggestive signs of active bleeding (the water in the region failed to remain clean). The bleeding source, however, could not be identified.

With the attachment of the cap, a punctate vascular lesion (Yano type 3) with pulsatile active bleeding was identified (Fig. 1). Hemostasis was achieved with submucosal injection of adrenaline solution (1:10.000), followed by bipolar electrocoagulation. Since the patient was receiving anticoagulation therapy, 2 hemostatic clips were also applied.

Patient 2
A 66-year-old man with a medical history of ischemic stroke who was receiving warfarin-based anticoagulation therapy presented with hematemesis. He evolved with late-onset papillary bleeding with the need for endoscopic hemostasis that was performed with an hemostatic clip. A new episode of UGIB with hemodynamic instability occurred 1 week later.

EGD identified a large amount of blood at the distal portions of the duodenum. No bleeding from the papillotomy site was identified. With the aid of the cap and underwater technique, a small duodenal ulcer with arterial bleeding (Forrest IA) was discovered (Fig. 3). The endoscopic treatment consisted of submucosal injection of adrenaline solution (1:10.000) followed by endoscopic clipping. The bleeding was controlled, and no recurrences were evidenced.

Patient 4
A 77-year-old man with no significant medical history was admitted for intense vomiting followed by hematemesis. Endoscopy showed a small esophageal laceration along the Z line with no active bleeding (Fig. 4). At first it was not possible to identify the lesion owing to the typical mucous pleating of the region. With the aid of the cap separating the folds, it was possible to identify a small laceration (Mallory-Weiss tear). The gastric chamber, however, had a moderate quantity of fresh blood, a scenario inconsistent with a gastroesophageal laceration with no active bleeding.

At the apical portion of the duodenal bulb, we observed a fresh blood clot. After proper mobilization of the clot to

Figure 1. Vascular lesion, Yano type 3, with active bleeding, located in the second portion of duodenum.

Figure 2. Oozing active bleeding from the vasa vasorum of the distal esophagus.
the gastric chamber, it was possible to identify, at the apical portion of the duodenal bulb, an active ulcer. The cap and underwater technique allowed proper exposure of the region and identification of active nonpulsatile bleeding (Forrest Ib) (Fig. 5). Dual endoscopic therapy was performed with the injection of adrenaline solution (1:10,000) and electrocoagulation with a bipolar probe. The electrocoagulation therapy exposed a vascular stump with a visible rupture point that was successfully treated.

**DISCUSSION**

The technical difficulty in visualizing and treating endoscopic hemorrhagic lesions during an upper digestive endoscopy may occur owing to its unfavorable location, the instability of the device in relation to the injury, or the presence of folds in proximity to the bleeding site, among other factors. Locations with tangential visualization include the esophagus, the cardiac region, the posterior wall of the stomach body, the duodenal bulb in its posterior wall, and the apical region, toward the second duodenal portion.

In the case series presented, 2 patients presented fresh blood residue without adequate identification of the source of bleeding. Two other patients had partial or limited visualization of the bleeding site, preventing the application of adequate hemostatic therapy. In all cases, the use of a transparent plastic cap, attached to the distal end of the endoscope, and the use of the underwater technique allowed perfect visualization of the operative field and successful hemostasis.

The use of endoscopic caps is well described as an aid in the identification of lesions in pleated and sinuous regions, as well as an aid to improve endoscope stability. The use of this device also facilitates the control of GI bleeding as it improves endoscopic reach, the visualization of the bleeding site, and hemostatic rates.

In some of the cases presented, the source of bleeding was the duodenum, a region often difficult to evaluate. The cap allowed us to push aside folds, stabilize the tip of the gastroscope, and expose bleeding sites while maintaining a certain distance from the endoscopic lens, allowing an optimal focus distance (essential for good endoscopic evaluation). In addition, the endoscopist can apply a certain amount of pressure against the duodenal wall, decreasing local venous return, which facilitates bleeding management and visualization.

In case 2, the bleeding source was located at the distal esophagus. This region can be difficult to manage owing to its tangential position in relation to the gastroscope and the presence of mucosal folds. The tonus of the lower esophageal sphincter in this region can pose an extra challenge to proper endoscopic evaluation. The cap allows modification of the visual angle, giving a more frontal view of the esophageal wall. It allows proper targeting of the bleeding site as it promotes an ideal and constant focal distance.
The underwater technique was initially described by Binmoeller et al as an alternative method for the resection of colorectal lesions. It was also described as an alternative method for achieving cecal intubation in technically difficult colonoscopies. Currently, its use in EGD is described to assist in the detailed assessment of the duodenal mucosa.

In GI bleeding, water immersion helps to clean fluids and debris, properly distends the lumen of the organ, reduces spasm (if heated fluid is used), and makes the blood from the bleeding site stream into the water, making it easy to pinpoint the source of bleeding and to treat it more efficiently.

In the case series presented, the underwater technique allowed a more detailed examination of the duodenal and esophageal mucosa and helped to identify more clearly the bleeding site without the blood clots covering the lesion or reflecting toward the lens of the endoscope. Furthermore, water immersion provides an interesting magnifying effect that can be useful to identify small punctate lesions. This simple technical variation is easily reproducible and inexpensive. It facilitated and increased the effectiveness of the endoscopic treatment and decreased procedure time in achieving proper hemostasis.

CONCLUSION

The use of the cap and underwater technique is a simple, safe, and low-cost strategy that improves the identification and control of UGIB in locations with poor visibility and technical challenges in endoscopic evaluation (Video 1, available online at www.giejournal.org).

DISCLOSURE

All authors disclosed no financial relationships.

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