Modification of the endoscopic hemostatic powder application technique

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INTRODUCTION

EndoClot Polysaccharide Hemostatic System (EndoClot PHS; Micro-Tech Europe, Dusseldorf, Germany) is a starch-derived compound that consists of biocompatible absorbable hemostatic polysaccharides that absorb water when in contact with blood or liquids, creating a gelled matrix over the bleeding lesion. It also accelerates the in situ coagulation process through hyperconcentration of platelets and coagulation factors.[1] Hemostatic powders are considered an endoscopic hemostatic option for upper and lower nonvariceal bleeding, which are easy to use and have a good safety profile.[2-6] It is mainly reserved to salvage endoscopic therapy but can be considered a first-line therapy in diffuse bleeding lesions, poor visualization settings, and neoplastic lesions with oozing bleeding where first-line treatments may fail[1,4,7,8] or when a first-line therapy, performed by a skilled endoscopist, is not available.[9]

Endoscopic hemostatic powder delivery systems available have a dedicated catheter for endoscopic application.[10] However a disadvantage of these systems is that the catheter tip may accidentally contact liquids inside the working channel or the GI lumen during the application-planning movements, causing premature powder activation, and thus catheter occlusion.[1,6,7,10,11] This particular disadvantage is more significant in cases of difficult-to-access bleeding sites, incomplete intraluminal aspiration settings, or anatomic modifications because of surgery or tumor burden, which may increase the risk of technical failure.[7,12] The video we present here exposes a modification of the endoscopic hemostatic powder (EndoClot) application technique in oncologic patients with distorted anatomy and upper GI bleeding.

PROCEDURE

The Endo Clot system consists of 3 main parts: The air compressor with its air tube, the air-powder mixing chamber, and the through-the-scope catheter. The powder, made of absorbable modified polymers, comes in a separate canister that contains 2 to 3 g of the product, and is connected to the air-powder mixing chamber.[4] The conventional technique states that prior to catheter insertion, the working channel must be flushed with air to remove residual liquids that may remain inside it. Additionally, the air compressor must be turned on and must avoid suction during the catheter insertion to keep the tip dry.[7,13]

Despite following the recommendations to keep the catheter tip dry, sometimes it is not possible to completely avoid contact with secretions or blood. When the anatomy is distorted because of tumor burden or surgically modified anatomy, it becomes especially difficult to maneuver, making the procedure susceptible to technical failure because of catheter occlusion. The proposed technique modification shown in this video aims to avoid premature catheter occlusion because of powder reaction with liquid inside the tip.

The proposed modification of the technique (Video 1, available online at www.giejournal.org), keeps the conventional way for the system-parts connection. Once it is connected, nontoxic modeling clay is applied to the catheter tip, using a pea-sized amount, enough to occlude just the distal 2 to 3 mm (Fig. 1). It is important to ensure that the modeling clay completely occludes the tip, without leaving gaps between the clay and the catheter walls to create sufficient inner pressure to eject the plug. Once the dispenser is connected, it must be held at an upright position before and during the catheter insertion through the working channel. During the catheter insertion (with the already occluded tip), the air compressor must be turned off. Once the catheter is inserted and the bleeding lesion targeted, the air compressor must be turned on. Immediately afterward, the clay plug will be ejected (Fig. 2). Next, the powder dispenser must be turned downside, provided that the plug is already ejected. We suggest gently tapping the canister downward, instead of compressing it, to gradually allow the powder to pour out while avoiding obscured visualization. Also, this helps to avoid a suction effect inside the catheter tip, which may cause a powder-fluid reaction inside it (Fig. 3). If more than one application is planned during the same procedure, the catheter should be extracted with the compressor turned on. Once the catheter is out, the clay plug must be replaced.

The modeling clay used for this technique (Play-Doh; Hasbro) is certified by manufacturers (Hasbro, Pawtucket, RI) as a nontoxic material because it is made of edible ingredients such as flour, water, and salt. Even though the amount of clay used for the plug is minimal, if there is still concern regarding the safety of ingestion, it may be

Figure 1. Catheter tip occlusion with nontoxic modeling clay.

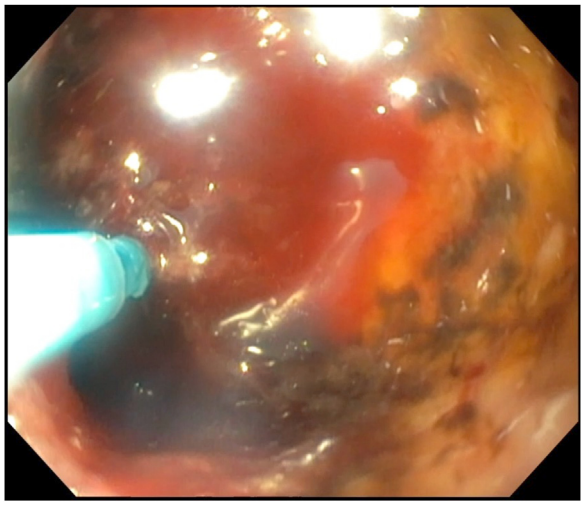

Figure 2. Clay plug ejection.

retrieved and extracted with forceps after the powder ejection. Since Play-Doh modeling clay contains gluten, if this technique is planned for patients with gluten intolerance or allergy, either a gluten-free modeling clay could be used or the clay plug may be retrieved after the powder is poured out.[14]

The first case in the video shows a patient with an advanced nonresectable ampullary adenocarcinoma that invaded the duodenal wall (Video 1). Two months earlier, the patient underwent an ERCP for a biliary plastic stent placement. One month after the ERCP, he came to the emergency department presenting melena and significant hemoglobin drop. The duodenoscopy with a frontal view endoscope showed distorted anatomy because of tumor burden, which impaired visualization and maneuverability. The second case presents a patient with upper GI bleeding because of a gastric adenocarcinoma. A frontal view gastroscopy showed a large neoplastic lesion with multiple recent bleeding areas and focal area with an adhered clot. Both cases were successfully treated by hemostatic powder

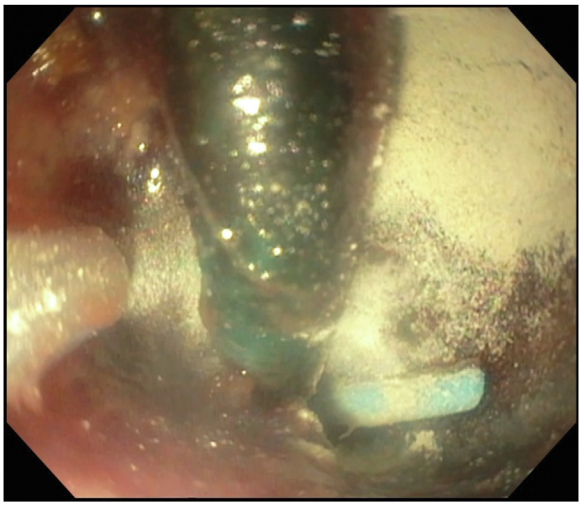

Figure 3. Hemostatic powder spraying.

application with the modified technique. In cases where the lesion is anatomically difficult to access, diffuse bleeding occurs, or when secretions or blood in the lumen cannot be properly removed, premature catheter occlusion by powder activation may occur if the tip is not dry. As shown in both cases, the catheter tip occlusion with the proposed technique avoids technical failure and allows successful hemostasis.

OUTCOMES AND DISCUSSION

In our center, many of the cases of GI bleeding are because of tumor etiology. In these clinical settings, there are few options for endoscopic therapy. Since they are easy to use and have a good safety profile, endoscopic hemostatic powders are reasonable options to treat tumoral oozing bleeding or refractory tumoral GI bleeding. The technical pitfalls we identified are associated with premature catheter tip occlusion in cases with difficult-to-access bleeding sites or with limited endoscopic maneuverability. There is a recently described modified technique for hemostatic powder (Hemospray; Cook Medical, Bloomington, Ind) application based on catheter tip occlusion.[15] The difference with EndoClot is its powder-delivery system based on the use of an air compressor and an air-powder mixing chamber, which allows both the plug and the powder to be ejected in the same movement, without requiring additional material or additional steps. Therefore, we propose this technique modification for endoscopic hemostatic powder catheter-based systems to prevent the tip from contacting secretions or blood, either inside or outside the working channel. Furthermore, the tip occlusion technique proposed allows suction of fluid during the catheter insertion or once the catheter is visible before spraying powder (as shown in Video 1), thus avoiding technical

failure. This is an affordable, safe, and easy-to-use technique. In our center, we have used this technique in several cases and obtained successful technical results, including covering the lesion completely, immediate hemostasis, and postprocedure permeable tip.

CONCLUSION

The proposed modification for the endoscopic hemostatic powder application technique, shown in Video 1, is based on the tip occlusion before the catheter insertion through the working channel. The method discussed was conceived for the EndoClot system, but it can be adapted for any through-the-scope catheter-based delivery system. To obtain the desired results, once the tip is occluded, the airflow through the catheter must start once the tip is visible and the lesion targeted. This technique features a reduction of premature tip occlusion because of the powder-fluid reaction inside the catheter tip, thus avoiding technical failure.

DISCLOSURE

The authors disclosed no financial relationships.

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