Alternative approach to hemostatic particle spraying for treatment of GI bleeding by the use of cross-platform devices

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Background and Aims: GI bleeding is a leading cause of morbidity and mortality in the United States, with an estimated 20,000 deaths per year. Some subgroups of patients show refractory recurrent bleeding despite standard endoscopic therapy. The U.S. Food and Drug Administration has recently approved a hemostatic spray for clinical use in nonvariceal bleeding. Despite its efficacy, not all endoscopy units have access to this spray, at times because of cost. Our aim was to determine the safety and efficacy of a plant-based hemostatic particle spray in nonvariceal GI bleeding by use of a cross-platform setup.

Method: We present 3 cases in which plant-based particle spray was used for hemostasis with a cross-platform delivery system. Conventional therapies failed in the first 2 cases, and in the third case hemostatic particle spray was used as a primary therapy.

Results: Successful immediate hemostasis was achieved in all 3 patients. No immediate adverse events or recurrence of bleeding was noted.

Conclusions: Plant-based hemostatic particle spray is safe and effective as a temporizing measure in refractory ulcer and postnecrosectomy cavity bleeding. Further studies are needed to establish the safety and comparative efficacy of plant-based hemostatic powder. The cross-platform system used here for plant-based hemostatic particle spray presents a less-expensive alternative in selected cases. (VideoGIE 2019;4:386-8.)

GI bleeding is a leading cause of morbidity and mortality in the United States, with an estimated 20,000 deaths per year.[1] Some subgroups of patients show refractory recurrent bleeding despite standard endoscopic therapy. Although used internationally for the last 5 years, a hemostatic spray for clinical use in nonvariceal GI bleeding was only recently approved by the U.S. Food and Drug Administration (FDA).[2,3] Despite its efficacy, not all endoscopy units have access to this device, at times because of its cost.

In this case series, we used an absorbable and affordable powder derived from purified plant starch (Arista AH, C. R. Bard, Inc, Davol, Warwick, RI, USA). This product was used "off label" in our case series for treatment of nonvariceal ulcer and postpancreatic necrosectomy cavity bleeding (Video 1, available online at www.VideoGIE.org). Matrix agents made of macromolecules like cellulose, collagen, and polysaccharides provide a substrate for thrombus formation[4] and have been used in surgical specialties for over a decade.[5] These agents are formulated as sheets, gels, and powders to be applied directly to the bleed. Once applied to the area of bleeding, these molecules are typically absorbed and cleared within 24 to 48 hours by amylases. These plant-based hemospheres are packaged as 1-g, 3-g, or 5-g vials. The manufacturer recommends applying no more than 50 g of powder in diabetic patients because of the potential to affect the glucose load. Adverse events are uncommon, although a potential for embolization may exist.

The longest purpose-built delivery catheter by a manufacturer for ear, nose, and throat applications is only 38 cm long. Therefore, we implemented currently available endoscopic accessories for endoscopic particle delivery. The following equipment was needed: an upper therapeutic gastroscope with a 4.2-mm accessory channel, a vial of hemostatic particles, a 30-mL syringe, and a cross-platform 9F stent introduction system. After the site of bleeding is identified, a vial of hemostatic particles is emptied into a 30-mL syringe after the plunger is removed (Fig. 1A). The 5.5F inner guiding catheter is removed from the stent introduction system to access a bigger 9F channel for particle delivery (Fig. 1B). The size of this channel is comparable with a recently FDA-approved preassembled delivery system, which has 7F and 10F catheters.

After the bleeding area is identified, the endoscope channel is flushed with 30 mL of air to remove moisture.

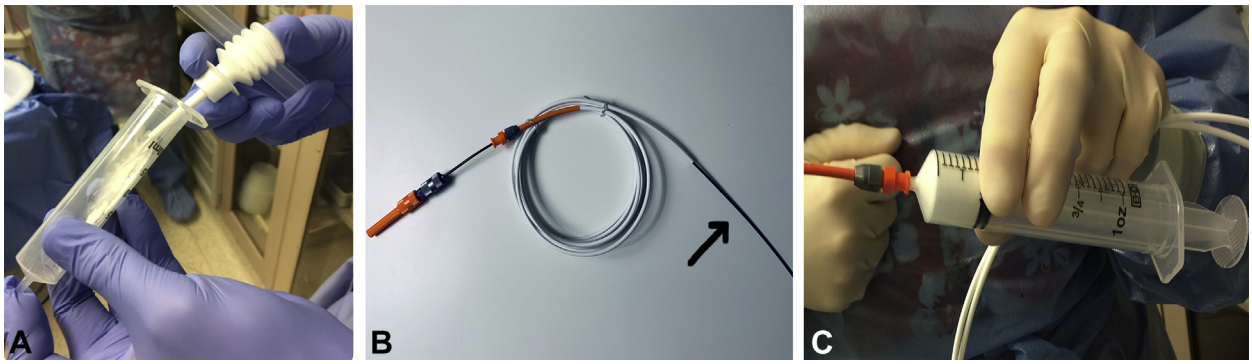

Figure 1. Cross-platform setup for hemostatic particle spraying by use of a stent introduction catheter. **A,** Vial of hemostatic particles is emptied into a 30-mL syringe after removal of the plunger. **B,** The cross-platform stent introduction system has a 5.5F inner guiding catheter (*black arrow*), which is removed to access a bigger 9F channel for particle delivery. **C,** Hemostatic particle spray is delivered in small puffs by pushing on the syringe. Attention is given to maintain the catheter in a "dry state" to prevent clumping of the hemostatic particles.

Also, caution is taken to maintain 1 to 2 cm of distance from the site of bleeding to keep the catheter tip dry. The spray is then delivered in small puffs by pushing on the syringe (Fig. 1C). Despite poor visualization and a snowing effect from the spray, the endoscope is not irrigated to prevent clogging of the catheter.

We also compared spray dispersion areas between the current cross-platform technique and an available preassembled spray system. A similar spray dispersion area was observed with both methods of particle delivery. The currently proposed cross-platform method of hemostatic particle delivery is significantly cheaper than the commercially available preassembled system. At our institution, the cost of a cross-platform setup with 1 vial of hemostatic powder was <$200 USD compared with $1500 USD for a preassembled system. However, this does not account for the assembly time, which usually takes less than 5 minutes.

In our case series, use of the plant-based hemostatic particle spray was safe and effective as a temporizing measure in refractory GI and postnecrosectomy cavity bleeding. Further studies are needed to establish the safety and comparative efficacy of plant-based hemostatic powder. The cross-platform setup used here for plant-based hemostatic particle spray presents a less-expensive alternative in selected cases.

PATIENT 1

A 61-year-old man with a history of hepatitis C–related cirrhosis, who had undergone liver transplantation 6 months earlier, presented with recurrent GI bleeding from a large duodenal ulcer. He had previously been treated for GI bleeding with multiple endoscopic procedures and gastroduodenal artery embolization. During this admission, we performed emergent angiography of the superior mesenteric artery and the celiac artery without evidence of extravasation. This was followed by emergent EGD. After failure of clip deployment (Fig. 2A), we moved to an off-label use of hemostatic particle spray using a cross-platform setup as described above. One vial (3 g) of particles was sprayed. There was no recurrence of bleeding after this intervention (Fig. 2B), and repeat upper endoscopy at 3 months showed ulcer healing.

PATIENT 2

A 67-year-old man with a history of gallstone-related severe pancreatitis, complicated by walled-off pancreatic necrosis, presented with >500 mL of bloody percutaneous drain output, melena, and hypotension. Four weeks before this presentation, a lumen-apposing metal stent had been placed, followed by extensive necrosectomy. During this visit for a repeated necrosectomy, active bleeding from the wall of the cavity was observed. Unsuccessful attempts were made to obtain hemostasis with clip placement and argon plasma coagulation. With failure of these conventional methods, off-label hemostatic particles were sprayed with a cross-platform setup described above. The entire cavity was then covered with 3 g of particles, with cessation of bleeding at the end of the procedure. He had no recurrence of bleeding, and a repeat necrosectomy performed 4 weeks later was uneventful.

PATIENT 3

A 52-year-old man with a history of gallstone-related severe pancreatitis, complicated by pancreatic necrosis, was seen with gastric outlet obstruction. He had experienced nausea, poor appetite, and a 10-pound weight loss over the previous 4 weeks. He had received multiple transluminal necrosectomy procedures in the past. Repeat CT scan at this presentation showed recurrence

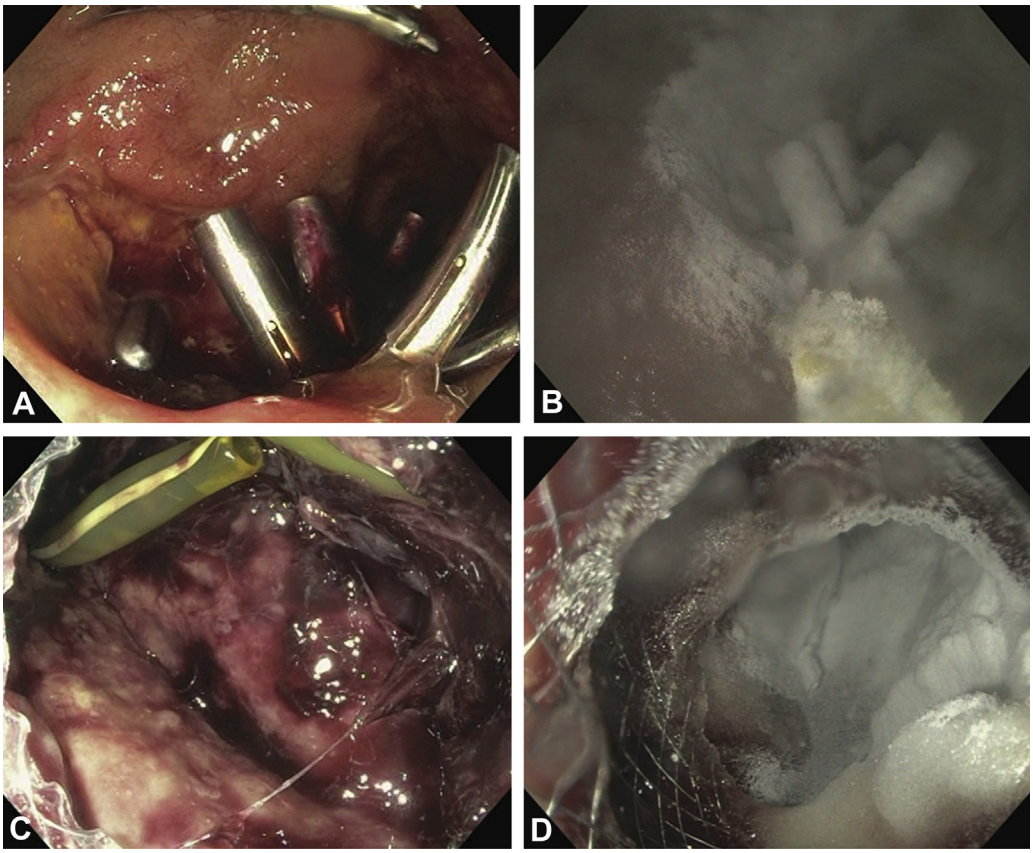

Figure 2. Refractory large duodenal ulcer bleed (**A**) that failed conventional therapies is treated with hemostatic particle spray by use of a cross-platform setup (**B**). A postnecrosectomy cavity bleeding (**C**) that failed conventional therapies is also treated with hemostatic particle spray by use of a cross-platform setup (**D**).

of a peripancreatic walled-off collection. An endoscopic transluminal drainage was planned. A 15-mm × 10-mm transgastric lumen-apposing metal stent was deployed, and the stent was dilated to 12 mm after deployment. This was complicated by evidence of fresh bleeding from the necrosectomy cavity (Fig. 2C), not from the gastric wall. We used hemostatic particles with the help of the cross-platform setup as described earlier. Three grams of particles were sprayed, with complete cessation of bleeding at the end of the procedure (Fig. 2D). He had no recurrence of bleeding, and a repeat necrosectomy 2 weeks later was uneventful.

DISCLOSURE

Dr Freeman is a consultant for Hobbs, Abbvie, and Boston Scientific. Dr Amateau is a consultant for Cook Medical, US Endoscopy, Boston Scientific, Olympus Medical, and Merit Medical. The other author disclosed no financial relationships relevant to this publication.

Abbreviations: FDA, U.S. Food and Drug Administration; USD, U.S. dollars.

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