

ADVANCES IN ENDOSCOPY

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Use of Endoscopic Ultrasound for Management of Severe, Refractory Gastrointestinal Bleeding



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G&H How is severe, refractory gastrointestinal bleeding usually managed?

MB Currently, gastroenterologists perform up to 2 endoscopic attempts to stop gastrointestinal bleeding; if these attempts are not successful, gastroenterologists move from endoscopic interventions to radiologic or surgical interventions to stop the bleeding. Studies have shown that performing 1 or 2 therapeutic endoscopic procedures in patients with gastrointestinal bleeding can decrease recurrence and mortality.

G&H How can endoscopic ultrasound-guided vascular therapy help manage severe, refractory gastrointestinal bleeding?

MB Endoscopic ultrasound (EUS)-guided vascular therapy enables the visualization of small lesions that could not be endoscopically managed in the past because there was no active bleeding at the time of the endoscopy or because the lesions were not visible during endoscopic examination of the digestive mucosa (because of their location deep in the digestive wall). Thus, EUS-guided vascular therapy offers doctors another option for stopping gastrointestinal bleeding.

EUS management of these patients differs depending on whether the bleeding site is known. For example, a computed tomography (CT) scan that was previously taken might reveal a bleeding site in a vascular malformation beyond the gastric or esophageal wall that can be treated via EUS because of EUS' ability to visualize

vascular abnormalities beyond these walls. The bleeding can be managed via an EUS linear probe, which enables EUS-guided placement of a needle into a vascular malformation and subsequent injection of glue to block the lumen of the malformation.

On the other hand, it might not be possible to see anything, including the bleeding site, with either a CT scan or endoscopic examination. In these patients, EUS can be used to explore the gastric and duodenal walls to identify the source of the bleeding, as EUS can visualize small blood vessels that cannot be seen with radiologic or endoscopic exploration, as previously mentioned. Thus, EUS can be used both to identify and treat bleeding sites.

G&H How effective is the use of EUS to manage severe, refractory gastrointestinal bleeding?

MB My colleagues and I recently published a retrospective case series in *Endoscopy* of 8 patients who were admitted for severe, refractory gastrointestinal bleeding and subsequently underwent EUS-guided vascular therapy. Seven of these patients had active bleeding. The bleeding was caused by deep varices beyond the gastric or esophageal wall in 3 patients, gastroduodenal artery aneurysms or fundal aneurysmal arterial malformations in 3 patients, and Dieulafoy ulcers in 2 patients. The bleeding vessel was punctured with a 19-gauge needle and injected with cyanoacrylate glue or polidocanol under Doppler control. Patients were followed for a median of 9 months (3–18 months). All of the patients were treated with EUS,

and all of the treatments were successful, allowing the patients to avoid surgical intervention.

G&H Have any other studies examined this new management strategy?

MB Only case reports and small case series have been published to date on this new technique. Before our paper, the largest report in this area was a case series of 5 patients that was published by Michael Levy and colleagues in 2009 as part of an EUS Working Group document. These patients were bleeding despite having undergone at least 1–3 endoscopic interventions. The patients all underwent EUS management with alcohol, cyanoacrylate glue injection, or microcoil injection. For example, 1 patient underwent EUS-guided embolization with microcoils that were injected in deep varices surrounding a digestive anastomosis following a pancreatotomy, and the bleeding subsequently stopped. The results of this case series were similar to those of our case series, and no bleeding occurred during the follow-up of these patients.

My colleagues and I are currently conducting a prospective study to determine the role of EUS management in severe, refractory gastrointestinal bleeding. No prospective studies have yet been published on EUS management of severe, refractory gastrointestinal bleeding.

G&H Thus far, how safe is the use of EUS for the management of bleeding lesions?

MB There were no clinical complications in our case series, although 1 patient experienced diffusion of cyanoacrylate in the hepatic artery. At the beginning of the case series, there was some concern that puncturing the walls of veins or arteries with the EUS needle would cause additional bleeding, but there was no increase in bleeding in any of the patients. In addition, there was some concern about the risk of infection because the EUS-guided needle had to pass through the gastric wall into the lumen of the blood vessel. Therefore, antibiotic prophylaxis was used, and no infection was reported in any of the patients.

G&H Is there any risk associated with the use of cyanoacrylate glue or polidocanol in this procedure?

MB After embolizing the blood vessel with cyanoacrylate glue or polidocanol in our case series, a CT scan was always performed to verify the diffusion of the agent and the safety of the injection. To help ensure diffusion, we used a mixture of lipiodol and cyanoacrylate, which is a synthetic glue, and we carefully injected the agent

through a 19-gauge needle to allow a sufficient output of the viscous agent. We had to avoid injecting the agent too hard because of the risk that it would diffuse and cause ischemia of the spleen, liver, or an adjacent organ.

G&H Would it be possible to use coils, rather than chemicals, to encourage thrombosis?

MB I do not have experience using coils in EUS-guided vascular therapy because I did not have access to them until recently. There have been talks with manufacturers about developing more microcoils that could be used in EUS-guided vascular therapy. Hopefully, these coils will be available next year. To be used for this indication, the coils must be thin enough to pass through the very thin lumen of 19-gauge EUS needles directly into the lumen of the blood vessel.

Levy and colleagues successfully used coils in the previously mentioned case series. Coils were passed through the lumen of 22-gauge needles, and the stylet was advanced to push the constrained coils that were pre-loaded in the needle into the lumen of the treated varices.

G&H Following EUS management of bleeding, should patients be monitored and periodically restudied to make sure that the Doppler flow signal is gone and that their blood vessels stay occluded?

MB In our case series, the disappearance of the Doppler flow signal after treatment was used as an endpoint, indicating occlusion of the offending blood vessel. All of our patients showed immediate and complete disappearance of the Doppler flow signal at the end of the procedure (Figures 1–3). We have no data on the follow-up of the Doppler signal after its initial disappearance. So far, we have followed patients only with clinical data or CT scans (when lipiodol and cyanoacrylate were used). As both our team and Levy's team have not reported any recurrence of bleeding during the follow-up period, I am not sure that further monitoring of the Doppler signal would be helpful. However, this question is interesting, and further studies should be conducted to determine the answer.

G&H Can EUS be used to manage all patients with gastrointestinal bleeding?

MB I think that EUS is effective at managing severe, refractory gastrointestinal bleeding, especially in patients in whom surgical and/or radiologic interventions are extremely difficult or impossible (eg, patients with acute pancreatitis or a large pancreatic necrosis). When using



Figure 1. The Doppler signal of an arterial anomaly within the gastric wall.



Figure 2. Endoscopic ultrasound–guided embolization of the arterial anomaly with cyanoacrylate glue.



Figure 3. The Doppler signal has disappeared following endoscopic ultrasound–guided injection of the glue.

an EUS scope, the endoscopist is very close to the blood vessels and the pancreatic necrosis, so it is possible to treat these patients very quickly by a direct transgastric or transduodenal approach.

G&H What training is necessary before endoscopists can perform EUS-guided vascular therapy?

MB Training is a problem for this new procedure—in fact, for all therapeutic EUS procedures. In France, only approximately 10% of EUS endoscopists are trained to perform therapeutic EUS procedures, which is a very low number. Also, very few endoscopists in France (and elsewhere in the world) are trained to perform EUS-guided vascular therapy, as training programs for EUS management of bleeding lesions or vascular malformations are very rare. The low number of practitioners of this technique is likely due to fear or lack of awareness of the technique; even among endoscopists who perform therapeutic EUS (which is itself a new technique), very few endoscopists know that it is possible to obtain EUS access to vascular abnormalities or lesions. Informing doctors of this new management approach is particularly difficult because it is a new technique with a new device. My colleagues and I are trying to develop a special training program for EUS-guided vascular therapy using models of live pigs.

G&H What are the next steps for research in this area?

MB A sufficient number of large, prospective, randomized, multicenter studies using the same EUS approach and the same methodology are needed to further evaluate the safety and efficacy of EUS management of severe, refractory gastrointestinal bleeding. I will be speaking with the European Working Group of EUS about conducting 1 such study. Conducting more studies in this area and reporting study results at medical meetings will help inform endoscopists about this novel technique.

Suggested Reading

Gonzalez JM, Giacino C, Pioche M, et al. Endoscopic ultrasound-guided vascular therapy: is it safe and effective? *Endoscopy*. 2012;44:539-542.

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