

Endoscopic Doppler Probe in the Diagnosis and Management of Upper Gastrointestinal Hemorrhage

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ABSTRACT

Through-the-scope (TTS) endoscopic Doppler ultrasound probe technology is a tool that has garnered interest for the evaluation of variceal and non-variceal bleeding. In previous studies, this technology has been proposed as a more objective method of identifying the bleeding subsurface blood vessel in peptic ulcer hemorrhage. We describe 3 cases where the use of an endoscopic Doppler probe guided the diagnosis and management of upper gastrointestinal (GI) hemorrhage due to causes other than peptic ulcer disease. The first case describes a patient with a duodenal Dieulafoy lesion, while the other 2 cases outline patients with a gastroesophageal varix as the etiology of the bleed.

INTRODUCTION

Although current recommendations in acute peptic ulcer hemorrhage rely on endoscopic criteria, there is appreciable interobserver variability in the identification of such stigmata.¹ Through-the-scope (TTS) endoscopic Doppler ultrasonography is a more objective alternative for identifying the vascular source of gastrointestinal (GI) bleeding.^{1,2} We describe 3 cases in which an endoscopic Doppler probe enabled diagnosis and dramatically changed the management of upper GI hemorrhage.

CASE REPORT

Patient 1: A 55-year-old African American man with a history of end-stage renal disease presented with melena, coffee-ground emesis, and syncope. The patient was hemodynamically stable. Laboratory values revealed a low hemoglobin value of 7.1 g/dL. Patient underwent upper endoscopy, colonoscopy, small-bowel capsule endoscopy, push enteroscopy, and tagged red blood cell scan over the following days, but no source of bleeding could be identified. In total, the patient received 7 units of packed red blood cells in the setting of persistent melena and continued blood loss. Endoscopic ultrasound (EUS) was performed to assess the gastric fundus for gastric varices or a gastric Dieulafoy as described by Fockens et al.³

EUS revealed a 2-mm red spot in the duodenal bulb (Figure 1). Given the uncertainty of whether the red spot was a trauma artifact, duodenitis, or a potential bleeding source, a TTS endoscopic Doppler US probe (VTI, Nashua, NH) was used to interrogate the red spot at the mid-depth setting (0–4 mm). A strongly positive arterial Doppler signal compatible with a duodenal Dieulafoy lesion was identified. Doppler US probe-guided endoscopic therapy was then performed with the injection of 1:10,000 epinephrine and the placement of 4 hemoclips. Repeat interrogation showed that the Doppler signal had been eliminated.

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Figure 1. A 2-mm red spot in the duodenal bulb (arrow) seen during repeat EGD on day 6.

Patient 2: A 32-year-old man with a history of alcohol abuse and recent ibuprofen use presented with hematemesis. The patient was hemodynamically stable. Laboratory values were significant for normal hemoglobin 13.5 g/dL and platelets $88 \times 10^9/L$. Upper endoscopy revealed a Mallory-Weiss tear that was felt to be the etiology of the bleeding (Figure 2). Further evaluation with an endoscopic Doppler US probe revealed an audible venous Doppler signal at mid-depth that was consistent with an unexpected ulcerated junctional gastroesophageal varix. Three bands were successfully deployed over the varix, and the immediate post-band ligation Doppler signal was absent.

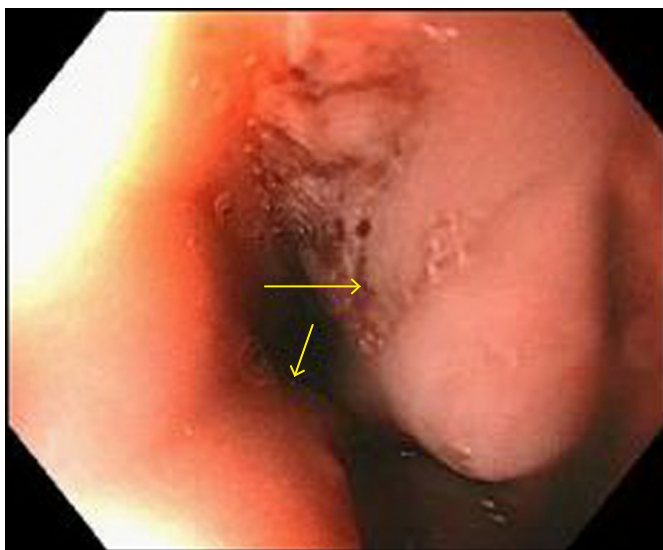


Figure 2. Initial upper endoscopy showing a tear around GE junction (arrow), thought to represent a Mallory-Weiss tear.



Figure 3. Endoscopy showing gastric varix with recent stigmata of hemorrhage or white nipple sign.

Patient 3: A 64-year-old man with a history of non-steroidal anti-inflammatory use was evaluated for upper GI hemorrhage. Laboratory values were significant for a low hemoglobin value of 6.1 mg/dL. Computed tomography of the abdomen and pelvis with intravenous contrast showed a large pancreatic tail mass invading the splenic hilum concerning for infiltrative pancreatic adenocarcinoma. Endoscopy revealed clotted blood in the gastric fundus, and a gastric varix with superficial ulceration was found in the stomach with recent stigmata of bleeding or white nipple sign (Figure 3). A TTS Doppler US probe confirmed venous flow, indicative of a varix, and injection of cyanoacrylate was guided with the Doppler US probe. After injection, the TTS Doppler US probe confirmed cessation of the Doppler signal. Endoscopy was repeated 4 days after presentation and showed type 2 gastroesophageal varices that had been previously treated and showed no bleeding. Biopsies of the stomach showed large B cell lymphoma.

DISCUSSION

Although primary endoscopic hemostasis is readily achievable with various types of endoscopic treatments, recurrent bleeding remains a problem that is estimated to occur in up to 25% of cases.⁴ Wong et al.⁴ studied a group of patients with endoscopically confirmed bleeding from gastric, duodenal, pyloric, or anastomotic ulcers who then underwent endoscopic Doppler US examination before and immediately after endoscopic therapy. They found that patients with a persistently positive Doppler US signal immediately after endoscopic therapy had a significantly higher rate of recurrent bleeding than ulcers where the signal was eliminated. Thus, a persistently positive Doppler US signal may be a marker of inadequate endoscopic therapy.⁴ Jensen et al.⁵ similarly showed

that residual arterial blood flow after endoscopic hemostasis was not only associated with increased risk for rebleeding, but the use of endoscopic Doppler US probe resulted in a significant reduction in 30-day rates of recurrent bleeding in patients with severe non-variceal upper GI hemorrhage compared to standard, visually guided endoscopic hemostasis.

We report 3 patients in whom a TTS endoscopic Doppler US probe was used to guide the diagnosis and subsequent management of acute upper GI hemorrhage. In the first patient, the Doppler US probe helped identify an obscure source of GI bleeding after multiple endoscopies and a bleeding scan. In the second patient, the endoscopic diagnosis was changed from that of a Mallory-Weiss tear to a junctional varix. Treatment of the Mallory-Weiss tear may have included endoclippping and epinephrine injection, which is inappropriate for the management of variceal bleeding and could have resulted in uncontrollable bleeding requiring balloon tamponade. The use of the Doppler US probe led to the appropriate treatment of the junctional varix with endoscopic band ligation. In the third patient, a TTS Doppler US probe helped identify the source of bleeding as an isolated gastric varix, which was successfully treated with cyanoacrylate. Endoscopic management was changed as it could have just been a thickened gastric fold or infiltration of the stomach wall by cancer, and some endoscopists may have considered taking biopsies, which would have been incorrect management in a varix.

There is new interest in utilizing endoscopy with a Doppler US probe to guide endoscopic hemostasis based on subsurface blood flow. The literature has identified its utility in acute peptic ulcer hemorrhage; however, these 3 cases highlight its

utility in other bleeding etiologies, which may translate to downstream effects such as decreasing morbidity, mortality, and length of hospitalization related to GI hemorrhage.

DISCLOSURES

Author contributions: All authors wrote the manuscript. S. Satyavada is the article guarantor.

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Informed consent was obtained from two patients. Consent could not be obtained from the third patient despite multiple attempts, but identifying information has been removed.

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