# Achieving Hemostasis and the Risks Associated with Therapy

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**KEYWORDS**

• Clips • Endoscopic band ligation • Gastrointestinal bleeding • Hemostatic spray • Hemostasis • Peptic ulcer bleeding • Perforation • Thermal coagulation

**KEY POINTS**

- The major adverse events attributed to endoscopic hemostasis include precipitation of uncontrollable bleeding and perforation.
- The effective and safe application of endoscopic hemostasis necessitates a working knowledge of the various hemostatic tools available and recognition of pitfalls of endotherapy based on the location and characteristics of the targeted lesion.

**Videos demonstrating endoscopic hemostasis accompany this article at http://www.giendo.theclinics.com/**

## INTRODUCTION

Despite the declining trend in admission for acute gastrointestinal (GI) bleeding,[1] the condition still remains a common cause for hospitalization and a source of significant morbidity and mortality.[2] Endoscopic diagnosis and therapy are an integral part of the management algorithm for acute GI bleeding. A variety of hemostatic tools are at the disposal of the endoscopist, and a working knowledge of these devices is essential for their safe and effective use. Herein, the authors highlight the applications and caveats of endoscopic hemostasis from a device perspective.

## PITFALLS OF ENDOSCOPIC HEMOSTASIS

Determinants for a successful outcome include the availability and appropriate selection of particular devices for hemostasis, the experience and skill of the operator, and the suitability of the targeted lesion for endoscopic therapy. It is imperative to recognize potential pitfalls of endotherapy based on the location and features of the

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bleeding lesion. Failure to recognize potentially problematic lesions can result in serious adverse events, such as precipitation of uncontrollable bleeding and perforation, during attempted endoscopic hemostasis.

### *Lesion Location*

Endoscopic therapy for lesions in the territories of the left gastric artery (LGA) and gastroduodenal artery (GDA) needs careful consideration because these lesions are usually fed by large-caliber vessels. The problem is further compounded by the endoscopic difficulty in accessing these lesions. A salvage plan consisting of angiographic and/or surgical intervention needs to be established before attempted endotherapy in the event of iatrogenic uncontrollable bleeding. The LGA and its tributaries course along the proximal lesser curvature of the stomach. This area is also a technically difficult area to access with the endoscope in both direct and retroflexed positions. Inconspicuous lesions, such as a small Dieulafoy lesion, can hide behind the shaft of the retroflexed endoscope. Deeply penetrating ulcers with high-risk stigmata (HRS) of recent hemorrhage (eg, dense adherent clot) and large Dieulafoy lesions (>2 mm) arising from the main LGA are prone to brisk bleeding and are not usually amenable to standard endoscopic therapy, such as coaptive coagulation. Prophylactic radiologic embolization may be appropriate for these lesions because of the high incidence of potentially life-threatening rebleeding. Placement of through-the-scope (TTS) clips adjacent to the bleeding site can serve as fluoroscopic markers to facilitate subsequent supraselective angiographic embolization.

The GDA usually arises from the common hepatic artery, supplies the proximal duodenum, and can be a source of significant bleeding in the setting of peptic ulcer disease (PUD). Access to ulcers on the posteroinferior duodenal wall and treatment of underlying bleeding stigmata can be challenging because of restricted visualization at the duodenal angle and an unstable endoscope position, especially if the bulb is short and edematous. Cap-assisted hemostasis can potentially remedy this situation (see later discussion). In addition, culprit vessels arising from the GDA can be large and difficult to treat adequately with conventional TTS clips and contact thermal probes. If therapy is entertained, a duodenal ulcer with a dense adherent clot should undergo large-volume epinephrine injection before clot removal by cold snare guillotine, followed by definitive therapy for the underlying bleeding stigmata, as appropriate (Video 1). In general, readily accessible visible vessels (VV) 2 mm or less in size are amenable to contact coagulation (10F thermal probe) or TTS clip placement (**Fig. 1**). Newer devices, such as the over-the-scope clip (OTSC), may be effective at managing lesions with bleeding vessels greater than 2 mm in size, although OTSC data for this indication are scant (**Fig. 2**). For lesions in which conventional endoscopic hemostasis is thought to be too risky (eg, VV >2 mm) and the risk of rebleeding without endotherapy is high, prophylactic angiographic embolization is an option. As previously mentioned, placement of TTS clips close to the bleeding point can assist as fluoroscopic markers for supraselective coil embolization (**Fig. 3**).

Other locations where careful endotherapy is warranted include the thin-walled colon (in particular, cecum and diverticular dome) and the small bowel, especially when contact thermal probes are used. Distention of these segments should be curtailed to avoid thinning the wall even further before application of thermal therapy in order to minimize the risk of perforation.

### *Lesion Features*

For shallow bleeding peptic ulcers with HRS, endoscopic management consisting of thermal or mechanical (clip) therapy, with or without epinephrine injection, is typically