

# What if Endoscopic Hemostasis Fails?



## Alternative Treatment Strategies: Interventional Radiology

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### KEYWORDS

- Endoscopic hemostasis • Interventional radiology
- Acute upper gastrointestinal bleeding • Treatment • Embolization

### KEY POINTS

- Medical and endoscopic therapy has been very successful at diminishing rates of upper gastrointestinal bleeding as well as in its treatment.
- There will be a small but challenging subset of patients for whom endoscopy cannot achieve hemostasis or will not be able to identify the source of bleeding.
- For persistent slow or intermittent bleeding that cannot be localized by esophagogastroduodenoscopy, further diagnostic evaluation with computed tomography angiography or scintigraphy should be considered.
- Individuals with active bleeding that is refractory to endoscopic treatment should undergo transcatheter angiography and intervention (TAI).
- TAI's technical and clinical success rates in most series are more than 90% and 70% for the treatment of upper gastrointestinal bleeding.

### INTRODUCTION

Since the 1960s, interventional radiology (IR) has played a role in the management of gastrointestinal (GI) bleeding. What began primarily as a diagnostic modality has evolved into much more of a therapeutic tool. And although the frequency of GI bleeding has diminished thanks to management by pharmacologic and endoscopic methods, the need for additional invasive interventions still exists. Transcatheter angiography and intervention (TAI) is now a fundamental step in the algorithm for the treatment of GI bleeding.

### Evolution

- 1963: Selective arteriography for localizing GI bleeding<sup>1,2</sup>
- 1968: Selective arterial infusion of vasopressin to reduce blood flow in superior mesenteric artery (SMA) and to reduce portal venous pressure<sup>3,4</sup>

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- 1970: Selective embolization of gastropiploic artery using autologous clot (in conjunction with epinephrine) to stop active bleeding from a gastric ulcer<sup>5</sup>
- 1970s to 1990s: Arterial infusion of vasopressin used to treat GI bleeding<sup>4,6</sup>
- 1990s to the present: Superselective arterial embolization becomes primary endovascular method for treatment of GI bleeding<sup>7,8</sup>

## MATERIALS AND METHODS

In 1963, an angiogram was used as a means to help diagnose the presence of, as well as to help localize, a site of GI bleeding. The catheters available at that time allowed access to first-order and some second-order branches of the aorta but often not more distal. Embolic agents existed, but because they could not be deployed superselectively, the affected downstream territory was larger, with greater potential for ischemia. Sometimes, too proximal of an embolization did not treat direct collateral pathways to the bleeding site, resulting in ongoing or promptly recurring hemorrhage. Therefore, safe and effective treatment was somewhat limited.

Given the inability to reach sites of focal bleeding, more regional treatments were applied. Vasoconstrictive medications were administered intra-arterially to limit pressure and blood flow to sites of hemorrhage, facilitating hemostasis by patients' autologous clotting mechanisms. These arterial procedures typically lasted from 12 to 48 hours (Table 1).

Although the use of vasoconstrictive medications can be effective, especially for the treatment of diffuse bleeding, it has some clear limitations. Because the medication's effects cannot be confined to its site of administration, it poses significant systemic risks to anyone who has ischemic heart disease or prior stroke by further restricting blood flow to these areas. Additionally, because its effect ends on cessation of infusion, bleeding will resume if a stable clot has not formed. As a result, the rates of recurrence following therapeutic vasoconstriction were reported as high as 71%.<sup>9</sup>

With continued evolution of endovascular tools, however, the treatment options and their safety and efficacy increased significantly.

Probably the most important development that redefined the endovascular world was the development of the microcatheter. Microcatheters are small-diameter catheters (1.7–3.0 F catheters compared with 5–6 F diagnostic catheters) that can be navigated selectively into higher-order branch vessels, thereby allowing the targeting of very focal sites of vascular abnormality (Figs. 1–3). The microcatheters serve as a conduit for the instillation of contrast material as well as a variety of embolic agents.

**Table 1**  
Basic procedural tools for TAI in treatment of GI bleeding

Tool	Use
Access sheaths	Continuous arterial access; conduit through which exchange of catheters can take place without compromising access site; can provide continuous arterial pressure monitoring
Catheters and wires, including microcatheters and microwires	Numerous shapes and sizes allow selective and superselective catheterization to maximize diagnostic evaluation and targeted delivery of therapeutic materials
Embolic agents	Temporary (Gelfoam and autologous clot) and permanent (particulate, coils, liquids <sup>10,11</sup> ); to occlude or promote autologous occlusion of target blood vessel
Vasopressin	Vasoconstrictor diminishes pressure and flow to promote autologous hemostasis

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