# Endoscopic Closure of Gastrointestinal Fistulae and Leaks

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**KEYWORDS**

• Lumen-apposing metal stent • Fistula • Leak

**KEY POINTS**

- Endoscopic fistula closure offers a minimally invasive alternative to surgery when conservative measures fail.
- Endoscopic therapies for management of fistula and leaks include stenting, clipping, full-thickness suturing, and use of tissue adhesives. These therapies continue to evolve and show promising results.
- The lumen apposing metal stent (LAMS) has provided the endoscopist the ability to create iatrogenic fistulae to treat disease states.
- Fistulae resulting from the LAMS have not been routinely closed after the LAMS removal. Further study is warranted to determine whether residual fistula closure may be necessary in certain instances, such as transgastric fistula in Roux-en-Y gastric bypass.

## INTRODUCTION

A gastrointestinal (GI) fistula is an abnormal connection between an abdominal organ and another organ (internal fistula) or the body surface (external fistula). These fistulae may arise from malignant or inflammatory conditions, or may be iatrogenic, occurring after surgery, endoscopic therapy, or radiation therapy. Traditionally, conservative measures and surgical therapy has been the mainstay of treatment of GI fistulae. However, surgical therapy tends to be complex and is plagued by high rates of morbidity.[1] In recent years, advances in interventional endoscopic techniques have altered the management paradigm for GI fistula, allowing for an additional option before considering surgery.

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Development of new endoscopic techniques, such as GI stenting, suturing, clip application, and use of tissue adhesives, have had a significant impact on management of GI fistulae. The advancement of endoscopic technology, including the lumen apposing metal stent (LAMS), has allowed for the deliberate creation of GI fistula to perform endoscopic therapy that previously could not be achieved. These techniques continue to evolve and require further study for optimization of efficacy. The aim of this article is to examine the rapidly evolving area of endoscopic fistula closure and its relation to LAMS.

## DIAGNOSIS

The first step in diagnosing a GI defect is through examination and medical history. Common symptoms include pain (initially localized but may become diffuse) and fever[2]; however, some patients may be completely asymptomatic. Once the suspicion for GI fistula or leak exists, the source and route must be established to determine the appropriate intervention.

Enterocutaneous fistula may be diagnosed based on appearance. Enterocutaneous fistulas may present with abnormal drainage from the skin, such as purulence or intestinal contents. Definitive diagnosis requires cross-sectional imaging, such as computed tomography (CT), MRI, or contrast fistulogram, demonstrating an abnormal connection between bowel and another organ.[3] When fistulae are too small for imaging, dye injected via catheter or during endoscopy can aid in diagnosis. Evidence of staining in wound drainage, urine, feces, or from the vagina may confirm the presence of enteric fistula.[4]

Internal GI fistulae are more difficult to diagnose than enterocutaneous fistulae. Comprehensive study of the anatomic defect requires imaging modalities such as contrast fistulogram, CT, MRI, or radionuclide testing. For contrast studies, barium is the medium of choice for its ability to remain undiluted and define mucosal surfaces (**Fig. 1**). However, extravasated barium may induce an inflammatory reaction. Therefore, a water-soluble medium should be considered if there is a concern for GI perforation or leak.[5] In addition, carbon dioxide is recommended for insufflation during

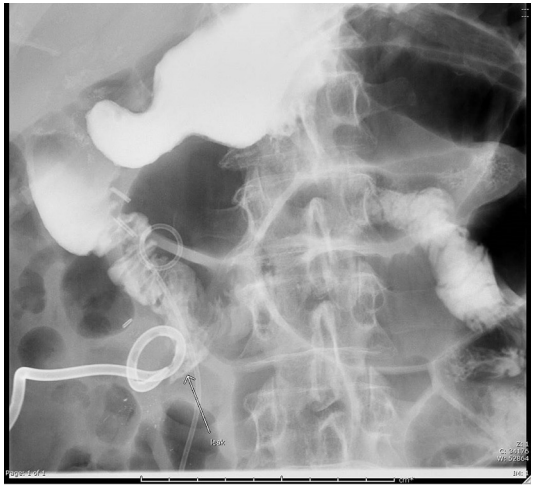

**Fig. 1.** Contrast upper GI series demonstrating a leak (*arrow*) at the junction of the second and third portions of the duodenum after surgical resection of a sarcoma.