

# Evaluation and Management of Enterocutaneous Fistula

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**CASE SUMMARY:** A 36-year-old woman presents with an abscess at her midline wound 4 weeks following an ileocectomy for Crohn's disease. After the abscess is incised, there is purulent drainage followed by the drainage of enteric contents; the output is 750 mL per 24 hours.

## CLINICAL QUESTIONS

- What is the immediate care required for patients when an enterocutaneous fistula is first recognized?
- What are nutritional and wound care needs of patients with enterocutaneous fistula?
- What preoperative preparation is required before embarking on repair of an enterocutaneous fistula?

## BACKGROUND

Enterocutaneous fistulas (ECFs) are defined as any communication between the GI tract and the skin of the abdominal wall. This condition typically bears a major negative impact on the quality of life of patients, and treatment requires several months/years to resolve. There is a stepwise approach to treating this condition, and patients must be evaluated with attention to detail.

## PRESENTATION AND DIAGNOSIS

Patients with ECF may present with a range of symptoms, from small localized abscesses to florid septic shock. In the latter case, prompt attention to address systemic sepsis is essential. Immediate attention to goal-directed fluid resuscitation, electrolyte correction, and critical care support is essential. The underlying intra-abdominal septic source must be controlled, and broad-spectrum antibiotics covering enteric organisms should be initiated rapidly.<sup>1</sup> Source control may be obtained with percutaneous drainage of an abscess visualized on CT scan (Fig. 1), which is required in upward of 10% of patients presenting to tertiary centers.

More often than presenting with sepsis, patients will present with a suspected surgical site infection or with frank bilious drainage. There should be a high index of suspicion in patients who present with a localized wound infection several weeks postoperatively (Fig. 2). When a fistula is suspected, an incision should be made that will allow for adequate drainage, skin care, and pouching. It is not uncommon for there to be an initial drainage of purulence followed by enteric contents within the ensuing days.

## MANAGEMENT

Once the diagnosis of ECF has been confirmed, a stepwise approach is necessary to ensure successful resolution of the fistula. After resuscitation and source control of infection, the next step is to ensure proper skin and wound care. This can be particularly challenging given the quality of the effluent and special anatomic considerations of each particular fistula. Particularly with small-intestine ECF, the effluent can be caustic to the surrounding skin.<sup>2</sup> It can be difficult to obtain an adequate seal that isolates the fistula, allows the surrounding tissue to granulate, and protects the surrounding skin. Customized pouching systems or negative-pressure wound therapy with fistula isolation may be required<sup>3</sup> (Fig. 3). A multidisciplinary approach is essential, including an experienced wound/ostomy nursing team. Once the wound care issues have been addressed, the next phase of management is to categorize the fistula as either low or high output. Traditionally, a low-

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**FIGURE 1.** Computed tomography scan of patient with enterocutaneous fistula demonstrating abscess.

output fistula is defined as effluent volume  $<200$  mL/24 h, and high-output fistula is characterized as  $>500$  mL/24 h.<sup>4</sup> Low-output fistulas have a higher likelihood of spontaneous closure, and a portion of patients with ECF will heal spontaneously with appropriate nutritional support and wound care.<sup>5</sup> Several factors may contribute to the persistence of fistulas, including the presence of foreign body/material at the fistula site, prior radiation exposure to the



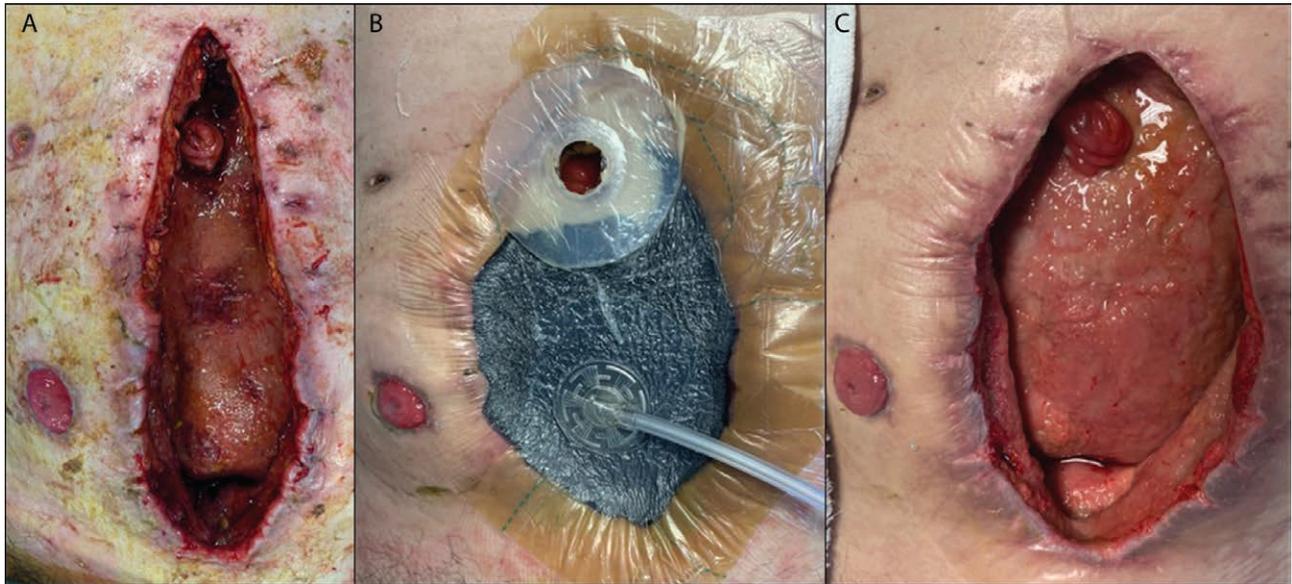
**FIGURE 2.** Suspected enterocutaneous fistula in patient several weeks after colectomy. (Photo courtesy of Eric K. Johnson, M.D.)

involved bowel, active infection/unaddressed sepsis, IBD, epithelialization of the fistula tract, neoplasm, presence of a distal obstruction, and active steroid use.<sup>6</sup> In these situations, operative management is almost always required.

The treatment of ECF was revolutionized with the advent of total parenteral nutrition (TPN).<sup>7</sup> Although enteral nutrition is always preferred, it can lead to increased fistula output by stimulating the production of intestinal secretions, thereby resulting in major problems with dehydration and electrolyte imbalances for which patients are unable to compensate. It is possible to challenge patients with an enteral diet while in the hospital; if the output increases significantly, then patients should not be allowed to take enteral nutrition. A multidisciplinary team including physicians, nutritionists, nurses, and pharmacists provide complex home parenteral nutrition. This includes frequently monitoring basic electrolyte values and serum markers of nutrition while adjusting the TPN formula accordingly. Although there is no absolutely reliable serum marker for nutrition, frequent measurements include prealbumin, albumin, and transferrin.<sup>8</sup> The multidisciplinary team extends to the patients' homes, where home health nursing can assist with the administration of TPN. With bowel rest and the administration of TPN, fistulas may close in up to 12 weeks. The addition of somatostatin analogs is controversial and relatively expensive. Most studies demonstrate that, although somatostatin analogs will decrease fistula output, they do not affect the rate of successful closure.<sup>9</sup>

In cases of Crohn's disease, the timing of ECF presentation is significant. Patients who present with ECF who have not had surgery in the past are more likely to close with the initiation of biologic therapy compared with those that present in the postoperative period. The treatment of patients with biologic therapy should be individualized; the assessment of potential fistula closure should be balanced with the risk of immunosuppression, especially while on TPN.

For fistulas that do not close, operative intervention is indicated.<sup>10</sup> Before embarking on operative intervention, it is imperative to time the operation appropriately. A general consideration is to wait at least 6 months, which is associated with decreased mortality following the operation.<sup>11</sup> This also allows to time for intra-abdominal adhesions to soften and improves the safety of the operation; some patients require waiting additional time to allow the tissues to achieve a workable state. If there was a skin graft in place, a "pinch test" can be performed to evaluate if the intestines have separated from the anterior abdominal wall.<sup>7</sup> Also, in the case of an enteroatmospheric fistula with surrounding granulation tissues, allowing the granulation tissue to epithelialize may help with wound healing postoperatively (Fig. 4). An encouraging sign that an enteroatmospheric fistula is ready for operation is when the intestines begin to prolapse. After an appropriate waiting period, it is necessary to define the anatomy. Computed tomography scan and small-bowel follow-through will delineate the anatomy, and a retro-



**FIGURE 3.** Enteroatmospheric fistula with fistula isolation and negative pressure wound therapy. A, Fistula upon initial presentation after transfer from outside facility. B, Customized fistula-exclusion negative-pressure dressing. C, After 72 hours of negative-pressure wound therapy, there is already improvement in granulation tissue and contraction of wound.

grade contrast study or endoscopic evaluation will identify distal obstruction. In addition, the abdominal wall should be evaluated for hernia and may require the assistance of a general surgeon or plastic surgeon who specializes in abdominal wall reconstruction.<sup>6</sup> The intestinal anatomy must be taken into consideration, and it is important to know the relative location of the fistula along the GI tract and to understand the potential absorptive capacity of the residual intestines.

If the fistula is accessible endoscopically, there are nonsurgical techniques that can be attempted such as over-the-scope clips. These devices are not effective for the treatment of chronic or enteroatmospheric fistulas, but

have been shown to have some efficacy for the treatment of acute postoperative fistulas. A majority of fistulas will require surgical intervention, and, therefore, the operation must be planned conscientiously. Extensive preoperative counseling is required because 16% of fistulas recur after operative intervention, and postoperative mortality is 10% to 20%.<sup>12</sup> These operations are frequently time consuming, requiring several hours of adhesiolysis. Typically, these patients are not candidates for participation in enhanced recovery after surgery programs; however, select elements of these protocols should be customized for each patient. Special attention should be given to the plan for perioperative pain management and may include uti-



**FIGURE 4.** Local wound care of this enteroatmospheric fistula resulting in improved granulation and epithelization after 2 months of treatment. (Photo courtesy of Thea Price, M.D.)

lization of epidural catheters, transverse abdominis plane blocks, and patient-controlled analgesia.

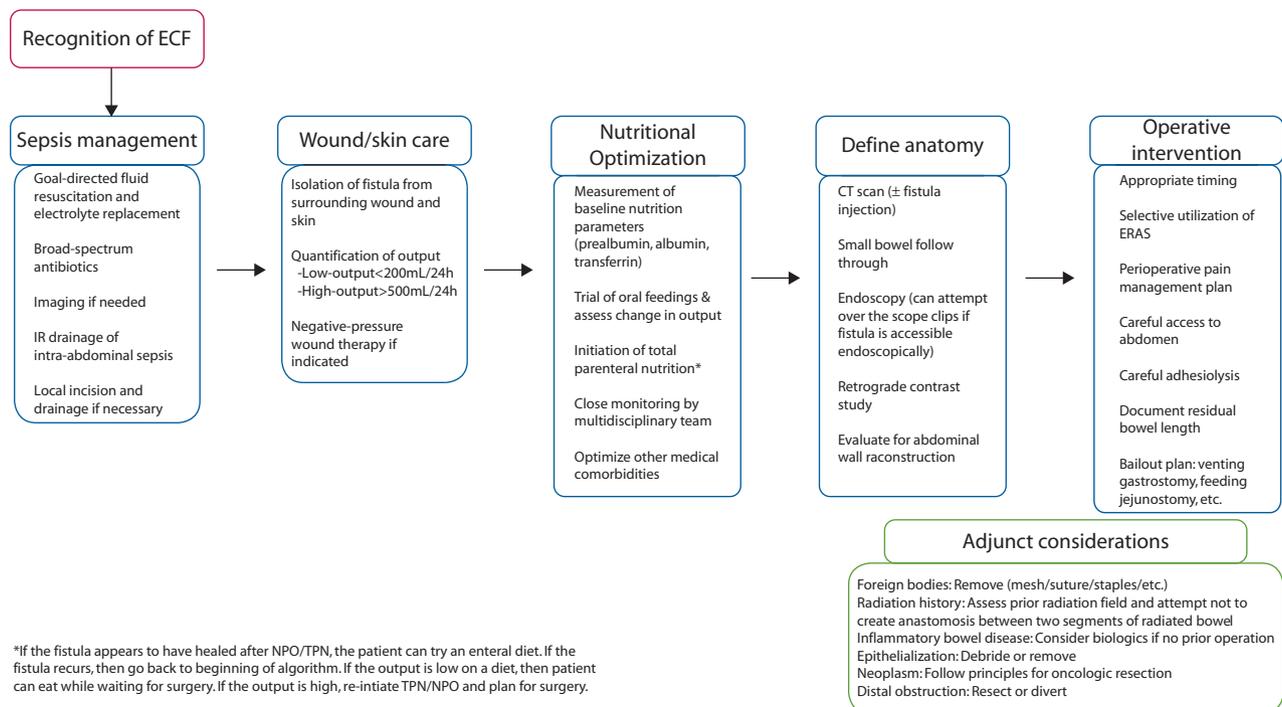
The patient should be positioned in the lithotomy position with access to the anus in case intraoperative endoscopy is required. Ureteral stents should be utilized selectively based on the prior surgical history. Often, entering the abdomen is the most challenging portion of the case. Before the operation, carefully review the preoperative imaging to evaluate for the best location to enter the abdomen, which is often inferior to the xiphoid in previously unviolated tissue planes. Extreme caution must be taken to avoid creating enterotomies when entering the abdomen or when performing adhesiolysis, which should be done by a cautiously sharp technique. The anatomy of the intestine can be unclear, and running the entire bowel to ensure that proper anastomoses are created is essential. Resection of the fistula-containing segment of intestine with anastomosis is necessary rather

than attempts at suturing the fistula closed primarily.<sup>12</sup> Measurement of residual intestinal length should be documented in cases of potential short-gut syndrome. In cases of the frozen abdomen, it is necessary to have an armamentarium of bailout maneuvers, such as placement of a gastrostomy tube for venting and/or a jejunostomy tube for feeding. It is rarely necessary to wait a longer period of time (upward of 1–1.5 years) before reattempting surgical treatment of ECF.

## CONCLUSION

Enterocutaneous fistulas can be debilitating for patients and often require a long period of preoperative optimization before attempting surgical repair. The reliance on a multidisciplinary team to address wound care and nutritional optimization is crucial to successful outcomes for the operative management of ECFs.

## EVALUATION AND TREATMENT ALGORITHM



Abbreviations: ECF = enterocutaneous fistula; ERAS = enhanced recovery after surgery; IR = interventional radiology; NPO = nothing by mouth; TPN = total parenteral nutrition.

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## Expert Commentary on the Management of Enterocutaneous Fistula

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**D**r Bhama has written an excellent review of the management of enterocutaneous fistulas (ECFs). She has included all the salient management strategies. In general, the management of an ECF can be considered in 4 phases: control of sepsis, management of effluent, protection of skin, and nutritional management. Although this strategy allows a clinician to think clearly about an ECF in a simple, stepwise fashion, the management is not always quite so simple. The author has eloquently highlighted all of the major issues. Here, I will discuss some of the practical implications from the perspective of someone who has a high-volume colorectal surgery practice and who does a significant number of operations for ECF every year.

The role as an “expert” in the management of ECF is often not desired because these are very difficult problems in complex patients. Although some patients with an ECF have developed a spontaneous fistula as a result of the complication of Crohn’s disease, diverticulitis, or cancer, frequently it is a consequence of surgical misadventure.

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These surgical complications have often been unsuccessfully managed at outside facilities and patients arrive in less than ideal physiologic states. It is not uncommon for their wounds to be large with poorly managed surrounding skin. We also find patients with a negative energy balance as reflected by low protein, albumin, and prealbumin. In addition, they are often in an inflammatory state as indicated by elevated levels of C-reactive protein and erythrocyte sedimentation rate.

We typically encounter these patients for the first time in the outpatient setting. Given their constellation of issues, it is not uncommon for patients to require a hospital admission. A recent abdominal scan is necessary to ensure that all sources of sepsis have been controlled. Surgical intervention is indicated if there is evidence of uncontrolled sepsis in the setting of an acute abdomen. Once the patient is out from the initial event, it is best, if possible, to avoid returning to the operating room for some time. In fact, an operation at this stage will likely harm the patient. The placement of percutaneous drains as needed, along with intravenous antibiotics, is paramount to controlling intra-abdominal sepsis.

The authors have nicely shown the importance of wound care as part of the management schema. Figures 3 and 4 of the article clearly show novel strategies and their importance for wound healing. The role of a certified wound and ostomy clinical nurse is invaluable to the process. The wound is the greatest source of patient distress in the time before surgical intervention, and the wound and ostomy clinical nurse is one of the best resources for the patient.