

# Complex Enterocutaneous Fistula: Closure With Rectus Abdominis Muscle Flap

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**ABSTRACT:** Most enterocutaneous fistulas are caused by complications of abdominal surgery that may result from anastomotic failure, poor blood supply, or iatrogenic bowel injuries. Mortality rates are high when associated sepsis and malnutrition are uncontrolled. Fistulas that occur late and those that recur spontaneously present more difficulty and may close spontaneously in less than 30% of cases. Mortality rates in patients with complex enterocutaneous fistulas may reach 60% to 80%. When traditional conservative surgeries of fistulous tract excision, bowel mobilization, and resection with primary end-to-end anastomosis fail, a more aggressive approach is required. The rectus abdominis muscle flap has been extensively studied and used in a wide variety of abdominal, vaginal, and perineal repairs. We report successful closure of complex enterocutaneous fistulas with a rectus abdominis muscle flap in a complicated case.

ENTEROCUTANEOUS FISTULAS are most commonly seen in the postoperative setting and can portend a difficult course for the patient. Morbidity associated with fistulas is significant and includes malnutrition, dehydration, skin excoriation, abscess formation, and sepsis.<sup>1</sup> Mortality rates are high and range from 15% to 43%; the principle causes of death are sepsis and associated malnutrition.<sup>1,2</sup> Particularly difficult to manage are complex fistulas or those associated with large abdominal wall defects. Mortality rates in these cases may reach 60% to 80%.<sup>3,4</sup> The initial management of enterocutaneous fistulas consists of bowel rest, total parenteral nutrition (TPN), and delineation of the anatomy of the fistula. Even under ideal conditions, fistulas may fail to close or may recur. Complicated fistulas will close spontaneously in <30% of cases.<sup>1,3</sup> When operative intervention is indicated, the recommended procedure is resection of the involved segment of bowel with primary anastomosis. Cases in which patients have previously had extensive bowel resection, or in which the fistula is associated with a large abdominal wall defect, defy traditional operative management. In these difficult cases, vascularized muscle flaps may be helpful in closing enterocutaneous fistulas. We detail such a case.

## CASE REPORT

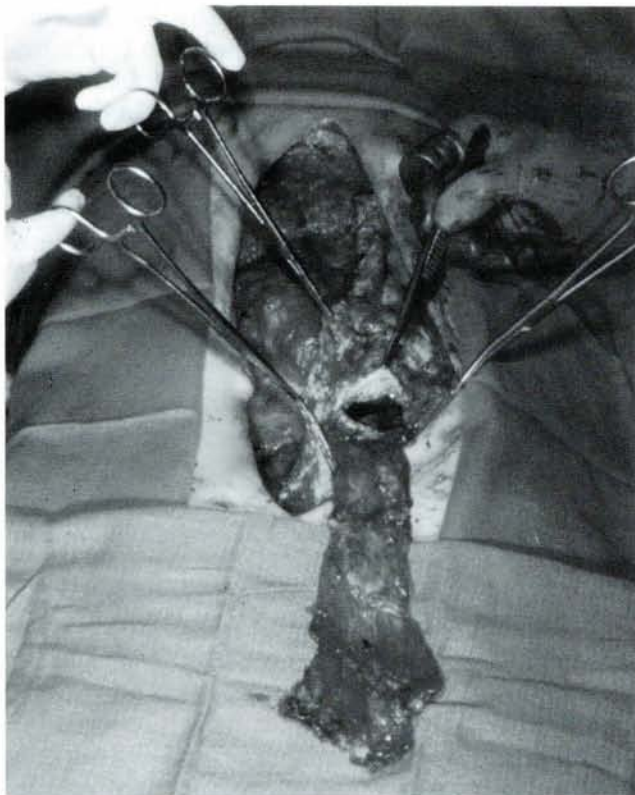
A 53-year-old man had radical total gastrectomy, splenectomy, and Roux-en-Y esophagojejunostomy for a T2 N0 M0 adenocarcinoma of the proximal aspect of the stomach in January 1994. He received no adjuvant therapy and remained free of disease and complications for 15



**FIGURE 1.** Abdominal wound dehiscence with multiple enterocutaneous fistulas.

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**FIGURE 2.** Left rectus abdominis muscle flap and its deep inferior epigastric artery pedicle. Opening through transversalis fascia below arcuate line.

months. Postoperatively, a mechanical small bowel obstruction developed, and the patient had small bowel resection and primary anastomosis. At the time of operation, there was no evidence of recurrent carcinoma, and the bowel obstruction was caused by an adhesive band. His postoperative course was remarkable for the development of a small bowel anastomotic leak, which ultimately required further small bowel resection and anastomosis. This second resection was further complicated by a recurrent enterocutaneous fistula, which developed at the anastomotic site several weeks postoperatively. The fistula resolved after nonsurgical therapy consisting of bowel rest and antibiotics. He was subsequently discharged from the hospital in stable condition.

Approximately 8 weeks later, the patient came to the emergency department with a 1-week history of fever, vague abdominal pain, anemia, and bilious drainage from the abdominal wound. He subsequently had lower gastrointestinal tract bleeding that required transfusion of 14 units packed red blood cells. Computed tomography (CT) of the abdomen suggested the presence of ischemic bowel and an intra-abdominal abscess. At exploration, an enterocutaneous fistula was identified in the middle portion of the previous incision, and massive bleeding from associated mesenteric vessels was seen. Distally, the small bowel and mesentery were ischemic and markedly edematous, with dense adhesion. Resection of the distal aspect of the small bowel and cecum was required to control the hemorrhage, and a stapled jejunocolostomy was done. There was no evidence of recurrent malignancy or significant intra-abdominal abscess formation.

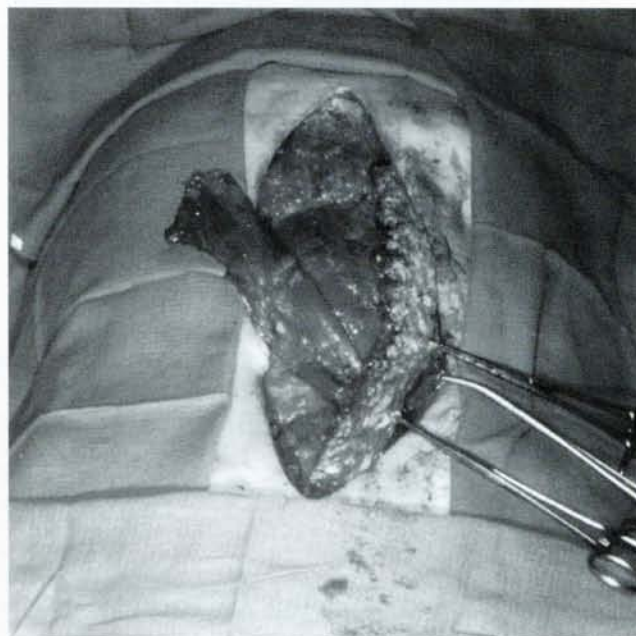
On postoperative day 6, dehiscence of the abdominal wound was observed. Two intestinal perforations were identified and primarily repaired; one was in the distal

aspect of the small bowel proximal to the jejunocolostomy, and the other was in the colon, distal to the anastomosis. The wound was packed open, and a series of daily debridements and dressing changes was done. On subsequent inspections, the patient had multiple fistulas that communicated with the open abdominal wound (Fig 1). Due to the complex nature of the multiple fistulas, use of a rectus abdominis muscle flap was proposed to cover and control the fistulas and provide well-vascularized tissue in the contaminated field.

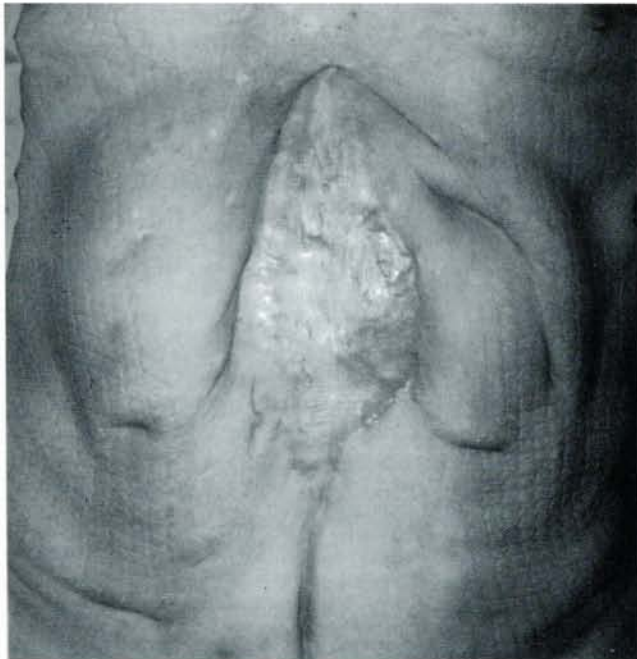
A left rectus abdominis muscle flap was elevated (Fig 2), passed posteriorly through the fascia (Fig 3), and inset in the abdominal wall overlying the multiple fistulas. Closed suction drains were placed beneath the muscle flap in an effort to control the fistulous drainage. The abdominal wound was again packed open. Postoperatively the patient did well, and the fistulas resolved after 2 weeks (Fig 4). The abdominal wound was revised, undermined, and closed primarily (Fig 5). The patient required TPN but was also allowed an oral diet in conjunction with paregoric and cholestyramine (Questran). At his 18-month follow-up, the patient's weight remained stable, though he had required supplemental TPN. There was neither evidence of recurrent malignancy nor recurrent enterocutaneous fistulas.

## DISCUSSION

Enterocutaneous fistulas most commonly develop as a postoperative complication of bowel surgery, though in 15% to 20% of cases fistulas occur spontaneously. Spontaneous fistulas may arise in patients with inflammatory bowel disease, radiation enteritis, diverticular disease, perforated duodenal ulcers, and pancreatic or gynecologic malignancies.<sup>5</sup> Crohn's disease is the most common primary bowel disease leading to enterocutaneous fistulas,<sup>5</sup> and surgical treatment may be difficult because additional



**FIGURE 3.** Left rectus abdominis muscle flap passing through opening into abdominal cavity.



**FIGURE 4.** Healed abdominal wound after closure of enterocutaneous fistulas with rectus abdominis muscle flap.

enterocutaneous fistulas will develop in many of these patients postoperatively.

The vast majority of fistulas occur in the postoperative setting. Development is more frequent after emergency surgery when the patient preparation is poor or in the chronically debilitated, malnourished patient.<sup>5</sup> Causes include disruption of the anastomotic suture line, unintentional enterotomy, or inadvertent small bowel injury at the time of closure.<sup>5</sup> Careful planning and meticulous technique can certainly lessen the risk of postoperative fistula formation.



**FIGURE 5.** Abdominal view after revision and primary closure of abdominal defect.

Initial management of enterocutaneous fistulas includes fluid resuscitation, electrolyte replacement, nutritional support, bowel rest, and control of fistula drainage. Aggressive fluid and electrolyte replacement is especially critical for the patient with a high-output fistula, since the proximal location precludes absorption of nutrients and the secretory nature of the duodenum and jejunum greatly contributes to electrolyte imbalances. Adequate nutrition while on bowel rest can be ensured with the use of TPN.

Nonsurgical therapy may allow spontaneous closure of the fistula, though this can be expected less than 30% of the time.<sup>1</sup> A variable amount of time to allow spontaneous closure of fistulas has been recommended, ranging from 30 days to 6 to 8 weeks.<sup>1,6-8</sup> During this preoperative preparation, external control of the fistula drainage prevents skin disruption and provides guidelines for fluid and electrolyte replacement.

According to some reports,<sup>9</sup> somatostatin, a naturally occurring peptide containing 14 amino acids and its long-acting analogue octreotide are widely being used in fistula management. Several small, uncontrolled and heterogenous studies claim that octreotide can rapidly reduce fistula output by more than 50% in 1 to 3 days and help accelerate spontaneous fistula closure in more than 70% of cases. Because of the complex nature of our particular case, somatostatin and its analogues were considered but not used.

The preferred operation for fistula closure is resection of the fistula-bearing segment and primary end-to-end anastomosis.<sup>1</sup> The anastomosis may be reinforced by greater omentum or a serosal patch from adjacent small bowel.<sup>10</sup> Extra caution should be taken in the presence of radiation enteritis, since chronic ischemia inhibits wound healing and dense adhesions increase the likelihood of unintentional bowel injury.<sup>10</sup> Bypass or exclusion procedures are a safe alternative in irradiated bowel when dense adhesions are present or when patients are unable to tolerate more extensive operations.<sup>11,12</sup>

Treatment options become increasingly limited as the number of complicating factors rises. Complex fistulas, as in our patient's case, may be associated with extensive small bowel resection, gastrointestinal bleeding, and abdominal wall defects. When further bowel resection is inadvisable, as in the setting of previous extensive resection, or when nonsurgical therapy fails or is impractical, the use of muscle flaps

may be helpful.<sup>10</sup> Muscle flaps provide well-vascularized coverage and may help in controlling fistula drainage when multiple fistulas are encountered in a large abdominal wall defect. These flaps are an added benefit in the presence of infection because they have been shown to provide phagocytically active tissue to the bed of inflammation that often accompanies the fistula.<sup>13</sup> Muscle or musculocutaneous flaps have been used to buttress anastomoses both before and after the development of anastomotic leakage and have also been reported in the treatment of enterocutaneous fistulas and perineal sinuses.<sup>10,14,15</sup> A case reported by Young et al<sup>15</sup> showed the versatile and reliable vascularity of the rectus abdominis muscle flap in the management of a persistent perineal sinus. Lui et al<sup>10</sup> reported three cases of using vascularized muscle flaps from a distant, nonirradiated field to reinforce high-risk intestinal anastomosis. Muscle flaps can expedite healing and perhaps should be considered early in the management of complex fistulas, eg, those associated with radiation enteritis, uncontrolled malignancy, abdominal wall defects, or multiple concurrent fistulas.

The most likely complication that will be expected to develop in our patient is a widening ventral hernia. However, due to the numerous operations and extensive small bowel resections, herniation is unlikely in this case because of multiple adhesions and the lack of small bowel length.

In our case, multiple concurrent fistulas occurred in a patient who had radical gastrectomy and subsequent extensive small bowel resection. The case was further complicated by wound dehiscence and a large abdominal wall defect. In this instance, spontaneous closure of the fistula was highly unlikely. The use of a rectus abdominis muscle flap achieved control and closure of these multiple fistulas. The patient has maintained a stable weight, is able to toler-

ate oral feeding, and, though he still requires supplemental TPN (due to short bowel syndrome), it is given at a decreased volume. Prompt plastic surgery consultation and evaluation for muscle flap closure should be considered in similar patients with complex enterocutaneous fistulas.

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