Surgical Management of Complex Enteric Fistulas in Crohn's Disease

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Clin Colon Rectal Surg 2019;32:268–272.

Abstract

Keywords

- enterocutaneous fistula
- Crohn's disease
- abdominal fistula

Crohn's disease is a chronic, inflammatory bowel condition that can affect the entire digestive tract and in many cases lead to enteric fistula formation. The management of enteric fistulas can be challenging and often requires a multidisciplinary approach.

Crohn's disease (CD) is a chronic, incurable, inflammatory bowel disease that affects any segment of the digestive tract, from the mouth to the anus. It is characterized by recurrent inflammatory activity and frequent complicating conditions such as abscess, stenosis, and formation of fistulas.¹

According to the Centers for Disease Control and Prevention (CDC), in America, CD prevalence and incidence ranges are 29 to 199 and 3.1 to 14.6 cases per 100,000 persons, respectively.²

About 20 to 40% of affected patients will present with stricturing or penetrating complications at the time of their diagnosis. Moreover, 60 to 80% of patients will develop those complications within 20 years of disease diagnosis.³ For this reason, data from the prebiologic era demonstrate that 30 to 60% of patients would need some surgical procedure within 5 years after their initial diagnosis.⁴ The natural history of CD comprises three different phenotypes: inflammatory, stricturing, and penetrating disease. Although they are presented as separate conditions, there is evidence that, indeed, they represent an evolution of disease that is not well controlled.⁵

Penetrating disease occurs in approximately 10% of cases and seems to be a result of chronic bowel ulceration and includes perianal and a variety of enteric fistulas. Enteric fistulas are particularly challenging and require a multidisciplinary approach for management. This article discusses the surgical management of complex CD enteric fistulas.

Imaging Techniques

As CD can happen in any segment of the digestive tract, when dealing with an enteric fistula, it is of paramount importance to accurately establish its location and that of involved structures (bladder, small bowel, stomach, etc.). There are several imaging techniques that can be useful to verify those aspects and, consequently, help in defining surgical strategy.¹

Computed Tomography Enterography

In the majority of specialized centers, computed tomography enterography (CTE) has replaced the traditional small bowel follow through for the assessment of the small bowel anatomy, because it allows 3D reconstruction and better assessment of involved adjacent organs.⁶ The difference between CTE and standard abdominal and pelvic CT lies in the use of low-density oral contrast such as VoLumen, polyethylene glycol, or mannitol, instead of iodine or barium contrast to fill the lumen. The simultaneous use of intravenous iodinate contrast allows bowel wall evaluation.⁷ The accuracy of CTE in identifying fistula location is variably reported. Vogel et al retrospectively assessed the results of 36 CD patients who underwent abdominal surgical procedures. The authors compared the CTE results with operative findings and concluded that its accuracy for fistula presence and number was 94 and 86%, respectively.⁸ Similarly, another retrospective

study by Seasted et al found that CTE had an accuracy for fistula diagnosis of 79%.⁹ Although CTE can be considered high accuracy in the diagnosis of enteric fistulas, the surgeon must be aware of the potential adverse effects of cumulative radiation dosage, as it can be up to five times higher than a small bowel follow through.¹⁰

Magnetic Resonance Enterography

Similar to CTE, magnetic resonance enterography (MRE) also allows excellent small bowel anatomy evaluation and its image quality rivals CTE. However, it is more time consuming, usually more expensive, and its protocols are less standardized among institutions than CTE protocols. Despite that, it has the advantage of being a radiation-free test, an advantage that should be taken into consideration as CD enteric fistula patients usually have long-lasting disease and the need to undergo multiple imaging tests in their life.^{11,12}

Types of Enteric Fistulas

A fistula is an abnormal passageway between two organs in the body or between an organ and the exterior of the body.¹³ Fistulas can be classified based on their anatomy, indicating the bowel segment of origin, followed by the target organ (e.g., enterocutaneous, enteroenteric, ileosigmoid, iliopsoas, ileoduodenal, enterogastric, enterovesical/ureteral, enterocolic, rectovaginal, rectourethral). Conversely, fistulas can also be classified according to their etiology, such as iatrogenic (after percutaneous drainage or postsurgical) or CD related.¹⁴

Assuming that in many cases penetrating disease is an advanced evolution of inflammatory phenotype,⁵ it is easy to understand that the genesis of an enteric CD fistula is a chronic process, where organs or structures adjacent to the inflamed bowel attach to its wall causing blockage and eventual perforation and finally becoming one end of the fistula tract. Anastomotic complications following surgery for CD can also result in enteric fistulas.¹⁵

Medical Management: Initial Approach

In 1964, Chapman et al described the four cardinal principles in the initial care of patients with enteric fistulas: correction of intravascular volume deficit, drainage of abdominal abscess, control of fistula effluent, and skin protection.¹⁶ Still today, these concepts are still considered the basis for successful treatment of all enteric fistulas, including CD-related fistulas.¹⁷ The use of antibiotics for sepsis control is an important step in the management of these patients.¹⁸ Drainage of any existing abdominal abscess is fundamental, as it can help in sepsis control, in avoiding emergent surgical procedures, as well as in limiting the extent of resection at surgery. Abscess drainage can be obtained by surgical procedures (laparotomy or laparoscopy) or guided by imaging, such as CT scan and abdominal ultrasound.¹⁹ Although abdominal surgery seems to be inevitable in the majority of the CD patients with intra-abdominal abscess, controlling the inflammatory processes with image-guided drainage is associated with decreased

morbidity.²⁰ The surgeon should always be aware that the site where the drainage needle is inserted is likely to be the external opening of an eventual enterocutaneous fistula formation.¹⁴ Therefore, the appropriate drainage site should be chosen not only based on the best window for abscess access but also at a skin site where the potential fistula drainage can be cared for without major difficulties. Nutritional evaluation and support, if required, is also important in the treatment of CD fistula patients. As CD enteric fistula formation is usually a long-lasting process, the proportion of malnourished patients is considerably high, justifying routine preoperative nutritional status assessment.²¹ Moreover, despite preoperative support, some of these patients are likely to need a high output diverting stoma, consequently, a significant proportion of them will also require long-term home total parenteral nutrition (TPN).²²

Medical Management: Anti-TNF Drugs and Enteric Fistulas

As previously mentioned, as a rule, enteric CD fistulas are associated with structural damages to the bowel; therefore, it is expected that anti-tumor necrosis factor (TNF) would be relatively inefficient in those cases. Ruling out the presence of an abscess is the first step when considering the use of anti-TNF drugs for enteric CD fistula patients. Anti-TNF drugs are absolutely contraindicated if there exists a concomitant abscess as it can facilitate sepsis progression.²³

To the best of our knowledge, there are no randomized controlled trials investigating the effect of medical treatment for nonperianal fistulizing CD. Therefore, the best evidence available is based on the analysis of subgroups from several trials.²⁴

A small study from Poland of 29 enteric CD fistula patients who were treated with infliximab and adalimumab demonstrated healing in 28%.²⁵ Similar to that, a Spanish study demonstrated that the use of anti-TNF resulted in complete healing in only 3 out of 24 enteric CD fistula patients.²⁶

Surgical Management: Initial Approach

The surgical treatment of an enteric fistula is complex and can be a real challenge, even for the most experienced of surgeons. Therefore, preoperative planning that anticipates potential complications is of paramount importance.

Large inflammatory mass: Due to the chronic inflammatory processes involved in the enteric CD fistula pathogenesis, it is not uncommon to find large inflammatory masses, whereas it is nearly impossible to differentiate diseased bowel loops from secondarily affected loops. In these cases, proximal diversion is the preferred first step, followed by definitive surgery at a second operation several months later is a potential strategy that should be considered. Diverting the fecal stream from the affected area can help in ameliorating the inflammatory process, easing the intraoperative discrimination between a diseased from a secondarily affected small bowel loop, thus helping to preserve healthy small bowel. Although there is no specific literature relating to this strategy, the results of fecal

diversion in “cooling down” the inflammatory process of patients with severe perianal disease supports this approach.²⁷

Technical aspects: Surgery for enteric CD fistulas can be extremely demanding due to the presence of dense adhesions, especially in the area around the fistula and the former surgical scar. It may be prudent to enter the abdomen above or below the original scar, avoiding areas of potential adhesions between the small bowel and abdominal wall and, therefore, minimizing the risks of accidental enterotomy. Our preference is sharp entry into the peritoneal cavity with the knife, precisely incising the plane between the peritoneum and the adherent small bowel. After entering the abdomen, the dissection is carried under the abdominal scar, which is progressively opened and into both flanks, isolating the area containing the fistula opening. The dissection is then cautiously extended so as to gradually encircle the area surrounding the fistula that needs to be resected. It is important that all fistulous tissue and adjacent diseased bowel are resected. In general, the segment that is primarily involved is managed with resection, while the fistula site at the target location can be managed with repair. The anastomosis should be constructed in a healthy area, with a very low threshold for proximal fecal diversion.²⁸ In extreme cases, where multiple anastomoses might be needed and patient conditions are suboptimal, a multiple-stage approach with the use of stomas and mucous fistulas might be a safer strategy.²⁹

Types of Enteric CD Fistulas—Specific Surgical Concepts

Although the principles of enteric CD fistulas are shared by all types of fistulas, there are particular considerations that pertain to specific types of fistulas.

Enteroenteric fistula: Enteroenteric fistulas may present with a variety of symptoms according to the small bowel segments involved. The most common fistulas are those involving the terminal ileum. In cases where patients who initially complained of abdominal cramps and distension related to a stenotic bowel, they can actually report improvement in their symptoms once fistula formation occurs, as the fistula bypasses the stenosis, alleviating the symptoms of subocclusion. If the small bowel segments involved are close to each other, the patient might be relatively asymptomatic and surgical treatment might be unnecessary. However, when the segments connected by the fistula are far apart, diarrhea after meals, malabsorptive syndromes, electrolyte imbalance, and malnutrition can occur at different levels, warranting surgical treatment.^{23,24}

Among the various types of enteroenteric fistulas, three deserve special attention: fistulas with the stomach, duodenum, and sigmoid colon.

Gastric fistulas typically occur with the transverse colon and patients complain of diarrhea soon after meals, feculent vomiting, and significant weight loss. It is a rare condition with an incidence around 0.6%.³⁰ Its genesis seems to be related to deep ulceration in the transverse colon with consequent fibrosis and fistula formation with the adjacent stomach. In most cases, the colon is diseased, but there is no

evidence of gastric CD.³¹ Patients who have previously undergone multiple ileocolic resections are also predisposed to the condition, as disease at the ileocolic anastomosis, now located in the midline, may involve the stomach as well as the third portion of the duodenum. Surgical treatment involves partial gastrectomy and segmental transverse colectomy with removal of the fistula area. Preoperative nutritional support and liberal use stomas or staged procedures are advisable strategies for those patients.

Duodenal fistulas are particularly challenging conditions and the surgical treatment is based on the fistula anatomy and on the involved duodenal portion. Penetrating disease in the terminal ileum or a previous ileocolic anastomosis may involve the second or third portions of the duodenum, while more proximal small bowel or left colonic disease may involve the fourth portion of the duodenum and the duodenojejunal flexure. Symptoms vary, but diarrhea and malnutrition are common. Due to the morbidity involved in duodenal resections, fistula site resection and bypasses of adjacent stenosis are acceptable options.³² As the occurrence of postoperative anastomotic leak can be disastrous for these patients, the placement of a jejunal feeding tube after the anastomosis that potentiates earlier, enteral nutrition should be considered. When a gastro-jejunostomy is required, a highly selective vagotomy is advisable.³³ Routine anastomotic area drainage is also advisable. In certain conditions when the nutritional status is too critical and could not be improved in the preoperative period, one could advocate for a decompressive, temporary gastrostomy as well.

Fistulas with the sigmoid colon, more specifically where the terminal ileum is involved, are particularly common and it is advisable to have a high index of suspicion of its existence when performing an ileocolic resection for terminal ileal CD, especially because approximately 40% of the cases are not detected by preoperative imaging studies. Patients with these fistulas can complain of diarrhea (especially early after food ingestion) and weight loss. Surgical treatment involves ileocolic resection with an ileocolic anastomosis and a partial resection of the sigmoid colon. The extent of resection depends on the size and location of the involved area, but usually a segmental sigmoid colectomy is not necessary. A diverting loop ileostomy can be considered on an individual basis, but a lower threshold for diversion should be adopted.³⁴

Fistulas with the genitourinary tract: Fistulas with the genitourinary tract are also of particular interest for surgeons dealing with CD. Based on the organ affected, they can result in vaginal discharge, urinary infection, and severe sepsis. There are four main types of CD-related genitourinary fistulas: enterovesical, enteroureteral, rectourethral, and rectovaginal. Fistulas with the bladder (enterovesical) represent approximately 90% of all CD-related urinary fistulas.³⁵ Patients usually complain of pneumaturia and/or fecaluria.³⁶ Recurrent urinary tract infections are frequent and surgical treatment is mandatory to avoid severe urinary sepsis. With respect to the bowel site of the fistula, the terminal ileum is the most common with the sigmoid colon the second most affected area. Diagnosis can be made by cystoscopy and/or CT scan demonstrating gas inside the bladder. Surgical

treatment includes resection of the affected bowel segment with the fistula tract and the involved area of the bladder.³⁷ Enteric CD fistulas involving the ureter are very rare and represent only approximately 2% of all urinary CD-related fistulas. There is a paucity of data regarding fistulas to the ureter in the literature. Symptoms include urinary infection, low back pain, pneumaturia, and fecaluria. Due to its anatomical proximity, the bowel segment involved is usually the right and left colons, and the terminal ileum.³⁷ The surgical treatment will depend on the ureteral area involved and a multidisciplinary approach is advisable.

Rectourethral CD fistulas are rare but difficult situations. The incidence is 0.3% and there are only a few case reports in the literature.³⁵ Patient symptoms are penile discharge, recurrent urinary infection, and dysuria. The management of rectourethral fistula is controversial because of limited experience, and the gold standard procedure remains unclear. Treatment individualization is crucial and factors such as the extent and the severity of disease, presence of proctitis and urinary sepsis, previous surgical treatments, and nutritional status must be taken into account. Diagnosis can also be difficult and careful proctoscopy, urethroscopy, and radiological procedures are necessary tools. Fazio et al recommended conservative surgical management for selected patients with no evidence of proctitis, with disease elsewhere well controlled, without urinary sepsis and with an absent perineal opening. They achieved good results using transanal rectal advancement flaps.³⁸ Temporary fecal diversion might be a reasonable initial option, as it is a minor surgical procedure that allows the inflammatory process to settle down permitting a definitive surgical procedure to be undertaken under more favorable circumstances.³⁴

Rectovaginal: Rectovaginal fistula can significantly affect quality of life in patients with CD. There are several surgical techniques and there is no prospective randomized trial defining the gold standard for its treatment. Surgical strategies vary from local repairs to major operations such as total proctocolectomy with end ileostomy and Turnbull-Cutait procedures. Moreover, in many cases, multiple attempts at repair are necessary. As a result, individualization is crucial.³⁹

The initial step in defining the ideal option is to evaluate the state of the rectum. Patients with significant proctitis are very unlikely to respond well to local surgical procedures.^{23,24} Indeed, they can get worse after surgery, as repair failure might increase the fistula size. For those with mild proctitis, a local repair is an option. There are several types of repairs. Rectal or vaginal advancement flaps are reasonable first options for those patients with minor rectovaginal fistulas.⁴⁰

In more severe cases, the use of proximal diversion prior to the repair attempt should be considered as it settles down the inflammatory process and enhances procedure success.⁴⁰ Interposition of healthy tissue between the rectal wall and the vagina might also be necessary. This can be achieved with the use of biomes, gracilis⁴¹ muscle bulboavernosus, or labia majora flaps (Martius procedure)⁴² with success rates ranging from 60 to 90%. For more complex situations, particularly if there is significant rectal or perineal damage, a total proctocolectomy with permanent ileost-

omy can result in a better quality of life. If there is no sphincter impairment, the pull-through (Trumbull-Cutait) procedure is a valid option, in some cases associated with omental flap interposition, resulting in a success rate of approximately 90%.⁴³

Conclusion

The surgical treatment of enteric CD fistula is challenging. Optimization of the patient's condition preoperatively and drainage and treatment of any sepsis foster outcomes. Surgical management is difficult and needs to be individualized based on location and severity of disease, patient condition, and desired quality of life.

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