Management of Complex Perineal Fistula Disease

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Abstract

Keywords

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Management of complex perineal fistulas such as high perianal, rectovaginal, pouch-vaginal, rectourethral, or pouch-urethral fistulas requires a systematic approach. The first step is to control any sepsis with drainage of abscess and/or seton placement. Patients with large, recurrent, irradiated fistulas benefit from stoma diversion. In patients with Crohn's disease, it is essential to induce remission prior to any repair. There are different approaches to repair complex fistulas, from local repairs to transperineal and transabdominal approaches. Simpler fistulas are amenable to local repair. More complex fistulas, such as those secondary to irradiation, require interposition of healthy, well-vascularized tissue. The most common flap used for this treatment is the gracilis muscle with good outcomes reported. Once healing is confirmed by imaging and endoscopy, the stoma is reversed.

Complex perianal fistulas (CPF) such as high perianal, rectovaginal (RVF), pouch-vaginal (PVF), rectourethral (RUF), and pouch-urethral are among the most challenging diagnoses encountered in the colorectal practice. The definition of "complex" can vary somewhat among authors, but usually includes large fistulas and those associated with Crohn's disease, radiation, pre-existing incontinence, or multiple failed attempts at repair.^{1,2} Fistulas cause significant discomfort and have profound sexual and social implications. The aim of treatment is permanent closure of the fistula tract without functional impairment. Several surgical techniques have been developed with variable results. To date, there is no consensus or widely accepted guidelines for the treatment of CPF. Herein, we describe the most commonly used procedures as well as new emerging techniques in the treatment of this complex pathology.

Diagnosis and Evaluation

Management of CPF starts with a detailed history and clinical examination. A fistula can present as an acute perineal sepsis or a chronic condition. A history of abscess drainage can help the physician in making a diagnosis. Purulent or bloody discharge, pain, and itching are also common symptoms.

Each type of fistula has specific symptoms: fecaluria and pneumaturia in RUF, and stool, gas, or odorous mucopurulent vaginal discharge in RVF/PVF. Rectal or vaginal pain, dyspareunia, and recurrent urinary and/or vaginal infection are also frequently reported. These RVF symptoms can be misinterpreted as fecal incontinence by patients or physicians.

Perineal examination may reveal an external opening, scar, or perineal body deformity. Digital rectal examination provides information about anal sphincter tone and, combined with anoscopy, helps to locate the internal opening. A small internal opening may not be obvious, especially in high fistulas; sometimes only a dimple or area of irregularity can be felt. In patients with PVF or RVF, the methylene blue tampon test may be used. The patient inserts a vaginal tampon and is given Fleet® (Fleet, Lynchburg, VA) enemas dyed with methylene blue. After walking for approximately 20 minutes, the tampon is inspected for blue staining, which is indicative of a fistula. Office examination is not always well tolerated by the patient and may not provide all the information needed to adequately treat these patients.

Examination under anesthesia is more comfortable for the patient and allows for better characterization of the fistula. A catheter can be introduced through the fistula tract and injected dye or hydrogen peroxide can delineate the internal

opening. Concomitant flexible sigmoidoscopy may be performed, providing important information about the quality of the surrounding tissue, and the size and location of the fistula, which help guide the type of repair and approach. Biopsy should be taken in case of suspected malignancy. Full colonoscopy for screening may be needed.

While imaging studies are not usually indicated for simple fistulas, these modalities may help in evaluating the anatomy and adjacent organs and identifying secondary tracts or collections. Ultrasound (US), with or without hydrogen peroxide enhancement, and magnetic resonance imaging (MRI) are the two most commonly used modalities. A meta-analysis with 481 patients considered the two methods comparable in sensitivity, with a higher specificity for MRI (both modalities had poor specificity).³ A combination of two or three methods, including examination under anesthesia, US, and MRI, provides the most accurate assessment.⁴

In the evaluation of RVF/PVF, water-soluble contrast enema, vaginogram, computed tomography (CT), MRI, or US may be used. MRI seems to be superior to US in the evaluation of RVF.⁵ US to identify sphincter defects is indicated in women with a history of childbirth, complaints of fecal incontinence, or those with a weak sphincter on physical examination.⁶ Anal manometry may also be selectively used. In patients with RUF, cystourethrogram and cystoscopy are used to evaluate the fistula as well as the condition of the bladder and urethra.⁷

Patients with Crohn's disease should undergo flexible sigmoidoscopy or colonoscopy, and small bowel imaging with MRI enterography, CT enterography, or small bowel follow-through to ensure that no proximal active disease is present at the time of the fistula repair.

Treatment

The first step in the treatment of CPF is drainage of concomitant pelvic or perineal sepsis. A loose seton is placed around the fistula to provide drainage and reduce the risk of recurrent abscess formation. Setons are often used as a bridge to definitive surgery as they "mature" the tract and, in some cases of high perianal fistula, may lower the tract.⁸ Loose setons play a major role in patients with Crohn's disease while treatment,⁹ frequently anti-tumor necrosis factor, is instituted.^{10,11} Surgical repair should only be performed in the setting of disease remission with controlled proximal disease.

In patients with more complex fistulas, complete fecal diversion is needed to reduce secretion and inflammation of the surrounding tissues.¹² While this topic is controversial¹³ and there are no widely accepted guidelines, a diverting stoma is usually performed in patients with significant symptoms affecting quality of life, large defects (>1 cm), irradiated, inflamed, and scarred tissue, recurrent disease, pelvic sepsis, and/or multiple comorbidities including diabetes and immunosuppression. Fecal diversion is more commonly used with transperineal versus transvaginal or transrectal approaches to fistula repair^{14,15}; the former is usually reserved for higher fistulas and those with refractory previous treatment or poor surrounding tissue. The use of a

diverting stoma may improve but does not necessarily ensure a successful repair.^{12,16,17} Two systematic reviews—one including 278 patients with RVF, RUF, and perineal sinus and the other with 416 patients with RUF—reported similar success rate of 90% after repair. In both studies, 90% of the patients had a diverting stoma, 10% of which were permanent. The most common causes for permanent stoma were treatment failure and irreversible sphincter damage.^{18,19} Although a colostomy may provide better diversion, the ease of ileostomy reversal makes this the preferred method. Whether the stoma is constructed prior to or at the time of fistula repair does not seem to interfere with outcome. However, the authors' preference is to perform diversion 3 months prior to repair to allow the tissue to become more pliable.

Surgical Techniques

Numerous surgical techniques have been described which can be performed through a variety of approaches. The decision to perform a local versus transperineal (with or without tissue interposition) versus transabdominal approach is based on the etiology, size, and location of the fistula, quality of the surrounding tissue, and sphincter function.

Complex Perianal Fistulas

CPFs include those in which the tract crosses more than 30% of the external sphincter (high transsphincteric, suprasphincteric, and extrasphincteric), involve multiple tracts, or are anteriorly located, related to Crohn's disease or irradiation, recurrent or occur in patients with fecal incontinence.^{1,4} Fistulotomy should be avoided in favor of a sphincter-preserving technique due to the high risk of fecal incontinence.

Local Repair

Ligation of the Intersphincteric Fistula Tract

Ligation of the intersphincteric fistula tract (LIFT) was first described by Rojanasakul et al²⁰ and was found to be a simple, safe, and cost-effective treatment option for CPF.^{21,22}

The LIFT technique consists of dividing and ligating the fistula tract between the internal and external sphincter muscles.

In a systematic review of 13 articles including 438 patients with CPF, the overall success rate ranged from 40%²³ to 94.4%,²⁰ with a pooled success rate of 71%.²⁴ A prospective study of 15 patients undergoing the LIFT procedure for perianal Crohn's disease showed success in 60% in the first month, with a drop to 33% after one year²⁵; 60% of these patients had active proctitis.

Several variations of the original LIFT technique have since been reported. The addition of fistulectomy of the external tract resulted in a success rate of 82%.^{22,26} Closure of the internal orifice by suture or advancement flap has not yielded better results (68%).^{26,27} Adding bioabsorbable mesh interposition was successful in 93.5%²⁸ and insertion of a fistula plug was successful in 95%.²⁹ The LIFT has the advantages of minimal impairment of continence (6%)⁷ and potential to

convert a high fistula to an intersphincteric one even in the case of failure.^{23,25,28}

Rectal Advancement Flap

Rectal advancement flap (RAF) is one of the most commonly used techniques for CPF in patients with a normal or minimally diseased rectum. The principle of this technique is to obliterate the primary orifice by interposing a flap of rectal wall (high pressure side), leaving the sphincter untouched.¹¹

In a systematic review of 2,065 patients undergoing RAF for CPF, the success rate varied from 36.6 to 98.5%; when the sample size per study was taken into consideration, the weighted average success rate was 79.2%, superior in patients with cryptoglandular disease (80.8%) versus those with Crohn's disease (64%).^{29,30} Although RAF is considered a sphincter-preserving technique, incontinence up to 25% has been reported (9.4–25%).^{29,30}

Several factors have negatively impacted the outcomes of the RAF, including Crohn's disease,^{2,30} > 2 prior repairs,^{2,31–33} RVE,⁶ and obesity (body mass index >30 kg/m²).³⁴ Conversely, preoperative placement of a loose seton and a partial thickness flap (mucosa, submucosa, and some fibers of the internal sphincter) have been correlated with better prognosis.^{31,34,35}

Rectal Sleeve Advancement Flap

The rectal sleeve advancement flap (RSAF) is indicated for CPF due to severe perianal Crohn's disease or radiation therapy,³⁶ in the setting of extensively damaged anorectal mucosa, multiple fistulous tracts (including extension to the vagina or urethra), and cavitating ulcerations of the anal canal, but a preserved proximal rectum. The technique consists of cir-

Fig. 1 Transanal circumferential mucosectomy is performed, removing the affected mucosa and submucosa. The dissection proceeds through the supralelevator space until sufficient rectal mobilization is achieved. The ulcerated distal segment is resected and the fistula tract cored out. (Reprinted with permission from Cleveland Clinic Center for Medical Art & Photography © 1999–2015. All Rights Reserved.)

Fig. 2 A hand-sewn anastomosis of the healthy rectum and the neodentate line is performed. (Reprinted with permission from Cleveland Clinic Center for Medical Art & Photography © 1999–2015. All Rights Reserved.)

cumferential mobilization of the rectum, resection of a cylinder of the diseased anal canal/distal rectum (►Fig. 1), and anastomosis between the proximal healthy rectum and the neodentate line (►Fig. 2).

The patient and surgeon should be prepared for conversion to a transabdominal approach if a tension-free anastomosis cannot be achieved.³⁷ A success rate of 61% has been reported in patients with complex perianal Crohn's disease. RSAF is an invasive procedure and should be considered for severe cases as an alternative to proctectomy or permanent stoma.³⁶

Biodegradable Products

Fibrin Glue

Injection of fibrin glue for obliteration of CPF has yielded disappointing results, with success rates between 10 and 78%.^{30,38,39} In patients with Crohn's disease, the results of fibrin glue injection are even poorer, although better than seton removal alone (38 vs. 16%).^{40,41}

Anal Fistula Plug

The collagen anal fistula plug is a sphincter-sparing technique with a 54.3% weighted average healing rate, including patients with Crohn's disease.⁴² The main cause of early failure was plug extrusion, followed by infection. Despite the lack of adequate trials assessing the outcome of biodegradables in the treatment of CPF, these products tend to be simple, have no significant impact on continence, and do not hinder further treatment.²⁹ Therefore, they should be included as tools in the armamentarium of surgeons dealing with CPF, especially for patients at a higher risk for fecal incontinence.

Mesenchymal Stem Cells

Injection of adipose-derived stem cells (ASC) into the fistula tract is a novel treatment for CPF. Initial results were promising; however, in a phase III multicenter trial comparing 200 patients randomized into three groups (ASC only, ASC + fibrin glue, and fibrin glue only), the authors failed to find a significant difference among treatments.⁴³ The use of bone marrow stem cells for CPF has been associated with a success rate of 70% at 12 months after multiple injections.⁴⁴ De la Portilla et al used allogenic ASC for 24 patients with refractory perianal Crohn's disease, and reported fistula closure in 56.3% and drainage reduction in 69.2% after a 24-week follow-up.⁴⁵

Video-Assisted Anal Fistula Treatment

First described by Meinerio⁴⁶ in 2010, the video-assisted anal fistula treatment technique allows direct visualization of the fistula tract and detection of secondary tracts, cavities, and abscesses, in an effort to prevent untreated tracts.⁴⁷ After the diagnostic phase, all fistula tracts are cauterized with a monopolar electrode. Success rates of 73 to 90% for CPF have been reported.^{48,49} No impairment in continence has been reported.

Laser

The laser probe treatment is based on destruction of the internal epithelial layer and consequent obliteration of the fistula tract using a radial emitting probe laser. Success rates vary from 71 to 82%.^{50,51} This technology is not yet approved by the Food and Drug Administration (FDA).

Fistula Clip

The gastrointestinal fistula clip closure was designed to firmly close the internal opening of a CPF and to promote fistula healing without impairment of the anal sphincter. While success rates of 70 to 90% have been reported for cryptoglandular CPF,^{51–53} an 88% failure rate has been observed in patients with RVF, RUF, Crohn's disease, and radiation, mostly due to clip migration and abscess formation.⁵⁴ The clip is currently not FDA-approved.

Transabdominal Approach

For complex CPF with extensive anorectal damage such as in Crohn's disease, a transabdominal procedure offers good control of symptoms (51.7–81%).^{11,55} A proctectomy with a coloanal anastomosis is possible if the anal canal is unaffected. When the fistula is associated with chronic suppuration and irreversible loss of sphincter function, a permanent stoma is necessary.

Rectovaginal/Pouch-Vaginal Fistulas

RVF are primarily caused by obstetric trauma (88% of cases), followed by Crohn's disease, radiation, neoplasia, and pelvic infection. PVF is usually the result of technical error and is an important risk factor for pouch loss.^{56,57} Fistulas that manifest years after ileostomy reversal raise a concern for Crohn's disease.⁵⁸ Complex RVF includes those >2.5 cm, located high in the rectovaginal septum, associated

with inflammatory bowel disease, malignancy, and irradiation, or are persistent despite multiple attempts at repair.⁵⁹

Local Repairs

Rectal Advancement Flap

RAF was first described in 1902 for repair of RVF, based on the theory of fistula closure by the high-pressure aspect. The success rate varies from 33%²⁶ to 100%.⁶⁰ Crohn's disease has been implicated as a significant risk factor for failure, associated with inferior outcomes (33–83%) and with recurrence rates of up to 60%.^{2,60,61}

Rectal Sleeve Advancement Flap

RSAF is an option for patients with RVF with extensive damage to the anal canal/transition zone but with a preserved rectum. Success rates range from 60 to 75% in small series.^{37,62}

Transvaginal Approach

A transvaginal approach is a good option in patients with small, low, or Crohn's-related RVF, with the advantage of avoiding the rectum and using normal, pliable vaginal mucosa for flap or fistula inversion.¹⁷ Success rates range from 92 to 100%.^{63,64}

Transperineal Approach

The transperineal approach is indicated for more complex, recurrent and larger RVF. This approach allows good exposure of the fistula, dissection and repair, with or without tissue interposition.

Transperineal Layered Closure

Transperineal layered closure is usually reserved for low RVF associated with anterior sphincter defect or coexisting fecal incontinence, or after a failed transanal or transvaginal approach. Both episiotomy and transverse transperineal repair can accomplish this goal. Episiotomy entails a fistulotomy (→ Fig. 3) followed by layered reconstruction of the perineal body (→ Fig. 4).^{61,65} Success rates range from 71.4 to 78%.^{61–66}

A transverse transperineal repair consists of a transverse perineal incision, separation of the rectal and vaginal walls, excision of fistula tracts, and layered closure with levatorplasty, with or without advancement flap. Success rates range from 70 to 100%,⁶⁷ with morbidity at 20%.⁶⁸

Tissue Interposition

Chronically inflamed, irradiated, fibrosed, and poorly vascularized fistulas require interposition of healthy, well-vascularized tissue to separate the affected organs. Tissue interposition for lower fistulas, most commonly gracilis and Martius flaps, is performed via a perineal approach. Conversely, fistulas higher than 10 cm from the anal verge require a transabdominal approach with omental interposition or transverse rectus abdominis myocutaneous flap.⁶⁹

Fig. 3 A probe is placed through the fistula and a longitudinal incision is performed, dividing all the tissues overlying the probe. The rectovaginal fistula tract is debrided followed by dissection and identification of the muscular groups. (Reprinted with permission from Cleveland Clinic Center for Medical Art & Photography © 1999–2015. All Rights Reserved.)

Martius Flap

The Martius flap, or bulbocavernosus muscular fat pad, was first described for the treatment of vesicovaginal fistula and has since been modified for the treatment of RVF. The technique consists of separating the rectum and vagina through a perineal dissection and transposing the pedicle muscular graft from the labia majora to the perineal wound between the rectum and vagina.⁷⁰ Mainly used for low recurrent RVF,⁷¹ success rates of up to 94% have been reported,⁷² rendering this approach superior to rectal or vaginal advancement flap alone. Inferior outcomes have been reported in patients with Crohn's disease (50%).^{70,73} The Martius flap is associated with good functional and cosmetic outcomes,⁷¹ as well as lower morbidity.⁷⁴

Gracilis Muscle Flap

The gracilis muscle flap interposition (GMFI) is usually reserved for the most challenging and refractory perineal fistulas.⁷⁵ Due to its proximal pedicle and vestigial function, this muscle can be easily harvested and transposed to the perineal wound, preserving its vascularization with little thigh impairment (►Figs. 5–7). This procedure is usually preceded by a diverting stoma.

Success rates with GMFI range from 71 to 100%,^{76,77} even in patients with RVF secondary to Crohn's disease.⁷⁸ In a

Fig. 4 The rectal mucosa is closed and overlapping repair of the sphincteric muscle is performed. Finally the vaginal wall is closed. (Reprinted with permission from Cleveland Clinic Center for Medical Art & Photography © 1999–2015. All Rights Reserved.)

recent review of 97 patients who underwent GMFI for mainly RVF and RUF in the past 20 years at our institution, the primary healing rate was 45% (38.2% RVF, 50% RUF). One-third of patients underwent a different procedure, such as fibrin glue instillation or redo gracilis flap, for a final success rate of 79% at a mean follow-up of 20 months (unpublished data). All patients had a diverting stoma and 50% had failed at least one prior surgical attempt. GMFI is an invasive and

Fig. 5 Patient in Lloyd-Davies position: both extremities of the gracilis muscle are harvested. (With permission from Ruiz D, Bashankaev B, Speranza J, Wexner SD. Graciloplasty for rectourethral fistula, rectovaginal and rectovesical fistulas: technique overview, pitfalls, and complications. *Tech Coloproctol* 2008;12:227–282. © Springer 2008.)

Fig. 6 The neurovascular bundle is identified using a neurostimulator. (With permission from Ruiz D, Bashankaev B, Speranza J, Wexner SD. Graciloplasty for rectourethral fistula, rectovaginal and rectovesical fistulas: technique overview, pitfalls, and complications. *Tech Coloproctol* 2008;12:227–282. © Springer 2008.)

Fig. 7 The gracilis muscle is transposed through a subcutaneous tunnel from the proximal thigh incision to the perineal wound and anchored with sutures. (With permission from Ruiz D, Bashankaev B, Speranza J, Wexner SD. Graciloplasty for rectourethral fistula, rectovaginal and rectovesical fistulas: technique overview, pitfalls, and complications. *Tech Coloproctol* 2008;12:227–282. © Springer 2008.)

technically complex procedure associated with a morbidity rate of 36%, mainly due to perineal dehiscence and infection.

Bioabsorbable Mesh Interposition

Bioabsorbable mesh has been incorporated in the treatment of complex RVF since 2004. Different types of mesh are available including Permacol™ (Covidien, Minneapolis, MN) and Surgisis (R) (Cook Surgical, Bloomington, IN), which are placed using a transperineal or transvaginal approach. This surgical strategy has a success rate of 64 to 81%, and includes patients with Crohn's disease.^{79,80} However, inferior results are seen in irradiated patients.^{81,82} Due to good results and low morbidity, proponents of mesh suggest that this technique should be the first step in the treatment of RVF, prior to GMFI. Larger randomized trials are needed to better evaluate the role and cost-effectiveness of bioabsorbable mesh in the management of complex RVF.

Transabdominal

The transabdominal approach is reserved for high RVF not amenable to transperineal repair. If the rectum is relatively

preserved, separation of the fistula with omental interposition offers success rates of 90 to 100%.^{82,83} If the rectum is damaged and anal function is preserved, low anterior resection with fistula tract excision and coloanal anastomosis can be performed.⁸⁴

Rectourethral Fistula

RUF is a rare condition, usually the result of surgical complications, pelvic irradiation, or ablative treatments for prostate or anal cancer. Other causes include trauma, chronic infection, or malignancy.^{85,86} In addition to fecal diversion, suprapubic catheter drainage may be used in patients with significant symptoms or severe urethral stricture.

Local Repair

Rectal Advancement Flap

RAF is an option for small, low, and nonirradiated RUF,^{87,88} with a 67% primary success rate. Patients with Crohn's disease have poorer results.⁸⁹

York Mason–Posterior Sagittal Transrectal

The posterior transsphincteric transluminal approach is indicated for the treatment of smaller and iatrogenic RUF.⁹⁰ The procedure consists of a posterior incision and division of the sphincter muscles and posterior rectal wall with exposure of the fistula that is repaired primarily or with mesh.⁹¹ The rectal wall and sphincter muscles are then sutured.⁹² Success rates widely range from 33 to 100%.^{90–93} This approach has poor surgical exposure⁹⁰ and a paucity of available tissue for interposition⁹⁴ and is, therefore, not recommended for large or irradiated fistulas.

Perineal Approach

RUF with severe tissue damage requires tissue interposition. Patients with urethral stricture or large urethral defects may undergo reconstruction with a buccal mucosal flap.⁹⁵

Tissue Interposition

Dartos Flap

The Dartos flap interposition is designed to provide an easily obtained, well-vascularized flap to be interposed between the rectum and the urethra. Through a transperineal incision, the myocutaneous flap is dissected and space is created between the sphincter complex/rectum and urethra until the fistula is identified. The flap is then transposed between the urethra and rectum.⁹⁶ Success rates vary from 75 to 100%.^{96,97} For irradiated and immunocompromised patients at risk for poor tissue healing, a bulkier flap such as the gracilis muscle should be used.

Gracilis Muscle Flap

The gracilis is the preferred muscle to use for interposition flap in patients with large (>1cm) and irradiation-induced RUF. In a systematic review of 375 patients who underwent RUF repair, the overall success rate was 91%.¹⁹ Similar results were seen by adding a buccal mucosal graft to treat large

irradiated fistulas.⁹⁵ Whether the urethral opening is closed does not affect the outcome.

Transabdominal Approach

The transabdominal approach is usually indicated in the setting of severe radiation damage, large RUF, or significant symptoms, with successful control of symptoms in 86 to 100% of patients.^{98,99} Several procedures can be performed, depending on the functional status of the bladder, urethra, anorectal sphincter, and rectum. These procedures range from division of the fistula tract with omental interposition to proctectomy, with or without permanent stoma and cystectomy with ileal conduit. The transabdominal approach is associated with higher morbidity and should be reserved for the most complex RUF cases.^{92,99}

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