# Clinical Practice Guideline for the Management of Anorectal Abscess, Fistula-in-Ano, and Rectovaginal Fistula

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The American Society of Colon and Rectal Surgeons is dedicated to ensuring high-quality patient care by advancing the science, prevention, and management of disorders and diseases of the colon, rectum, and anus. The Clinical Practice Guidelines Committee is charged with leading international efforts in defining quality care for conditions related to the colon, rectum, and anus by developing clinical practice guidelines based on the best available evidence. These guidelines are inclusive, not prescriptive, and are intended for the use of all practitioners, health care workers, and patients who desire information about the management of the conditions addressed by the topics covered in these guidelines. Their purpose is to provide information based on which decisions can be made, rather than dictate a specific form of treatment.

It should be recognized that these guidelines should not be deemed inclusive of all proper methods of care or exclusive of methods of care reasonably directed to obtaining the same results. The ultimate judgment regarding the propriety of any specific procedure or intervention must be made by the physician in light of all the circumstances presented by the individual patient.

## STATEMENT OF THE PROBLEM

A generally accepted explanation for the etiology of anorectal abscess and fistula-in-ano is that the abscess results from obstruction of an anal gland and the fistula is due to chronic infection and epithelialization of the abscess drainage tract.[1–6] Anorectal abscesses are defined by the anatomic space in which they develop and are more common in the perianal and ischiorectal spaces and less common in the intersphincteric, supralevator,

and submucosal locations.[7–11] Anorectal abscess occurs more often in males than females, and may occur at any age, with peak incidence among 20 to 40 year olds.[4,8–12] In general, the abscess is treated with prompt incision and drainage.[4,6,10,13]

Fistula-in-ano is a tract that connects the perineal skin to the anal canal. In patients with an anorectal abscess, 30% to 70% present with a concomitant fistula-in-ano, and, in those who do not, one-third will be diagnosed with a fistula in the months to years after abscess drainage.[2,5,8–10,13–16] Although a perianal abscess is defined by the anatomic space in which it forms, a fistula-in-ano is classified in terms of its relationship to the anal sphincter muscles. In general, intersphincteric and transphincteric fistulas are more frequently encountered than suprasphincteric, extrasphincteric, and submucosal types.[9,17–19] Anal fistulas may also be classified as "simple" or "complex".[19–21] "Complex" anal fistulas include transphincteric fistulas that involve greater than 30% of the external sphincter, suprasphincteric, extrasphincteric, or horseshoe fistulas, and anal fistulas associated with IBD, radiation, malignancy, preexisting fecal incontinence, or chronic diarrhea.[19,20,22–24] "Simple" anal fistulas have none of these complex features and, in general, include intersphincteric and low transphincteric fistulas that involve <30% of the sphincter complex. Given the attenuated nature of the anterior sphincter complex in women, fistulas in this location deserve special consideration and may also be considered complex.

Rectovaginal fistulas may be classified as "low," with a tract between the distal anal canal (dentate line or below) and the inside of the vaginal fourchette, "high" with a tract connecting the upper vagina (at the level of the cervix) with the rectum, and "middle" for those that lie somewhere between.[25] The terms "anovaginal fistula" and "low rectovaginal fistula" may be used interchangeably. Rectovaginal fistulas may also be classified as "simple" or "complex."

Simple rectovaginal fistulas have a low, small-diameter (<2.5 cm) communication between the anal canal and vagina and result from obstetrical injury or infection.[26] "Complex" fistulas involve a higher communication between the rectum and vagina, or a larger opening, or result from radiation, cancer, or complications of pelvic surgical procedures.[26–29] Rectovaginal fistulas most commonly occur as a result of obstetric injury[4,26,29] and may also occur in the setting of Crohn's disease,[30,31] malignancy, and infection,[32] or as an unintended consequence of colorectal anastomosis,[33,34] anorectal operations,[35] or radiation therapy.[36] The treatment of rectovaginal fistulas includes a variety of interventions that are influenced by the presenting symptoms, anatomy of the fistula, quality of the surrounding tissues, and previous attempts at fistula repair.[4,37]

Anorectal abscess and fistula-in-ano are also a manifestation of Crohn's disease with a reported incidence of fistula in 10% to 20% of patients in population-based studies, 50% of patients in longitudinal studies, and in nearly 80% of patients cared for at tertiary referral centers.[31,38,39] In Crohn's disease, perianal abscess and fistula appear to result from penetrating inflammation rather than infection of a perianal gland.[40] Although the evaluation and treatment of cryptoglandular and Crohn's-related perianal abscess and fistula are often similar, the distinct etiology and progressive nature of Crohn's disease mandates a specialized and often multidisciplinary therapeutic approach in these patients.[39,41,42]

## METHODOLOGY

This guideline is built on the last clinical practice guideline for the management of perianal abscess and fistula-in-ano published by the American Society of Colon and Rectal Surgeons.[43] An organized search of the MEDLINE, PubMed, EMBASE, and the Cochrane Database of Collected Reviews was performed through December 2015. Key word combinations using the MeSH terms included abscess, fistula, fistula-in-ano, anal, rectal, perianal, perineal, rectovaginal, anovaginal, seton, fistula plug, fibrin glue, advancement flap, and Crohn's disease. Directed searches of the embedded references from the primary articles were also performed in selected circumstances. Primary authors reviewed all English language articles and studies of adults. Recommendations were formulated by the primary authors and reviewed by the entire ASCRS Clinical Practice Guidelines Committee. The final grade of recommendation was performed by using the GRADE system (Table 1) and reviewed by the entire Committee.[44]

## RECOMMENDATIONS

### Initial Evaluation of Anorectal Abscess and Anal Fistula

1. **A disease-specific history and physical examination should be performed, emphasizing symptoms,** **risk factors, location, presence of secondary cellulitis, and fistula-in-ano. Grade of Recommendation: Strong recommendation based on low-quality evidence, 1C.**

The diagnosis of anorectal abscess is usually based on the patient's history and physical examination. Perianal pain and swelling are common with superficial abscesses, whereas drainage and fever occur less often.[8–10,45] Deeper abscesses, such as those that form in the supralevator or high ischiorectal space, may also present with pain that is referred to the perineum, low back, or buttocks.[7,46,47] Inspection of the anoperineum may reveal superficial erythema and fluctuance with tenderness to palpation or may be unrevealing in patients with intersphincteric or deeper abscesses.[6,10,46,48] Digital rectal examination and anoproctoscopy are occasionally needed to clarify the diagnosis. Sedation or anesthesia may be needed when an awake examination is limited by pain or tenderness. The differential diagnosis of anorectal abscess includes fissure, thrombosed hemorrhoid, pilonidal disease, hidradenitis, anal cancer and precancerous conditions, Crohn's disease, and sexually transmitted infections.[6,48,49]

Patients who present with anal fistula after resolution of the abscess typically report intermittent perianal swelling and drainage. Information about anal sphincter function, prior anorectal surgery, and associated GI, genitourinary, or gynecologic pathology should be included in the patient history. Inspection of the perineum should include a search for surgical scars, anorectal deformities, signs of perianal Crohn's disease, and the presence of the external opening of the fistula. Gentle probing of the external opening of the fistula can help confirm the presence of a tract but should be done with care to avoid creating false tracts.[50] Goodsall's rule, that an anterior fistula-in-ano has a radial tract and a posterior fistula has a curvilinear tract to the anus, has proven generally accurate for anterior fistulas but less so for posterior fistulas.[51–53]

2. **CT scan, ultrasound, MRI, or fistulography should be considered in patients with occult anorectal abscess, complex anal fistula, or perianal Crohn's disease. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.**

Superficial abscesses and simple fistulas, in general, do not require diagnostic imaging to guide treatment. Alternatively, imaging with CT, ultrasound, MRI, or fistulography, has proven useful in the assessment of occult anorectal abscess, recurrent fistula-in-ano, and perianal Crohn's disease.[54–58] In a retrospective study, of patients with confirmed anorectal abscess, the sensitivity of CT was 77% and 70% in immunocompetent and immunocompromised patients.[59] An advantage of MRI over CT

**TABLE 1.** The GRADE system-grading recommendations

| | Description | Benefit vs risk and burdens | Methodological quality of supporting evidence | Implications |
|---|---|---|---|---|
| 1A | Strong recommendation, High-quality evidence | Benefits clearly outweigh risk and burdens or vice versa | RCTs without important limitations or overwhelming evidence from observational studies | Strong recommendation, can apply to most patients in most circumstances without reservation |
| 1B | Strong recommendation, Moderate-quality evidence | Benefits clearly outweigh risk and burdens or vice versa | RCTs with important limitations (inconsistent results, methodological flaws, indirect or imprecise) or exceptionally strong evidence from observational studies | Strong recommendation, can apply to most patients in most circumstances without reservation |
| 1C | Strong recommendation, Low- or very-low-quality evidence | Benefits clearly outweigh risk and burdens or vice versa | Observational studies or case series | Strong recommendation but may change when higher quality evidence becomes available |
| 2A | Weak recommendation, High-quality evidence | Benefits closely balanced with risks and burdens | RCTs without important limitations or overwhelming evidence from observational studies | Weak recommendation, best action may differ depending on circumstances or patients' or societal values |
| 2B | Weak recommendations, Moderate-quality evidence | Benefits closely balanced with risks and burdens | RCTs with important limitations (inconsistent results, methodological flaws, indirect or imprecise) or exceptionally strong evidence from observational studies | Weak recommendation, best action may differ depending on circumstances or patients' or societal values |
| 2C | Weak recommendation, Low- or very-low-quality evidence | Uncertainty in the estimates of benefits, risks and burden; benefits, risk, and burden may be closely balanced | Observational studies or case series | Very weak recommendations; other alternatives may be equally reasonable |

GRADE = Grades of Recommendation, Assessment, Development, and Evaluation; RCT = randomized controlled trial.
Adapted from Guyatt G, Gutermen D, Baumann MH, et al. Grading strength of recommendations and quality of evidence in clinical guidelines: report from an American college of chest physicians task force. *Chest*. 2006;129:174–181.[44] Used with permission

is its utility for the identification of both anorectal abscess and associated fistula tracts. In a study of 54 patients with perianal Crohn's disease, in which MRI and operative/clinical findings were compared, all the abscesses and 82% of the fistulas were correctly identified by MRI.[60] In a 2014 study, the presence and origin of a supralevator abscess was confirmed by MRI in 13 patients before operation.[55] In another 2014 study, MRI had a positive predictive value of 93%, a negative predictive value of 90% for anorectal abscess, and a sensitivity of over 90% for fistula-in-ano.[61]

Representative studies of endoanal ultrasound (EUS), in 2 or 3 dimensions, with or without peroxide enhancement, indicate that this imaging modality is also useful in the diagnosis and classification of anorectal abscess and fistula-in-ano with concordance with operative findings in 73% to 100% of cases.[62–66] Transperineal ultrasound (TPUS), a noninvasive alternative to EUS, has been studied in patients with anorectal abscess, anoperineal fistulas, and rectovaginal fistulas of cryptogenic or Crohn's disease origin.[67–70] A comparison of EUS and TPUS in patients with perianal Crohn's disease, with EUS as the reference standard, TPUS had a sensitivity of 85% and a positive predictive value of 86% for anal fistulas and was of similar value as EUS for the diagnosis of anorectal abscess.[67]

In 2004, Buchanan performed a comparison of limited clinical examination (awake, no probing), EUS, and MRI in patients with fistula-in-ano and determined that these modalities accurately classified the fistula in 61%, 81%, and 90% of patients.[62] A meta-analysis of MRI and EUS for the assessment of fistula-in-ano indicated that the sensitivities of MRI and EUS were 87% and 87%, and their specificities were 69% and 43%.[71]

Fistulography, contrast injection of the fistula under fluoroscopy, may also be an effective means of studying an anal fistula with concordance with operative findings demonstrated in 89% of cases.[72] In a recent study, fistulography accurately identified the primary fistula tract, internal opening, secondary tracts, and associated abscess in 100%, 74%, 92%, and 88% of patients.[63] Finally, the added value of combining diagnostic modalities to enhance the accuracy of anal fistula assessment was exemplified in a 2001 study of 34 patients with perianal Crohn's disease in which EUS, MRI, and examination under anesthesia were accurate in 91%, 87%, and 91% of patients, whereas 100% accuracy was achieved with the combination of any 2 techniques.[57]

## Anorectal Abscess

1. **Patients with acute anorectal abscess should be treated promptly with incision and drainage. Grade of**

**Recommendation: Strong recommendation based on low-quality evidence, 1C.**

The primary treatment of anorectal abscess remains surgical drainage. In general, the incision should be kept as close as possible to the anal verge to minimize the length of a potential fistula, while still providing adequate drainage. After drainage, abscess recurrence has been observed in up to 44% of patients, most often within 1 year of initial treatment.[2,10,15,73–75] Inadequate drainage, loculations, horseshoe-type abscess, and failure to perform primary fistulotomy have been identified as risk factors for recurrent anorectal abscess.[15,45,73] Once the abscess has been drained, the value of packing the wound has been studied in prospective, randomized trials that have demonstrated equivalent or superior abscess resolution, with less pain and faster healing, in patients whose wounds are left unpacked.[76–78]

A variation of incision and drainage uses a small catheter (eg, 10–14F Pezzer or Malecot) placed into the abscess cavity with the use of local anesthetic and a small stab incision. The drain is removed when the abscess drainage stops and the cavity has closed down around the catheter (usually 3–10 days).[79] Although this technique may not allow for complete disruption of loculations within the abscess cavity and generally omits primary fistulotomy, comparative analyses of incision and percutaneous drainage of perianal and other soft-tissue abscesses indicate that the 2 techniques have equal efficacy.[80–82]

Intersphincteric abscesses are drained into the anal canal via internal sphincterotomy.[83] Supralevator abscesses originating from upward extension of an intersphincteric abscess are also internally drained via incision of the rectal wall or transanal insertion of a drain. Supralevator abscesses resulting from upward extension of an ischiorectal abscess should be drained externally, through the perianal skin.[7,19] The treatment of supralevator abscesses in this manner will help prevent complex fistula formation.

Horseshoe-type anorectal abscesses develop most often originating in the deep posterior anal space, but they may also develop in the deep anterior anal space, and then progress with unilateral or bilateral extension into the ischiorectal spaces.[46,84] The Hanley procedure, first described in 1965, is a technique for draining the deep postanal space via major fistulotomy with additional incisions into the ischiorectal spaces, as needed, to completely drain the abscess.[85] Although this procedure has proven effective in the treatment of the horseshoe abscess, it is debilitating, and a comprehensive assessment of its impact on long-term anal sphincter function was not included in the larger reported series.[46,84] A modified Hanley technique, in which a partial sphincterotomy is combined with a seton that is incrementally tightened, is a less destructive but similarly effective means of horseshoe abscess resolution with preservation of anal sphincter function.[46,86,87]

2. **Abscess drainage with concomitant fistulotomy may be performed with caution for simple anal fistulas. Grade of Recommendation: Weak recommendation based on moderate-quality evidence, 2B.**

Thirty to seventy percent of patients with anorectal abscesses present with a concomitant fistula-in-ano.[2,5,8–10,13–16] A controversial topic is the role of "primary fistulotomy" during incision and drainage of an abscess. Although fistulotomy would address the offending crypt, edema and inflammation may obscure the location of the internal opening and overzealous probing could create a false opening or a larger wound. Some studies report anal sphincter functional impairment after primary fistulotomy, but others do not.[2,8,15,88,89] A 2010 Cochrane Review included 6 trials, with 479 patients, and demonstrated that sphincter division (via fistulotomy or fistulectomy) at the time of incision and drainage was associated with a significant decrease in abscess recurrence, persistence of fistula or abscess, and the need for subsequent surgery (relative risk, 0.13; 95% CI, 0.07–0.24), but an increased, albeit statistically insignificant, incidence of continence disturbances at 1-year follow-up (relative risk, 3.06; 95% CI, 0.7–13.45).[90] Therefore, when a simple fistula is encountered during incision and drainage of an anorectal abscess, fistulotomy may be performed as long as the anticipated benefits (healing) are estimated to outweigh the risks (incontinence).[2,6,8] As an alternative to "primary" fistulotomy, a draining seton is a safe and acceptable treatment in this setting.[6,15,91]

3. **Antibiotics should be reserved for patients with anorectal abscess complicated by cellulitis, systemic signs of infection, or underlying immunosuppression. Grade of Recommendation: Weak recommendation based on low-quality evidence, 2C.**

In general, the addition of antibiotics to routine incision and drainage of an uncomplicated anorectal abscess in healthy patients does not improve healing or reduce recurrence; it is not generally recommended. However, selective use of antibiotics for patients with anorectal abscess complicated by cellulitis, systemic illness, or immunosuppression has been advocated by experts in the field.[6,10,16,92] Evidence supporting this approach may be gleaned from a recent retrospective study of 172 patients with uncomplicated anorectal abscess in which the outcomes of incision and drainage alone were compared with incision and drainage plus 5 to 7 days of oral antibiotic therapy.[74] Nine percent of patients had recurrent abscess, with no difference between the treatment groups. However, among patients with anorectal abscess complicated by surrounding cellulitis, induration, or systemic sepsis, there was a 2-fold increase in recurrent abscess in patients who were not treated with antibiotics.

Although the practice of sampling the pus drained from an anorectal abscess is low yield, in general, the isola-

tion of methicillin-resistant *Staphylococcus aureus* (MRSA) in up to 33% of otherwise routine anorectal abscesses raises the question of whether wound culture is indicated after incision and drainage.[74,93,94] When MRSA is isolated from an anorectal abscess, a combination of abscess drainage and antibiotics directed against the organism is recommended for patients with systemic inflammation, sepsis, leukocytosis, or leukopenia.[95] Wound culture should also be considered in cases of recurrent infection or nonhealing wounds.[74] Patients with underlying HIV infection with either concomitant infections or atypical microbes, including tuberculosis,[96] may benefit from wound culture and targeted antibiotic treatment.

For neutropenic or otherwise immunosuppressed patients with anorectal abscess, the data suggest that antibiotics play an important role in treatment.[97–99] Although patients with a higher absolute neutrophil count (1000/mm³) and fluctuance on examination demonstrate higher resolution rates with incision and drainage, patients with lower neutrophil counts (absolute neutrophil count, 500–1000/mm³) and/or lack of fluctuance on examination have been successfully treated with antibiotics alone.[100–102]

Current guidelines from the American Heart Association recommend preoperative antibiotics before incision and drainage of infected tissue in patients with prosthetic valves, previous bacterial endocarditis, congenital heart disease, and heart transplant recipients with valve pathology. Unlike previous guidelines, antibiotic prophylaxis is no longer recommended in patients with routine mitral valve prolapse.[103]

### Anal Fistula

The primary goal of operative treatment of anal fistula-in-ano is to obliterate the internal fistulous opening and any associated epithelialized tracks and to preserve anal sphincter function. Because no single technique is appropriate for the treatment of all fistulas, treatment must be directed by the etiology and anatomy of the fistula, degree of symptoms, patient comorbidities, and the surgeon's experience. One should keep in mind the progressive trade-off between the extent of operative sphincter division, postoperative healing rates, and functional compromise.

### Treatment of Fistula-in-Ano

1. **Simple fistula-in-ano in patients with normal anal sphincter function may be treated with fistulotomy. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.**

Fistulotomy is an effective treatment for simple anal fistula that results in healing in over 90% of patients.[17,104,105] Fistulotomy failures have been associated with complex types of fistula, failure to identify the internal opening, and Crohn's disease.[105,106] Recent, prospective multicenter studies indicate that when fistulotomy is used for simple (low) anal fistula, in properly selected patients, the risk of fecal incontinence is minimal or none.[17,104] On the contrary, earlier, large retrospective studies reported some degree of fecal incontinence (mainly soiling and flatus incontinence) in up to 42% of patients who underwent fistulotomy.[89,105,107] Furthermore, a 2014, multicenter, retrospective study that included 537 patients with a "low perineal fistula" (less than one-third of the sphincter complex involved), who underwent fistulotomy, reported major postprocedure fecal incontinence in 28% of patients.[108] This wide variation in fistulotomy outcomes is likely due to differences in the selection of patients for fistulotomy, the definition of incontinence, and variations in follow-up. Risk factors for postoperative anal sphincter dysfunction include preoperative incontinence, recurrent disease, female sex, complex fistulas, and prior fistula or anorectal surgery.[105,107,109,110] Interventions *other* than fistulotomy are generally recommended in patients with anal fistula and these risk factors.

Marsupialization of the wound edges after fistulotomy has been associated with less postoperative bleeding and accelerated wound healing.[111,112] Marsupialization may also reduce the need for postoperative analgesics.[113] Fistulectomy, in which the tract is resected, is associated with longer healing times, larger defects, and a higher risk of incontinence, and it may not lower the recurrence rate compared with fistulotomy, suggesting that the increased morbidity is not offset by any significant benefit.[114,115]

2. **Endoanal advancement flaps are recommended for the treatment of fistula-in-ano. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.**

Endoanal advancement flap is a sphincter-sparing technique that consists of curettage of the fistula tract, suture closure of the internal opening, and mobilization of a segment of proximal healthy anorectal mucosa, submucosa, and muscle to cover the site. Reports indicate healing in 66% to 87% after initial endoanal advancement flap for cryptoglandular fistula.[110,116–120] Among those with recurrence, successful healing may be achieved with repeat advancement flap procedures.[116] Factors associated with failed repair include prior radiation, underlying Crohn's disease, active proctitis, rectovaginal fistula, malignancy, obesity, and the number of previously attempted repairs.[21,105,119,121–125] A diverting stoma has not been shown to improve the outcome of endorectal advancement flap for fistula-in-ano but can be considered on an individualized basis.[21,119] Although the sphincter is not divided per se during flap formation, internal sphincter fibers may be included in the flap and mild to moderate incontinence is reported in up to 35% of patients, with concomitant decreased resting and squeeze pressures on postoperative manometry.[120,126]

3. **Simple and complex anal fistulas may be treated with ligation of the intersphincteric fistula tract (LIFT) procedure. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.**

The ligation of the intersphincteric fistula tract (LIFT) procedure involves suture closure and division of the fistula tract in the intersphincteric plane.[127] A draining seton may be used before the LIFT procedure to promote fibrosis of the tract, which may facilitate the procedure but has not been shown to affect its success.[128] Meta-analyses of published data report that the standard or "classic" LIFT has resulted in fistula healing in 61% to 94% of patients, with little morbidity, a healing time of 4 to 8 weeks, and only rare alterations in fecal continence.[128–132] Modifications to the LIFT procedure that include omission of fistula tract division, excision of the lateral aspect of the tract, and the combined use of a seton, fistula plug, or biological mesh interposition have also been described with limited data indicating successful healing and preservation of anal sphincter function both on par with the classic LIFT.[129,133] The LIFT procedure may be used for both simple and complex transphincteric fistulas. In the recent prospective, multicenter study by Hall et al,[17] 43 LIFT procedures were performed with an overall healing rate of 79%. Among the 17 patients with a simple/low anal fistula, 82% were healed at 3 months follow-up. Interestingly, the post-LIFT procedure fecal incontinence severity scores improved in Hall's study. Fistula tract length >3 cm, previous procedures to eradicate the fistula, and obesity have each been associated with LIFT failure.[129,134]

4. **A cutting seton may be used with caution in the management of complex cryptoglandular anal fistulas. Grade of Recommendation: Weak recommendations based on moderate-quality evidence, 2B.**

With complex anal fistulas, initial seton placement to control sepsis is typically followed by a secondary, definitive procedure to eradicate the fistula.[135] Healing rates have ranged from 62% to 100%, depending on the type of secondary procedure.[116,135,136] Alternatively, the seton may also be left in place and tightened at intervals to allow gradual division of the sphincter.[137] This technique was used in a recently reported series of 200 patients in whom a suture seton was tightened every 6 to 8 weeks, in preparation for a superficial or "controlled" fistulotomy.[138] Healing occurred in 94% of patients with only minor disturbances in anal sphincter function in 4% of patients. In addition, recent retrospective studies of cutting setons for transphincteric or other complex cryptoglandular fistulas have also demonstrated fistula healing in over 90% of patients and preservation of anal sphincter function in the majority of patients.[139,140] An earlier review of 37 studies of a cutting seton for fistula-in-ano, that included 1460 patients, reported postprocedure fecal incontinence in 12% (0%–67%) overall, with broad variation in functional outcomes that depended on the type of fistula and the definition used for fecal incontinence.[141] Thus, although individual studies suggest that a cutting seton is both efficacious and safe for the treatment of complex cryptoglandular anal fistulas, this therapy can result in anal sphincter functional impairment, and, therefore, it should be performed with caution.

5. **The fistula plug is a relatively ineffective treatment for fistula-in-ano. Grade of Recommendation: Weak recommendation based on moderate-quality evidence, 2B.**

The bioprosthetic anal fistula plug is an acellular collagen matrix used to close the primary internal anal opening and to provide a scaffold for native tissue in-growth that will obliterate the fistula tract. Although early data demonstrated 70% to 100% success with the plug in low-lying fistulas,[142,143] more recent outcomes in complex disease have been less promising with healing rates of less than 50%.[144–148]

Reasons for early failure are typically sepsis or plug dislodgement, and failure is more common in patients with Crohn's disease, anovaginal fistula, recurrent fistula, or active smoking. Alternative biosynthetic matrices have followed a similar pattern of early promising results,[64,149] followed by multicenter trials, and a meta-analysis that showed less than 50% success at 1 year.[150–153] Despite the variability in healing with a fistula plug, the real possibility of success coupled with its sphincter-preserving nature allows this therapy to remain an option that may be considered for the treatment of fistula-in-ano.

6. **Fibrin glue is a relatively ineffective treatment for fistula-in-ano. Grade of Recommendation: Weak recommendation based on moderate-quality evidence, 2B.**

The success of fibrin glue therapy for anal fistulas has varied among studies with retrospective and prospective data indicating fistula resolution in the range of 14% to 63%.[154–161] In a prospective trial performed by Lindsey et al,[159] fibrin glue therapy for simple and complex anal fistulas resulted in healing in 3 of 6 (50%) and 9 of 13 (69%). By contrast, in a more recent prospective multicenter trial,[162] only 15 of 38 (39%) patients with a transphincteric fistula randomly assigned to the fibrin glue arm were healed at 1 year. A 2015 systematic review indicated the absence of a consistent association between fistula etiology, complexity, tract length, or the use of a mechanical bowel preparation and successful fibrin glue therapy. Despite the variability in healing of fistula-in-ano with fibrin glue therapy, the real possibility of success coupled with its being a sphincter-preserving technique allows this therapy to remain an option that may be considered for the treatment of fistula-in-ano.

### Rectovaginal Fistulas

In the initial evaluation and treatment of rectovaginal fistulas, underlying pathology such as cryptoglandular abscess, IBD, or malignancy must be addressed first, because procedures performed to eliminate the fistula in the setting of active disease or infection will often fail. Examination under anesthesia or radiologic assessment may be required to define the anatomy of the fistula and to evaluate the tissues involved. Assessment of anal sphincter function is another key step in the initial evaluation of patients with rectovaginal fistulas, because the status of the sphincter complex plays an integral role in the choice of repair.[26,29,163,164] The evaluation and management of simple or low rectovaginal ("anovaginal") fistulas may differ from the approach to complex and high rectovaginal fistulas. Although no one technique of repair is appropriate for all rectovaginal fistulas, the available evidence may be used to determine effective treatment. The use of fibrin glue therapy and collagen plug for rectovaginal fistulas are not included in these guidelines, because the success of these interventions has proven prohibitively poor.[165,166]

### Treatment of Rectovaginal Fistulas

1. **Nonoperative management is recommended for the initial management of obstetrical rectovaginal fistula and may also be considered for other benign and minimally symptomatic fistulas. Grade of Recommendation: Weak recommendation based on low-quality evidence, 2C.**

In most cases, the initial management of obstetrical rectovaginal fistulas is nonoperative therapy for a period of 3 to 6 months.[26,50,167] Sitz baths, wound care, debridement, antibiotics in cases of infection, and the use of stool-bulking fiber supplements are recommended.[50] The aim of this approach is to promote the resolution of acute inflammation and infection, which may set the stage for spontaneous healing of the fistula. Limited data from an older study by Homsi et al,[168] and a more recent study by Oakley et al,[169] demonstrated that this nonoperative approach resulted in healing in 52% and 66% of patients. As long as the underlying pathology is controlled, rectovaginal fistula unrelated to obstetrical injury may also be successfully managed without operative intervention.[169]

2. **A draining seton may be required to facilitate resolution of acute inflammation or infection associated with rectovaginal fistulas. Grade of Recommendation: Strong recommendation based on low-quality evidence, 1C.**

A draining seton may be helpful to prevent rectovaginal septal abscess, particularly in patients with a narrow fistula, a small-diameter vaginal side opening, or multiple tracts.[146,165,166,170] Setons may also provide long-term symptomatic relief for patients who are poor candidates for definitive repair, and may benefit patients with an active inflammatory or neoplastic process that requires other treatments before or as part of definitive repair of the fistula. In patients who are candidates for definitive repair, setons may relieve acute inflammation, edema, and infection so that the success of subsequent repair is more likely.[146,165,166,170,171] Although there is no defined period of drainage before definitive repair, setons should be left in place until the acute inflammation and any infection have resolved. In certain cases, when a seton and wound care are inadequate to control rectovaginal fistula–associated symptoms, inflammation, or infection, a diverting ostomy may be necessary.

3. **Endorectal advancement flap, with or without sphincteroplasty, is the procedure of choice for most simple rectovaginal fistulas. Grade of Recommendation: Strong recommendation based on low-quality evidence, 1C.**

The endorectal advancement flap procedure uses a partial-thickness flap of rectal wall to cover the defect in the rectovaginal septum. Although it is most often used to repair simple rectovaginal fistulas, it has also proven useful for recurrent fistulas, and, in combination with sphincteroplasty, for rectovaginal fistulas complicated by anal sphincter disruption. In 1988, Lowry and colleagues[26] reported on 81 patients with a simple, obstetrical rectovaginal fistula. Endorectal flap alone was performed in the 56 patients with preserved anal sphincter function and resulted in healing in 78% of patients. Endorectal advancement flap combined with sphincteroplasty was used in 25 patients with anal sphincter impairment with healing in 88% of patients. A representative sample of the larger studies that evaluated endorectal advancement flap repair of rectovaginal fistula demonstrate successful healing in the range of 41% to 78% of patients with variation that may be attributed to difference in fistula etiology, operative techniques, and the experience of the operating surgeons.[21,29,119,163,164,170,172] Factors associated with failure of this technique may include functional impairment of the anal sphincter, endoscopic or manometric defects in the anal sphincter, Crohn's disease, complex fistula, and recurrent fistula.[26,119,170,173,174] Although prior failed attempts at fistula repair are a risk factor for endorectal advancement flap failure, success with repeat flaps has been reported in up to 93% of patients.[26,116,175] A diverting stoma has not been shown to improve the outcome of endorectal advancement flap for rectovaginal fistula but can be considered on an individual basis.[119,170,175]

The results of endorectal advancement flap alone for rectovaginal fistula complicated by fecal incontinence have been relatively poor. A study by Tsang et al[164] included 52 patients with obstetrical rectovaginal fistulas of whom 48% had varying degrees of fecal incontinence. Endorectal advancement flap or sphincteroplasty ± levatorplasty were performed in 27 and 35 patients, with healing in 41% and

80%. Patients with fecal incontinence, or a sphincter defect detected by EUS, or an anal manometric defect who underwent sphincteroplasty had markedly higher (≥84%) fistula healing rates than those who underwent flap alone (33%). The link between endorectal advancement flap failure and incontinence mandates a careful assessment of anal sphincter function and consideration of EUS before repair of rectovaginal fistulas.[26,119,164,176]

The use of an endorectal advancement flap for the treatment of low rectovaginal (anovaginal fistula) creates the potential for bothersome anal mucus discharge. To prevent this, an alternative flap, created from the anoderm and perianal skin, instead of rectal mucosa, should be considered. This technique, combined with sphincteroplasty, was used by Chew and Rieger[177] for 7 patients with obstetrical low rectovaginal fistulas and resulted in healing in 100% of patients.

4. **Episioproctotomy may be used to repair obstetrical or cryptoglandular rectovaginal fistulas associated with extensive anal sphincter damage. Grade of Recommendation: Strong recommendation based on low-quality evidence, 1C.**

Episioproctotomy with reconstruction of the ano-rectal-vaginal septum is a transperineal approach that has been used to repair rectovaginal fistulas in patients with extensive anal sphincter defects and associated fecal incontinence with fistula healing in the range of 78% to 100% and generally excellent functional outcomes.[29,163,173,177–180] In a 2007 report by Hull et al,[178] this procedure was performed in 33 patients with mostly obstetrical rectovaginal fistulas associated with "significant" anterior anal sphincter defects, and healing occurred in 22 patients (67%). Hull et al[163] later reported a retrospective analysis of 50 patients with obstetrical or cryptoglandular rectovaginal fistula repaired by episioproctotomy with healing of the fistula in 39 patients (78%) and rare or no postoperative fecal incontinence in 46 patients (92%), which indicates that some patients who underwent this procedure experienced improved continence despite the absence of fistula healing. Furthermore, of the 25 (50%) patients with preoperative fecal incontinence, only 4 (8%) experienced postoperative fecal incontinence. A temporary diverting ostomy was used in 36 (72%) of Hull's episioproctotomy patients.

5. **A gracilis muscle or bulbocavernosus muscle (Martius) flap is recommended for recurrent or otherwise complex rectovaginal fistula. Grade of Recommendation: Strong recommendation based on low-quality evidence, 1C.**

The literature on the use of a gracilis flap for the treatment of rectovaginal fistula comprises retrospective studies including no more than 25 patients.[24,170,181–184] In these studies, a gracilis flap was most often used to repair recurrent

rectovaginal fistulas of various etiologies and typically utilized concomitant fecal diversion. The largest series of rectovaginal fistula was reported by Pinto et al[170] and demonstrated healing in 19 of 24 of patients overall (79%), but in only one-third of patients with Crohn's disease. Other retrospective studies, with 8 to 11 patients, report fistula healing in the range of 50% to 92%.[165,181,183–186] In 2 series of 15 and 8 patients after gracilis flap for rectovaginal fistula, Lefevre and Wexner each reported only minor operative site complications (mainly infections) in 47% and 37% of patients.[183,185]

The use of a bulbocavernosus flap for rectovaginal fistula has also been studied, for the most part, with small retrospective studies that include patients with Crohn's disease, radiation injury, and other causes of rectovaginal fistula. Pitel and colleagues[187] reported the largest series of 20 patients with bulbocavernosus flap for rectovaginal fistula. A diverting ostomy was used in 14 patients (70%), minor complications were observed in 3 patients (15%), and healing occurred in 13 patients overall (65%) and in 4 of 8 patients (50%) with Crohn's disease. In the series of Songne et al[188] of 14 patients, including 6 with Crohn's disease, a diverting ostomy was used in all patients and healing occurred in 13 patients (93%). In 2 studies in which the bulbocavernosus flap was used to treat patients with radiation-related rectovaginal fistula, healing was observed in 11 of 12 and 13 of 14 patients.[189,190] A diverting ostomy is generally recommended as an adjunct to muscle flap repair of rectovaginal fistula.

6. **High rectovaginal fistulas that result from complications of a colorectal anastomosis often require an abdominal approach for repair. Grade of Recommendation: Strong recommendation based on low-quality evidence, 1C.**

Fistulization of a colorectal anastomosis to the vagina has been reported to occur in as many as 10% of women who undergo low anterior resection.[33,34] When this occurs, fecal diversion is generally recommended as the initial step to facilitate resolution of the acute inflammation and associated infection. In some cases, diversion alone may result in healing. In 2005, Kosugi et al[34] reported that 6 of 16 (37%) colorectal anastomotic-vaginal fistulas treated with diversion alone healed within a period of 6 months. Persistent fistulas were treated with neocolorectal anastomosis, endorectal advancement flap, or gluteal-fold flap interposition. With the abdominal approach to a high rectovaginal fistula, the rectum and vagina are separated, the defects are debrided and closed, and healthy tissue, such as omentum, is interposed between the vagina and rectum. This repair was performed laparoscopically by van der Hagen and colleagues[191] in 40 patients with rectovaginal fistula mostly due to obstetrical or gynecologic surgical injury and resulted in healing in 95% of patients with median follow-up of 28 months.

7. **Proctectomy with colon pull-through or coloanal anastomosis may be required to repair radiation-related and recurrent complex rectovaginal fistula. Grade of Recommendation: Weak recommendation based on low-quality evidence, 2C.**

Rectovaginal fistulas that develop after pelvic irradiation may be amenable to repair with muscle flap interposition (described above),[189,190] on-lay patch of colon,[192] rectal sleeve excision with coloanal anastomosis,[193,194] or proctectomy with primary or staged coloanal anastomosis.[195] The sleeve excision technique includes resection of the rectum proximal to the fistula, mucosectomy of the fistulized and distal rectum, pull-through of healthy colon into the remaining muscular tube of rectum, and a sutured coloanal anastomosis. In 1986, Nowacki et al[193] described this technique and outcomes for 15 patients with a history of cervical cancer treated with radiotherapy who were subsequently diagnosed with a rectovaginal fistula. Fistulas healed in 11 of 14 patients (79%) who survived the procedure, and the functional results were described as "good" in all the patients who healed.[193] In a more recent retrospective study by Patsouras et al,[194] this technique was performed in 34 patients, and early and late postoperative complications occurred in 41% and 32% of patients. Fistula healing occurred in 75% of patients after the pull-through procedure, and 18 of 25 (72%) patients surveyed reported normal fecal continence after the procedure. When resection of the diseased, fistulized rectum is technically possible, a primary or staged (Turnbull-Cutait procedure) coloanal anastomosis may be used to restore continuity of the bowel. In a retrospective comparison of 67 patients undergoing primary or delayed operations for a variety of indications (only 3 patients had rectovaginal fistula), the Turnbull-Cutait procedure resulted in decreased rates of anastomotic leak (3% vs 7%) and pelvic abscess (0% vs 5%) but functional outcomes similar to a primary coloanal anastomosis.[195]

### Treatment of Perianal Fistula Associated with Crohn's Disease

The primary treatment for perianal Crohn's fistulas is medical, whereas surgery has traditionally been reserved for the control of sepsis and as an adjunct to medical therapy in seeking a cure. Antibiotics are effective, especially in fistulizing disease, with metronidazole and fluoroquinolones demonstrating improved symptoms (at least temporarily) in over 90% of patients.[196] Limited data for azathioprine, 6-mercaptopurine, cyclosporine, and tacrolimus have also reported some success for fistulizing Crohn's disease.[197-199] However, the mainstay of modern medical management for perianal Crohn's disease is treatment with biological therapy.[200,201] The first-line medical treatment is infliximab.[41,201-203] Level 1 evidence suggests initial healing of all anal fistulas in 38% to 55% of patients treated with infliximab,[41,204] with long-term healing of

39%.[204] Although 2 randomized trials showed no benefit of adalimumab over placebo,[205,206] a subsequent trial demonstrated 33% healing in the adalimumab group vs 13% in the placebo group ($p < 0.05$).[207] Evidence for the use of certolizumab is less compelling, with the PRECiSE trial showing healing of anal fistulas in 36% of patients treated with certolizumab vs 17% with placebo ($p = 0.038$). However, when the criterion for success was defined as healing noted on 2 consecutive visits, there was no difference between the certolizumab group and the placebo group.[208] In many instances, biological treatment is combined, at least initially, with a draining seton.[202,203,209]

The decision to embark on surgical treatment of perianal Crohn's disease must be individualized and based on the extent of disease and the severity of symptoms. Unfortunately, despite best available medical and surgical management, this disease may result in proctectomy or permanent diversion in some patients with severe perianal fistulizing disease.[210-214]

### Treatment of Perianal Fistula Associated with Crohn's Disease

1. **Asymptomatic fistulas in patients with Crohn's disease do not require surgical treatment. Grade of Recommendation: Strong recommendation based upon low-quality evidence, 1C.**

Anal fistulas in patients with perianal Crohn's disease may be secondary to either Crohn's disease or cryptoglandular origin. Irrespective of etiology, patients with asymptomatic anal fistulas and no signs of local sepsis require no surgical intervention.[200,215-217] These fistulas may remain dormant for an extended period of time; therefore, patients need not be subjected to the morbidity of operative intervention.

2. **Symptomatic, simple, low anal fistulas in patients with Crohn's disease may be treated by fistulotomy. Grade of Recommendation: Strong recommendation based on low-quality evidence, 1C.**

Fistulotomy is safe and effective in low-lying, simple anal fistulas involving no or minimal external anal sphincter.[196,218-224] Given the chronicity of Crohn's disease and high frequency of disease relapse, preservation of sphincter function is essential. Before embarking on any fistulotomy, surgeons should consider all relevant patient factors, in particular, the extent of anorectal disease, sphincter integrity, existing continence, rectal compliance, presence of active proctitis, previous anorectal operations, and stool consistency. With proper patient selection, healing rates after fistulotomy are reported in 62% to 100% of patients,[196,218,219,221-224] with mild incontinence rates of 6% to 12%; however, some studies have cited at least some degree of incontinence in >50% of patients.[220,224]

3. **Loose setons are useful in the multimodality therapy of fistulizing perianal Crohn's disease and may also be used for long-term disease control. Grade of Recommendation: Strong recommendation based upon low-quality evidence, 1C.**

For complex fistulas associated with Crohn's disease, long-term draining setons can successfully control drainage and allow inflammation to resolve by providing continuous drainage and preventing closure of the external skin opening.[196,216,225–227] Despite this technique, recurrent sepsis can occur >20% of the time, and soilage can be a bothersome symptom in these patients.[209,228,229] In patients being treated with infliximab with the aim of fistula closure, the timing of seton removal is controversial. In the randomized ACCENT 2 trial, setons were removed 2 weeks after starting infliximab, and this resulted in 15% of the patients developing new abscesses.[204] Because of this, some have suggested leaving setons in at least until the induction period of infliximab has been completed.[230] The decision to remove a draining seton needs to be balanced with the knowledge that long-term healing with this strategy occurs in only about 40% of patients[204] and that one prospective series showed a 0% new abscess rate when setons were left in situ.[231]

4. **Endoanal advancement flap, anal fistula plug, and the LIFT procedure may be used to treat fistula-in-ano associated with Crohn's disease. Grade of Recommendation: Weak recommendation based on moderate-quality evidence, 2B.**

Before considering a surgical repair in a patient with a complex Crohn's-related anal fistula, a detailed examination should be performed to rule out the presence of active proctitis, or anal stenosis, because these patients are likely better managed with long-term draining setons. The decision to operate needs to be carefully discussed with the patient, because success rates are lower in the setting of Crohn's disease, and functional outcomes appear to be worse than those seen in the setting of cryptoglandular disease.[224] The most commonly described surgical technique used in this setting is endoanal advancement flap closure. A systematic review of 35 studies with an average follow-up of 29 months showed healing in 64% of patients (range, 33%–93%). Incontinence was noted in 9.4% of patients (range, 0%–29%),[120] although some studies have reported fecal soiling in up to 75% of patients.[224] Reinterventions have been shown to be necessary in up to 50% of patients.[232] Mizrahi et al[21] studied advancement flap closure of anal fistulas and found that the only predictor for failure was Crohn's disease, with recurrence noted in 57% of Crohn's fistulas vs 33% of cryptoglandular fistulas.

The anal fistula plug has been reported in this setting as well, but with small numbers of patients. A recent review of 488 non-Crohn's and 46 Crohn's patients treated with the anal fistula plug showed that 54% of the non-Crohn's and 55% of the Crohn's fistulas were noted to heal, but the authors concluded that, because of the low number of patients and heterogeneity in technique, the anal fistula plug had not been properly evaluated in the setting of Crohn's disease.[233]

The LIFT procedure has also been studied in the setting of Crohn's disease. One prospective study of 15 patients with complex Crohn's-related fistulas showed a 67% healing rate at 12 months of follow-up after LIFT.[234]

5. **Complex Crohn's fistulas may require permanent diversion or proctectomy for uncontrollable symptoms. Grade of Recommendation: Strong recommendation based on low-quality evidence, 1C.**

A small percentage of patients with extensive and aggressive disease that is uncontrolled by medical management and long-term seton placement may require diversion or proctectomy to control perianal sepsis. Although some have suggested a trial of tacrolimus before considering a proctectomy,[200,201] this recommendation needs to be balanced by the data that demonstrate that healing of anal fistulas with tacrolimus is very unlikely.[199,235] This is a complex decision and needs to involve the patient, the surgeon, and the gastroenterologist. For patients with complex perianal Crohn's disease, diversion rates range from 31% to 49%. Evidence suggests at least an initial response to diversion in up to 81% of patients[201]; however, a sustained remission of symptoms can only be maintained in about 26% to 50% of patients.[210,211,236] Concomitant colonic disease, persistent perianal sepsis, prior temporary diversion, fecal incontinence, and anal canal stenosis are poor predictive factors.[210] Despite optimal medical therapy, up to 68% of these patients may ultimately require proctectomy to control refractory symptoms.[211,214,236]

### *APPENDIX A*

### *CONTRIBUTING MEMBERS OF THE ASCRS CLINICAL PRACTICE GUIDELINE COMMITTEE*

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