Surgical Management of Anal Fistulas: A review of the literature and a proposed treatment algorithm

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Abstract

Fistulas-in-ano represent the sequelae of perianal abscesses in up to 50% of cases. The two essential goals in the treatment of anal fistulas are to eliminate the primary fistula opening and any associated tracts and secondary openings, and avoid any detriment in fecal continence. No single technique exists that is appropriate for the management of all fistulas. With this in mind, a review of the English language literature was performed and an algorithm for the surgical management of anal fistulas was developed.

KEYWORDS: anal fistula, fistulotomy, fibrin glue, advancement flaps, ligation of the intersphincteric fistula tract, anal fistula plug
Introduction
Fistulas-in-ano are the sequelae in up to 50% of perianal abscesses. The goals in the treatment of anal fistulas are to eliminate the primary fistula opening and any associated tracts and secondary openings without a change in continence. No single technique exists that is appropriate for the treatment of all fistulas. When choosing among the treatment options available, one should consider the anatomy of the fistula, the amount of sphincter involved, any history of Crohn’s disease, previous radiation therapy, or mechanical sphincter injury, the risk of fistula recurrence, and the patient’s tolerance of any change in continence. With this in mind, a review of the literature was performed and an algorithm (figure 1) for the surgical management of anal fistulas developed.

Evaluation of Anal Fistulas
The initial step in the algorithm for the management of an anal fistula is to perform a problem specific history and physical examination. Besides assessing the patient’s overall condition and status as an operative candidate, the purpose of the examination is to determine if the fistula is “simple” or “complex”. Single intersphincteric or superficial transphincteric fistulas are generally considered to be “simple” fistulas. An anal fistula is considered to be ”complex” when there are factors present which may place the patient at an increased risk for a change in continence with treatment of their fistula. A fistula which involves greater than 30 to 50 percent of the length of the sphincter mechanism, is anterior in a woman, or if the patient has a history of pre-existing incontinence, Crohn’s disease, or local irradiation is generally considered to be “complex”. However, given the risk for a change in continence after fistulotomy, some authors classify all transphincteric fistulas as “complex”.

In the majority of patients, the anatomy of the fistula can be determined by physical examination either in the office or occasionally in the operating room under anesthesia. Radiographic evaluation may rarely be beneficial to identify secondary tracts or abscesses or to help delineate the fistula’s relationship to the sphincter complex. Magnetic resonance imaging or endorectal ultrasound with or without hydrogen peroxide injection are the studies of choice when radiologic assessment is deemed necessary.

Management of Anal Fistulas
Fistulotomy
Fistulotomy has long been considered the “gold standard” for the treatment of anal fistulas. In the algorithm, fistulotomy is considered the treatment of choice for “simple” fistulas. The fundamentals of fistulotomy include opening the entire fistula tract from the primary, internal opening to all secondary, external openings. For “simple fistulas”, the recurrence rate after fistulotomy is generally between 2 and 9 percent with a change in continence in 0 to 17 percent of patients. However, Garcia-Aguilar J, et al. performed a retrospective analysis of 375 patients with “simple” fistulas as determined by experienced colon and rectal surgeons managed by fistulotomy. With a minimum of 1 year of follow up, 45 percent of patients reported diminished continence after their fistulotomy.

Seton fistulotomy
A variation of a fistulotomy is the use of a cutting seton to slowly divide the sphincter and allow healing and fibrosis of the sphincter. This technique has been reported to decrease the incidence of a change in continence but does not completely remove it. The recurrence rate for “complex” fistulas managed with a cutting seton is
reported to be 0 to 8 percent with minor and major incontinence reported in 34 to 63 percent and 2 to 26 percent of patients respectively. Cutting setons are associated with significant morbidity related to discomfort from the seton which limits their use as first line therapy.

**Sphincter Preservation**

**Informed consent**

As a result of the risk of a change in continence with fistulotomy, sphincter preserving techniques are listed in the algorithm as an alternative first line options for the definitive management of “complex” anal fistulas. In general, sphincter preserving techniques for fistula management have a lower success rate when compared to fistulotomy but also have a decreased risk of diminished continence. Therefore, the choice between these techniques, as shown in the algorithm, should be made by the patient and their surgeon after the patient has been carefully informed of the risks and benefits of the different management options. In a recent study, when given a choice between a fistulotomy with a 95 percent success rate and a 15 percent risk of diminished continence or a sphincter preserving technique with a 70 percent success rate but no risk of a change in continence, 67 percent of patients with anal fistulas selected a sphincter preserving technique.\(^\text{16}\)

**Seton drainage**

For those patients who after informed consent select sphincter preservation, the next step in the algorithm is the placement of a loose seton to act as a drain. While controversial,\(^\text{18-21}\) many authors report improved outcomes with sphincter preserving fistula management techniques after a period of seton drainage to allow the fistula tract to mature.\(^\text{18-20}\) It is postulated that the period of seton drainage allows any acute inflammation of the fistula tract to resolve and potential side branches to close.\(^\text{20}\)

The treatment of anal fistulas in patients with Crohn’s disease is a special problem. The recurrent nature of the disease, along with its associated chronic diarrhea, places an emphasis on sphincter preservation. Patient satisfaction and the reduction in the number of septic episodes should be considered in addition to recurrence rates and a change in continence when selecting from the available treatment options. For patients with Crohn’s disease, one attractive option is the long term use of a non-cutting seton as a drain. The use of a seton has been shown to reduce the number of perianal septic episodes in patients with Crohn’s disease by providing continuous drainage of the fistula tracts. Despite this however, recurrent perianal sepsis will still occur in approximately one third of patients.\(^\text{14,22,23}\) More definitive fistula management can be considered if or when the patient’s Crohn’s disease becomes quiescent.

**Anal fistula plug**

Accepted sphincter preserving techniques of fistula management include fibrin sealant, endorectal and anodermal advancement flaps, bioprosthetic plugs and most recently ligation of the intersphincteric fistula tract (LIFT) alone or with the addition of a bioprosthetic (BioLIFT). In the algorithm, the bioprosthetic anal fistula plug, the LIFT and BioLIFT procedures are considered first line options. Commercially available anal fistula plugs have been made from lyophilized porcine intestinal submucosa and more recently synthetic materials. The advantages of the anal fistula plugs include technical ease of placement, preservation of anal sphincter integrity, minimal patient discomfort and the ability to repeat the procedure for treatment failures.\(^\text{24}\) The anal fistula plug made
from porcine submucosa has been used in the vast majority of the published studies. Initially success rates of 83 to 88 percent were reported. However, a number of subsequent studies had less encouraging results. Given the variable results with the bioprosthetic plug, a consensus conference was convened and a number of recommendations regarding the use of the bioprosthetic anal fistula plug were made (table 1). Prospective case series performed since then which have followed the recommendations of the consensus conference have better defined the role of the bioprosthetic anal fistula plug. These studies have reported success rates with the plug from 62 to 83 percent. In these studies, tobacco smoking, diabetes, previous failure of the plug and a posterior fistula were found to be associated with failure of the plug. In another study, the bioprosthetic anal fistula plug was found to be more cost effective for the management of “complex” anal fistulas when compared to advancement flaps. Given these results, the bioprosthetic anal fistula plug is included as a first line option for the sphincter preserving management of anal fistulas although consideration of other options may be appropriate for patients with risk factors for plug failure.

**LIFT/BioLIFT**

For patients who have a failure of the bioprosthetic plug, the LIFT or BioLIFT procedures are considered the next option. The LIFT and BioLIFT procedures are the most recent additions to the algorithm for the management of “complex” anal fistulas. In addition to being used in patients who have a failure of the less invasive bioprosthetic anal fistula plug, these techniques are appropriate for patients who select a more invasive procedure with the potential of an improved rate of fistula healing. The 2 studies of the LIFT technique with over 1 year of follow up have reported successful healing of the fistula in 57 and 89 percent of patients respectively. The BioLIFT procedure, a variation of the LIFT in which a bioprosthetic is placed in the intersphincteric plane to reinforce the closure of the fistula tract, was initially reported in patients with rectovaginal fistulas. The indications for the BioLIFT procedure have since been expanded to include all “complex” anal fistulas. In the 1 prospective case series of the BioLIFT technique with over 1 year of follow up, successful fistula healing was reported in 29 of 31 (94 percent) patients. While the precise roles of these 2 techniques in sphincter preserving fistula management have not been fully defined, the interest and enthusiasm in these procedures justifies their inclusion as first line options.

**Advancement flaps**

Many surgeons would consider advancement flaps as a first line option for the sphincter preserving management of “complex” anal fistulas. These flaps can be constructed of anoderm or more commonly, rectal muscle and mucosa and advanced to cover the primary fistula opening. Successful healing of the fistula has been demonstrated in 55 to 88 percent of patients managed with mucosal flaps. Multivariate analyses of large case series have shown the presence of Crohn’s disease, a rectovaginal fistula, high dose perioperative steroids and cigarette smoking to be predictors of flap failure. However, as mentioned above, mucosal flaps have been shown in one recent study to be less cost effective than bioprosthetic anal fistula plugs for the management of “complex” anal fistulas. Additionally, although the sphincter mechanism is not divided during advancement flap repair of fistulas, minor incontinence in up to 31 percent and major incontinence in up to 12 percent of patients has been recorded. Possible etiologies of this include damage to the sphincter mechanism during mobilization of a
mucosal flap and the potential for the creation of a mucosal ectropion with the advancement of the flap. Anal flaps have been less extensively studied, however the results seem to be comparable to those achieved with mucosal flaps. Because of this, advancement flaps have been included in the algorithm as a second line option to be considered only after failure of the bioprosthetic anal fistula plug and the LIFT or BioLIFT procedures if at all.

**Fibrin sealant**

One sphincter preserving technique not included in the algorithm for the management of “complex” anal fistulas is fibrin sealant. Initial studies of fibrin sealant for the management of anal fistulas were promising. The advantages of fibrin sealant obliteration of anal fistulas include easy application, preservation of anal sphincter integrity, minimal patient discomfort and the ability to repeat applications for treatment failures. Unfortunately, most recent studies have failed to achieve the results reported in earlier studies and have led most to question the usefulness of the technique. Tyler KM, et al reported on a prospective series of 89 patients with “complex” anal fistulas managed by obliteration of the fistula tract by fibrin glue. All of these patients had a non-cutting seton placed to allow maturation of the fistula tract prior to treatment with the fibrin sealant. With at least one year of follow-up, 62 percent of fistulas healed after the first application of the fibrin sealant and with repeat applications 70.7 percent of fistulas were healed. In contrast, a prospective series of 42 patients reported by Loungnarath J, et al. had a 16.3% success rate after the first application of the fibrin sealant and with repeat applications, 31percent of fistulas healed.

Fibrin sealant and flap repairs have been combined in an attempt to improve outcomes. In a retrospective chart review, Zmora, et al found that for 24 patients managed with fibrin sealant alone, 67 percent of the fistulas recurred, but when fibrin glue was combined with an endorectal advancement flap only 46 percent of fistulas recurred. In a prospective, randomized clinical trial of 58 patients, Ellis and Clark reported that when fibrin glue obliteration of the fistula tract was combined with advancement flap repair of the internal fistula opening, 26 percent of fistulas recurred compared to a 20 percent fistula recurrence rate for patients with an anal advancement flap without fibrin. This difference was statistically significant.

**Crohn’s disease**

As mentioned above, the treatment of anal fistulas in patients with Crohn’s disease is a special problem. Simple fistula associated with Crohn’s disease have been managed by fistulotomy with a fistula recurrence rate reported from 0 to 38 percent and a change in continence in 0 to 12 percent of patients. Additionally, the fistulotomy wound may take 3 to 12 months to heal.

While there are no reports on the role of the LIFT or BioLIFT in the management of anal fistulas associated with Crohn’s disease, the bioprosthetic anal fistula plug has been studied in patients with fistulas associated with Crohn’s disease. Initial results were similar to those reported for patients without Crohn’s disease but subsequent studies have reported the presence of Crohn’s disease to be associated with failure of the bioprosthetic plug.

Endorectal advancement flaps have also been used in patients with “complex” anal fistulas associated with Crohn’s disease although active proctitis is considered a contraindication. The short term success is reported to be 50 to 75 percent which is lower
than when the technique is used for fistulas not associated with Crohn’s disease and continues to diminish with longer follow-up.\textsuperscript{54,55}

**Management of Recurrent Fistulas**

Initially, one of the proposed advantages of the bioprosthetic anal fistula plug was the ability to repeat the procedure in the event of fistula recurrence. However, in a recent study, these repeat plugs were only successful in 3 of 15 (20 percent) attempts leading the authors to recommend against repeat attempts to manage a “complex” anal fistula with the anal fistula plug after failure of an initial use of the plug.\textsuperscript{32} However, in the report of BioLIFT for the management of “complex” anal fistulas, 18 of the 31 patients had failed a bioprosthetic anal fistula plug.\textsuperscript{32} Given these data, the BioLIFT procedure is recommended for failure of the bioprosthetic anal fistula plug in the algorithm.

There are no reports on efficacy of repeating a LIFT or BioLIFT procedure after a failure of one of these techniques as the primary method of fistula management. Given this lack of data, no recommendations can be made about the use of repeated attempts to manage recurrent “complex” anal fistulas with the LIFT or BioLIFT procedure. Repeat attempts to manage recurrent “complex” anal fistulas with mucosal flap after failure of a first flap have been reported with fistula recurrence rates significantly higher in those with a history of a previous attempt of flap repair.\textsuperscript{56-58} In one study, a history of a previous failed flap was the only significant predictor of failure of a subsequent flap.\textsuperscript{58}

The algorithm also lists long term seton drainage and cutting seton fistulotomy as options for the management of recurrent “complex” anal fistulas. These techniques should only be considered after a discussion of the risks and benefits as described above. However, the generally poor results or lack of data regarding the use of repeated attempts at sphincter preservation in patients with these recurrent “complex” anal fistulas justifies their inclusion in the algorithm.

**Conclusion**

“Complex” anal fistulas are a difficult surgical problem. The number of accepted treatment options is indicative that no one treatment strategy is appropriate for all patients. Fistulotomy or the use of a cutting setons has a the best success for healing anal fistulas but at the cost of a significant risk for diminished continence when used to treat “complex” anal fistulas. Sphincter preserving techniques in comparison, have a much less detrimental effect on continence but also have a high risk of fistula recurrence. This review stresses that the treatment modality for an anal fistula should be selected only after a clear discussion of the potential risks and benefits of the various options with the patient. The proposed algorithm represents a literature based management strategy for anal fistulas that has the potential to result in the best possible outcomes for patients with anal fistulas.

**Disclaimer**

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Table 2: Recommendations of a consensus conference on the use of the bioprosthetic anal fistula plug.

1. This device is not indicted for the treatment of simple, intersphincteric anal fistulas
2. The bioprosthetic anal fistula plug should only be used in mature fistula tracts without any acute inflammation or purulence.
3. Irrigation of the fistula tract with hydrogen peroxide is acceptable but betadine should be avoided.
4. Debridement of the fistula tract is acceptable but care must be taken to avoid any enlargement of the fistula tract.
5. The anal fistula plug should be placed into the primary, internal fistula opening and securely sutured into the fistula tract with an absorbable suture that includes the internal sphincter. Extrusion of the bioprosthetic anal fistula plug within the first week should be considered a failure of technique.
6. The distal end of the bioprosthetic anal fistula plug should not be sutured at the secondary, external fistula opening. It is essential that the external fistula opening be patent to allow drainage from the distal fistula tract.
7. Postoperatively, avoidance of straining is imperative for a period of 2 weeks. Stool softeners should be administered and the patient instructed to refrain for sexual intercourse or any strenuous activity.
8. It may take up to 12 weeks for the fistula tract to close. It is not uncommon for the fistula tract to temporarily close but re-open to drain serous fluid. The bioprosthettic plug should not be considered a failure before 12 weeks unless the bioprosthetic is extruded or there is recurrent anorectal sepsis.
Figure 1: Algorithm for the management of anal fistulas.

Fistula-in-ano

“Complex”

Yes

Informed Consent

Fistulotomy/Cutting seton

No

Healing

Draining seton

Anal Fistula Plug

LIFT/BioLIFT

Follow-up

Healing

Recurrence

Follow-up

Recurrence

Informed Consent

Draining seton

Repeat BioLIFT

Advancement Flap

Cutting Seton

Healing

Recurrence

Healing

Follow-up

Cutting Seton

Follow-up