ANAL ABSCESSES AND FISTULAS

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Anal abscesses and fistulas are a common part of surgical practice. Most abscesses simply need to be drained and most fistulas can be safely laid open. Excessive probing should not be attempted when draining abscesses as this may lead to iatrogenic fistulas. A small percentage of fistulas are complex and very challenging to manage. Management involves an accurate diagnosis and a balance between eradication of the fistula and maintenance of continence. A decision should be made, based on clinical evaluation and anal ultrasound (if available), whether the fistula can be laid open. If it cannot be laid open, a loose seton is placed and the sepsis is allowed to settle. Once the sepsis is quiescent, a definitive repair can be attempted. There are various techniques available including rectal advancement flap, fibrin glue and cutaneous flaps all of which are discussed.

Key words: anal fistula, peri-anal abscess.

Abbreviations: AIN, anal intraepithelial neoplasia; ATZ, anal transitional zone; ES, external sphincter; EUA, examination under anaesthetic; EUS, endo-anal ultrasound; IS, internal sphincter; MRI, magnetic resonance imaging; PPV, positive predictive value; RAF, rectal advancement flap; RCT, randomized controlled trial.

INTRODUCTION

Anal abscesses and fistulas are a common surgical condition. Management of the majority of anal abscesses and fistulas is straightforward and is based on a sound knowledge of the anatomy of the anorectum and adherence to established surgical principles. A small percentage of anal abscesses and fistulas are complex and very challenging to manage surgically. The joint aims of maintaining perfect continence and curing the fistula are often difficult to achieve.

ANATOMY

An understanding of the anatomy of the anal canal is essential for the appropriate management of anal fistulas. The external sphincter (ES) is a continuation of the pelvic floor musculature. The internal sphincter (IS) is a continuation of the inner circular muscle layer of the lower rectum (Fig. 1). These muscle layers are easily appreciated on endo-anal ultrasound (EUS). The IS appears as a hypo-echoic ring. The ES is identified by first identifying the puborectalis sling at the anorectal junction. This is hyper-echoic and U-shaped. Below this the ES commences when the open end of the U begins to close to form a complete ring of muscle.1–4

The mucocutaneous junction is the site of the dentate line (the term pectinate line should be discarded).5 The epithelium of the anal canal is mucosa above the dentate line and stratified non-keratinized squamous epithelium below. The dentate line is the site of the anal valves. Proximal to each anal valve is an anal crypt or sinus, which macroscopically appears as a small pit. The anal glands, which lie in the intersphincteric plane, empty into these anal crypts. For a distance of 5–20 mm (varying with age) above the dentate line, the mucosa is cuboidal and is known as the anal transitional zone (ATZ).6,7 This area is thought to be important for discrimination between flatus and faeces. Above the ATZ, the mucosa becomes columnar with typical goblet mucus secreting cells.

AETIOLOGY

The cryptoglandular theory of Eisenhammer and Parks is now widely accepted, although there have been very few subsequent studies to confirm or refute it. Eisenhammer proposed that an intramuscular anal gland became infected and because of subsequent infective obstruction of its connecting duct, it was unable to drain spontaneously into the anal canal.8 Parks found cystic dilatation of anal glands in eight of 30 consecutive cases of anal fistula. He attributes this to either acquired duct dilatation or a congenital abnormality and suggested that it was a precursor to infection within a mucin-filled cavity.9 Infection begins in the intersphincteric plane. If it tracks downwards in the intersphincteric plane, a perianal abscess forms. If it tracks upwards in the intersphincteric plane, a high intersphincteric abscess or supralevator abscess might form. Sepsis that tracks across the ES will result in an ischio-rectal abscess. If this then extends upwards across the levator plate, it may form a supralever abscess (Fig. 2). Horseshoe abscesses form from circumferential spread. This is most common in the ischiorectal plane, but can occur in the perianal and supralever planes.10

It has been suggested that most ‘high’ anal fistulas and most degrees of incontinence represent iatrogenic and therefore avoidable complications of abscess or fistula surgery.11

CLASSIFICATION

Initial classifications were made by Milligan and Morgan,12 Steltzner,13 Goligher,14 and Eisenhammer15. These were refined by Parks et al. and his classification – intersphincteric, trans-sphincteric, supra-sphincteric and extra-sphincteric (Fig. 3) – is now the most widely used and taught.16 Extensions (secondary tracks) might occur in the intersphincteric plane, the ischiorectal fossa and the pararectal (supralever) space.
There are limitations to Parks’ classification. Superficial fistulas are not classified because of the emphasis on the intersphincteric plane. These are common and make up around 16% of one series.\textsuperscript{17} The lowermost fibres of the ES curve in under the distal edge of the IS and on EUS the lower third of the anal canal has no IS. In the author’s experience, true intersphincteric fistulas, as classified by Parks, do not occur. Even very low fistulas cross some of these lowest fibres of the external sphincter and are, hence, trans-sphincteric.

The best treatment for an anal fistula is to lay it open. Obviously if this involves cutting a large amount of anal sphincter this will cause incontinence. Bennett in 1962 said: 'It is poor consolation for the fastidious patient who, after 17 weeks off work for treatment of his horseshoe fistula, finds that his underclothes are stained brown instead of yellow, even though his fistula is healed'.\textsuperscript{18}

A more clinically useful classification is whether or not a fistula can be laid open. This would be based on clinical and EUS findings and depends not just on the type of fistula, but also the sex of the patient and the extent of any pre-existing sphincter abnormalities.
ANORECTAL ABSCESS

Presentation of anorectal abscesses

Anorectal abscesses usually present with local pain and swelling. Presenting features vary depending on the site of the abscess and some patients may present simply with a pyrexia of unknown origin. Abscesses can be classified as perianal, ischiorectal, intersphincteric, or suprarelevator (Fig. 4).

Perianal abscesses usually present with a tense, tender erythematous swelling of short duration without any systemic signs of toxicity. Ischiorectal abscesses often have a long history of throbbing pain and can be associated with systemic toxicity. Intersphincteric abscess presents with severe rectal pain and can be mistaken for an anal fissure on history. There is often associated pyrexia (which should not occur in a simple fissure). Digital rectal examination is extremely painful but might reveal a tender nodule towards the upper end of the anal canal. A suprarelevator abscess presents with pelvic pain and constitutional symptoms. It might represent a true pelvic abscess from intra-abdominal pathology or an intersphincteric or ischiorectal abscess that has tracked upwards. Digital rectal examination may reveal a boggy tender swelling in the rectum.19

Management of anorectal abscesses

Abscesses require surgical drainage under general anaesthesia. An intersphincteric abscess is readily identifiable on EUS and can usually be drained endo-anally by excising a small disc of internal sphincter directly over the abscess. A suprarelevator abscess that is an extension in the intersphincteric plane can often be drained by opening into the intersphincteric plane in the upper anal canal and then dissecting in the intersphincteric plane up to the abscess. The abscess can be drained via this track and a small mushroom tipped catheter (de pezzer) can be left in the cavity for 3–4 days to prevent recurrence.

Perianal and ischiorectal abscesses are much more accessible and easy to drain. A suprarelevator extension of an ischiorectal abscess can be drained through the ischiorectal fossa. Whether an internal opening should be sought for at the time of draining an anorectal abscess is a source of debate. The prevalence of anal fistula formation ranges from 5 to 83%.20–23 Subsequent fistula formation is more likely with a perianal abscess than an ischiorectal abscess or if the abscess is complicated, e.g., horseshoe abscess.22,24

There have been six randomized clinical trials (RCT)23,25–29 comparing immediate and delayed treatment of associated fistula tracks. The first five of these were subjected to a crude meta-analysis. The findings were that if the fistula track is not sought out and treated when the abscess is drained, patients are 13 times (5.4–47 95%CI) more likely to have persistent problems with sepsis. However, if the track is sought out and treated there is an increased incidence of incontinence (odds ratio 0.36 (0.13–0.93).30

The sixth and most recent trial includes 100 patients in each arm of the study.23 In this series an anal fistula was identified in 83% of the group of patients where it was sought and treated (group A). In the group of patients where only drainage of the abscess was performed (group B), 29% went on to develop fistulas. In groups A and B the overall incontinence rate at 1 year was 6 and 0%, respectively. The conclusion of the paper was that ‘drainage of anal abscess with fistulotomy can be safely performed in cases of subcutaneous, intersphincteric, or low transsphincteric fistulas with minimal recurrence’. However, if the raw data is re-analysed, patients in group A were 2.8 times more likely to have a fistula (relative risk 2.8 (2.1–3.9 95% CI), P < 0.0001) and infinitely more likely to have continence problems (relative risk = infinity, P = 0.03). The obvious interpretation is that fistulas are present in the majority of cases of anorectal abscess formation, but that many resolve spontaneously such that aggressive early identification and treatment may be unnecessary and lead to poorer outcomes.

Fig. 3. Parks classification.
A reasonable approach is to inspect the anal canal with a suitable retractor before the abscess is drained. If moderate pressure on the abscess leads to obvious extrusion of pus into the anal canal at a readily identifiable internal opening, the abscess can be drained and a Seton placed along the fistula track. It is always safer to place a Seton in the track rather than lay open the track, as the extent of sphincter involvement is difficult to define in the presence of acute inflammation. If there is no obvious internal opening with this simple manoeuvre, the abscess should simply be drained with an incision parallel with the anal canal (less likely to cut through the lowermost fibres of the ES). No attempt should be made to look for a fistula with probes. In reality, inexperienced surgeons often perform this operation. Therefore, it should be kept as simple as possible. It is the author’s practice to use a 20–30 mm incision only, break down the loculations digitally and place a de Pezzer catheter into the cavity. The drain is left until there is minimal purulent drainage, which may vary from a few days to several weeks.

**ASSESSMENT OF ANAL FISTULA**

In 1900 Goodsall and Miles outlined five essential points in the assessment of fistulas. The principles remain unchanged.

- The location of the internal opening (a fistula can never be eradicated if this is not identified)
- The location of the external opening
- The course of the primary track
- The presence of secondary extensions
- The presence of other diseases complicating the fistula

**Clinical assessment**

In reality, the prevalence of fistula formation after drainage of an anorectal abscess is around 30%. Persistent drainage from the drainage site and/or recurrent abscess formation are usual indications that a fistula is present. The external opening is usually clear and is at the site of previous drainage or at the site of spontaneous drainage. The fistula track can often be felt between finger and thumb when performing digital rectal examination. Any clinical abnormalities of the anal sphincter, such as poor resting and/or squeeze tone and deficiencies from obstetric or iatrogenic trauma should be noted. No attempt should be made to pass probes in an awake patient as it is very unpleasant and might create false tracks. If there is no abscess formation requiring drainage, further assessment either by EUS or examination under anaesthetic (EUA) depending on available facilities is recommended.

Goodsall and Miles’ so-called ‘rule’ states that fistulas with an external opening lying above a horizontal line drawn through the centre of the anal canal, with the patient in lithotomy position, usually drain directly into the anal canal. Fistulas lying below this horizontal line usually drain to the midline posteriorly. Like all rules, there are exceptions. Cirocco and Reilly put the rule to the test in 1992. They reported a predictive accuracy of 90% for posterior fistulas, but only 49% of anterior fistulas obeyed the rule. Conversely, Gunawardhana and Deen, when comparing hydrogen peroxide installation with Goodsall’s rule, found a predictive accuracy for posterior and anterior fistulas of 41 and 72%, respectively.

Differential diagnoses should be considered in every case. Hidradenitis suppurativa, tuberculosis, Bartholin’s abscess, actinomycosis, anal fissure, ulceration associated with Crohn’s disease, sexually transmitted diseases, and a low pilonidal sinus are all possible differential diagnoses. A more important distinction is the differentiation between a chronic abscess and a perirectal dermoid cyst or a sacrococcygeal teratoma. If these lesions are inadvertently opened total excision may prove difficult and a sacrococcygeal fistula might develop, which is often impossible to eradicate.

**Imaging**

In practice, most low fistulas do not require imaging. Assessment and management is based on clinical evaluation and the findings at EUA. In the current medico-legal environment an objective assessment of the extent of muscle involved in a fistula is helpful prior to laying it open. How this is done depends on the local
availability of imaging techniques. It is the author’s practice to perform an EUS on all anal fistulas. This is performed either in theatre under general anaesthesia or in the clinic without sedation.

Endo-anal ultrasound
There are three criteria for identification of the internal opening on EUS: (i) contact of the internal sphincter by the intersphincteric track (positive predictive value (PPV) of 80%); (ii) an apparent defect of the internal sphincter (PPV 79%); and (iii) a defined subepithelial track associated with a localized sphincter defect (PPV 94%).35

The overall sensitivity using all three of these signs is 94% with a specificity of 87% and a PPV of 81%. The gas reflections from hydrogen peroxide highlight the track and may help to locate the site of the internal opening.36–40

Gold et al. studied interobserver and intraobserver agreement in assessing the anal sphincter and found interobserver agreement to be very good (kappa = 0.84).41 Conversely, Robinson described error and variation in image interpretation as the Achilles’ heel of radiology. The human eye and brain have failed to keep up with technological advances.42

One of the limitations of EUS is the difficulty distinguishing recrudescent sepsis from burnt-out fibrotic tracks in complicated disease.

Magnetic resonance imaging
The advantages of magnetic resonance imaging (MRI) include multiplanar imaging and high soft-tissue differentiation to show the track system in relation to underlying anatomy in a projection relevant to surgical exploration.43 The accuracy of MRI has been confirmed by comparison with surgery.44–47 It is especially helpful in assessing complex fistulas secondary to Crohn’s disease.48,49

Fistulography
Fistulography is certainly not the first line investigation. False positive results for rectal openings and high extensions have been reported40 and might lead to inappropriate surgery. Fistulography is an inaccurate, unreliable and possibly harmful procedure.51 Chronic tracks may be patent, but many acute tracks are actually just columns of inflamed granulation tissue without a patent lumen. Contrast injection therefore may show only part of the track system.43 Nevertheless, for complex fistulas, particularly those where repeated examination under anaesthesia has been unsuccessful in defining the course of the track, fistulography may be helpful in combination with either MRI and/or EUS.

Other investigations
Manometry
Manometry does not need to be done routinely, but might be helpful on occasions to objectively assess sphincter function if a decision is being made as to whether or not to lay open a fistula. If the resting pressure appears abnormal clinically, manometry may be used to confirm this clinical impression.

Examination under anaesthesia
If only an assessment is planned it is often more helpful to perform the examination under light general anaesthetic without muscle relaxation. If a definitive procedure is planned based on EUS or previous EUA, muscle relaxation may be used. Usually the lithotomy position is adequate. (For a rectal advancement flap on an anterior fistula the prone position should be used.) Careful palpation will usually identify induration along the fistula track. Pressure over the indurated area might lead to extrusion of pus through the internal opening. Traction on the external opening sometimes defines the internal opening.

A probe can be inserted through the external opening (prograde passage).34 Most often, this probe will easily pass along the track through the internal opening into the anal canal. A soft blunt-ended probe should be used. (Lockhart-Mummery fistula probes should probably be avoided as their tips are sharp.) A probe passed progradely that follows a course parallel to the anal canal is either in a secondary track from a transphincteric fistula or a long intersphincteric fistula. Hydrogen peroxide can be inserted via the external opening to identify the internal opening.37,52 Probes with curves of varying degrees can be used to identify the internal opening. Anal crypts can be mistaken for false passages.

After full assessment it is the author’s practice to either lay open the fistula or place a Seton and then re-assess after 2–3 months. At this time the fistula may now be able to be laid open or a rectal advancement flap can be performed.

When can a fistula be laid open?
The best treatment, in terms of absolute cure, is to lay open the fistula. It is usually clear that a very high fistula should not be laid open and that a very low fistula can be laid open without any functional sequelae. The low and mid trans-sphincteric fistulas cause the most concern and difficulty in deciding whether to lay open or to place a Seton. In doubt, always place a loose Seton, especially if a full discussion with the patient regarding possible complications of muscle division has not taken place.

As a general rule of thumb, a fistula can be laid open if it encompasses half of the external sphincter bulk posteriorly in a man, one third of the sphincter bulk anteriorly in a man, one third of the sphincter bulk posteriorly in a woman and never anteriorly in a woman. However, this decision needs to be individualized based on the condition of the sphincter. This will be affected by previous obstetric trauma, previous perianal operations (e.g., lateral sphincterotomy) and congenital abnormalities. It is essential to enquire regarding the above when taking the history.

‘Lay open’ technique (fistulotomy)
The majority of anal fistulas are successfully treated by this technique with little in the way of disturbed continence, however, this risk should be discussed with every patient. The lithotomy position is adequate to simply lay open a fistula. A Parks anal or Hill-Ferguson retractor is used to visualize the anal canal. The track is defined with a blunt ended probe. The tissue overlying the probe...
is divided along its entire length. The granulation tissue along the track is curetted. Any overhanging edges of skin can be excised with diathermy. Haemostasis is achieved with diathermy. Any extra tracks or undrained collections should also be opened. The wound is packed loosely with saline soaked gauze and this is removed when the patient washes the next day. Further packing is usually painful and mostly unnecessary. Recurrence after this technique ranges in the literature from 0 to 9% and disturbance in continence varies from 0 to 33%.17,21,24,54–59

**Seton**

The term seton is derived from the Latin word *seta* meaning bristle. Setons may be loose or cutting. Thin silastic tubing (‘vessel loop’) is commonly used. Another option is monofilament nonabsorbable nylon suture. When a loose seton is placed it is better to tie the ends of the seton parallel to each other with heavy silk (Fig. 5). When the seton is tied to itself, the knot is bulky and unpleasant for the patient. Some surgeons will lay open the lateral suture (3/0 PDS) encompassing the internal sphincter in the flap and the internal sphincter of the remaining anal canal. There is no need to do anything to the external opening; however, a small drain (infant feeding tube) should be placed through the external opening to lie underneath the flap and should be removed after 2–3 days.

Fig. 5. Loose seton.

Occasionally, when a seton has been present for 2–3 months, it may be apparent that the fistula can be safely laid open. It has been suggested that this is because of fibrosis associated with the fistula.60 This may not be necessary, as eventual eradication of the fistula depends only on elimination of the internal opening. It is the author’s practice to simply place the seton along the track. At the time of placement, any extra tracks or undrained cavities can be drained with a de pezzer catheter, which is left in place for a few days or weeks.

Patients are given a full bowel preparation prior to the procedure. For anterior fistulas the prone jack-knife position is used. For posterior and lateral fistulas lithotomy is adequate. First the flap is marked out with diathermy. It commences 5–10 mm below the internal opening and around 10–15 mm either side of the internal opening. The intersphincteric plane is infiltrated with a 1:400 000 solution of adrenaline. Mobilization should begin laterally away from the track on either side where the planes are virginal. The intersphincteric plane is identified and only then is the dissection continued towards the track. The flap should be raised proximally to the low rectum and should be under no tension when sutured. The portion of the flap containing the internal opening is excised and the flap is secured with sutures (3/0 PDS) encompassing the internal sphincter in the flap and the internal sphincter of the remaining anal canal. There is no need to do anything to the external opening; however, a small drain (infant feeding tube) should be placed through the external opening to lie underneath the flap and should be removed after 2–3 days.

The success rate for RAF varies in the literature from 29 to 95%.65–75 A realistic estimate of success rate from more recent series is 60–70%.74,78 In a recent series from the Cleveland Clinic, USA the overall primary success rate was 64%. When patients with Crohn’s disease were excluded, the success rate rose to 77%. As would be expected, the success rate decreases with each successive attempt.65,75 It is possible that the success rate might be improved if RAF is combined with application of fibrin glue to the track and the bed of the flap.

The functional results after RAF appear good. Finan et al.66 and Kreis et al.77 report no change in anal manometry or rectal compliance. Most papers report no deterioration in continence,65,71–73,76 however, Mizrahi et al.78 report a 9% incidence of deterioration in continence. Schouten et al.75 report that of 26 patients with normal continence preoperatively, 38% reported flatus incontinence and 12% faecal incontinence.

**Advancement flap**

An advancement flap should be considered if a fistula cannot be laid open. It should only be done when all signs of acute sepsis have settled.64 The term ‘mucosal advancement flap’ is a misnomer, as the flap is raised in the intersphincteric plane and includes both mucosa and IS. It is better described as ‘rectal advancement flap’ (RAF).

Fibrin glue treatment of anal fistulas has increased recently in Australia with the release of an easy to use product, although anecdotal results have not been encouraging.
Other options
Cutaneous flaps (island flap or V-Y flap), which involve mobilization of skin from the anal verge and transposition of this into the anal canal, have been described with good results. This is surprising, given that biomechanically the forces of defecation are directed to dislodging the flap rather than compressing it, as is the case with RAF. This technique should be considered in fistulas with a very low internal opening, which cannot be laid open and a RAF would leave mucosa outside the anal canal.

Cutting setons are still used by some, but lead to a keyhole deformity in the anal canal; they are poorly tolerated because of pain and are associated with high rates of incontinence. Chemical setons utilizing ayurvedic medicated thread (Kshara sutra) are described in the Indian literature. This is a variation of the cutting seton and involves a seton soaked in a caustic solution of three herbs. The method of action is unknown, but alkaline pH is critical. The herbs possess anti-inflammatory, antibacterial, and wound-healing properties. In a randomized trial comparing this method with conventional methods involving 500 patients, chemical setons obtained better results than conventional methods (recurrence 4% vs 11%, \( P = 0.03 \)).

A Martius flap involves mobilization of the fibro-fatty pad in the labia. This can be used in recto-vaginal fistula to fill the defect after mobilization of both rectum and vagina on either side of the fistula.

Long-term setons are very well tolerated and often used in Crohn’s disease and recurrent fistulas.

EXTRA-SPHINCTERIC FISTULAS
The primary pathology in a true extra-sphincteric fistula is infra-abdominal. Common causes are diverticular disease, enteric Crohn’s disease, malignancy and radiation damage to the bowel. An abdominal approach is required.

FISTULAS ASSOCIATED WITH CROHN’S DISEASE
Full discussion of this topic is beyond the scope of the present article. Usually a long-term seton is the safest option. This reduces perianal drainage and pain without damaging the sphincter and minimizes the risk of future abscesses arising from the fistula track. In the presence of active proctitis, any definitive surgery is very unlikely to be successful. Without proctitis, definitive surgery (laying open low fistulas, RAF for high fistulas) can be attempted. Success rates will still be lower than in patients without Crohn’s disease.

Infliximab is a murine chimeric monoclonal antibody against tumour necrosis factor-\( \alpha \). It is the only medical treatment proven to lead to a reduction in the number of perianal fistulas in patients with Crohn’s disease. However, in practice, recurrence after cessation is common. There is emerging evidence that in patients with setons in place who are undertaking a course of Infliximab for enteric Crohn’s disease, it may be worthwhile to simply remove the seton during the second course of Infliximab treatment.

ANORECTAL SEPSIS IN HIV
As a general principle, anorectal sepsis in an HIV positive patient should be treated along the same principles as anorectal sepsis in Crohn’s disease. Any tissue that is removed should be submitted to histological analysis as the prevalence of anal intraepithelial neoplasia (AIN) is high in this situation.

IF NOTHING IS WORKING
It might be appropriate to place a loose seton and plan to leave this in long-term. These are surprisingly well tolerated. Consider a pelvic cause for the fistula. Is it, in fact, an extra-sphincteric fistula? Perform an abdomino-pelvic computed tomography scan and a fistulogram. Is it not a fistula, but something very uncommon such as an infected epidermoid cyst?

SUMMARY
Most abscesses simply need to be drained and most fistulas can be safely laid open. An understanding of the anatomy of the anal canal and the aetiology of peri-anal abscesses and anal fistulas is essential. Abscesses require surgical drainage under general anaesthesia. Intersphincteric and supralevator abscesses may be difficult to identify clinically. Anal ultrasound or MRI can be used in these situations depending on local availability and expertise. When an abscess is drained no attempt should be made to probe the cavity as this can lead to iatrogenic fistulas. If an associated fistula is obvious even without probing a seton should be placed and left until the sepsis and associated inflammation and swelling has settled.

It is usually clinically evident with very low and very high fistulas whether or not laying open is appropriate. Laying open a fistula is the most successful method of treatment and in most situations this can be done safely without any disturbance of continence. In ‘mid level’ fistulas radiological assessment (usually with anal ultrasound) complements clinical examination and an objective assessment of the extent of sphincter involvement can be made. If it is not appropriate to lay open the fistula, another form of definitive repair will be required. A rectal advancement flap is a reasonable approach in this situation. The success rate for this technique is around 60–70% and functional results are good. If it fails it can be repeated, albeit with a lower success rate. When multiple attempts at repair have failed a long-term seton may be the best option.

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