Management of anal fistula

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Anal fistula is part of the spectrum of perianal sepsis. It is a chronic condition that may present de novo or after an acute anorectal abscess. Anal fistula causes a variety of prolonged or intermittent symptoms including pain, discharge, and social embarrassment.

The goals of management are to eradicate the fistula and prevent recurrence while maintaining continence. Simple anal fistula may be easy to treat, but complex cases may require several procedures over months (or years). In some cases, treatment may result in a stoma formation or incontinence, which has a profound effect on the patient’s quality of life.

This article aims to provide a pragmatic overview of this often poorly understood condition and enable primary care doctors and other non-specialists to appreciate the common management pathways that their patients might experience.

What is an anal fistula?
A fistula is defined as an abnormal communication between two epithelial surfaces. Anal fistula is a communication between the anorectal canal and the perianal skin that is lined with granulation tissue. It may be useful to consider it as a tunnel during discussions with patients. The fistula may harbour chronic infection, which may discharge continuously or intermittently through the opening onto the skin. Intermittent discharge is usually caused by cyclical accumulation of an abscess with associated discomfort and pain before some relief from discharge, which is followed by further accumulation. In the most severe cases, faecal material may also pass through the tunnel and cause soiling of underwear and skin irritation.

Who gets anal fistula?
The prevalence of anal fistula is 1-2 per 10 000 of the population in European studies, but this is probably an underestimate, with many patients being reluctant to present to medical services. The reported incidence in England is 18.4 per 100 000 per year. Men are twice as likely to be affected, and it most commonly presents in the third, fourth, and fifth decades, with a peak around 40 years of age.

SUMMARY POINTS
A high index of suspicion of anal fistula is needed when examining patients with a perianal abscess or sepsis
All fistulas consist of a primary track but may also have secondary extensions
Complex fistulas need careful assessment and investigation; many months of treatment and several procedures may be needed before resolution
Some patients are best treated with a seton alone
Counsel patients who consent to surgery of the anal sphincter about possible post-procedural incontinence

SOURCE AND SELECTION CRITERIA
We searched PubMed and the Cochrane Library for clinically relevant studies using the search terms anal fistula and perianal sepsis. We consulted guidelines from the National Institute for Health and Clinical Excellence, in addition to both the Association of Surgeons of Great Britain and Ireland and the Association of Coloproctology clinical guidance.

How do anorectal fistulas develop?
Most (~90%) in most case series) anal fistulas are idiopathic. Infection of glands in the intersphincteric space of the anal canal is thought to underlie both acute anorectal abscesses and anal fistulas (fig 1)—the “cryptoglandular hypothesis.” The exact cause or mechanism of infection has not been fully elucidated, but it spreads through pathways of least resistance, and in so doing creates a track that persists thereafter. Hence, a common presentation is an acute abscess that fails to heal after surgical drainage or recurs at the same site. It is not clear why certain cases of perianal sepsis are limited to abscess formation whereas others are associated with fistula formation. It is widely accepted that adequate surgical drainage is the optimal treatment for acute abscesses and that antibiotics are indicated only for treatment of surrounding cellulitis.

A recent review of perianal abscess and fistula quotes a fistula formation rate of 26-37% after perianal abscess.

Microbiological culture of pus from an adequately drained abscess may help to predict fistula formation. Small case series have shown that the abscess is unlikely to recur or develop into a fistula if only skin organisms are grown (0-30% of cases in most studies). When gut organisms are cultured, most studies have shown that 80% or more abscesses have an underlying fistula.

Some cases of anal fistula will be associated with other condition such as Crohn’s disease, tuberculosis, hidradenitis suppurativa, and previous surgery or radiotherapy. Cancer may present as a fistula or arise within a

Fig 1 | Anatomy of the anal canal and the cryptoglandular hypothesis of the development of an intersphincteric fistula
chronic complex fistula. Fistula arising from anorectal or obstetric trauma may be prevented if the wound is carefully debrided and repaired at the time of injury. Doctors need to be aware of the potential for underlying disease because the management approach will differ depending on the underlying cause.

**How are fistulas classified?**
Classification and successful management of anal fistula require expert knowledge of anorectal anatomy. A variety of classification systems have been described, but the most useful and widely accepted classification is that described by Parks (fig 2). This classification system is based on the relation between the primary track—the main tunnel that constitutes the fistula—and the sphincter muscles around the anal canal. In simple terms, consider the sphincters as two rings of muscle, with the inner ring termed the internal sphincter and the outer one the external sphincter.

**What are the different types of anal fistula?**
**Low versus high**
For the non-specialist, the key distinction is whether the primary track is “low” or “high.” In a low fistula the track passes through few or no sphincter muscle fibres and is relatively close to the skin. Examples include superficial fistulas, low intersphincteric fistulas, and low transsphincteric fistulas (fig 2). In the absence of complicating factors or underlying conditions these fistulas may be relatively easy to manage, because laying open and healing by secondary intention (fistulotomy) may pose little threat to continence. However, there is considerable debate among colorectal surgeons as to whether it is appropriate to divide any sphincter muscle at all (see below).

A high fistula describes a track that passes through or above a large amount of muscle; its route may be more complicated and further away from the skin. Examples include high intersphincteric fistulas, high trans-sphincteric fistulas, supra sphincteric fistulas, and extrasphincteric fistulas (fig 2). Laying open of such fistulas would damage considerable amounts of sphincter muscle and result in impaired bowel control. These fistulas are therefore also considered complex.

**Simple versus complex**
After considering whether a fistula track is high or low, additional complexity arises from the presence of secondary tracks or residual abscess cavities (fig 3). These may be explained to patients as branches or caverns off the main tunnel. Examples of such complexity include secondary tracks and cavities that extend above the levator muscles, supralevator or suprasphincteric extensions, those that extend in an almost circumferential manner around the anal canal—so called horseshoe extensions. Successful management of anal fistula requires that all secondary tracks and extensions are drained and eradicated before or at the same time as attempting definitive treatment of the primary track.

**Conditions associated with anal fistula**
- Crohn’s disease
- Tuberculosis
- Pilonidal disease
- Hidradenitis suppurativa
- HIV infection
- Trauma
- Foreign bodies
- Previous surgery (including ileoanal pouch surgery)
- Radiotherapy
- Bridging of an anal fissure
- Lymphogranuloma venereum
- Presacral dermoid cysts
- Sacrococcygeal teratoma
- Rectal duplication
- Perianal actinomycosis

![Fig 2](image-url) Parks’s classification of anal fistula. (A) A superficial fistula track beneath the internal and external anal sphincters. (B) An intersphincteric fistula track between the internal and external anal sphincter muscles in the intersphincteric space. (C) A trans-sphincteric fistula track crossing both the external and internal anal sphincters. (D) A suprasphincteric fistula travels outside the internal and external sphincters over the top of the puborectalis muscle and penetrates the levator muscle before tracking down to the skin. (E) An extrasphincteric fistula tracks outside the external anal sphincter and penetrates the levator muscle into the rectum.

![Fig 3](image-url) Diagram of the anal canal showing external openings and Goodsall’s rule. The rule states that fistulas with an external opening anterior to a plane passing transversely through the centre of the anus will follow a straight radial course to the dentate line. Fistulas with openings posterior to this line will follow a curved course to the posterior midline. Exceptions to this rule are external openings more than 3 cm from the anal verge. These almost always originate as a primary or secondary tract from the posterior midline, consistent with a previous horseshoe abscess.
Conditions such as Crohn’s disease, previous surgery or radiotherapy, and cancer also make the management of anal fistula more complicated, as does pre-existing impairment of continence. Thus a fistula with a low primary track may also be complex and difficult to treat if secondary tracks are present, specific disease underlies the fistula, or the sphincters have previously been damaged.

**How are anal fistulas assessed?**

**Primary care**

Anal fistula should be part of the differential diagnosis in any patient presenting with chronic or recurrent perianal pain, lump, or discharge. Recurrent abscesses or failure of healing at an incision and drainage site often indicates the presence of anal fistula. Ask about previous perianal sepsis, surgery or radiotherapy, trauma (obstetric or otherwise), and associated conditions (see box). Determine the patient’s baseline level of continence.

Abdominal examination will often be normal but is necessary to exclude obvious intra-abdominal pathology. Document any external openings, tracks, or internal openings. An external opening may appear as a simple pit in the skin or may be obviously discharging, with or without a surrounding rim of raised granulation tissue. Some external openings are within the scar of a previous abscess. Recurrent swelling and pain under such a scar indicate an underlying fistula, even if an obvious opening or frank discharge is not evident. It is conventional to describe external openings by their distance from the anal verge and by their position on a clock face, with the anterior midline as 12 o’clock (fig 3). Palpation of the perianal area with a lubricated finger may discern a palpable track that feels like a cord-like structure below the skin, indicating that the fistula is more likely to be “low.” A digital rectal examination with the tip of the finger in the anal canal may detect indentation or induration, often described as “a grain of rice,” associated with the internal opening. Digital examination higher up may also show bogginess or induration associated with chronic sepsis. Such patients should be referred for further assessment and evaluation to a specialist colorectal outpatient clinic.

**Secondary care**

**Assessment**

A full history and examination (including proctosigmoidoscopy) are fundamental to assessment. The aim of assessment is to determine the site and number of external and internal openings, the anatomy of primary and secondary tracks in relation to the sphincter muscles, and the exclusion of other conditions (such as Crohn’s disease). Careful inspection and examination of the perianal skin and digital rectal examination provide a considerable amount of this information. The position of an external opening also guides the surgeon, because those less than 2–3 cm away from the anal verge are often associated with lower tracks than those further away.3

Goodsall’s rule, much beloved by surgical examiners, states that external openings posterior to a line drawn from 9 o’clock to 3 o’clock should have a track that follows a course to the posterior midline. External openings anterior to this line should run directly radially to the anal canal. However, this rule is often unreliable in anterior fistulas and those with underlying disease.

The anatomy of the anal fistula can be further characterised by examination under anaesthesia. This allows a more thorough assessment of openings, and tracks may be probed or injected with agents such as hydrogen peroxide to define the anatomy of the fistula more accurately. Make it clear to patients that this procedure is part of their investigation. A simple fistula may be treated definitively at the time of examination, but in complex cases, although the insertion of a seton (see below) may be the first step of management, further investigations and procedures are usually necessary.

**Imaging**

Numerous non-randomised comparative studies have shown that endoanal ultrasound and magnetic resonance imaging (MRI) improve the characterisation of fistula anatomy and are the most useful imaging techniques in complex cases.10 Anal ultrasound is cheaper but operator dependent, provides anatomical detail of the tracks and the sphincters, and can be used intraoperatively to give surgeons more information at the time of examination with anaesthesia. Accuracy can be improved by injection of hydrogen peroxide into fistula tracks. However, ultrasound has a limited field of view (about 2 cm from the anal probe) and is poor at evaluating pathology beyond the sphincters (both laterally and above).

MRI is considered the “gold standard” for imaging fistula anatomy. It provides excellent soft tissue resolution in multiple planes without the need for ionising radiation. It is indicated for all recurrent fistulas and primary fistulas that appear to be complex after examination under anaesthesia or endoanal ultrasound. Unfortunately, some patients have implants that preclude MRI or they find the procedure intolerable. In these cases, thin slice spiral computed tomography may be useful and may also be informative if abdominal or pelvic sources of sepsis are suspected; its value is otherwise limited. Similarly, fistulography has been superseded by endoanal ultrasound and MRI, and its role is limited to cases where an extraspincteric track is suspected. A recent meta-analysis of four studies confirmed that endoanal ultrasound and MRI had similar...
Anal manometry measures pressures within the anal canal and allows objective assessment of sphincter function. It is particularly useful in patients with compromised continence or those at risk, such as patients with previous sphincter surgery or injury.

**What are the management options for anal fistulas?**

A range of treatment options are available, but none is universally successful or without risk. Key principles for the management of anal fistula are described by the acronym SNAP, which stands for sepsis, nutrition, anatomy, and procedure. Eradication of sepsis is the first step—a fistula will not heal while infection is present. As with wound healing in general, anal fistulas heal poorly in malnourished patients. Fistula openings and therefore the underlying track anatomy are not always clear, and failure to recognise secondary tracks may lead to treatment failure. Selection of the appropriate procedure is key to successful management.

Anal fistulas will not heal without intervention, and failure to treat may lead to progression of the disease process. If left untreated, anal fistulas are at risk of recurrent formation of a perianal abscess interspersed with partial healing of the fistula track. This can become a chronic septic focus with the establishment of a complex fistula network. The consequences for the patient may include pain, bleeding, incontinence, cellulitis, and systemic sepsis.

**Seton**

A seton is a simple thread placed through the anal fistula track and tied to form a continuous ring between the internal and external openings (figs 4 and 5). The primary application is in high trans-sphincteric fistula, where division of greater than one third of the anal sphincter muscle risks incontinence. Setons maintain patency of the fistula track, allow drainage, and prevent the development of perianal sepsis. The thread is usually a non-absorbable suture or vascular sling. The placement of a draining seton is usually the first step in treating a complex fistula. It reduces inflammation, allowing the establishment of a well formed track and defining the anatomy of the fistula. Secondary treatment will be required to close the track.

A subsequent option for trans-sphincteric fistulas is the use of a cutting seton. This involves regular tightening of the seton to encourage gradual cutting through of the sphincteric muscle with associated inflammation followed by fibrosis. This process aims to resolve the fistula without allowing the muscle to spring apart, thereby maintaining continence. However, high rates of functional disturbance have been reported: a prospective study that examined the use of a slow cutting seton for the treatment of intersphincteric and trans-sphincteric fistulas reported an incontinence rate of 25% at 42 months.

**Fistulotomy**

Fistulotomy describes division of superficial tissue and thus laying open of a fistula track. It is the most effective method of dealing with a fistula and is the standard treatment for submucosal (low) fistulas because there is no risk to continence and recurrence is low (0-2%). Its use in the treatment of fistulas that involve the sphincter mechanism is controversial, however, because division of muscle risks incontinence. Practice parameters described for the management of perianal abscess and fistula-in-ano in 2005 stated that fistulotomy may be used in the treatment of simple perianal fistulas in cryptoglandular disease. A simple fistula was defined as a single non-recurrent track that crossed less than 50% of the external anal sphincter, but not the anterior sphincter in women, in people with perfect continence and no history of Crohn’s disease or pelvic radiation.

The amount of sphincter that should be divided during fistulotomy is unclear. Some surgeons prefer not to divide any external sphincter muscle because of the fear of causing incontinence. Several sphincter preserving methods have been developed and are discussed below. However, others argue that persistence with such procedures after failure or recurrence often leads to protracted treatment with multiple procedures and prolonged suffering. Some patients, when counselled appropriately, may prefer to choose a long term loose seton. Others, particularly those who have had a protracted course, may accept the risks of minor soiling or incontinence associated with sphincter division for the almost certain cure that fistulotomy offers.

**Sphincter saving methods**

**Fibrin glue**

Fibrin glue is a combination of fibrinogen, thrombin, and calcium in a matrix, which is injected into the fistula track while the patient is under general anaesthesia. It heals the fistula by first inducing clot formation within the track and then encouraging growth of collagen fibres and healthy tissue. The internal and external openings do not need to be closed but there should be no deficiencies in the track when filling it with glue; this raises particular problems in complex fistulas and multiple tracks.

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**Fig 5** Photograph of a loose seton traversing a trans-sphincteric fistula.
CLINICAL REVIEW

TIPS FOR NON-SPECIALISTS

Consider possible underlying causes in a patient with a suspected anal fistula. When performing a digital rectal examination in patients with perianal abscess or fistula, an internal opening classically feels like palpating a grain of rice. Microbiology swabs of the affected perianal area may help determine whether the primary bacteria are skin or bowel commensals. Although antibiotics are not usually effective in treating perianal abscess or infection associated with anal fistula, they are recommended in patients who have associated spreading cellulitis.

Observational cohort studies and controlled trials report healing rates of 31-85%. Reasons for this wide variation include aspects of trial design such as length of follow-up, heterogeneity of patients, and variable fistula anatomy included in the treatment and control arms. In addition, a review highlights the importance of ensuring that all perianal sepsis has resolved and that stool softeners are used and a sedentary lifestyle is maintained after surgery to minimise dislodgement of the glue.

Infiltration of fibrin glue is a simple, benign, sphincter sparing technique, and in simple tracks most authors conclude that the fistula heals in one to two thirds of patients treated. This makes it an attractive early option, particularly because failure does not preclude other subsequent treatments.

Fistula plug

The biological fistula plug is manufactured from porcine small intestinal mucosa. It is resistant to infection, does not induce a foreign body reaction, and encourages host cells to populate it and ultimately fill the fistula track.

Insertion of a fistula plug is a sphincter sparing procedure with limited dissection. The plug is pulled through the fistula track and secured in place at the internal opening, then trimmed at the external opening, which is left open for drainage. A recent systematic review of 20 studies found that this technique resulted in fistula closure in 54% of patients, excluding those with Crohn’s disease.

Further randomised controlled trials are awaited to confirm the efficacy of the fistula plug. One of the largest is the Fistula In Ano Trial (FIAT), which is due to report in 2015 (www.acpgbi.org.uk/members/research/fiat-trial/).

Endorectal advancement flap

Advancement flaps aim to stop the fistula track communicating with the bowel and cover the internal opening with disease-free anorectal wall. The procedure involves dissection of a full or partial thickness flap of the proximal rectal wall, which is then advanced on its pedicled blood supply to cover the previously excised internal opening. Principles for success include adequate flap vascularity and anastomosis of the flap to a site well distal of the previous internal opening. Modifications include curved incisions, rhomboid flaps, anorectal flaps with proximal advancement, and closure or dissection of the remaining fistula track (or both).

Failure or ischaemia of the flap may result in the creation of a much larger defect than previously existed, and dissection in a scarred anorectum risks damage to the underlying sphincter. Consequently, observational cohort studies report widely variable success rates—from 0% to 63%. Most surgeons quote a success rate of 30% overall.

LIFT procedure

Ligation of the intersphincteric fistula track (LIFT) was first described in 2007. A skin incision is made between the internal and external anal sphincters; the fistula track is exposed within the intersphincteric space and subsequently ligated and divided. A 94% success rate was initially reported, with no effect on continence.

A Malaysian research group applied the technique to 45 patients (five with recurrent fistulas); after a median follow-up of nine months the healing rate was 82%. A North American cohort study found a 57% success rate at median follow-up of 20 weeks. The technique is sphincter sparing, inexpensive, and if it fails it does not prohibit other treatment methods. Recent modifications known as the BioLIFT involve placing a biological mesh in the intersphincteric space to act as a barrier to refistulisation. However, a larger area of dissection is needed, and the introduction of foreign material increases the risk of infection.

Stem cells

The use of stem cells is a novel treatment. In a comparative study of 49 patients with cryptoglandular fistulas or Crohn’s related fistulas the patient’s own adipose tissue was processed and centrifuged to provide adipose derived stem cells. These cells were cultured and injected into the fistula track. A stem cell plus fibrin glue group was compared with a fibrin glue alone group and the healing rate was 71% versus 16%. The recurrence rate was 17.6% in the stem cell group at one year, with no recurrences in the control group. However, this technology is not available in most centres.

Defunctioning

In rare cases where perianal sepsis is difficult to control and multiple tracks exist, the bowel may need to be defunctioned by bringing out the proximal colon as a

ADDITIONAL EDUCATIONAL RESOURCES

Resources for healthcare professionals


Resources for patients


colostomy. This improves symptoms of perianal leakage and diverts the bowel contents away from the anorectum, thus providing the optimum environment for sepsis resolution. However, the operation involves entering the peritoneal cavity and establishing a stoma. Postoperative problems include bleeding, infection, thrombosis, ileus, leaks, and complications associated with colostomy. Defunctioning is therefore considered only as a last resort in non-healing anal fistula. Once treatment of the anal fistula is complete it is possible to reverse the colostomy and restore intestinal continuity in some patients. Special cases Crohn’s disease The cumulative incidence of anal fistula in patients with Crohn’s disease is 20-25%. Fistulas are often complex and multiple in these patients; this makes the treatment challenging and seriously affects the patient’s quality of life. Randomised clinical trials have confirmed the efficacy of the anti-tumour necrosis factor antibody, infliximab, and this agent should be considered first line treatment. In one multicentre randomised double blind trial, conducted at 45 sites, 306 patients were enrolled to receive infliximab maintenance therapy or a control maintenance therapy. Over the 54 week study, nearly twice as many patients who received infliximab, as compared with placebo, had complete and durable closure of their fistula. Surgical options are considered if medical treatment fails, but because of the poor rate of wound healing in active Crohn’s disease, a defunctioning colostomy is a more common strategy. Tuberculosis Tuberculosis may be the cause of anal fistula in some cases. The clinical presentation may imitate that of Crohn’s disease or cancer, and it is more likely to be the underlying cause in patients with HIV. Tuberculosis should be suspected in patients who fail to respond to standard treatment or who develop recurrent fistulas. Diagnosis is made through the histological finding of granulomatous disease and the positive identification of acid fast bacilli. Antituberculous drugs are the first line treatment. Contributors: JAS and AB contributed equally to the writing and revision of the manuscript. JHS was responsible for editing and revision. Patient consent obtained. Funding: No special funding received. Competing interests: All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work. Provenance and peer review: Not commissioned, externally peer reviewed.