

Anal fistula

Past and present

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ABSTRACT

يُوصف الناسور الشرجي على أنه اتصال غير صحيح بين القناة الشرجية والجلد حول الشرج، فهو حالة مرضية شائعة قد تنتج تلقائياً أو تتطور من بعد علاج الخراجات الشرجية الحادة. فعلى الرغم من شيوع هذا المرض إلى حد كبير، إلا أننا نفتقر لوجود أرقام تقديرية دقيقة لنسب الإصابة به. يعود ذلك لوجود حالات كثيرة لا يتقدم المريض المتضرر إلى الطبيب شاكياً منها، مما يسبب في عدم وجود سجل دقيقة لهذه الحالات. إن من الممكن أن يؤثر هذا المرض سلباً على الحياة اليومية للمريض من خلال ما تسببه من آلام يومية طفيفة، مع وجود حرج اجتماعي في أسوأ الحالات، وفي الحالات الشديدة، قد تؤدي إلى صدمة بكتيرية ينتج عنها تسمم دموي بكتيري، بالرغم من أن النواسير الشرجية من الأمراض الحميدة. لا يزال علاج الناسور الشرجي أحد المواضيع الأكثر تحدياً وإثارة للجدل في جراحة القولون والمستقيم اليوم إلى يومنا هذا. فالأهداف الأساسية لعلاج الناسور تلخص في التخلص من النتن البكتيري الموضعي المصاحب له، والقضاء على قناة الناسور، والتقليل من احتمالية حدوث السلس البرازي. لتحقيق هذا الهدف، تبرز أهمية وجود منهجية في عمل الفحوصات اللازمة، بدءاً ببساطة من فحص المستقيم بالإصبع إلى استخدام التكنولوجيا المتقدمة التي تساعد على معرفة مسار الناسور، مثل التصوير المقطعي والتصوير بالرنين المغناطيسي، والتي تلعب دور رئيسي مؤثر في نتائج العلاج. هناك مجموعة كبيرة من خيارات العلاج تحت تصرف الجراحين، بما في ذلك الخيط الشرجي الجراحي المصمم للحفاظ على الجرح مفتوحاً، وبالتالي السماح للناسور بتصريف القيح المتجمع به دون زيادة معاناة المريض، وحقن قناة الناسور بفرء مادة اللين أو سدده بحشوة حيوانية وغيره من طرق العلاج. الهدف من هذا المقال الطبي هو توعية الجراحين العامين وأطباء التخصصات الأخرى ذات العلاقة وجعلهم على بينة بخيارات التصوير والعلاج المختلفة المتاحة وتقديم تقرير عن النتائج المتوقعة لمختلف الطرق الجراحية، بحيث يمكن تحديد العلاج الأكثر مناسبة لمرضاهم.

Anal fistula is a common benign condition that typically describes a miscommunication between the anorectum and the perianal skin, which may present de novo, or develop after acute anorectal abscess.

Although anal fistulae are benign, the condition can still negatively influence a patient's quality of life by causing minor pain, social hygienic embarrassment, and in severe cases, frank sepsis. Despite its long history and prevalence, anal fistula management remains one of the most challenging and controversial topics in colorectal surgery today. The end goals of treatment include draining the local infection, eradicating the fistulous tract, and minimizing recurrence and incontinence rates. The goal of this review is to ensure surgeons and physicians are aware of the different imaging and treatment choices available, and to report expected outcomes of the various surgical modalities so they may select the most suitable treatment.

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Fistula-in-ano, or anal fistula, is a common benign anorectal disorder that is treated surgically. A fistula is typically defined as an abnormal communication between 2 epithelialized surfaces; more specifically, anal fistulae manifest as an abnormal communication between the anorectal canal and perianal skin.¹ Although anal fistulae can occur at any age, the average age of development is 39 years,² and approximately 65% of all patients who present with an initial perianal abscess will develop a chronic, or recurrent anal fistula.³ While the globally estimated incidence of anal fistula is unknown, the incidence in a Finnish population was estimated at approximately 5.5 per 100,000 women,

and 12.1 per 100,000 men; however, it is likely that this number is lower than the actual incidence due to patient reluctance to seek medical attention owing to social embarrassment of the symptoms.⁴ Furthermore, up to 30% of patients with Crohn's disease will develop a perianal fistula, making it the most common type of fistula that occurs in this population.⁵

In most cases, surgical intervention is the mainstay for anal fistula management. The principal goal of treatment is to eradicate the fistula, preserve anal continence, and decrease the risk of recurrence. Despite the long history of this disease' entity, and the fact that it has been the subject of an increasing number of studies, especially over the last 20 years, anorectal anatomy and the fistula tract continues to pose a considerable challenge for surgeons. Although several surgical options are currently available, there is no standardized approach to treating anal fistulae. Thus, the treatment of this disease is more of an art, the end result of which is determined by the specific fistula tract and the surgeon's experience. The goal of this review is to present the history of anal fistulae, summarize imaging and treatment modalities, and discuss potential outcomes of this benign, yet important clinical condition.

Definition and etiology. A fistula is defined as an abnormal communication between 2 epithelial surfaces; anal fistulae resemble a tunnel connecting the anorectal canal to the perianal skin, which is lined with granulation tissue, and typically results from the healing of a perianal sepsis focus. Microbes residing in the fistulous tract can cause chronic infection, and the accumulation of secretions and debris can occlude the fistula tract. Conversely, these substances may discharge continuously or intermittently through the external opening and onto the skin, and while the passage of this material can offer temporary relief for the patient, the development of an abscess from the chronic infection is a distinct possibility. In fact, this cyclical building of pressure followed by relief is often reported by patients with anal fistulae.⁶ Furthermore, abscess onset is often preceded by a stressful event that lowers the immune defense and facilitates anal sepsis.⁷ Although the fistula tract is usually too narrow to permit the passage of stool, in rare cases, fecal material may pass through the fistula, which can cause physical irritation and considerable psychological anxiety and embarrassment.

As the complex perianal anatomy contributes to the formation of multiple recesses and pockets that might harbor the progressing crypto-glandular infection, which later matures into a perianal abscess, multiple types of fistulae can manifest according to the preceding

abscess location. Surgical treatment should be tailored according to disease type and extent with the aim of draining the infection, eliminating the fistula, and minimizing the potential for incontinence.

Classification. Multiple classification systems aimed at describing and subsequently categorizing the risk of recurrence and possible surgical outcome in anal fistulae have been implemented, however, the most widely used and accepted method is the Parks classification.⁸

Low versus high. This simple classification method is based entirely on the location of the fistula. As the name implies, a low fistula involves only the lower most third of the internal and external sphincter muscle. Conversely, a high fistula involves more than just the lower third. The clinical significance of this distinction is that a high fistula carries with it the possibility of more difficult surgical treatment, and a greater risk of incontinence.

Simple versus complex. One of the major drawbacks to the low versus high classification method is that it does not consider other factors that may influence the complexity and risk involved in the surgical treatment. For instance, a "low" fistula may carry a greater risk of incontinence, should it be anteriorly located in a female and involve the vagina. Hence, the simple versus complex method considers both the location of the fistula and other factors: fistulae that are considered complex include anterior fistulae in females; any fistula with secondary tracts, or with remaining abscess activity; fistulae occurring concurrently with other diseases/conditions (for example Crohn's disease, tuberculosis, following radiation treatment, neoplastic processes, and so forth); or the involvement of other organs (for example, vagina, base of the scrotum, and urinary bladder).^{9,10}

The Parks Classification. As previously mentioned, one of the most complex, descriptive, and commonly used classifications of anal fistulae is the Parks classification. Published in 1976, the Parks classification is based on a case series that included 400 patients treated over the course of 15 years.⁸ This system is based primarily on the relationship between the tract to the external sphincter and puborectalis muscles, and included 4 major types, which are described below.^{11,12}

Intersphincteric fistulae. The intersphincteric fistula is the most common anal fistula, and it is usually preceded by a perianal abscess. The intersphincteric fistulae tract primarily passes into the intersphincteric space transecting the internal sphincter before reaching the perianal skin. The tract might extend upward to open into the lower rectum, or end blindly in the

intersphincteric plane. It may be caused by a pelvic collection and present with its external opening in the intersphincteric plane. The sparing of the external sphincter in intersphincteric fistulae minimizes the risk of incontinence following fistulotomy.

Transsphincteric fistulae. Approximately one quarter of perianal fistulae can be classified as transsphincteric under the Parks classification. Transsphincteric fistulae originate from an ischiorectal abscess, and form a tract transversing both internal and external sphincters with its external opening in the ischiorectal skin. A high blind tract reaching the pelvic cavity can coexist with this type of fistulae.

Suprasphincteric fistulae. Unlike the intersphincteric and transsphincteric fistulae, suprasphincteric fistulae are exceedingly rare, accounting for only 5% of cases. Originating from a supralelevator abscess, the tract resembles the transsphincteric type in that it involves both sphincters; however, as it enters the intersphincteric plane, it curves upward and involves the puborectalis muscle, then the ischiorectal space before it opens to the perianal skin. The rarity of this type of fistula combined with the fact that most reported cases involve previous surgery has prompted debate whether this condition occurs naturally.¹¹

Extrasphincteric fistulae. Rarer still are extrasphincteric fistulae, which account for a mere 2% of cases. In this type of fistula, the tract begins at the perineal skin, travels down to the lower rectum, where it passes through the ischioanal fossa and levator muscles before exiting through the ischiorectal skin. Although this type of fistula spares the sphincter complex, it is often the most difficult to treat. Extrasphincteric fistulae may be caused by inflammatory disease, malignancy, or they may be iatrogenic following treatment for supralelevator abscess drainage.¹¹

Intrasphincteric fistulae. Although not typically included in the Parks classification, the intrasphincteric or superficial fistula, which do not transverse any of the sphincter muscle, and thus whose tract are inside the internal sphincter is worth mentioning.¹³ These fistulae, which are often associated with anal fissures are treated by simple fistulotomy with a near 100% success rate, and rarely affect continence.¹⁴

Clinical assessment. As in any sound medical practice, an initial clinical history, and physical examination are required for anal fistula assessment. A proper clinical history for anal fistulae is particularly important, as previous or recurrent episodes of perianal abscesses might alert the physician of an underlying pathology (for example, inflammatory bowel disease

[IBD], malignancy, or chronic infection). Furthermore, impaired baseline fecal continence can dramatically alter the treatment approach. On physical examination, the presence of an active infection is usually easily identified by purulent discharge or tenderness following palpation of the external opening. In order to determine the appropriate treatment course, proper mapping of the fistula, including locating the internal opening are of utmost importance. To follow are some of the more commonly used methods to map anal fistulae.

Goodsall's rule. Goodsall's rule is an excellent tool for determining the location of the internal opening of the fistula, which uses the site of the external opening as a guide: an external opening located posterior to the midsagittal line will likely have a tract with an internal opening posterior to the midline; conversely, an anterior external opening will travel in a relatively straight line to its internal opening (Figure 1). It should be noted, however, that Goodsall's rule is not as reliable when considering fistulae with concomitant conditions, such as tuberculosis, IBD, or malignancy, or for fistulae with external openings located more than 3 cm from the anal verge.¹⁵ Furthermore, while the rule is accurate for external openings posterior to the transverse anal line (90%), it is much less accurate for fistulae with external openings anterior to this line.¹⁶ Thus, clinicians should be aware of the benefits and pitfalls of Goodsall's rule in order to make the best possible estimate of the location of the internal fistula opening, as this information is crucial for guiding treatment.

Digital rectal exam. A digital rectal examination may be helpful for detecting the internal fistula opening and tract, sphincter tone and bulk, which may be used to guide treatment, or to determine what other tests may be necessary. A digital rectal exam is the most basic, least costly, and fastest approach to identifying

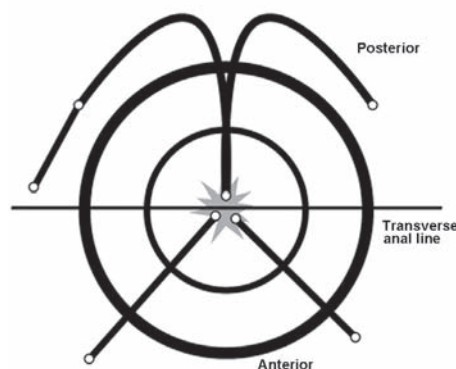


Figure 1 - Diagram of Goodsall's rule for determining the anal fistula path.

fistula characteristics; however, this method lacks specificity and the ability to visualize the tract. Locating the internal opening of the tract can be augmented by injecting hydrogen peroxide into the external opening, as the subsequent bubbles at the other end of the fistula can be used to identify the opening.⁶

Conventional fistulogram. The conventional fistulogram is a technique in which a water soluble dye is injected into the external fistula opening, and the fistula tract is resolved on x-ray. This technique, which has a long history has 2 main disadvantages: conventional fistulogram is not a viable option for plugged fistulae, and the technique does not provide any information pertaining to the sphincter muscles, and thus relationships between these muscles and the tract cannot be elucidated.¹⁷ Furthermore, this procedure can be quite painful for patients. A variation of this technique, known as “evacuation fistulography”, can be useful for identifying the course of blind fistula tracts. This method involves injecting a water soluble dye into the rectum and encouraging the patient to strain, which causes the dye to follow the tract, and thus facilitates identification of the opening. However, with the advent of newer, more advanced techniques, conventional fistulograms are rarely implemented in clinical practice today.

Computed tomographic fistulography. Computed tomographic (CT) fistulography using a contrast agent is capable of accurately mapping the fistula tract, and provides critical information that can guide the surgical management of these patients.¹⁸ Despite the strengths of this technique, it also suffers from substantial limitations. For instance, the fistula tract, fibrotic material, and sphincter muscles share similar attenuation values, and thus they can occasionally be difficult to distinguish.¹⁷

Endoanal ultrasound. Endoanal ultrasound, which can be combined with hydrogen peroxide injections into the fistula tract, can provide highly accurate representations of the fistula.¹⁹ However, the accuracy of endoanal ultrasounds is operator dependent, and in some instances, a complete field of view image may not be attainable.¹⁷ For instance, a well-known limitation to the traditional 2-dimensional endoanal ultrasound is that it cannot identify secondary or tertiary tracts, due to its utility in only visualizing one plane.²⁰ However, recent advances in 3-dimensional (volumetric) ultrasound systems and software overcome these limitations.²¹ This new technique/methodology improves both the overall accuracy, and provides more precise identification of internal fistulae openings compared to 2-dimensional endoanal ultrasound.^{19,22,23} Endovaginal or endoperineal

ultrasounds can also successfully identify anterior fistula openings in many cases.²⁴

Magnetic resonance imaging. The MRI is the gold standard for visualizing anal fistulae. This technique permits the orthogonal visualization of sphincter muscles and mapping of complex/branching fistulae, all of which can easily be identified due to good contrast resolution.²⁵ The drawbacks of this technique are related to its high relative cost, particularly compared with digital rectal exam and conventional fistulography, and based on the benign nature of this condition, allocation of resources may dictate that MRI be reserved for more critical conditions.

Anorectal manometry. Anorectal manometry is a simple technique used to measure sphincter contractility by inserting a balloon into the anus and recording the resulting pressure using a sensor. With respect to fistulae, this technique can be utilized preoperatively to identify potential sphincter defects, which can influence the success rate of certain procedures, such as endorectal replacement flap repairs.²⁶

History and management. The long history of anal fistula management dates back more than 2,000 years. It is generally accepted that the first documentation of this condition was recorded by Hippocrates in the fourth century BC.²⁷ Not surprisingly, Hippocrates also reported the first anal fistula treatment: a seton. However, it was not until the seventh century that the high incidence of incontinence as a consequence of this condition was appreciated. During the tenth century, the fistulotomy was introduced in Al-Andalus by an Arab muslim named Abu al-Qasim al-Zahrawi (936-1013; also known in the West as Abulcasis);²⁸ he is considered as the greatest medieval surgeon from the Islamic world, and the father of modern surgery.²⁹ In the sixteenth century, Ambroise Paré treated anal fistulae using horse hair to divide internal sphincter muscles.²⁸ An anal fistula has even been featured as a major plot device in Shakespeare's play 'All's well that ends well'.³⁰ Although the tools to treat anal fistulae have changed over the centuries, many of the aforementioned techniques that were developed in antiquity are still being used today. As always, the end goal of these and newly proposed management strategies is to alleviate symptoms, and eradicate the fistula and internal opening, while preserving continence and minimizing recurrence rates. Generally, the choice of treatment should be tailored to the course of the fistula tract, sphincter status, underlying cause of the fistula (if it can be determined), and the experience of the surgeon. The most commonly used treatment options are described in greater detail below.

Fistulotomy. A fistulotomy describes surgical dissection and removal of the tissues forming the fistula tract, aiming for secondary healing. In its most basic form, this procedure simply converts the tunnel into a wound that heals with dressing. Hence, it is logically indicated for low submucosal fistulae, or those that only minimally involve the sphincter complex (less than 30%), which carry low (0-2%) inherent recurrence rates.³¹ Depending on the amount of muscle that is divided during the operation, the major potential side-effect is incontinence. Contraindications for fistulotomy include anterior fistulae (especially in females, where the sphincter muscles are the thinnest and weakest), incontinence, IBD, and previous pelvic radiation.

Seton insertion. Setons are threads, typically made of silk, or more often of rubber or silastic, which are inserted into the fistula tract with the intention of maintaining patency in order for the infection to drain, and to prevent further abscess formation. A draining seton is usually a thin, non-absorbable suture that is placed through the fistula, and looped through the anus. A cutting seton is similar to a draining seton; however, unlike the latter, it is routinely tightened to promote healing and fibrosis. The main indications for setons are fistulae that are contraindicated for fistulotomy due to a high risk of incontinence, high fistulae (those involving more than 30% of the anal sphincter), or transsphincteric fistulae. Seton insertion is usually the initial step in anal fistula management strategy, and is designed to eliminate inflammation so that it can be better treated using other methods. Draining seton use is the mainstay of fistula management in patients with Crohn's disease in order

to optimize medical management, including allowing time for the administration of anti-tumor necrosis factor-alpha (TNF- α) drugs, given their high success rates in Crohn's disease fistula closure.³² A cutting seton, on the other hand, acts by slow division of the tissues aiming for a minimal transection of the muscles and ongoing continuous healing; however, in a recent meta-analysis,³³ incontinence rates following cutting seton treatment reached 12%, and should therefore be reserved for cases, in which other alternatives are not viable. Furthermore, a significant rate of gas incontinence was noted in a study conducted in King Faisal Specialist Hospital.³⁴ A recent study by Cariat³⁵ investigated using a novel decision algorithm for deciding between fistulotomy or seton approaches by considering location of the fistula (low versus high) and percentage of sphincter involvement (> or <10%), and found that they could reduce sphincter cutting procedures by 20%. Nevertheless, unlike draining setons, cutting setons are a curative approach (Figure 2).

Horseshoe fistulae. Horseshoe fistulae, in which the fistula tract travels across the body and has openings on either side of the anus, require specific management due to their complexity. Although several different techniques for these types of fistulae have been described, including, endorectal advancement flap, fibrin glue, collagen plug, and fecal diversion, the most prominent method of choice is the Hanley technique.³⁶⁻³⁹ The Hanley technique involves performing a sphincter transecting posterior fistulotomy with lateral counter drainages, and it remains one of the most efficacious treatment methods for this type of fistula with limited continence rates to date.³⁹⁻⁴¹

Sphincter sparing procedures. Sphincter sparing procedures are treatment options that do not divide the sphincter muscles. The previously described treatment methodologies that separate the sphincter muscle, such as fistulotomy, can reduce the ability to squeeze the sphincter muscles, which can cause continence issues in up to 50% of patients.⁴² Sphincter sparing techniques, on the other hand, can potentially treat all fistulae with a high cure rate and zero incidence of incontinence (Table 1).³¹

Fibrin glue. A fibrin glue consisting of fibrinogen, thrombin, and calcium is suitable for injection into a well-established fistula that is free from inflammatory processes. Injecting the glue fills the fistula, and usually no further intervention is required. While this simple procedure spares the sphincter muscles, success rates vary widely from as low as 33% to as high as 69% with repeated applications.^{43,44} However, despite the variable

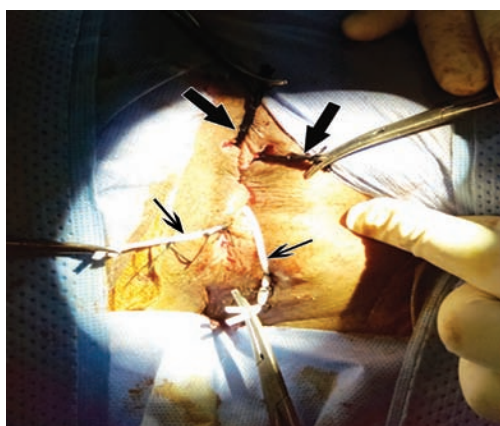


Figure 2 - Multiple anal fistulae of differing heights. The surgeon was required to insert both cutting setons (black threads, thick arrows) posteriorly to the low fistulae, and draining setons (white rubber, thin arrows) anteriorly for the high fistulae.

success rate, it is a simple procedure, and given that the use of fibrin glue does not subsequently preclude the implementation of other techniques, it is often used as a first line treatment.

Fistula plug. Closely resembling the biological mesh manufactured from porcine small intestine, a fistula plug is a collagen wad that is inserted into the fistula tract, and secured in place at the internal opening.⁵² It is expected that the plug will act as a framework for healing and closure of the tract. As this procedure involves no dissection, it preserves the sphincter muscles and does not influence continence. In our center's initial experience with this technique, after a mean follow-up of 12 months, 19 of the 23 fistula tracts remained successfully closed for an overall success rate of 83%.⁴⁴ Unlike the aforementioned fibrin glue, however, a recent systematic review has reported highly variable success rates ranging between 24% and 92%.⁵³

Endorectal advancement flap. Endorectal advancement flap is a technique, in which either a partial or full thickness dissection at the internal opening of the fistula is performed, and normal bowel tissue is advanced over the opening. Tension, vascularity, and surgeon experience are factors that influence the success rates of this procedure. For complex fistulae, the success rates of this technique are similar to a fistula plug, but endorectal advancement flaps carry a greater risk of potential complications.⁵⁴ Such potential complications include rectal dissection and scarring of the ano-rectal area; thus, it is usually reserved for, when other treatment methodologies have proven unsuccessful. Recently, it was reported that multiple endorectal advancement flap surgeries for those with recurrent fistulae are a viable option with success rates in line with the initial flap surgery.⁵⁵

Video assisted ablation of the fistula tract (VAAFT). A novel technique, dubbed VAAFT, has been explored as

an option for treating complex fistulae. This technique has 2 distinct phases: the diagnostic, and the operative phase. The goal of the diagnostic phase is to locate the internal fistula opening, and is accomplished by inserting a fistuloscope through the external opening, and the internal opening is identified when the rectal mucosa is visualized on screen. Next, the internal location is marked using several sutures. In the operative phase, the fistula is cleaned, and then destroyed using a unipolar electrode attached to the fistuloscope. After removing all waste material, the fistula openings are closed using either staples, or a mucosal flap.⁵⁶ This technique offers many advantages including not requiring additional holes in the buttocks, and absolute certainty regarding the location of the internal opening.⁵⁶

Laser ablation. Similar to VAAFT, laser ablation has recently been implemented for the closure of recurrent anal fistulae. Briefly, after drainage and conventional flap technique for internal opening closure, a radial emitting laser probe is inserted into the external opening. While emitting a constant energy, the probe is slowly retracted, and the fistula tract is continuously destroyed.⁵⁷ This technique, like VAAFT, eliminates all fistula epithelium, and thus reduces, or even eliminates the possibility of recurrence.

Dermal island-flap anoplasty. Dermal island-flap anoplasty, or more simply, cutaneous skin flap is a technique adapted by Del Pino et al,⁵⁸ and is suitable for most fistulae that originate near the dentate line, and traverse the external sphincter. Initially described to treat anal strictures and mucosal ectropion, this technique involves first incising the internal fistula opening, and then creating a pear shaped flap of skin from the perianal area, and pulling the flap into the anus to cover the excised internal opening. This technique has proven particularly useful for treating patients with Crohn's disease, as it does not exacerbate the condition.⁵⁹

Ligation of the intersphincteric fistula tract (LIFT). The LIFT is a sphincter sparing procedure that involves making an incision at the intersphincteric groove, ligating the incision to the internal opening of the fistula tract, followed by fistula removal, and finally suturing of both openings.⁴⁵ While this new procedure initially generated very high success rates, more recent, long-term results while still showing promise have not reached the same lofty levels.^{46,60} Benefits to this procedure, in addition to being sphincter sparing, include its being inexpensive and easy-to-learn nature; however, using LIFT to treat complex fistulae can be technically challenging.⁶¹ Recently, modifying LIFT by combining it with the use of a fistula plug for the distal tract have shown to improve success rates.⁴⁷ Furthermore, a new

Table 1 - Estimated success rates of anal fistula closure using various techniques.

Technique	Success rate
Fibrin glue ^{42,43}	33-69% (with repeated applications)
Fistula plug ⁴⁶	24-92%
Endorectal advancement flap ⁶	55-98%
Ligation of the intersphincteric fistula tract ^{54,62}	61-94.4%
Stem cell injection ⁵⁷	30%*
Video assisted ablation of the fistula tract ^{63,64}	approximately 82%
Laser ablation ⁶⁵	82%

*more trials are necessary to obtain accurate success rates

report indicates that while the LIFT technique poses a significant risk of failure, good clinical outcome results are consistently obtained, particularly in patients who have no history of recurrence.⁶²

Stem cell injection. Very recently, researchers have begun investigating the possibility of treating anal fistulae with adipose-derived allogenic mesenchymal stem cells injected directly into the fistula.⁶³ Early reports suggest complete closure rates of 30%, but this technique is still in its infancy, and larger trials are required before conclusions can be drawn and it is adopted by the general surgical community.

Diversion. The most aggressive technique reviewed in this article; diversion involved temporary or permanent proximal diversion, and defunctioning of the ano-rectal junction. However, the potentially severe impact of perianal disease, complex fistulae, and recurrent infection (for example, in IBD patients) on a patient's health and social life should not be underestimated. If previous anal fistula treatment causes permanent damage to the sphincter, clinicians should always remember that a good stoma is better than a non-functioning anus. Due to its radical nature, and with the advent of more sophisticated techniques, such as VAAFT and laser ablation, fecal diversion is rarely used in clinical practice, and is reserved for only the most extreme cases.

Marsupialization. Several studies, most notably a controlled trial by Pescatori et al⁶⁴ have shown that marsupialization of surgical fistulae reduces wound size and risk of bleeding. Furthermore, this process does not increase postoperative pain or sepsis, wounds heal more quickly, and greater sphincter pressure is preserved; thus, marsupialization should be a consideration for all applicable fistula management approaches.^{64,65}

In conclusion, ever since first being reported more than 2 millennia ago, physicians and researchers have sought techniques and methodologies to successfully treat anal fistulae. Unfortunately, even with advanced imaging options, most surgical techniques offer a wide range of potential success rates, and thus clinical management is often difficult. However, more advanced techniques, such as the use of stem cell injections show great promise, and may become the gold standard for treatment in the future. As the goal of anal fistulae treatment is closure and retaining continence, sphincter sparing techniques, such as the use of a fibrin glue or fistula plug should be the first line treatment consideration.

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