

Review Article

A review of recent advances in the surgical management of anal fissures

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ABSTRACT

An anal fissure is a rupture or lesion in the anal canal's lining below the mucocutaneous junction or dentate line. It is a painful condition that can last for up to two hours during and after defecation. The present literature review is aimed at outlining the clinical signs and symptoms, etiopathogenesis, clinical evaluation, and surgical management of anal fissures with a brief discussion on laser-assisted surgeries. This literature review has been compiled to revisit the different treatment modalities of anal fissures based on the recent updates in the literature. PubMed and ScienceDirect databases were used for the literature search of this review. Based on the literature review surgical interventions are necessary when the conventional pharmacological treatment fails to cure the disease. There are varying outcomes based on the type of surgery with respect to healing rates, recurrence, and incontinence. However, the outcomes of surgery may vary from patient to patient. Various studies have shown that lateral internal sphincterotomy is currently considered the most effective surgical treatment for anal fissures. Surgeons may choose to use either the closed or open method for this procedure. Using lasers for sphincterotomy can help to minimize bleeding and postoperative pain. Despite numerous clinical practice guidelines and systematic reviews, there is still debate over the ideal anal fissure treatment. Surgical treatments discussed in this review have varying advantages and the surgeon is the right person to decide which procedure is suitable for the patient.

Keywords: Anal fissure, Lateral internal sphincterotomy, Laser-assisted surgery, CO₂ laser, Novel therapy

INTRODUCTION

An anal fissure is a very painful condition and is frequent in individuals who have had previous anal surgery, a history of trauma, a low-fiber diet, constipation, or hard stools. A painful linear tear in the distal anal canal, beginning just below the dentate line and continuing to the anal edge is known as an anal fissure or fissure-in-ano. Sharp pain is one of the initial symptoms of anal fissures and it worsens at the time of defecation. Some people experience a painful sentinel pile and think this is the source of their discomfort. More than 70% of patients exhibit a slight stain of bright-red blood on the toilet paper or the surface of the stool.¹ The anal fissure was first identified by Lockhart-Mummery in 1934 it

accounts for 10-15% of all proctological consultations worldwide, affecting people of all ethnic groups.² They are classified as acute fissures (lasting less than six weeks) or chronic fissures (lasting more than six weeks). The posterior or anterior midline is where the majority of anal fissures are detected. The posterior midline is often the location of primary anal fissures, which make up the majority share. Injuries and dysfunction of the external sphincter are linked to anterior fissures which are relatively less common.³ The presence of indurated edges, a clear absence of granulation tissue, internal sphincter fibers that are visible at the fissure's base, a sentinel polyp at the fissure's distal end, or a fibroepithelial polyp at the fissure's apex are all indicators of a chronic anal fissure.⁴

Males and females are both at the same risk for anal fissures, with a lifetime incidence rate of about 11%.² According to an epidemiological study, the majority of anal fissures affected in the US are middle-aged and younger people, with an annual case count of about 342,000 new cases.^{4,5}

Both adults and children can suffer from anal fissures, and those who have experienced constipation in the past are more likely to have this condition frequently. Anal fissures are generally diagnosed clinically. There are numerous treatment options, including surgical and pharmacological management.⁶ When treated using traditional treatments, acute anal fissures in low-risk patients normally heal within a few days to a few weeks. However, some of these patients develop chronic anal fissures, necessitating medication or surgical therapy. Anal fissures have a significant impact on quality of life. If not adequately managed, anal fissures can result in complications like bleeding, discomfort, infection, incontinence, and the most serious outcome, fistula formation.^{2,3}

This article is intended to evaluate and educate readers about the studies published in recent literature on surgical and laser-aided treatments for anal fissures.

ETIOPATHOGENESIS

The literature review has revealed that unless the anal fissure is a sign of another ailment, the precise cause of anal fissures is unknown. According to several studies, passing large or hard stools, localized discomfort from diarrhea, anorectal surgery, and ano-receptive intercourse that causes discomfort to the anoderm are some of the main causes of anal fissures. The anal mucosa may develop stenosis or tethering as a result of surgical scarring, making it more susceptible to injury from hard stools. Prior anal surgery is one of these risk factors.⁷⁻⁹ Other risk factors for anal fissures include inflammatory bowel disease, AIDS, colorectal cancer, skin conditions like psoriasis or pruritis ani, anal trauma (surgery, pregnancy), and medications like opioids or chemotherapy.^{2,10,11}

It starts with pain and poor stretchiness of the anal sphincter which leads to spasms and eruption of the internal anal tissues. It further worsens into reduced anodermal perfusion causing local ischemia and delayed healing of the fissure.⁷

CLINICAL EVALUATION OF ANAL FISSURES

There are several ways of evaluating anal fissures.

Physical examination

The individual is positioned in a left lateral position. In this technique, the buttocks are softly separated. Because of their discomfort, the patient may want to avoid being examined.

Palpation

Sentinel tags, induration, and fibrosis in chronic wounds are inspected at the site. Inflammation of the anal papillae and internal sphincter fibers may be observed.

Digital rectal examination (DRE)

An anal canal numbing jelly containing 5% lidocaine can be introduced using a nozzle or Foley catheter and left there for 15 to 20 minutes. After that, DRE can be performed on the patient. The use of laxatives, sitz baths, and calcium channel blockers can be initiated as part of conservative care if the examination causes discomfort.

Proctoscopy

To rule out other possible anorectal problems, a proctoscopy is required. If the patient is in extreme discomfort, it may be impossible to do the procedure at first.⁸

TREATMENT MODALITIES

Studies have shown that anal fissures can be managed with dietary modifications, sitz baths, and pharmacological or surgical treatments. Fiber supplementation and sitz baths have been shown to reduce pain in comparison with topical anesthetics. According to the 2016 clinical practice guidelines of the American Society of Colon and Rectal Surgeons (ASCRS), these non-operative therapies can be the first line of treatment for acute anal fissures (strong recommendation based on moderate-quality evidence).¹² The majority of acute anal fissures get resolved with treatments like topical vasodilators and muscle relaxants. The three components of pharmacological and surgical therapies are straightforward. The initial step is to treat the underlying condition that led to the fissure's formation. This frequently comprises easing the straining and constipation as well as avoiding additional anal trauma triggers. To enhance blood flow and promote healing, the second element includes relaxing the internal anal sphincter. This can be accomplished using a variety of therapies to reduce the symptoms of the fissure, which are often discomfort and bleeding, which makes up the third part. Topical nitrates are also considered a strong recommendation by ASCRS but their efficacy is limited by a few side effects on the other side calcium channel blockers show similar efficacy with a better profile of side effects making them suitable for first-line of treatment (Strong recommendation).^{12,13}

Other medical methods for treating fissures include oral nifedipine, topical vasodilators, the use of muscle relaxants, endoscopic anal dilatation, and chemical cauterization.⁴ According to studies, pharmacological treatments can heal around 50% of chronic anal fissures, with recurrence rates of 18.6%. In case of severity, complications, recurrence, and failure of medical therapy, surgical interventions may be necessary.^{13,14}

SURGICAL MANAGEMENT

Operative intervention is recommended for individuals who do not respond to conventional medical therapy or experience recurrence after initial healing. It provides rapid relief and eliminates the need for additional treatment. The major goals of fissure surgery are to relieve internal anal sphincter spasms, reduce maximum anal resting pressure, cure ischemia, and heal ulcers.¹⁵ The surgical treatments for anal fissures include the following.

Surgical anal dilatation

For decades, the Lord's operation, which entailed putting four fingers from each hand into the anal canal and extending for three to four minutes, was the preferred method for sphincter-stretching under general anesthesia. Due to the development of non-surgical treatments, an intolerably high risk of fecal incontinence (around 52%), and other factors, this technique has, however, been largely abandoned in recent years.^{7,15}

Lateral internal sphincterotomy

Lateral internal sphincterotomy (LIS) is the surgical treatment of the choice for refractory anal fissures and may be offered as the first-line management option, according to the practice parameters by the ASCRS.¹² The procedure can be performed using either an open or closed approach. Eisenhammer pioneered open LIS, which is performed by a radial incision in the anoderm laterally exposing the internal sphincter muscle fibers, followed by a sharp division with a knife or scissors under direct eyesight. The wound might be largely closed or left open. Notaras pioneered closed LIS, also known as lateral subcutaneous sphincterotomy, which involves inserting a narrow-bladed scalpel, such as a beaver, cataract knife, or 11-blade, through the perianal skin on the lateral side and pushing it subcutaneously upward between the internal sphincter and the skin lining the anal canal. When the blade reaches the dentate line, the internal sphincter is separated by cutting medial to lateral or lateral to medial. However, cutting the sphincter predisposes to sphincter dysfunction which can manifest as various degrees of incontinence of gas, liquid, or stool. In the past two decades, different LIS modifications have been developed in response to concerns about disturbed postoperative continence, and words like "calibrated," "tailored," "conservative," or "managed" LIS has been coined. Numerous studies have been undertaken to examine the effects of sphincterotomy on outcomes. The extent of the procedure is measured as a percentage of the sphincter split or as the distance below or above the dentate line. Naturally, more sphincters divided results in a larger prevalence of impaired continence; fewer sphincters divided results in a higher rate of fissure recurrence.⁷ Upon failure of pharmacological therapy, LIS is the most acceptable surgical technique as per ASCRC (strong recommendation).¹²

Anal advancement flap

Chronic anal fissures have been treated using an anal advancement flap (AAF). The incision is made from the anal margin, prolonged caudally, advanced into the anal canal to fill the fissure, and sutured. It requires the use of a subcutaneous flap. According to a few studies, with this treatment recovery rates can reach 80-100% with decreased fecal incontinence.¹

A 2018 systematic review and meta-analysis concluded that when chronic anal fissures are treated using this technique there are fewer rates of incontinence but the postoperative complications and healing rates are similar to the LIS, however, the conclusion is based on fewer pieces of evidence and additional studies need to be conducted.¹⁶ A retrospective observational study conducted in 2021 on 455 patients concluded that the AAF technique is a safe option for chronic anal fissures and provides a quicker cure than fissurectomy. Upon failure of medical therapy, it can be considered a good first-line treatment but additional studies are required to evaluate it.¹⁷

Fissurectomy

In a fissurectomy, the scar, hypertrophied papilla, and chronic granulation tissue that lines the fissure's bottom is removed. The resulting raw space is then generally either left open or closed. Fissurectomy has a high success rate and is associated with quick pain alleviation, even though full recovery is frequently delayed. Additionally, it doesn't seem to harm continence.⁷

This method is proven to be a good technique for sphincter-sparing surgeries with minimal recurrence rates and no incontinence after 2 years of surgery. Moreover, this technique shows faster relief from the symptoms of chronic anal fissures but when compared to its results against LIS, it shows slightly higher complication rates making it less preferable.^{18,19} For such reasons, ASCRS guidelines give a weaker recommendation based on moderate-quality evidence.¹²

LASER SURGERIES

Almost all routine surgeries for anal fissures have some limitations associated with respect to recurrence rates, complete or partial fecal incontinence, scars, and infections. There is a need to adopt a procedure that poses fewer risks and minimal invasion.⁴ These bottlenecks can be overcome with the help of laser surgeries that show promising advantages regarding lower post-operative pain, a shorter span of recovery, and the minimal chance of post-operative fecal incontinence.²⁰ Additionally, anal skin is thin and sensitive, laser therapy is a novel treatment for these lesions. Laser treatment of anal fissures is a non-contact method that often results in less bleeding, pain, and discomfort for the patient. As a result, it is regarded as

convenient and beneficial for the treatment of anal fissures.²¹

Using CO₂ laser for chronic anal fissures surgeries has the additional advantage of minimal blood loss and thereby better vision of the site of operation to the naked eye. A laser sphincterotomy and fissurectomy have proven to be very successful therapeutic options since the development of the CO₂ laser. The procedure can be completed in an outpatient setting. In 98% of cases, the procedure can be done under local anesthesia. In rare circumstances where exposure is challenging or pain tolerance is low, spinal anesthesia and general anesthesia may be necessary. The procedure can be performed for a fraction of the cost of hospital surgical care, and patient acceptability is exceptional.²²

Patients do not have to spend the night in the hospital after carbon dioxide laser surgery, and the procedure can last anywhere from a few minutes to an hour. Patients can resume normal activities one to two days after surgery. The recovery time is determined by how much work was done during the procedure, but all patients' fissures heal in one to two weeks.⁷

With the advent of this laser technique, the post-operative complications have significantly reduced to pain, temporary fecal impaction, and slight discharge without any serious complication. Moreover, there is no incidence of anal stenosis, hemorrhage, or incontinence. Having a diameter of less than 1 mm, the CO₂ laser beam technique allows surgeons to operate on challenging areas without affecting the surrounding tissues. Numerous studies have shown that laser exposure can start the regeneration of various tissues because it encourages the development of fibroblasts, increased epidermal growth, collagen formation, vascular structure growth, and total healing.^{4,5,21}

In a specific study from 2017 conducted on 200 patients suffering from chronic anal fissures, minimally invasive laser electrocoagulation with the help of nitroglycerine or nifedipine was evaluated using anesthesia. The internal sphincter and its margins stay completely unaffected by the electrocoagulation of the fissure. By using this technique, the elimination of scar tissue is achieved which gives the tissue a chance to gradually recover from the anal ulcer's bottom to its top. The patients make a smooth recovery and are released the same day. It is advised to follow a soft food and vegetable diet, take painkillers and antibiotics, defecate regularly, wash, and apply a gauge to the anal area for seven days. Patients treated with this technique experienced faster healing without any recurrence, complications, or incontinence.²³

Laser therapy benefits include the effective elimination of all clinical symptoms, reduced recovery time, and a few side effects. Patients are more likely to be compliant with the treatment as it is painless.²¹

NOVEL THERAPIES

Sacral nerve stimulation

This technique can prove to be a promising technique in cases where surgical procedures need to be avoided. In pilot research from 2011, patients had painless temporary 8-electrode octad lead implantation for sacral nerve root stimulation, which was carried out for 20 minutes three times each day. After stimulation for three weeks, the lead was taken out. Sacral nerve stimulation began to relieve the patient's perineal pain right away, and the pain reduction effect persisted for 10 to 12 hours. Because of this, stimulation was carried out in brief sessions to keep the patients comfortable and prolong the life of the external neurostimulator's battery. All patients' chronic anal fissures were cured by the third week, and a year following treatment, there were no cases of recurrence.^{7,24}

Autologous adipose tissue transplant

This technique is useful when there is no response to the surgical treatments as well or there are repeated recurrences of anal fissures. In a study from 2010, the hypogastrium's purified autologous fat is removed and then injected into the fissure. In 75% of patients, total recovery and pain relief was observed.²⁵ In another trial from 2017, subcutaneous injections of autologous adipose-derived regenerative cells (ADRC) from fat removed by liposuction were made and administered to the internal anal sphincter and the edge of the fissure. In all patients, the anal fissure completely healed, and all signs and symptoms disappeared. It took 15-30 days on average to completely stop experiencing pain. After 3 months, all fissures healed, and they continued to heal 12 months after the treatment. The surgery had no associated problems. According to the study's findings, applying ADRC may be a safe alternative to lateral sphincterotomy and a method to prevent fecal incontinence.^{7,26}

Posterior tibial nerve stimulation

To evaluate the efficacy of transcutaneous electrical nerve stimulation (TENS), a retrospective study was conducted in 2013 by stimulation of the sacral nerve in the ankle through the posterior tibial nerve. 10 patients were treated with TENS in addition to standard medical care for ten days. Two days after therapy, all patients' pain and the bleeding stopped, and six patients' mucosal healing was visible ten days later. From the results of multiple studies, it is confirmed that posterior tibial nerve stimulation is a promising technique for chronic anal fissures treatment as a non-invasive therapy.^{7,27}

SPECIAL CONSIDERATIONS

HIV

In HIV+ patients the anal fissures are visibly indistinguishable from the other patients. However, they

must be differentiated from idiopathic AIDS-related anal ulcers and ulcerating syphilis or herpes simplex virus.¹⁰ Benign anal fissures are low in the anal canal and typically narrow. On the other hand, HIV-associated anal ulcers are typically deep, cavitating, or broad-based lesions linked to decreased anal sphincter pressure. The initial course of treatment is still the same, with conservative methods being used as a first choice and surgery being kept for treatment failures with serious symptoms. In one case series of HIV-related anal fissures, 92% of patients who had surgical sphincterotomy experienced clinical improvements.²⁸ After the advent of highly active antiretroviral therapy (HAART), research conducted at the University of Southern California HIV clinic assessed the presence of HIV-associated anorectal disease. The findings of this investigation revealed that HAART did not affect the prevalence of anorectal pathology. Anal fissures in HIV patients continue to be a challenge and should be treated with caution, especially when there is baseline incontinence or severe disease.^{13,29}

Crohn's disease

In Crohn's disease, perianal symptoms are particularly common. In a retrospective review of 306 patients with Crohn's disease symptomatic anal pathology was reported in 42.4% of patients.³⁰ Anorectal surgeries has traditionally been prohibited in cases of Crohn's disease. The majority of medical professionals support the use of topical drugs, efforts to reduce diarrhea and bulk the stool, and medical therapy for Crohn's fissures, which normally results in a healing rate of 50 to 61% of patients.³¹ A healing rate of 88% after surgical intervention using a fissurectomy, closed lateral internal sphincterotomy, or a combination of the two, was demonstrated in a study conducted by Fleshner and colleagues.³⁰ 41 patients with Crohn's disease and anal fissures were recently investigated by D'Ugo and colleagues. A total of 14 patients underwent anal fissure surgery; 6 underwent lateral internal sphincterotomy, and 8 underwent Botulinum toxin (BT) injection with or without fissurectomy. The complication rate was 57.1%, leading the authors to conclude that nonoperative therapy should remain the primary focus with a recommendation of additional randomized research.³²

Low pressure fissures

Very few studies have discussed low-pressure fissures so far. Incontinent patients may develop low-pressure fissures; these are typically found in postpartum patients.¹³ In a prospective study performed in 1997 on 209 primigravid women with no anal fissure history, 9% of primigravid women who underwent anorectal manometry before and after giving birth later developed fissures. Manometric readings pre and postpartum were identical in those patients who later developed fissures. Patients having low-pressure fissures receive first-line treatment same as anal fissures. In case conservative management fails, the next best course of action is unclear. To help

direct management, anorectal manometry, and ultrasound can be taken into consideration as part of the evaluation procedure. In this difficult patient population, island flaps or endoanal advancement flaps have been tested with no evidence of postoperative incontinence.³³

CONCLUSION

The conventional therapy of vasodilators, muscle relaxants, stool softeners, and warm sitz baths is limited for acute anal fissures and not all patients respond to this treatment. Frequent recurrence, risk of infection, unbearable pain, and bloody stools are a few complications that force medical practitioners to opt for surgical treatments to manage the fissures more effectively. The advantages of surgical treatment include higher rates of recovery from disease and its symptoms with lesser rates of recurrence when compared with pharmacological therapy. The major risk associated with surgical treatment is complete or partial fecal incontinence along with infection, recurrence, blood loss, slow healing, and pain during defecation. Blood loss during surgical interventions hinders the vision of the surgeons at the site of operation and imparts difficulty in surgery. Post-surgical pain, slower healing, and scars are a few other bottlenecks of the surgery. Few studies have reported that laser-assisted surgeries are beneficial in such cases, as the laser's accuracy in making cuts at the site of operations causes minimal damage to adjacent tissues and minimal blood loss, easing the surgery process. Furthermore, several studies have demonstrated that CO₂ laser promotes the healing process that helps in faster recovery of the fissures. Thus, laser-assisted surgeries might be preferred in near future considering their advantages over conventional surgery procedures. However, additional studies with a broader sample size are recommended to determine the optimal wavelength and definitive clinical outcomes.

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