

Review Article

Trends in Treatment for Hemorrhoids, Fistula, and Anal Fissure: Go Along the Current Trends

Sung Hwan Hwang

Busan Hangun Hospital & Busan Hangun Hospital Bumcheon Campus, Busan, South Korea

Abstract

Recent trends in benign anal disease treatment are minimizing surgery to preserve normal anorectal anatomical unit and its functions. However, some surgeons still prefer and are confident with the use of conventional solid surgical methods. In this report, we will investigate the recent trends in the treatment for hemorrhoids, fistula, and anal fissure. The practice guidelines of advanced countries, including UK, Italy, France, USA, Japan, and ESCP, are referred to in this review. Opinions suggested in international meetings were also added. In the management of hemorrhoids, surgical treatments and office procedures were recommended according to a patient's status and preference. For the management of complex anal fistula, novel sphincter-preserving surgical techniques are more widely accepted than a sphincter-dividing procedure of immediate repair following fistulectomy. The treatment of anal fissures is well covered in the guidelines of the ASCRS.

Keywords

recent trends, hemorrhoids, fistula, anal fissure

J Anus Rectum Colon 2022; 6(3): 150-158

Hemorrhoids

Over the centuries, many surgical techniques have been designed and introduced for the treatment of hemorrhoidal disease (HD). In 1882, Walter Whitehead (1840-1913) reported in the British Medical Journal that the "intention of the operation is to remove from the lower segment of the rectum the diseased, dilated, and tortuous vessels, and the adjacent tissues, hypertrophied and consolidated by plastic exudation"[1]. In 1887, he reported more than 300 consecutive cases of hemorrhoids cured by "cutting through the skin and mucous membrane, and applying the ligature to the artificially produced pedicle"[2].

In 1924, JP Lockhart-Mummery pointed out that Whitehead's operation was not recommended, as the results usually obtained by general surgeons are not good[3]. Deformity, a typical bad result in many cases, resulted in skin stric-

ture at the anal margin with mucosal prolapse[4]. Nevertheless, some surgeons still use the Whitehead operation to treat circumferential hemorrhoids and gain some positive results[5].

Milligan-Morgan (MM) hemorrhoidectomy, introduced in 1937[6], has long been widely accepted worldwide as the "golden standard" for mixed hemorrhoids. However, this procedure is followed by severe pain, prolonged healing time, and the possibility of complications of stricture or fecal incontinence. To address these problems, Alan Parks introduced a mucosal-sparing technique, with high ligation of the hemorrhoidal pedicle in an area of the rectum that was insensitive, called "submucosal hemorrhoidectomy"[7]. In the meantime, Ferguson described a surgical technique, "closed hemorrhoidectomy," that completely removes hemorrhoids and produces a skin-lined anal canal. This maintained the best principles of plastic surgery and resulted in excel-

lent outcomes[8].

In France[9] and other European countries, the most widely used technique is MM hemorrhoidectomy, which is well codified and produces durable results if indicators and post-op follow-ups are carefully observed and if postoperative pain can be controlled. The technique was modified by Arnous et al. in 1970, and Bellan's operation introduced a fourth posterior incision, an anoplasty, to protect against a concomitant anal fissure or fourth posterior hemorrhoid[9,10].

Because the closed approach is associated with lower postoperative pain and bleeding, as well as quicker wound healing, Ferguson's closed hemorrhoidectomy technique, as explained in 1959[8], remains the most widely adopted procedure in Australia and North America. Postoperative complications, hemorrhoid recurrence, and infectious complications were similar between open and closed hemorrhoidectomy[11]. Furthermore, the ASCRS pointed out that ultrasonic shears can result in quicker recuperation to normal working life, lower pain, and fewer complications compared with conventional hemorrhoidectomy[11].

If we examine Japanese guidelines for hemorrhoid treatment, classic ligation and excision with a semi-closed technique is prominent, and for the treatment of Grade III internal hemorrhoids, rubber band ligation (RBL) and phenol almond oil are used, whereas novel aluminum potassium sulfate and tannic acid (ALTA) have proven effective for Grades II, III, and IV. The negative preference for Stapled hemorrhoidopexy (SH) is due to its bad long-term results. Novel separating ligation is described as an effective surgical treatment for Grades III and IV[12]. Ultrasonic scalpel, vessel sealing system, bipolar semiconductor lasers, indocyanine green (ICG) dye-enhanced diode laser photosclerotherapy, and carbon dioxide gas-yttrium aluminum garnet lasers were mentioned as alternative methods also for the management of hemorrhoids.

The Italian Society of Colorectal Surgery's (SICCR) consensus statement was established in 2015[13] and updated in 2020[14]. It is very interesting that the SICCR mentioned diverse surgical options for HD, such as hemorrhoidal laser procedure (HeLP), sclerotherapy (SCL), Ferguson (closed) and MM (open) hemorrhoidectomies, RBL, Doppler-guided hemorrhoidopexy (DGHAL), and excisional hemorrhoidectomy. The SICCR also introduced a validated severity score for hemorrhoids[15] while considering several limitations of the Goligher classification, pointing out that Goligher "does not consider the associated symptoms and their impact on quality of life, the etiopathogenesis of the disease, and specific clinical conditions such as circumferential prolapse or single prolapsed pile"[16].

The ESCP guidelines are more helpful for colorectal surgeons in that they are more specific, systematic, and offer clear algorithms in treating HD. Colorectal surgeons in six

nations, the Netherlands, UK, Germany, Italy, Denmark, and France, participated in establishing a multidisciplinary, international guideline for HD and in providing guidance on the most effective treatments[17]. For classification, ESCP noted that the Goligher classification has been used most widely and allows healthcare providers to select the best treatment for each individual patient. Other recent classifications include the Single Pile Classification, PATE, and one by Luniss et al.[18-20] While of interest, such classifications might be clinically less useful compared with the Goligher classification. In any case, members of the Guideline Development Group agreed that there was no evidence favoring one classification over another.

ESCP divided the treatment methods between outpatient procedures and surgical treatment. When basic treatment does not result in acceptable reduction of symptoms, surgeons must certainly consider further procedures. For outpatient procedures, ESCP proposed SCL, infrared coagulation (IRC), and RBL[21]. However, for patients with circular prolapsing Grades III and IV, primary surgical interventions such as hemorrhoidectomy, DGHAL + mucopexy, or SH must be applied. In any case, selecting an outpatient procedure should also consider patients' preferences, their fitness for further procedures, and the availability of procedures.

It is notable that ESCP recommends surgical procedures not only in Grades III and IV but also in cases when acceptable outcomes have not resulted from basic treatment and outpatient procedures. According to the ESCP guidelines, for patients with Grade II-III hemorrhoids, DGHAL can be used, whereas for those patients with Grade II-III hemorrhoids and/or patients who are refractory to outpatient procedures, SH can be considered. Hemorrhoidectomy should be used for Grade IV hemorrhoids and considered for patients with Grade II-III hemorrhoids or who are refractory to outpatient.

In conclusion, the ESCP guidelines advise that for Grade I and II hemorrhoids, RBL is preferable, because it shows better response and significantly low recurrence than SCL and/or IRC. For Grades III and IV, hemorrhoidectomy remains the treatment of choice. The efficacy of hemorrhoidectomy is better than that of SH, particularly for Grade IV hemorrhoids. For patients with Grade II or III hemorrhoids, DGHAL + mucopexy can be considered. However, the side effects of DGHAL are currently being investigated, as two studies have demonstrated significantly more complications and unscheduled postoperative events in the DGHAL + mucopexy group[22,23].

The practice guidelines of each organization for the treatment of hemorrhoids are summarized in Table 1. As for surgical options, conventional hemorrhoidectomy, SH, and DGHAL are listed in the practice guidelines for hemorrhoid management. Each surgical method has its own benefits and complications[10-14,17,24]. Conventional hemorrhoidectomy

Table 1. Summary of Practice Guidelines for the Treatment of Hemorrhoids.

	Italy	France	ACRSI	ASCRS	Japan	ESCP
Surgery						
Hemorrhoidectomy	GIV	All	GIII, IV	GIII, IV	GIII, IV	GII, III, IV
SH	GIII	GII, III	GIII, IV	GIII	GIII	GII, III
DGHAL	GII, III	GII, III	GII-IV	GI-IV		GII, III
Office procedure						
RBL	GI, II, III	GI, II	GII, III	GII-III	GI, II, III	GI, II, III
SCL	GI, II, III	GI, II	GI, II, III	GI-III	GII, III, IV	GI, II
IRC	GI, II, III	GI, II	GI, II, III	GI-II		GI

* Sclerosing agents: 5% phenol almond oil. Sodium tetradecyl sulfate. Aluminum potassium sulfate and tannic acid. (ALTA)

* SH (Stapled hemorrhoidopexy), DGHAL (Doppler hemorrhoidal artery ligation)

* RBL (Rubber band ligation), SCL (Sclerotherapy), IRC (Infrared coagulation) * ACRSI (Association of Colon & Rectal Surgeons of India 2016)

* ESCP includes Grade II in the indication of hemorrhoidectomy, SH, DGHAL

has been widely applied worldwide, but the preferences vary. In Europe, most countries, including France, have adopted the MM technique or its modified techniques[9]. In Italy, the traditional excisional methods (Milligan-Morgan, Ferguson) still remain as the preferred and most common practice for symptomatic Grade III and IV hemorrhoids[14].

In the United Kingdom, MM hemorrhoidectomy seems to be the most popular technique. This entails grasping and everting the hemorrhoids before dissecting it off the anal sphincter. The vascular pedicle is ligated, and the wounds are left open to granulate, preserving the bridges of skin and mucosa to prevent anal stricture. However, MM hemorrhoidectomy may induce severe pain, chance of postoperative bleeding, longer hospital stays, and complications, such as stricture or fecal incontinence.

The Parks procedure is a semi-open pedicular hemorrhoidectomy. Under the lithotomy position, the knees are flexed. A Parks retractor is inserted to expose the anus, and each cushion is treated separately after injection of Xylocaine® with 1% epinephrine and clamping of the skin. Through reverse “Y” incision and submucosal dissection of the hemorrhoids, the intraluminal mucosa is reconstructed with interrupted sutures that include the internal sphincter. To facilitate drainage, the cutaneous part is left open[7].

Ferguson hemorrhoidectomy is more popular in North America and Australia. After excision and ligation of hemorrhoids, the wound is closed with a continuous suture. The Ferguson procedure appears to have reduced postoperative pain, facilitated faster wound healing, and lowered the risk of postoperative bleeding, albeit with longer procedure time. Wound dehiscence following excision of three piles prolonged healing to over 6 weeks after closed surgery. In Korea, Japan, and East Asia, semi-closed hemorrhoidectomy is preferred to overcome the disadvantages of open or closed hemorrhoidectomy. Ultrasonic shears or tissue-sealing de-

vices are used to make it easier to excise hemorrhoids without bleeding.

SH is an effective technique for prolapsed hemorrhoids. It is associated with faster operating time compared with conventional hemorrhoidectomy, as well as less pain, shorter hospital stays, and earlier return to normal activity due to better wound healing. However, this technique sometimes needs an additional surgical procedure to cut the external hemorrhoids or skin tag. Without additive excision after SH, the incidence of recurrence could be significantly higher than conventional hemorrhoidectomy.

For Grade II and III and possibly for Grade IV hemorrhoids, transanal hemorrhoidal dearterialization (THD) or DGHAL is a treatment option if performed by an experienced surgeon. THD/DGHAL is associated with reduced pain, minimal complications, and faster recovery compared with conventional hemorrhoidectomy. This technique is more popular in Europe, especially in Italy.

Office procedures for the treatment of hemorrhoids that have been introduced in clinical practice include RBL, cryotherapy, IRC, SCL, direct current electrocoagulation (Ultroid®), and even bipolar diathermy (BICAP®). Emerging techniques include embolization of the hemorrhoidal arteries through a HeLP, which applies a 980-nm diode laser, and laser hemorrhoidoplasty. Some techniques such as IRC, RBL, and SCL have also been adopted as office procedures by the clinical practice guidelines[7,9-15,18].

Anal Fistula

Through long-term efforts in care and research, surgeons have developed meticulous familiarity with the anatomy of the anorectal unit and the pathophysiology of anal fistula. In addition, due to the development of sophisticated operative technologies, as well as creative, advanced surgical tech-

niques, we have achieved substantial results in the treatment of anal fistula. Although we actively pursue our work based on sound surgical principles, we, colorectal surgeons, must still deal with relapses and complex anal fistula cases that do not heal.

The goals in treating anal fistula include maintaining continence, reducing the acute and chronic inflammatory process, and preventing recurrence[25,26]. The risk factors for recurrence include the number of previous interventions, horseshoe extension, complex fistula, and not finding the internal orifice of the fistula tract. The possibilities of fecal contamination and sphincter injury after even simple fistula surgery are also unavoidable. Therefore, the problems of delayed wound healing, anal fistula recurrence, and possible fecal incontinence are always challenging.

The risk factors for complications of an anal fistula include the following: 1. factors related to the fistula anatomy and other comorbidities, 2. preoperative assessments of lack of identification of internal opening and of anorectal anatomic structure, 3. intraoperative deficiencies such as surgeon's failure in the complete excision of sepsis and improper technique leading to recurrence, and 4. factors related to postoperative care in preventing complications[27-30].

If we take a look at the Japanese practice guidelines for anal fistula[31], it is unique in usually employing the Sumikoshi classification, whereas the Parks classification is widely adopted in the West. It is also well known that many proctologists are adopting "coring out," a novel Japanese surgical technique. There is no argument on the most fundamental point of etiology of the anal fistula, the "cryptoglandular theory."

Several surgical approaches are employed for anal fistulas in the JSCP guidelines, such as fistulotomy, fistulectomy, and seton. However, results of the ligation of the intersphincteric fistula tract (LIFT) present a high recurrence, relatively, of 10%-40%. The JSCP guidelines recommend that in high intersphincteric fistulas (Sumikoshi type IIH), simple cases can be excised, but complex cases involving rectal stricture necessitate incision and curettage of the tract, with around a 10% recurrence rate. In ischiorectal fistulas (type III), the Hanley procedure and the modified Hanley procedure, or sphincter-preserving methods (coring out, muscle filling, and advancement flap), are recommended, with around 10% recurrence rate; for pelvirectal fistulas (type IV), the recurrence rate is 15%[31].

According to the ASCRS guidelines for anal fistula (2016), simple and complex fistulas are well depicted. "Complex" anal fistulas include transsphincteric fistula that involves over 30% of the external sphincter, suprasphincteric, extrasphincteric, or horseshoe fistulas and fistulas associated with IBD, radiation, malignancy, preexisting fecal incontinence, or chronic diarrhea. "Simple" anal fistulas present none of these complexities and, in general, include in-

tersphincteric and low-transsphincteric fistulas involving less than 30% of the sphincter complex[32].

The guidelines advise fistulotomy for simple anal fistula with a strong recommendation based on moderate-quality evidence (1B), endoanal advancement flaps for anal fistula (1B), and LIFT for simple and complex anal fistulas (1B). Meanwhile, the surgeon may use a cutting seton with caution in managing complex cryptoglandular anal fistulas, with weak recommendations based on moderate-quality evidence (2B). The guidelines note that the fistula plug and fibrin glue treatment is relatively ineffective for anal fistula (2B).

For the diagnosis and treatment of cryptoglandular fistula, the ESCP website indicates that a guideline development group led by Gottgens (NE Maastricht) et al. is presently formulating research questions. Leenders et al.[33], another group involved in the development of the ESCP guidelines, suggest that the length of the gap from the external opening to the anal verge (DEOAV) predicts the complexity of a cryptoglandular anal fistula and, therefore, any necessity for additional imaging. This group measured DEAOV preoperatively and divided it into categories, namely, <1 cm, 1-2 cm, >2 cm, to determine the complexity of the fistula. The conclusion was that preoperative imaging is necessary in fistulas with an external opening of >1 cm from the anal verge.

The ACPGBI position statement on the management of anal fistula was first published in 2007[34] and the second edition statement in 2018[35]. In this article, perplexing conditions of anal fistula for the colorectal surgeon were reviewed. It concluded that the widely accepted cryptoglandular theory by Eisenhammer[36] and Parks[37] on the etiology of anal fistula is still the best explanation for the initiating event in most cases of idiopathic anal sepsis.

The ACPGBI's recommended imaging methods for anal fistula assessment include anal ultrasound, contrast fistulography, magnetic resonance imaging (MRI), and computed tomography. Anal ultrasound can be performed with or without three-dimensional reconstruction and with or without ultrasound contrast. MRI has been used with an endoanal receiver coil, a pelvic phased array coil, and with or without intravenous contrast, and with an assessment of magnetization transfer.

A range of surgical approaches is still employed, indicating a lack of a single ideal procedure applicable to every patient. In its findings and recommendations of surgical methods for fistulotomy in acute anorectal sepsis and inflammatory bowel disease, interestingly, the ACPGBI recommends "marsupialization" following fistulotomy to aid healing and reduce wound discharge (grade A). Traditional surgical methods of setons and procedures of advancement flaps such as transanal advancement flaps and cutaneous advancement flaps were also described.

New techniques using biocompatible materials, such as fibrin glue and fistula plugs, were also listed, as well as novel

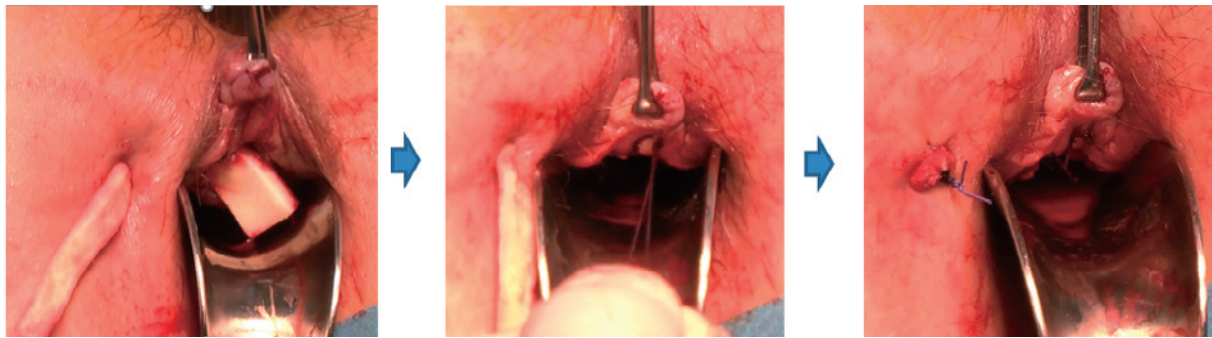


Figure 1. Fistula Plug.

techniques for the treatment of anal fistula, such as LIFT procedure, clips, lasers, video-assisted anal fistula treatment (VAAFT), and treatment using autologous adipose-derived stem cells (ADSCs). Initial work on these techniques achieved interesting results, with minimal adverse effects, although the outcomes of long-term follow-up were not definite. Few patient-reported outcome data are available, multicenter studies only have short or medium follow-up, and the functional outcome data remain limited.

Although there are no standard practice guidelines from ESCP, there have been some major meetings for anal fistula in Europe. German S3 guidelines[38] were one of them for the treatment of anal abscess and fistula. They suggest that only one of the following surgical interventions can treat anal fistulas: laying open (only for superficial fistulas), plastic surgical reconstruction with suturing of the sphincter (flap, sphincter repair, LIFT), seton drainage, and occlusion with biomaterials. Only superficial fistulas should be laid open. The thickness of the sphincter muscle that is divided significantly determines the risk of postoperative incontinence. All high anal fistulas should be treated with a sphincter-preserving procedure. The different plastic surgical reconstructive procedures all yield approximately the same results, whereas occlusion with biomaterials produces a lower cure rate.

Another international conference on anal fistula held in Rome, Italy, introduced various interesting techniques of fistula repair, such as treatment with dermal matrix plug, VAAFT, fistulotomy and primary sphincteroplasty, Permacol collagen paste, gracilis muscle transposition, fistulectomy and immediate repair with anoplasty, fistula laser closure (FiLaC), autologous micro-fragmented and minimally manipulated adipose tissue for complex fistulas, ADSC transplantation, and laser ablation of fistula tract[39].

LIFT[40] was one of the more widely accepted sphincter-preserving techniques for anal fistula surgery. Rojanasakul's preliminary results concerning non-healing and intact anal function were very promising, with a success rate of 94.4% for 17 patients. There was meta-analysis of the LIFT procedure from 24 original studies, including one randomized

controlled study, three case-control studies, and 20 case series. Most of the studies dealt with patients with transsphincteric or complex fistula that was not amenable to fistulotomy. In this report, the mean success rate was 76.4%, there was no fecal incontinence, and the complication rate was 5.5%[41].

The anal fistula plug is made from lyophilized porcine-derived small intestinal submucosa [Surgisis[®] anal fistula plug (AFP)] (Figure 1). At first, it was designed to act as scaffolding for the host fibroblast to promote tissue healing, augment damaged tissue, and bridge large tissue defects in the body. Ellis[42] and O'Connor[43] reported success rates of 88% and 80%, respectively. However, the success rates of others were more disappointing, which were 42.5%[44], 43%[45], and 44%[46].

Also, there were RCT studies comparing the results of fistula plug with endorectal advancement flap (ERAF) for the treatment of high transsphincteric anal fistulas. In these reports, no differences were observed between the two groups concerning continence, quality of life, and postoperative pain. However, the success rates were better in the ERAF group than in the fistula plug group[47,48]. There is no doubt that the ASCRS-described fistula plug is relatively ineffective for anal fistula (2B).

The use of over-the-scope clip (OTSC) for anal fistula was introduced a decade ago (Figure 2)[49]. One hundred cases in which a new clipping device was used, namely, the OTSC[®] Proctology (Ovesco Endoscopy AG), were analyzed to assess the device's effectiveness in treating complex anorectal fistulas. As first-line therapy, the healing rate was 79%, whereas in the recurrent fistulas, the rate was 26%. The healing rates of transsphincteric, suprasphincteric, extrasphincteric, and rectovaginal fistulas were 61%, 74%, 100%, and 20%, respectively[50]. However, other results were more disappointing, with a 47% overall success rate, 66.7% for simple, and 38.5% for complex[51].

On the other hand, a sphincter-preserving procedure using a narrow endoscope, the VAAFT technique[52], was widely accepted in Europe, the Middle East, and even Asia. VAAFT was developed in 2006 by Meinero, who reported his results

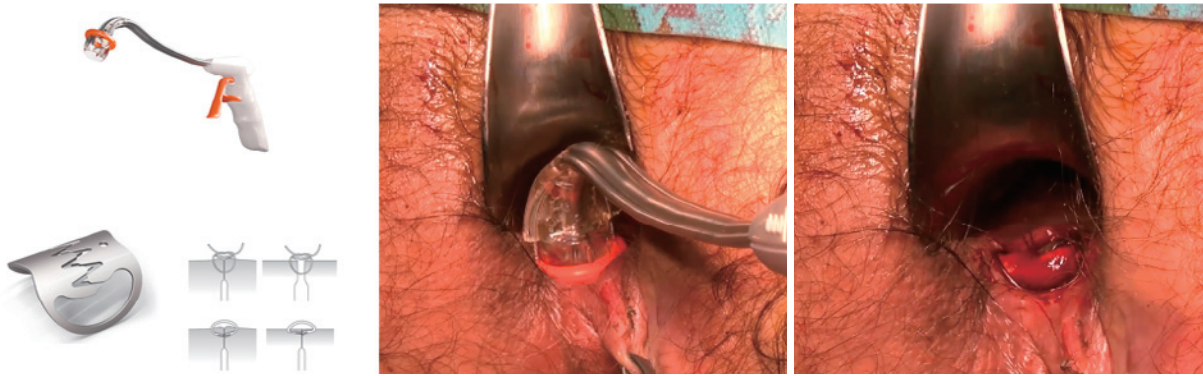


Figure 2. Over The Scope Clip (OTSC).



Figure 3. Video-Assisted Anal Fistula Treatment (VAAFT).

as a new sphincter-preserving procedure for complex anal fistulas. His initial work on VAAFT looked promising, with minimal adverse events; however, long-term follow-up results were also needed. The advantage of VAAFT appears to be that it can be performed when there is no identified primary opening or in the presence of blind sinus with or without active abscess (Figure 3).

Perianal fistula treatments with cultured mesenchymal stem cells derived from the adipose tissue or bone marrow have shown promising results in both Crohn's disease[53,54] and non-Crohn's disease patients[55]. Furthermore, the efficacy and safety of ADSC treatment in refractory complex anal fistulas of cryptoglandular origin are well known, as shown by many published studies[53,54,56]. There are also other studies of the use of autologous fat tissues[57] or micro-fragmented fats[56,58]. However, obstacles in terms of cost and time in ADSC treatment still remain, and hospitals face challenges in providing proper facilities and equipment, as well as in securing the proper expertise and technical know-how.

Anal Fissure

An anal fissure is a longitudinal, oval, ulcer-like tear in the anal canal that can extend from the dentate line to the

anal verge[59-63]. In almost 90% of cases, the anal fissures are observed in the posterior midline and cause pain during defecation and/or bleeding due to hypertonia of the internal anal sphincter, which results in ischemia.

The clinical practice guidelines for the management of anal fissures do not significantly vary worldwide. In acute anal fissures, conservative treatments including sitz baths and the use of psyllium fiber or other bulking agents with or without the addition of topical analgesics or topical hydrocortisone are recommended. These methods are well tolerated with minimal to no side effects.

Almost 50% of patients with acute anal fissures respond to conservative treatment, and non-responsive patients should be treated with other methods, such as topical nitric oxide. Increasing the dose does not improve healing rate but is associated with an increased incidence of headache. Topical nitrates are associated with healing in approximately 50% of chronic anal fissures. Approximately 50% of patients will experience recurrent fissures. Recurrent cases are considered candidates for botulinum toxin treatment or lateral internal sphincterotomy (LIS). Topical or oral calcium channel blockers can be used as an alternative of topical nitrates. These are considered as first-line treatments for chronic anal fissures[59-62].

Second-line treatments include botulinum toxin and LIS.

The limitation of botulinum toxin is the lack of standards for dosages, injection site, and number of injections for patient. LIS cures chronic anal fissure by preventing internal sphincter hypertonia and yields superior results compared with medical therapy in selected patients. Of all surgical options, LIS remains the preferred treatment for chronic anal fissures. Both open and closed techniques are available and show similar results[60]. Furthermore, judicious repeat application of LIS for recurrent anal fissure has shown good healing rates with minimal risk of fecal incontinence[64].

“Tailored” sphincterotomy, defined as a sphincterotomy tailored to the length of the fissure apex, has been proposed in an effort to reduce the rate of fecal incontinence after traditional LIS[65]. However, tailored sphincterotomy may have worse healing rates compared with traditional LIS. Spasm-controlled LIS has also been reported. Compared with a fissure apex group, an anal caliber of 30 mm was obtained through serial small sphincterotomies. The “controlled” sphincterotomy provided faster pain relief and was associated with a lower treatment failure rate than sphincterotomy up to the fissure apex, or “tailored” sphincterotomy[66].

Although LIS remains as the preferred treatment for chronic anal fissures, problems of fecal seepage and incontinence are reported in 8%-30% of patients[59]. A sphincter-preserving anocutaneous flap (dermal V-Y or house flap) procedure to prevent fecal incontinence following surgery can be an alternative surgical treatment method for chronic anal fissures. Flap surgeries have been associated with better rates of fissure healing and lower incidence of minor fecal incontinence. In a prospective study, Giordano et al. reported a 98% healing rate and concluded that simple cutaneous advancement flap anoplasty should be considered as a first-line surgical treatment for chronic anal fissure, regardless of a patient’s gender and anal tone[67]. Patel and colleagues[68] achieved healing in 96% of patients following anal fissurectomy with an anal advancement flap.

Conclusion

In terms of the management of hemorrhoids, hemorrhoidectomy, SH, and Doppler-guided hemorrhoidopexy (DGHAL) are accepted as novel surgical treatments. Furthermore, RBL, sclerotherapy (SCL), and infrared coagulation are on the list as office procedures in the guidelines of advanced countries. Because the shape and features of hemorrhoids are so variable, exclusive use of only one of these methods cannot treat all the types of hemorrhoids. In addition, only a well-experienced surgeon can consider the complexity of hemorrhoids.

Coloproctologists sharing their opinions about these problems in the international meeting have suggested “hybrid techniques,” such as a separate treatment through RBL for

internal hemorrhoids with skin tag excision, DGHAL with minimal excision of skin tag, or SH with skin tag excision or injection SCL (e.g., ALTA) with skin tag excision, to treat Grade IV hemorrhoids. These methods can be used as alternative treatments for the radical excision of hemorrhoids. However, some surgeons still prefer radical excision through conventional Milligan-Morgan, Ferguson, Parks, semi-closed, or other modified approaches to hemorrhoidectomy.

For the management of complex anal fistula, sphincter-preserving surgical techniques are more widely accepted than a sphincter-dividing procedure of immediate repair following fistulectomy. Representative sphincter-preserving techniques include LIFT, VAAFF, FiLaC, OTSC, Fistula plugs. Interests in biomaterials, mesenchymal stem cells, or anti-inflammatory tissue engineered products are also on the rise. In addition, trials of immunomodulation through tissue engineering and regenerative medical treatment in the treatment of chronic inflammation are currently gaining popularity.

Recent trends in the treatment of anal fissures are as before. Acute fissures occurring within 6-8 weeks may be treated with conservative care. Chronic fissures developing over 6-8 weeks should begin to be treated under careful investigation, taking into consideration anal sphincteric pressure. Both the medical and surgical management of chronic anal fissures are well covered in the treatment guidelines of the ASCRS.

Conflicts of Interest

There are no conflicts of interest.

References

1. Whitehead W. The surgical treatment of haemorrhoids. *Br Med J*. 1882 Feb; 1(1101): 148-50.
2. Whitehead W. Three hundred consecutive cases of haemorrhoids cured by excision. *Br Med J*. 1887 Feb; 1(1365): 449-51.
3. Lockhart-Mummery JP. Diseases of the rectum and colon and their surgical treatment. *Br J Surg*. 1934 Apr; 23(91): 687-8.
4. Smith D. Whitehead deformity. *J Am Med Assoc*. 1928 Sep; 91(12): 879-80.
5. Erzurumlu K, Karabulut K, Özbacı GS, et al. The Whitehead operation procedure: Is it a useful technique? *Turk J Surg*. 2017 Sep; 33(3): 190-4.
6. Milligan ETC, Morgan CN. Surgical anatomy of the anal canal and operative treatment of haemorrhoids. *Lancet*. 1937 Nov; 2: 1119-24.
7. Parks AG. The surgical treatment of haemorrhoids. *Br J Surg*. 1956 Jan; 43(180): 337-51.
8. Ferguson JA, Heaton JR. Closed hemorrhoidectomy. *Dis Colon Rectum*. 1959 Mar; 2(2): 176-9.
9. Moul HP, Aubert M, De Parades V. Classical treatment of hemorrhoids. *J Visc Surg*. 2015 Apr; 152(2): S3-9.
10. Suduca J-M, Vinson-Bonnet B, Higuero T, et al. Guidelines for the treatment of hemorrhoids (short report). *J Chir Visc*. 2016 Jun;

- 153(3): 220-4.
11. Davis BR, Lee-Kong SA, Migaly J, et al. The American Society of Colon and Rectal Surgeons clinical practice guidelines for the management of hemorrhoids. *Dis Colon Rectum*. 2018 Mar; 61(3): 284-92.
 12. Yamana T. Japanese practice guidelines for anal disorders I. hemorrhoids. *J Anus Rectum Colon*. 2017 Jul; 1(3): 89-99.
 13. Trompetto M, Clerico G, Cocorullo G, et al. Evaluation and management of hemorrhoids: Italian society of colorectal surgery (SICCR) consensus statement. *Tech Coloproctol*. 2015 Oct; 19(10): 567-75.
 14. Gallo G, Martellucci J, Sturiale A, et al. Consensus statement of the Italian society of colorectal surgery (SICCR): management and treatment of hemorrhoidal disease. *Tech Coloproctol*. 2020 Feb; 24(2): 145-64.
 15. Lee M, Morgan J, Watson A, et al. A validated severity score for haemorrhoids as an essential prerequisite for future haemorrhoid trials. *Tech Coloproctol*. 2019 Jan; 23(1): 33-41.
 16. Goligher J. Surgical anatomy and physiology of the anus rectum and colon. *Surg Anus Rectum Colon*. 1984 Jan: 1-44.
 17. Van Tol R, Kleijnen J, Watson A, et al. European Society of Coloproctology: guideline for haemorrhoidal disease. *Colorectal Dis*. 2020 Jun; 22(6): 650-62.
 18. Gaj F, Trecca A. New "PATE 2006" system for classifying hemorrhoidal disease: advantages resulting from revision of "PATE 2000 Sorrento". *Chir Ital*. 2007 Jul; 59(4): 521-6.
 19. Elbetti C, Giani I, Novelli E, et al. The single pile classification: a new tool for the classification of haemorrhoidal disease and the comparison of treatment results. *Updates Surg*. 2015 Dec; 67(4): 421-6.
 20. Lunniss P, Mann C. Classification of internal haemorrhoids: a discussion paper. *Colorectal Dis*. 2004 Jul; 6(4): 226-32.
 21. Barron J. Office ligation of internal hemorrhoids. *Am J Surg*. 1963 Apr; 105(4): 563-70.
 22. Aigner F, Kronberger I, Oberwalder M, et al. Doppler-guided haemorrhoidal artery ligation with suture mucopexy compared with suture mucopexy alone for the treatment of Grade III haemorrhoids: a prospective randomized controlled trial. *Colorectal Dis*. 2016 Jul; 18(7): 710-6.
 23. Gupta P, Kalaskar S, Taori S, et al. Doppler-guided hemorrhoidal artery ligation does not offer any advantage over suture ligation of grade 3 symptomatic hemorrhoids. *Tech Coloproctol*. 2011 Dec; 15(4): 439-44.
 24. Agarwal N, Singh K, Sheikh P, et al. Executive summary-The Association of Colon & Rectal Surgeons of India (ACRSI) practice guidelines for the management of haemorrhoids -2016. *Indian J Surg*. 2017 Feb; 79(1): 58-61.
 25. Limura E, Giordano P. Modern management of anal fistula. *World J Gastroenterol*. 2015 Jan; 21(1): 12.
 26. Garcia-Aguilar J, Belmonte C, Wong WD, et al. Anal fistula surgery. *Dis Colon Rectum*. 1996 Jul; 39(7): 723-9.
 27. Dudukgian H, Abcarian H. Why do we have so much trouble treating anal fistula? *World J Gastroenterol*. 2011 Jul; 17(28): 3292.
 28. Nabiyah B, Muhammad U. Factors increasing the risk of recurrence in fistula-in-ano. *Cureus*. 2019 Mar; 11(3): e4200.
 29. Mei Z, Wang Q, Zhang Y, et al. Risk factors for recurrence after anal fistula surgery: a meta-analysis. *Int J Surg*. 2019 Sep; 69: 153-64.
 30. Jordán J, Roig J, García-Armengol J, et al. Risk factors for recurrence and incontinence after anal fistula surgery. *Colorectal Dis*. 2010 Mar; 12(3): 254-60.
 31. Yamana T. Japanese practice guidelines for anal disorders II. Anal fistula. *J Anus Rectum Colon*. 2018 Jul; 2(3): 103-9.
 32. Vogel JD, Johnson EK, Morris AM, et al. Clinical practice guideline for the management of anorectal abscess, fistula-in-ano, and rectovaginal fistula. *Dis Colon Rectum*. 2016 Dec; 59(12): 1117-33.
 33. Leenders L, Stijns J, Van Loon Y, et al. The complexity of cryptoglandular fistula-in-ano can be predicted by the distance of the external opening to the anal verge; implications for preoperative imaging? *Tech Coloproctol*. 2021 Jan; 25(1): 109-15.
 34. Williams J, Farrands P, Williams A, et al. The treatment of anal fistula: ACPGBI Position Statement. *Colorectal Dis*. 2007 Oct; 9: 18-50.
 35. Williams G, Williams A, Tozer P, et al. The treatment of anal fistula: second ACPGBI Position Statement-2018. *Colorectal Dis*. 2018 Jul; 20: 5-31.
 36. Eisenhammer S. A new approach to the anorectal fistulous abscess based on the high intermuscular lesion. *Surg Gynec Obstet*. 1958 May; 106: 595-9.
 37. Parks AG. Pathogenesis and treatment of fistula-in-ano. *Br Med J*. 1961 Feb; 1(5224): 463.
 38. Ommer A, Herold A, Berg E, et al. German S3 guidelines: anal abscess and fistula (second revised version). *Langenbecks Arch Surg*. 2017 Mar; 402(2): 191-201.
 39. Ratto C, Parello A, Litta F, et al. International Conference "Anal Fistula" July 2-3, 2018. *Tech Coloproctol*. 2019 Oct; 23(2): 183-91.
 40. Rojanasakul A, Pattanaarun J, Sahakitrungruang C, et al. Total anal sphincter saving technique for fistula-in-ano; the ligation of intersphincteric fistula tract. *J Med Assoc Thai*. 2007 Mar; 90(3): 581.
 41. Hong KD, Kang S, Kalaskar S, et al. Ligation of intersphincteric fistula tract (LIFT) to treat anal fistula: systematic review and meta-analysis. *Tech Coloproctol*. 2014 Aug; 18(8): 685-91.
 42. Ellis CN. Bioprosthetic plugs for complex anal fistulas: an early experience. *J Surg Educ*. 2007 Jan; 64(1): 36-40.
 43. O'Connor L, Champagne BJ, Ferguson MA, et al. Efficacy of anal fistula plug in closure of Crohn's anorectal fistulas. *Dis Colon Rectum*. 2006 Oct; 49(10): 1569-73.
 44. El-Gazzaz G, Zutshi M, Hull T. A retrospective review of chronic anal fistulae treated by anal fistulae plug. *Colorectal Dis*. 2010 May; 12(5): 442-7.
 45. Christoforidis D, Etzioni DA, Goldberg SM, et al. Treatment of complex anal fistulas with the collagen fistula plug. *Dis Colon Rectum*. 2008 Oct; 51(10): 1482-7.
 46. Thekkinkattil D, Botterill I, Ambrose N, et al. Efficacy of the anal fistula plug in complex anorectal fistulae. *Colorectal Dis*. 2009 Jul; 11(6): 584-7.
 47. Ortiz H, Marzo J, Ciga M, et al. Randomized clinical trial of anal fistula plug versus endorectal advancement flap for the treatment of high cryptoglandular fistula in ano. *Br J Surg*. 2009 Jun; 96(6): 608-12.
 48. Koperen PJ, Bemelman WA, Gerhards MF, et al. The anal fistula plug treatment compared with the mucosal advancement flap for cryptoglandular high transsphincteric perianal fistula: a double-blinded multicenter randomized trial. *Dis Colon Rectum*. 2011

- Apr; 54(4): 387-93.
49. Prosst R, Herold A, Joos A, et al. The anal fistula claw: the OTSC clip for anal fistula closure. *Colorectal Dis.* 2012 Sep; 14(9): 1112-7.
 50. Prosst R, Joos A. Short-term outcomes of a novel endoscopic clipping device for closure of the internal opening in 100 anorectal fistulas. *Tech Coloproctol.* 2016 Nov; 20(11): 753-8.
 51. Grossberg S, Harran N, Bebington B, et al. Use of the OVESCO OTSC® Proctology Clip for closure of fistula-in-ano at Wits Donald Gordon Medical Centre-a single centre experience. *S Afr J Surg.* 2020 Jun; 58(2): 74-7.
 52. Meinero P, Mori L. Video-assisted anal fistula treatment (VAAFT): a novel sphincter-saving procedure for treating complex anal fistulas. *Tech Coloproctol.* 2011 Dec; 15(4): 417-22.
 53. Panés J, García-Olmo D, Van Assche G, et al. Expanded allogeneic adipose-derived mesenchymal stem cells (Cx601) for complex perianal fistulas in Crohn's disease: a phase 3 randomised, double-blind controlled trial. *Lancet.* 2016 Sep; 388(10051): 1281-90.
 54. Garcia-Olmo D, Herreros D, Pascual M, et al. Treatment of enterocutaneous fistula in Crohn's disease with adipose-derived stem cells: a comparison of protocols with and without cell expansion. *Int J Colorectal Dis.* 2009 Jan; 24(1): 27-30.
 55. Borowski DW, Gill TS, Agarwal AK, et al. Autologous adipose-tissue derived regenerative cells for the treatment of complex cryptoglandular fistula-in-ano: a report of three cases. *Case Rep.* 2012 Nov; 2012: bcr2012006988.
 56. Laureti S, Gionchetti P, Cappelli A, et al. Refractory complex Crohn's perianal fistulas: a role for autologous microfragmented adipose tissue injection. *Inflamm Bowel Dis.* 2020 Jan; 26(2): 321-30.
 57. Dige A, Hougaard HT, Agnholt J, et al. Efficacy of injection of freshly collected autologous adipose tissue into perianal fistulas in patients with Crohn's disease. *Gastroenterology.* 2019 Jun; 156(8): 2208-16.
 58. Naldini G, Sturiale A, Fabiani B, et al. Micro-fragmented adipose tissue injection for the treatment of complex anal fistula: a pilot study accessing safety and feasibility. *Tech Coloproctol.* 2018 Feb; 22(2): 107-13.
 59. Stewart Sr DB, Gaertner W, Glasgow S, et al. Clinical practice guideline for the management of anal fissures. *Dis Colon Rectum.* 2017 Jan; 60(1): 7-14.
 60. Farkas N, Solanki K, Frampton AE, et al. Are we following an algorithm for managing chronic anal fissure? A completed audit cycle. *Ann Med Surg (Lond).* 2016 Feb; 5: 38-44.
 61. Arroyo A, Montes E, Calderón T, et al. Treatment algorithm for anal fissure. Consensus document of the Spanish Association of Coloproctology and the Coloproctology Division of the Spanish Association of Surgeons. *Cir Española (Engl).* 2018 May; 96(5): 260-7.
 62. Cross K, Massey E, Fowler A, et al. The management of anal fissure: ACPGBI position statement. *Colorectal Dis.* 2008 Nov; 10(3): 1-7.
 63. Tarasconi A, Perrone G, Davies J, et al. Anorectal emergencies: WSES-AAST guidelines. *World J Emerg Surg.* 2021 Dec; 16(1): 1-45.
 64. Liang J, Church JM. Lateral internal sphincterotomy for surgically recurrent chronic anal fissure. *Am J Surg.* 2015 Oct; 210(4): 715-9.
 65. Montes BB, Ege B, Leventoglu S, et al. Extent of lateral internal sphincterotomy: up to the dentate line or up to the fissure apex? *Dis Colon Rectum.* 2005 Feb; 48(2): 365-70.
 66. Montes BB, Güner MK, Leventoglu S, et al. Fine-tuning of the extent of lateral internal sphincterotomy: spasm-controlled vs. up to the fissure apex. *Dis Colon Rectum.* 2008 Jan; 51(1): 128-33.
 67. Giordano P, Gravante G, Grondona P, et al. Simple cutaneous advancement flap anoplasty for resistant chronic anal fissure: a prospective study. *World J Surg.* 2009 May; 33(5): 1058-63.
 68. Patel SD, Oxenham T, Praveen BV. Medium-term results of anal advancement flap compared with lateral sphincterotomy for the treatment of anal fissure. *Int J Colorectal Dis.* 2011 Sep; 26(9): 1211-4.

Journal of the Anus, Rectum and Colon is an Open Access journal distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view the details of this license, please visit (<https://creativecommons.org/licenses/by-nc-nd/4.0/>).