World Journal of Pharmaceutical and Life Sciences

Impact Factor: 8.21 www.wjpls.org Coden USA: WJPLA7

# A REVIEW ON CURRENT MEDICAL PARADIGMS PERTAINING TO THE MANAGEMENT OF FISTULA-IN-ANO

**Dr. Preeti G. Verma[1]*, Dr. Kamalakar V. Gajare[2]**

[1]PhD Scholar, Department of Shalyatantra, MAM's Sumatibhai Shah Ayurved Mahavidyalaya, Hadapsar, Pune, Maharashtra-411028.

[2]Professor, Department of Shalyatantra, MAM's Sumatibhai Shah Ayurved Mahavidyalaya, Hadapsar, Pune, Maharashtra-411028.

***Corresponding Author: Dr. Preeti G. Verma**

PhD Scholar, Department of Shalyatantra, MAM's Sumatibhai Shah Ayurved Mahavidyalaya, Hadapsar, Pune, Maharashtra-411028.

**DOI:** https://doi.org/10.5281/zenodo.20963353

**How to cite this Article:** Dr. Preeti G. Verma[1]*, Dr. Kamalakar V. Gajare[2] (2026). A Review on Current Medical Paradigms Pertaining To The Management of Fistula-In-Ano. World Journal of Pharmaceutical and Life Sciences, 12(6), 370–375.



**Article Received on 05/05/2026** **Article Revised on 25/05/2026** **Article Published on 01/06/2026**

## ABSTRACT

Cryptoglandular abscesses resulting from occluded and infected anal glands in the inter-sphincteric plane are the cause of anal fistulas. There are five grades and an incidence of 8.6 per 100,000. Anorectal fistulas can be brought on by foreign objects, radiation, infection, neoplasm, epithelialization, and distal obstruction. Obesity, diabetes, hyperlipidaemia, a history of surgery, salt consumption, smoking, and patients under 40 or with recurrent abscesses are risk factors. Imaging methods such as endo-anal ultrasound, CT pelvis, CT-fistulography, and pelvic MRI are crucial for diagnosis. The prognosis for anal fistulas varies; for sphincter-preserving procedures, the healing rate for simple fistulas is approximately 80%, while that of complex fistulas is approximately 60%. Up to 80–90% of setons have been successfully used; however, incomplete division, resection, or ligation can lead to failure. The gold standard for treating acute anal fistulas is fistulotomy, though there are other options. Reducing the number of procedures, customizing treatment for high-risk patients, educating patients about the risks of fecal incontinence, and obtaining preoperative imaging to more precisely classify fistulas are all important aspects of prevention.

**KEYWORDS:** Fistula in Ano, Anorectal fistula, Fistulotomy, Complex fistulas.

## INTRODUCTION

Cryptoglandular abscesses resulting from occluded and infected anal glands in the inter-sphincteric plane are a common cause of anal fistulas. These can happen in as many as 40% of cases, and the formation of spontaneously draining abscesses is more common. There are 8.6 cases for every 100,000 people.[1] Anal fistulas are categorized according to their anatomical locations and are distinguished by the tract's position in relation to the internal and external sphincters.

Approximately fifty percent of all cryptoglandular fistulas are inter sphincteric fistulas, which are the most prevalent kind. Both sphincters are involved in trans sphincteric fistulas, which call for more involved or phased care. Before changing direction caudally to their external opening, supra sphincteric fistulas pass through the puborectalis muscle and travel superior to the external sphincter. Extra sphincteric fistulas have an external opening in the perianal region and frequently develop in the proximal rectum as a consequence of a procedure. Imaging is used by St. James University Hospital (SJUH) to categorize these fistulas into five grades according to their anatomic location.

Grade 2 fistulas have an additional fistulous tract or concurrent abscess, whereas grade 1 fistulas are straightforward linear inter sphincteric fistulas. The external sphincter is involved in grades 3 and 4, and an atypical aetiology may be indicated by grade 5 fistulas. Compared to intraoperative findings, the SJUH classification is more predictive of surgical outcome and offers surgeons an objective preoperative evaluation. When treating fistulas in Crohn's disease, the underlying illness should be taken into consideration.

Similar to fistulotomy, fistulectomy entails removing the entire fistula tract. Fistulectomy and fistulotomy did not significantly differ in terms of recurrence or postoperative incontinence in low fistulas, according to a recent meta-analysis of six randomized controlled trials.[2]

## ETIOLOGY

Foreign bodies, radiation, infection, epithelialization, neoplasm, and distal obstruction are some of the causes of fistulas. It is possible to purposefully place foreign objects in the rectum to lower a fistula tract and promote healing. Anorectal fistulas, which can arise from a blockage of the anal glands and crypts, are most frequently caused by infection.

Anorectal abscesses can develop on their own, and the rate of fistula formation can be reduced by taking antibiotics for five to ten days. Proper surgical management requires an understanding of anorectal anatomy.[3]

Infections that are sexually transmitted (STIs) of the rectum and anus may put people at risk for fistulas and perianal abscesses. Anal fistulas can also be caused by radiation proctitis, which in less than 10% of cases calls for surgery. Anal fistulas and anorectal disease are more common in HIV-positive patients. Although they frequently heal on their own, complicated vaginal deliveries with third or fourth-degree tears or the need for an episiotomy may increase the risk of anal fistulas. The striated voluntary muscle fibres that make up the external sphincter are essential for preserving fecal continence.[4]

## EPIDEMIOLOGY

Anorectal fistulas are uncommon, affecting 1–8 out of every ten thousand people each year. Obesity, diabetes, hyperlipidaemia, a history of surgery, and salt consumption are risk factors. Additionally, smoking is associated with the development of fistulas and recurrent anal fistulas. Anal fistulas may be more common in patients under 40 or with recurrent abscesses.[5]

## PATHOPHYSIOLOGY

An anal fistula, which is characterized by granulation and inflammatory tissue, is an epithelialized link between the anal canal and the external peri-anal region. Debris-related distal obstruction hinders healing. Setons promote fistula migration and healing by enabling continuous drainage.[6]

## HISTOLOGY

When an atypical aetiology, such as infectious or malignant, is suspected, histologic examination of fistula tissue is advised. Except in cases of recurrent fistula or suspected HIV, TB, or Crohn's disease, anal fistula surgery tissue is typically not sent for pathologic analysis. A fistula tract makes up the majority of fistula pathology.[7]

## HISTORICAL PERSPECTIVE

Determining the cause of a perianal fistula in patients who have not recently had a perirectal abscess drained requires a comprehensive history, review of systems, and physical examination. Inflammatory bowel disease patients may exhibit systemic symptoms, bloody diarrhoea, tenderness, or abdominal pain. Since lymphogranuloma venereum can result in a perianal fistula, a thorough sexual history is crucial.[8] Since radiation-induced fistulas are well-documented, a history of cancer or pelvic radiation is crucial. Suspicion of syphilis should be raised by a history of rash or several new sexual partners. Concerns about a systemic process are raised by multiple draining fistulas, abnormal locations, and chronic or recurrent fistulas.[9]

## IMAGING METHODS

Several imaging methods, such as endo-anal ultrasound, CT pelvis, CT-fistulography, and MRI of the pelvis, can be used to diagnose anorectal fistulas. While CT scans and CT fistulograms are helpful for locating abscesses and drainable fluid collections, endoanal ultrasound is a less costly and invasive way to check for abscesses. Although CT fistulography is inexpensive, it necessitates a skilled surgeon for contrast injection as well as knowledgeable radiologists.[10] Fistulous tracts and underlying abscesses have been identified with comparable efficiency using multidetector CT. An effective preoperative technique is magnetic resonance imaging (MRI), especially for complicated fistulas and those with an external opening larger than 2 cm from the anus. In addition to helping with surgical planning and lowering fistula recurrence, MRI is sensitive and specific in identifying fistulous tracts and characterizing their internal and external openings. Additionally, it works well for detecting post-operative complications like recurrent fistulas or abscesses.[11] To ascertain the course of the fistulous tract or its aetiology, patients should have laboratory results, such as a complete blood count and a comprehensive metabolic panel.

## DIVERSE EVALUATION

Atypical presentations of sexually transmitted diseases, infectious processes, and common anorectal conditions are all included in the differential diagnosis of anal fistula. Anal fissures, warts, haemorrhoids, condyloma acuminate, perianal abscesses, and solitary rectal ulcer syndrome are common ailments. Anal fistula symptoms in HIV-positive individuals may also be a sign of lymphoma or Kaposi sarcoma.[12]

## PROGNOSIS

The prognosis for anorectal fistulas varies based on the cause. For sphincter-preserving procedures, the healing rate for simple fistulas is approximately 80%, whereas that of complex fistulas is about 60%. Up to 80–90% of setons have been used successfully; however, these are evaluated after six months. After 12 weeks, fistulas treated with fistulotomy or fistulectomy should be completely healed.[13] Incomplete division, incomplete

resection, or incomplete ligation can all lead to surgical therapy failure. Crohn's disease and smoking are risk factors for flap treatment failure. Inadequate covering, inadequate debridement, and early dislodgement are the main causes of anal fistula plug failure. Recurrent fistulas are treated with additional procedures, such as MRIs and anaesthesia exams.[14] For recurrent fistulas, a sphincter-preserving strategy works best, particularly if the initial treatment was a fistulotomy or fistulectomy. Setons should be viewed as a staged procedure that is succeeded by a fistulotomy.

**AN ADVANCE ON SURGICAL METHODS FOR ANAL FISTULAS MANAGEMENT:**

**A) GARG CARDINAL PRINCIPLES FOR COMPLICATED FISTULA MANAGEMENT**

According to Garg,[15] the three management principles for complex fistulas in ano are as follows: (1) the inter sphincteric tract resembles an abscess in a closed space (ISTAC); (2) drain all pus and maintain continuous drainage (DRAPED) following surgery until full healing takes place; and (3) healing proceeds gradually until it is irreversibly disrupted by a collection (HOPTIC). More precisely, according to ISTAC, a fistula tract in the inter sphincteric space should be drained because it functions similarly to an abscess in a confined space. DRAPED emphasizes how crucial it is to remove pus and maintain efficient drainage during the postoperative phase until healing is finished. According to HOPTIC theory, the healing process continues unless a buildup of pus or serous fluid stops it or permanently obstructs it. To get the best outcomes, surgical procedures should follow these guidelines. For example, procedures based on the principles of ISTAC and DRAPED, like fistulectomy with primary reconstruction (FPR) and trans anal opening of the inter sphincteric space (TROPIS),[16-18] frequently produce better results than the ligation of the inter sphincteric fistula tract (LIFT) method. Moderate success rates have been achieved with the LIFT technique, which mainly concentrates on ISTAC and ignores DRAPED (because the opened inter sphincteric space is not maintained postoperatively).

**B) MANAGEMENT OF AN EXTRA SUPRALEVATOR OPENING IN A COMPLICATED FISTULA**

When a supra levator fistula in ano has an additional supra levator rectal opening (ASRO) beyond the primary internal opening at the dentate line, it can be extremely difficult to manage. There were no literature or guidelines on the management of ASROs prior to recent research.[19] carried out the first investigation into this problem in 2021. The ASRO was treated in three different ways in that comparative study: (1) the ASRO was laid open into the rectum in continuity with the primary opening at the dentate line; (2) the mucosa surrounding the ASRO was cauterized; or (3) the ASRO was left untreated. The results indicated that regardless of the choice used, the ASRO healed well. This finding emphasizes how crucial it is to manage the primary opening at the dentate line because it seems to be the primary factor in fistula healing. Additionally, the study offers comforting proof that the fistula's final outcome is unaffected by not treating the ASRO.

**C) MANAGING FISTULAS WITH INTERNAL OPENINGS THAT CANNOT BE LOCATED**

Even after a comprehensive examination and assessment using MRI or transrectal ultrasound, the internal or primary opening cannot be found in 10% to 25% of anal fistula cases. A recurrence risk that is up to 22 times higher than that of cases where the opening can be located is linked to a non-locatable internal opening.[20] The Garg protocol was created to solve the problem, and it has proven to be very successful in handling formulas with non-locatable internal openings.

**The Garg protocol:** In this procedure, the location of the fistula closest to the internal sphincter is determined by reevaluating MRI or EAUS. Treatment is scheduled based on the assumption that the internal opening is located here. According to the protocol, horseshoe anal fistulas without a visible internal opening are likely to have an internal opening in the midline, specifically in the anterior midline for anterior horseshoe fistulas and the posterior midline for posterior horseshoe fistulas.[20]

**D) FISTULOTOMY**

The most effective treatment for low fistulas is still fistulotomy. However, because of worries about incontinence, this procedure is extremely underutilized. Given that fistulotomy is linked to the highest success rates—between 95% and 100%—this underutilization is unfortunate. Consequently, needless recurrences may occur when low fistulas that are suitable for fistulotomy are treated with alternative therapies that have lower success rates. The Garg classification is crucial in this situation because it aids surgeons in identifying which fistulas can safely undergo fistulotomy (Garg grades I–II) and which shouldn't (Garg grades III–V). Promising results have been observed in recent attempts to close the sphincter following fistulotomy. Fistulotomy with primary sphincteroplasty (FIPS) should be regarded as a feasible treatment option for certain simple anal fistulas, particularly inter sphincteric and low trans sphincteric types, according to a study evaluating the procedure's safety and long-term effectiveness.[21] Fistulotomy has a number of advantages over fistulectomy, including shorter operating times, shorter hospital stays following surgery, quicker wound healing, less pain following surgery, and fewer complications following surgery.[22] For patients with simple low-lying fistula in ano, fistulotomy has proven to be more effective than fistulectomy because of these advantages.[22]

**E) PRIMARY RECONSTRUCTION POST FISTULECTOMY**

While fistulectomy for high fistulas carries a high risk of failure, fistulectomy for low fistulas is marginally less successful than fistulotomy. As a result, there has been a

lot of interest in FPR, which includes primary sphincter repair. FPR has a low effect on continence and a high success rate (90%–95%).[23,24] However, FPR is a technically difficult procedure and is typically not advised for supra sphincteric fistulas and high trans sphincteric fistulas (those involving more than two thirds of the EAS).[23,24]

**F) TRANSANAL OPENING OF THE INTERSPHINCTERIC SPACE: (TROPIS)**

The most promising of these methods for treating complicated anal fistulas is the TROPIS procedure, a newly created sphincter-preserving technique. The ISTAC and DRAPED principles serve as the foundation for this process. For two key reasons, TROPIS is a significant improvement in the management of complex fistulas. By deroofing it into the anal canal using a trans anal technique, it first successfully addresses the inter sphincteric portion of the fistula tract. Second, through secondary intention, it facilitates the healing of the deroofed inter sphincteric tract and the internal opening. To access the fistula tract inside the inter sphincteric space during the TROPIS procedure, artery forceps are trans anally inserted into the internal opening. Electrocautery is used to cut the mucosa and internal sphincter above the artery forceps and trim the edges. The fistula tract in the inter sphincteric space is then opened into the anal canal. Secondary intention leaves this wound open to healing. The fundamental idea behind TROPIS is that healing in the presence of sepsis is more successful and dependable when secondary intention is used rather than primary intention, which would entail trying to seal the internal opening with sutures. Any technique the surgeon deems practical, such as excision or curettage with the insertion of a drainage tube or laser ablation, can be used to manage fistula tracts lateral (or external) to the EAS. According to a recent meta-analysis, long-term follow-up studies carried out worldwide showed that the TROPIS procedure has a success rate of 86%–93% (with a weighted healing rate of 89%) for treating complex high fistulas.[23] TROPIS has the highest cure rate of all the procedures reviewed, according to another meta-analysis on sphincter-sparing surgical techniques for complex anal fistula.[23] TROPIS's high success rate as a conclusive primary single-stage procedure for fistulas connected to abscesses is another advantage.[24]

**G) LIGATION OF THE INTERSPHINCTERIC FISTULA TRACT: (LIFT)**

For more than ten years, the LIFT procedure has been widely used to treat complex fistulas while preserving the sphincter. High success rates have been reported in a number of studies; a recent meta-analysis found that the pooled success and complication rates for LIFT were roughly 76% and 14%, respectively.[25] Nevertheless, a prospective randomized controlled trial that contrasted LIFT with alternative surgical methods discovered that LIFT had a lower success rate—roughly 42%.[26] The procedure's heavy reliance on the operator's skill could be the cause of this disparity. Surgical results have improved with modifications to LIFT, such as the addition of a bioprosthetic graft (BioLIFT).[27] Furthermore, it was discovered that using bone marrow mononuclear cells sped up healing, but this did not result in higher rates of healing success.[28]

**H) SPHINCTER-SPARING TECHNIQUES CENTERED AROUND CONVENTIONAL DEVICES:**

Fibrin glue,[29] anal fistula plug,[30] over-the-scop clip (OTSC),[31] video-assisted anal fistula treatment,[32] laser treatment for fistula in ano (Fistu-tract Laser Closure[FiLaC] or laser ablation of fistula tract[LAFT]),[33,34] and FiXcision[35] are some of the device-based procedures that have been developed and studied over the past ten years. At first, these device-based procedures showed a promising success rate of 70% to 90%. Nevertheless, the success rate has significantly decreased to 20% to 55% over time. These techniques seem to be useful for maintaining continence in extremely complicated fistulas, which is the main reason they were created. However, rather than focusing solely on a cohort of complex fistulas, nearly all research on these procedures has been done on simpler fistulas. These studies have reported success rates ranging from 30% to 60%, mostly for simple fistulas. The success rate of fistulotomy for simple fistulas is between 95% and 100%, and no decline in continence is observed. Despite the fact that these device-based techniques were initially developed for highly complex fistulas, their usefulness is called into question by the dearth of data in this particular subset (that is, high complex fistulas only). However, if patients are fully informed about the high risk of recurrence, these procedures may be offered to those who prefer sphincter-sparing options. Crucially, the inter sphincteric part of fistula tracts is not addressed by these device-based procedures, which instead focus on managing the external aspects of the tract. As a result, these procedures are less successful in treating complex high fistulas, which usually involve a portion of the fistula tract within the inter sphincteric plane, than they are in treating simple low fistulas, which usually have little to no inter sphincteric involvement.

**I)SETON THERAPY FOR FISTULA IN ANO**

The loose draining seton is still used to treat acute abscesses and manage anal fistulas as a supplement to other treatments. Nonetheless, the cutting stone is still in use in many parts of the world.[36] The cutting seton shows a high success rate for low fistulas, but it is less desirable than fistulotomy due to its higher morbidity and pain.[37] Cutting seton use has been associated with a decrease in consistency in the context of high fistulas, but there is currently insufficient data to draw firm conclusions. The "tube in tract" method is another cutting-edge approach that replaces the draining seton.[38] This method involves inserting a suitable-sized draining tube into the external tract, placing it in the ischiorectal fossa without passing through the EAS. After that, the

tube is sutured to the skin. Compared to a loose draining seton, this method offers a number of advantages. Compared to a draining seton, which extends through the internal opening and keeps it patent, it has a higher chance of fistula closure because it does not pass through the internal opening or the EAS. Drainage may occasionally be stopped by the sling adhering to or closing around the seton; this problem does not arise with a draining tube. Additionally, the tube's size can be changed to suit the required drainage volume. The fundamental idea is that the skin at the external opening is problematic because it often closes too soon, which causes pus to build up. The problem is more successfully resolved by using a draining tube to make sure the skin at the opening stays patent.

**J) PRP IN THE MANAGEMENT OF FISTULAS**

When used in conjunction with other procedures, platelet-rich plasma (PRP) has demonstrated favourable outcomes. In comparison to other tested approaches, a meta-analysis found that the combination of LIFT and PRP resulted in lower failure and complication rates in the treatment of complex anal fistula.[39] According to a different meta-analysis, the cure rate for PRP alone was 62.39%, while the success rate for PRP in combination with other procedures was roughly 72.11%.[40] Long-term outcomes are still expected, though.

**K) STEM CELL THERAPY FOR FISTULAS:**

Mesenchymal stem cell therapy is still in its early stages, but it shows great short-term efficacy and may be a novel therapeutic approach for complex peri-anal fistulas.[41] With healing rates of up to 50%, autologous adipose-derived stem cells have also produced encouraging results.[42] Although stem cell therapy's safety profile is its main selling point, its application is frequently restricted because of its high cost.

**OUTCOMES**

Anal fistulas remain a therapeutic challenge, especially when they are complex. These methods are now essential for diagnosis, disease assessment, and management planning due to advancements in diagnostic modalities like MRI and EAUS. The Garg classification, a new and enhanced classification system that helps surgeons distinguish between simple and complex fistulas, was also made possible by MRI. Anatomical spaces that were previously unknown, like the outer sphincteric space, and fistula spread pathways, like the RIFIL fistula, have been identified thanks to MRI. Additionally, MRI is essential for evaluating and verifying fistula postoperative healing. Better understanding of the role of appropriately treating the fistula tracts inter sphincteric portion has led to higher cure rates. Over the past ten years, a number of new device-based procedures have been introduced, but none have shown much promise thus far. Even though the field of anal fistulas has advanced significantly, there is still much to be done.

**REFERENCES**


1. Jimenez M, Mandava N. Anorectal Fistula. In: StatPearls. Treasure Island (FL): StatPearls Publishing, 2024.
2. Hiremath SCS, Patil R. Fistulotomy versus Fistulectomy for Fistula-in-Ano: A Randomized Prospective Study. Surg J N Y N., Oct., 2022; 8(4): e336–40.
3. Galie KL, Whitlow CB. Postoperative enterocutaneous fistula: when to reoperate and how to succeed. Clin Colon Rectal Surg, Nov., 2006; 19(4): 237–46.
4. Assi R, Hashim PW, Reddy VB, Einarsdottir H, Longo WE. Sexually transmitted infections of the anus and rectum. World J Gastroenterol, Nov. 7, 2014; 20(41): 15262–8.
5. Wang D, Yang G, Qiu J, Song Y, Wang L, Gao J, et al. Risk factors for anal fistula: a case-control study. Tech Coloproctology, Jul., 2014; 18(7): 635–9.
6. Tabry H, Farrands PA. Update on anal fistulae: surgical perspectives for the gastroenterologist. Can J Gastroenterol J Can Gastroenterol, Dec. 2011; 25(12): 675–80.
7. Wijekoon NS, Samarasekera DN. The value of routine histopathological analysis in patients with fistula in-ano. Colorectal Dis Off J Assoc Coloproctology G B Irel, Feb., 2010; 12(2): 94–6.
8. Tarasconi A, Perrone G, Davies J, Coimbra R, Moore E, Azzaroli F, et al. Anorectal emergencies: WSES-AAST guidelines. World J Emerg Surg, Sep., 16, 2021; 16(1): 48.
9. Sadighian M, Hakam N, Amend G, Shaw NM, Tahir P, Allen IE, et al. Radiation-induced Fistulas in Patients With Prior Pelvic Radiotherapy for Prostate Cancer: A Systematic Review and Meta-analysis. Urology, Jun., 2023; 176: 121–6.
10. Sharma A, Yadav P, Sahu M, Verma A. Current imaging techniques for evaluation of fistula in ano: a review. Egypt J Radiol Nucl Med., Jul., 22, 2020; 51(1): 130.
11. Bhatt S, Jain BK, Singh VK. Multi Detector Computed Tomography Fistulography In Patients of Fistula-in-Ano: An Imaging Collage. Pol J Radiol, 2017; 82: 516–23.
12. Gardner IH, Siddharthan RV, Tsikitis VL. Benign anorectal disease: hemorrhoids, fissures, and fistulas. Ann Gastroenterol, Feb., 2020; 33(1): 9–18.
13. Charalampopoulos A, Papakonstantinou D, Bagias G, Nastos K, Perdikaris M, Papagrigoriadis S. Surgery of Simple and Complex Anal Fistulae in Adults: A Review of the Literature for Optimal Surgical Outcomes. Cureus, Mar., 2023; 15(3): e35888.
14. Van der Hagen SJ, Baeten CG, Soeters PB, van Gemert WG. Long-term outcome following mucosal advancement flap for high perianal fistulas and fistulotomy for low perianal fistulas: recurrent perianal fistulas: failure of treatment or recurrent patient disease? Int J Colorectal Dis., Dec., 2006; 21(8): 784–90.

15. Garg P. A new understanding of the principles in the management of complex anal fistula. Med Hypotheses 2019;132:109329.
16. Garg P, Mongia A. Transanal opening of the intersphincteric space (TROPIS): a novel procedure on the horizon to effectively manage high complex anal fistulas. Ann Coloproctol., 2024; 40: 74–81.
17. Garg P, Kaur B. Transanal opening of intersphincteric space: a novel procedure to manage highly complex anal fistulas. Dis Colon Rectum, 2023; 66: e292–3.
18. Garg P. Transanal opening of intersphincteric space (TROPIS): a new procedure to treat high complex anal fistula. Int J Surg., 2017; 40: 130–4.
19. Garg P, R Menon G, Kaur B. Comparison of different methods to manage supralevator rectal opening in anal fistulas: a retrospective cohort study. Cir Esp (Engl Ed)., 2022; 100: 298–301.
20. Garg P, Kaur B, Singla K, Menon GR, Yagnik VD. A simple protocol to effectively manage anal fistulas with no obvious internal opening. Clin Exp Gastroenterol., 2021; 14: 33–44.
21. Litta F, Parello A, De Simone V, Grossi U, Orefice R, Ratto C. Fistulotomy and primary sphincteroplasty for anal fistula: long term data on continence and patient satisfaction. Tech Coloproctol., 2019; 23: 993–1001.
22. Hiremath SC, Patil R. Fistulotomy versus fistulectomy for fistula-in-ano: a randomized prospective study. Surg J (N Y)., 2022; 8: e336–40.
23. Seyfried S, Bussen D, Joos A, Galata C, Weiss C, Herold A. Fistulectomy with primary sphincter reconstruction. Int J Colorectal, Dis., 2018; 33: 911–8.
24. Ratto C, Litta F, Donisi L, Parello A. Fistulotomy or fistulectomy and primary sphincteroplasty for anal fistula (FIPS): a systematic review. Tech Coloproctol., 2015; 19: 391–400.
25. Emile SH, Khan SM, Adejumo A, Koroye O. Ligation of inter sphincteric fistula tract (LIFT) in treatment of anal fistula: an updated systematic review, meta-analysis, and meta-regression of the predictors of failure. Surgery, 2020; 167: 484–92.
26. Jayne DG, Scholefield J, Tolan D, Gray R, Senapati A, Hulme CT, et al. A multicenter randomized controlled trial comparing safety, efficacy, and cost-effectiveness of the surgisis anal fistula plug versus surgeon's preference for transsphincteric fistula-in-ano: the FIAT trial. Ann Surg., 2021; 273: 433–41.
27. Lau YC, Brown KG, Cheong J, Byrne C, Lee PJ. LIFT and Bio LIFT: a 10-year single-centre experience of treating complex fistula-in-ano with ligation of intersphincteric fistula tract procedure with or without bio-prosthetic reinforcement (BioLIFT). J Gastrointest Surg., 2020; 24: 671–6.
28. Rezk M, Emile SH, Fouda EY, Khaled N, Hamed M, Omar W, et al. Ligation of intersphincteric fistula tract (LIFT) with or without injection of bone marrow mononuclear cells in the treatment of trans-sphincteric anal fistula: a randomized controlled trial. J Gastrointest Surg., 2022; 26: 1298–306.
29. Maralcan G, Başkonuş I, Aybasti N, Gökalp A. The use of fibrin glue in the treatment of fistula-in-ano: a prospective study. Surg Today, 2006; 36: 166–70.
30. Garg P, Song J, Bhatia A, Kalia H, Menon GR. The efficacy of anal fistula plug in fistula-in-ano: a systematic review. Colorectal Dis., 2010; 12: 965–70.
31. Grossberg SJ, Harran N, Bebington B, Lutrin DL. 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; 58: 74–7.
32. La Torre M, Goglia M, Micarelli A, Fiori E, D'Andrea V, Grossi U, et al. Long term results of video-assisted anal fistula treatment for complex anal fistula: another shattered dream? Colorectal Dis., 2023; 25: 2017–23.
33. Tümer H, Bulbuloglu GC. A comparison of laser and fistulotomy techniques in the treatment of fistula-in-ano. Cureus 2023;15:e37053. 334 https://doi.org/10.3393/ac.2024.00325.0046 Ann Coloproctol., 2024; 40(4): 321-335
34. Tang CY, Roslani AC. Laser ablation of anal fistulae: a 6-year experience in a tertiary teaching hospital in Malaysia. Lasers Med Sci., 2022; 37: 3291–6.
35. Kasiri MM, Riss S, Stift A, Binder AD, Kogovšek U, Huth M, et al. Optimized fistulectomy using the novel FiXcision® device: a technical feasibility study and evaluation of short term healing rates. Tech Coloproctol., 2019; 23: 579–82.
36. Khamar J, Sachdeva A, McKechnie T, Lee Y, Tessier L, Hong D, et al. Cutting seton for the treatment of cryptoglandular fistula-in-ano: a systematic review and meta-analysis. Tech Coloproctol., 2023; 28: 12.
37. Garg P, Garg PK, Sodhi GS. Cutting seton is an inferior version of fistulotomy and is associated with increased morbidity in the management of anal fistulas. Tech Coloproctol., 2024; 28: 57.
38. Garg P. Tube in tract technique: a simple alternative to a loose draining seton in the management of complex fistula-in-ano: a video vignette. Colorectal Dis., 2016; 18: 107.
39. Aryanti C, Faruk M. Optimum management for complex anal fistula: a network meta-analysis of randomized controlled trials. Surg Open Sci., 2024; 18: 117–22.
40. Wang Y, Rao Q, Ma Y, Li X. Platelet-rich plasma in the treatment of anal fistula: a systematic review and meta-analysis. Int J Colorectal Dis., 2023; 38: 70.
41. Wang H, Jiang HY, Zhang YX, Jin HY, Fei BY, Jiang JL. Mesenchymal stem cells transplantation for perianal fistulas: a systematic review and meta-analysis of clinical trials. Stem Cell Res Ther., 2023; 14: 103.
42. Garcia-Arranz M, Garcia-Olmo D, Herreros MD, Gracia-Solana J, Guadalajara H, de la Portilla F, et al. Autologous adipose-derived stem cells for the treatment of complex crypto glandular perianal fistula: a randomized clinical trial with long term follow-up. Stem Cells Transl Med., 2020; 9: 295–301.