

Complex Anorectal Fistulas: A Critical Review of Evolving Surgical Techniques, Continence Preservation, And Recurrence Dynamics

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ABSTRACT

Complex anorectal fistulas remains a formidable challenge, And choosing the best surgical approach that will drastically improve the patient's condition and reduce the risk of incontinence remains unclear, requiring a delicate balance between eradicating the infected tract and preserving fecal continence. This critical review assesses the current sphincter-sparing surgical instruments and the method's theoretical origins, success rates and complications. This review includes all available clinical studies, meta-analyses, and guidelines regarding LIFT, TROPIS, ERAF, FiLaC, VAAFT, and biologic therapy. The traditional sphincter-sparing methods differ. For LIFT they are proven successful for 60%-76%, but because the lateral tract is recovered it is considered that the TROPIS is a better procedure (primary healing rate of 85%-94%) which focuses on ISTAC and DRAPED. The least invasive thermal and endoscopic therapies ensure continuation but show higher recurrence rates (20%-43%). When intersphincteric sepsis is treated and external anal sphincter is kept out of the picture, the most durable results are available. The TROPIS is a paradigm change, from modern management perspective.

KEYWORDS: Complex Anorectal Fistula; LIFT Procedure; TROPIS Technique; Sphincter-Sparing Surgery; Fecal Incontinence.

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I. INTRODUCTION

Anorectal fistulas are abnormal and chronically epithelialized communication from internal anorectal canal and external perianal skin (1). It is an extremely serious and chronic health issue associated with a majority of men between 30 to 50 years old. The prevalent pathophysiological model of this disease is cryptoglandular. It is posited that the majority of fistulous tracts are caused by an acute infection in the anal crypt glands (the crypt at the very center). If they are mechanically occluded, a localized abscess, which is intersphincteric and not localized, develops. The added pressure causes this abscess to rupture over time, creating a chronic tract that struggles through the delicate muscles of the pelvic floor (2).

In practice fistulas are traditionally classified in Parks Classification in terms of structure and their association with anal sphincter complex: intersphincteric, transsphincteric, suprasphincteric and extrasphincteric (1). A complex fistula is defined to be a fistula that cannot be totally obliterated in fistulotomy, irrespective of whether all of it is healthy and functional in urine or feces (transsphincteric fistulas (more than 30% of the external sphincter); suprasphincteric fistulas (horseshoe fistula in females), Crohn's disease or radiation fistulas) etc.) within the last 10 years. The number of sphincter-sparing approaches has been exploding since the late eighties in order to relieve chronic sepsis while leaving the internal anal sphincter (IAS) and external anal sphincter (EAS) intact during it.

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Preoperative Assessment and Pathological Risk Factors. Preoperative imaging of the main fistulous tract, along with the identification and location of secondary extension and

anatomical location of internal opening, is the key to success during surgery. MRI and 3D-EAUS are now the gold standard measurement of pelvic floor sepsis (3).

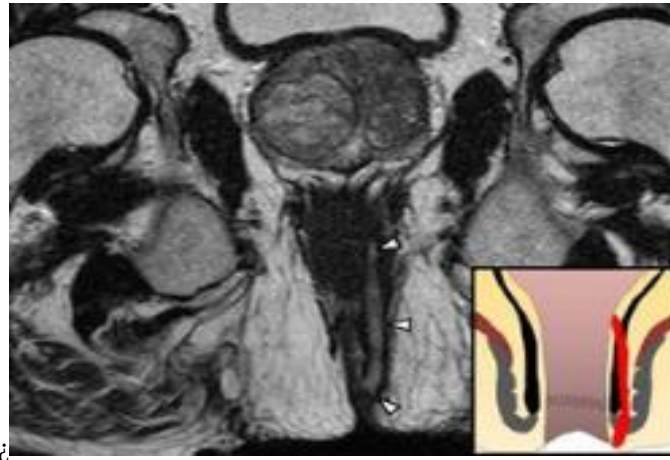


Figure 1: Preoperative Magnetic Resonance Imaging (MRI) of a complex transsphincteric anorectal fistula. Axial T2-weighted MRI demonstrating a hyperintense fistulous tract (indicated by the white arrow) traversing the external anal sphincter and extending into the right ischioanal fossa, with a notable secondary fluid collection suggestive of an occult abscess cavity. Proper radiological mapping is essential prior to selecting a sphincter-sparing technique.

Fistula recurrence is strongly related to systemic and anatomical factors. In all clinical multivariate regression analyses, it is found that severe anatomical problems such as a tract diameter greater than 5 millimeters, horseshoe extensions, and undrained secondary abscess cavities of patients significantly increase the likelihood of surgical failure (14). These cases also show the need for new eyes; even in 10% to 25% of cases, the internal primary opening cannot be found. Non-local internal opening seems to be the most important risk factor contributing to occult sepsis and later surgical failure (3, 14). Also, active cigarette smoking and poorly controlled diabetes mellitus drive a very serious percentage risk of failure (14).

Conceptual Paradigms: The Garg Cardinal Principles for Years. The Parks Classification has the foundation in the anatomy of fistula for decades (1). Yet at present that classification do not always work at all for surgical assessment. Modern management of complex fistula is greatly influenced by the Garg Cardinal Principles (2) that shift the focus away from merely suturing the opening and towards eliminating trapped intersphincteric sepsis (2).

ISTAC (Intersphincteric Tract is like an Abscess in a Closed Space): Within the fistula between external and internal sphincters, the internal area serves as a pressurized abscess that is not drainable on its own (2).

DRAPED (Drain all pus and ensure continuous Drainage): This localized sepsis should be widely opened and allowed to drain continuously until complete healing by secondary intention is achieved (2.).

HOPTIC (Healing Progressively Till Interrupted Irreversibly by a Collection): The physiological wound healing process advances naturally unless an undrained collection of pus interrupts the formation of healthy granulation tissue (2, 6).

Contemporary Surgical Management Strategies

Endorectal Advancement Flaps (ERAF)

The endorectal advancement flap is a traditional sphincter-sparing procedure designed in large number of occasions to slice the internal primary opening in a vacuum and recruit a vascularised flap of rectal mucosa and submucosa (11). This flap is directed upwards to effectively cover the hole at the dentate line, as the anterior and posterior tract are removed from dirty feces. The primary healing rate studies show moderate to sufficient primary wound scars (11, 13.) The procedure carries risks to ischemic flap necrosis, and donor site morbidity, and even some minor stage water seepage due to anal canal curvature (11).

Ligation of the Intersphincteric Fistula Tract (LIFT). Originating as a tissue-sparing procedure, the LIFT surgery involves surgically accessing the outer plane of the fistula as the hand operates between the IAS and the EAS and lacing it in both the medial and lateral direction in time before division (4).



Figure 2: The LIFT (Ligation of Intersphincteric Fistula Tract) Procedure. Intraoperative view showing the curvilinear incision at the intersphincteric groove. The fistulous tract has been identified, isolated on a right-angle dissector, and is being prepared for ligation with absorbable sutures close to the internal anal sphincter (IAS) and external anal sphincter (EAS) before sharp division.

1) Transanal Opening of Intersphincteric Space (TROPIS)
TROPIS represents a highly effective paradigm shift, strictly adhering to the Garg Cardinal Principles. The procedure involves a transanal approach to definitively lay open the intersphincteric portion of the fistula tract directly into the

anal canal, dividing the small segment of the IAS overlying the tract while strictly preserving the entire EAS.



Figure 3: The TROPIS Procedure.

Complete deroofing of the intersphincteric space by dividing the involved portion of the internal anal sphincter (IAS). The external anal sphincter (EAS) is left completely intact. This wide opening ensures continuous drainage (adhering to the DRAPED principle) and healing by secondary intention, resulting in success rates exceeding 85%.

Fistula Laser Closure (FiLaC): Utilizes a radial-emitting laser fiber probe to thermally ablate the tract walls. It offers an absolute zero-muscle-division profile but exhibits an intermediate pooled primary healing rate of 57.46%. **Video-Assisted Anal Fistula Treatment (VAAFT):** Employs a

miniaturized fistuloscope for direct visualization, debridement, and internal closure.

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Figure 4: Minimally Invasive Modalities. Figure 4 demonstrates the insertion of the radial-emitting laser fiber (FiLaC)

Biologic and Regenerative Therapies

One of the biological techniques is the surgical approach of pulling out the fistula system by bioactive scaffold. The Anal Fistula Plug (made of porcine submucosa) was initially very popular. However, based on significant evidence, such as the FIAT randomized controlled trial, the long term successful rate has been somewhat less positive with a success of on average about 50% to 55% due to spontaneous

plug extrusion and resistance to integrate into the infected organ (12). On the other hand regenerative medicine by using Adipose-Derived Mesenchymal Stem Cells (MSCs) (3, 13) has shown promising success in refractory fistulas associated with severe Crohn's disease which has led to strong local immunomodulatory effects and tissue regeneration. Comparative Analysis of Surgical Outcomes

Surgical Technique	Pooled Success Rate	Risk to Fecal Continence	Key Clinical Limitations
ERAF	60% – 85%	Low to Moderate	Technically demanding; risk of flap necrosis.
LIFT	60% – 76%	Very Low	Recurrence due to undrained intersphincteric space.
TROPIS	85% – 94%	Very Low	Prolonged secondary healing time of mucosal wound.
FiLaC	57% – 65%	Negligible	High recurrence rate as monotherapy.

CONCLUSION

The surgical management of complex anorectal fistulas demands that these conditions be treated with a unique, healthy procedure that meets human species' criteria. While LIFT and advancement flaps continue to be solid core procedures, their recurrent cases underscore the difficulty of dealing effectively with occult, trapped sepsis. While minimally invasive interventions (FiLaC, VAAFT) are risk factors to baseline continuation such that patients are chosen accurately because their primary healing occurs more slowly, surgical approaches which do follow a strict and uncompromising clinical approach with respect to direct, disease-causing intersphincter drainage is currently most effective, see, TROPIS with the highest clinical efficacy in terms of effective results, therefore, its use is proposed to reduce complications, in order to improve postoperative outcomes and decrease potential complications in the management of complex anal fistulas.

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