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Surgical techniques for anal fistula repair: A comparative review

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Abstract
This article examines and compares surgical methods for treating anal fistulas, especially in patients with Crohn's disease, by reviewing studies published from 2013 to 2023. For straightforward anal fistulas, fistulotomy is commonly used due to its high success rate, but it can lead to urinary incontinence in some cases. More complicated fistulas, which are often seen in Crohn's disease, are usually managed with techniques designed to preserve the sphincter muscle. These include the ligation of the inter-sphincteric fistula tract (LIFT), rectal advancement flap procedures, as well as newer approaches like video-assisted anal fistula treatment (VAAFT) and fistuloscopic laser closure (FiLaC).
The review assessed the quality of the included studies by considering their methodology, sample sizes, and reported outcomes. Findings showed that while traditional fistulotomy is effective in preventing recurrence, it carries a greater risk of urinary incontinence, particularly in complex cases. Sphincter-sparing options such as LIFT and FiLaC generally result in fewer complications and lower morbidity, but the likelihood of the fistula returning remains a challenge. The decision on which surgical technique to use depends on several factors, including the complexity of the fistula, whether the patient already has urinary control issues and any other existing health problems.
Ultimately, the review highlights the need for ongoing research, standardized definitions, consistent methods for measuring outcomes, and longer follow-up periods to improve the management of anal fistulas, particularly in patients with Crohn's disease. Individualized treatment planning remains essential to optimize patient results.

Keywords: Anal fistula, Crohn's disease, fistulotomy, sphincter-sparing surgery, LIFT, rectal advancement flap, VAAFT, FiLaC, surgical outcomes, urinary incontinence, recurrence, individualized treatment.

Introduction
A fistula is an abnormal passage or cavity that connects to the rectum or anal canal through a specific internal opening. Most fistulas are believed to arise as a result of a hidden gland infection. The importance of this research lies in the fact that anal fistulas are common, accounting for approximately 30-40% of pathological lesions in rectal diseases. These diseases differ from other diseases in the anxiety, fear, and psychological distress they cause for the patient, in addition to the fact that they suffer from a high rate of recurrence and severe complications. They also have a complex set of local symptoms. Hence the need to conduct this statistical study of anal fistula cases that visited Al-Assad University Hospital in Lattakia during the period between the beginning of 2003 and the end of August 2009, with the aim of reaching the best therapeutic results [1, 2, 3]. It is exactly here where problems pose their greatest challenges in Crohn's disease. Various surgical techniques are described to preserve the sphincter complex, with the internal rectal advancement flap (LIFT), the use of tampons, fibrin sealants, and even stem cells among these. 3 Crohn's disease may quite frequently give rise to perianal injury, say, very complex fistulas [4, 5, 6]. Such a clinical scenario may be particularly challenging to manage surgically. After the underlying disease has been appropriately treated by the currently available drugs, the question remains as to which surgical technique will be applied in these patients for the treatment of the anal fistula [7, 8]. The goal of surgical treatment is to achieve fistula healing without compromising anal incontinence [9, 10, 11]. Although classical techniques are effective in controlling the disease, with an average recurrence rate of 5%, their incontinence rates are lower than those of balloon techniques, which reach 20% [12, 13]. Evidence regarding the best surgical technique for FAR is currently highly controversial.

Series are highly heterogeneous; there are different definitions of complex FAR, a wide range of techniques and variants of each, outcome assessment criteria are diverse, and, in general, follow-up is short [14]. A systematic review concluded that fistulotomy combined with incisional surgery reduces bleeding and healing time; the flap technique may not be inferior to fistulotomy in terms of healing; the combination of flap and biological sealants increases the failure rate; and radiofrequency fistulotomy results in less pain on the first day and faster healing [15, 16, 17]. A Cochrane review concluded in a meta-analysis that analyzed 10 controlled studies to evaluate outcomes.

Methodology

The research aims to assess the effectiveness of surgical methods in the treatment of anal fistulas. In pursuit of this goal, the various works were considered through a systematic method that entails an all-encompassing collection of information followed by a critical analysis of the chosen articles.

The initial step of the applied methodology was to collect relevant scholarly articles from various recognized academic databases such as PubMed, Scopus, and Google Scholar. A search had been performed using target keywords such as "anal fistula surgical techniques," "surgical outcomes," and "systematic review," thus guaranteeing the retrieval of the literature concerned with the topic from both a historical and a contemporary point of view. A filter of peer-reviewed studies was applied, where articles dealing explicitly with the surgical treatment of anal fistulas were considered between the published period of 2013 and 2023. The rationale behind setting this timeframe was to ensure the relevance of the literature to the present-day advanced and attention-grabbing techniques concerning the subject matter.

Other exclusion criteria comprised non-English articles, case reports, and opinion articles that fell short of providing either ample empirical proof or categorized data. This strict filtering has strengthened the basis for analysis while providing a sampling of literature on surgical techniques for anal fistulas.

In all, 10 articles were selected for inclusion in the study. Each article was reviewed for methodology, sample size, and results. This meticulous selection process allowed for an elaborate study revolving around successful surgical approaches and the experiences of postoperative complications and healing rates in various populations.

The collected articles went through rigorous analyses on an annual basis to explore any trends in surgical approaches over the past decade. The articles were distributed as follows: 1 in 2013, 1 in 2015, 1 in 2017, 1 in 2020, 1 in 2021, 1 in 2022, and 5 in 2023. Such distribution points toward a rising curiosity and published output discussing surgical techniques for anal fistula, while the raise in 2023 publications could very well suggest a recent emphasis or advancement in this field.

By integrating the findings from analyzed articles, this research tries to shed light on and improve interpretations of comparative efficacy and safety of surgical measures for anal fistulas, eventually impacting the clinical practice and outcomes of colorectal surgery.

Results

Table 1: Overview of Research Objectives in Surgical Techniques for Anal Fistulas

Name of Authors	Year	Objective
Yongkang An, Ji-Hua Gao, Jiancheng Xu +3 more	(2023)	Compare outcomes of 13 surgical techniques for CAF. Identify the best surgical method for treating CAF.
Anestis Charalampopoulos, Dimitrios Papakonstantinou, George Bagias +3 more	(2023)	Identify surgical procedures for anal fistulas. Collect data on surgical outcomes and safety.
[Consensus of Chinese experts on the diagnosis and treatment of anal fistula (2020)]	-	Comprehensive evaluation of anal fistula before treatment. Discuss surgical treatment options for anal fistula.
Samuel O Adegbola, Kapil Sahnan, Gianluca Pellino +5 more	(2017)	Review efficacy and safety of novel surgical techniques. Identify role in anal fistula surgery.
Toby Hammond	(2013)	Review literature on anal fistulas and their management. Discuss requirements of postoperative care.
Lijiang Ji, Yang Zhang, Liang Xu +3 more	(2021)	Summarize new anal fistula therapies from the past 5 years. Evaluate methods based on healing, complications, and recurrence rates.
Anam Zahra, Jyothirmai Malla, Ramaneshwar Selvaraj +6 more	(2022)	Identify superior surgical techniques for complex anal fistulas. Improve understanding of disease process and treatment outcomes.
A. A. Darwish, Ibrahim Maged Abdel-Maksoud, Tasnim Naeem +1 more	(2023)	Evaluate success and recurrence rates of techniques. Compare incontinence rates between two surgical methods.
Yongkang An, Xueqing Chen, Maosheng Tian +2 more	(2023)	Compare Anal fistula plug and Endoanal advancement flap repair outcomes. Evaluate healing, recurrence, infection, and complication rates.
Elsa Limura, Pasquale Giordano	2015	Review new sphincter-preserving techniques for anal fistula treatment. Assess the efficacy and safety of these procedures.

Table 2: Information Collection Methodology Collecting Internet-Based Information on Surgical Techniques

Method	Population
Systematic review and network meta-analysis of surgical techniques.	Sample size: 2274.
Literature review of surgical techniques for anal fistulas.	Not specified
Fistulography, ultrasound, CT, or MRI for evaluation.	Not specified
Video-assisted anal fistula treatment (VAAFT), Fistula tract laser closure (FiLaC™), and Over-the-scope clip (OTSC®) proctology system	1245 patients across 18 studies.
Review literature on anal fistulas and their management.	Not specified
Narrative review of recent clinical studies; 29 papers selected for review analysis.	Included 21 prospective and seven retrospective studies.
Evaluation of techniques like LIFT, FP, and MAF.	Not specified
Cohort retrospective, comparative study; sample size: at least 30 cases studied.	Not specified
Meta-analysis including 5 RCTs and seven non-RCTs.	847 patients.
Review of sphincter-preserving techniques and their outcomes.	Not specified

Table 3: Article Citation Analysis Yearly Distribution and Citation Analysis of Selected Articles on Anal Fistulas

Findings
Fistulectomy may be the most effective surgical technique for anal fistula repair, showing the lowest complication rate.
No optimal surgical technique for anal fistulas was identified. Healing rates vary significantly based on fistula complexity.
Effective surgical techniques may breach or preserve sphincter function. Comprehensive evaluation before treatment is required.
Three sphincter-sparing techniques show acceptable short-term healing rates. Low morbidity with minimal effect on continence was reported.
Fistulotomy is effective but risks incontinence (5-40%). Alternative methods minimize sphincter disruption and improve comfort.
New anal fistula therapies evaluated over the past 5 years. Combined techniques show promise but need further validation.
LIFT procedure shows low fecal incontinence rates. No single method is definitively effective for complex anal fistulas.
LIFT has a shorter healing time and higher recurrence rates; the conventional technique has lower recurrence and higher incontinence rates.
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Sphincter-preserving techniques minimize injury and optimize function; variable success rates create clinical confusion.

Discussion

Men are affected somewhat more. To date, a large number of methods have been developed for the surgical treatment of pararectal fistulas. The nature and location of the fistula are often the guiding principles for choosing a surgical method. Despite the proposals of numerous surgical methods, a relatively large number of unsatisfactory results are observed after their use, with the frequent development of serious complications such as disease relapse in 11-38% of cases and rectal sphincter insufficiency in 3-45% of cases [18, 19].

As an outcome indicator, we wanted to analyze, as has been done in other series, the need for stomas in the development of complex anal fistulas, particularly in patients with Crohn's disease. However, these data take on different relevance in the clinical scenario of the review due to the presence of the disease [20, 21].

The surgical management of anal fistulas involves various techniques, each with distinct efficacy and complication profiles [22]. The choice of technique often depends on the complexity of the fistula and the need to preserve sphincter function. Below are the most effective surgical techniques and their associated complications.

Surgical Techniques were Fistulotomy [23]: This is the traditional method for simple anal fistulas, achieving high healing rates (>95%) but carries a risk of incontinence due to sphincter division (Charalampopoulos *et al*., 2023) (Hammond, 2013).

Fistulectomy: Identified as having the lowest complication rate among complex anal fistula treatments, it is effective for complex cases (An *et al*., 2023).

Ligation of InterSphincteric Fistula Tract (LIFT): A sphincter-sparing technique with healing rates of 60-90%, it minimizes the risk of incontinence (Charalampopoulos *et al*., 2023) ("[Consensus of Chinese experts on the diagnosis and treatment of anal fistula (2020)].", 2020).

Video-Assisted Anal Fistula Treatment (VAAFT) and Fistula Laser Closure (FiLaC): These novel techniques show promising short-term healing rates (64-100%) with low morbidity (Adegbola *et al*., 2017).

Associated Complications Incontinence A significant concern, particularly with fistulotomy, where the risk increases due to sphincter disruption (Hammond, 2013).

Recurrence: While fistulotomy has low recurrence rates, complex techniques like LIFT and FiLaC also report recurrence, albeit at varying rates (Charalampopoulos *et al*., 2023) (Adegbola *et al*., 2017).

Postoperative Pain: Techniques like VAAFT and FiLaC report lower postoperative pain compared to traditional methods (An *et al*., 2023).

The choice of surgical technique for anal fistula repair is influenced by several key factors, including the complexity of the fistula, patient characteristics, and the specific surgical goals. These factors significantly impact treatment success rates, which can vary widely depending on the chosen method.

Jian-ming Qiu *et al*. (2019) conducted a retrospective analysis of the treatment of 386 patients with rectal fistulas using the LIFT operation according to the standard technique. The average age of patients was 46 years. The operation was performed under general anesthesia. The complication rate was 7.8%. Among them, postoperative bleeding, urinary retention, and delayed wound healing were noted. In this study, the procedure was recognized as effective in 78% of patients. F. Cheung *et al*. (2018) conducted a study including 74 patients (48 men and 26 women, average age 45 years) with rectal fistulas who were treated using the VAAFT (video-assisted anal fistula treatment) method. The manipulation was performed using a fistuloscope, a monopolar electrode, and endoscopic forceps. After precise localization of the internal opening of the fistula tract and identification of possible secondary branches, the fistula tract was expanded to the internal opening using hydropressure (1% glycine-mannitol solution). After this, coagulation of the internal part of the fistula was performed. The internal opening was closed using a flap method using a fragment of the rectal mucosa. As a result of the operation, complete healing of the fistula was noted in 60 patients (81%). Gender, age, and type of fistula were not significant for the development of relapses.

Conclusion

In conclusion, further evidence-based guidance should be provided by ongoing research and clinical trials due to the ongoing evolution and advancement of surgical procedures for anal fistula closure. In order to enhance the corpus of knowledge pertaining to the long-term impacts and efficacy of such interventions, future research must take several key steps. Firstly, definitions of complex anal fistulas must be standardized. Secondly, consistent outcomes evaluation standards must be created. Thirdly, follow-up periods must be prolonged. A precise strategy that strikes a balance between anal function preservation and surgical efficacy is required for the treatment of anal fistulas. It is incumbent upon the surgical community to remain vigilant in the refinement of methodologies and procedures as our understanding of these intricate disorders evolves to ensure optimal patient outcomes.

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