Original Article

Comparison of Video-assisted Anal Fistula Treatment (VAAFT) and VAAFT Combined with Ligation of the Intersphincteric Fistula Tract (LIFT) for Management of Complex Anal Fistulas: A Multiple-center Retrospective Analysis

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Key Words
Complex anal fistula;
Video-assisted anal fistula treatment (VAAFT);
Ligation of intersphincteric fistula tract (LIFT)

Purpose. Determining the optimal surgical approach for complex anal fistulas is challenging due to their intricate nature and tendency for recurrence. This retrospective study aimed to compare the effectiveness of video-assisted anal fistula treatment (VAAFT) alone versus VAAFT combined with ligation of the intersphincteric fistula tract (LIFT) for managing complex anal fistulas. By assessing patient characteristics and postoperative outcomes, this study aims to provide information for clinical decision-making and optimize treatment strategies.

Methods. A retrospective cohort of 148 patients aged 18-65 with complex anal fistulas who underwent either VAAFT or VAAFT + LIFT was analyzed. Data included preoperative, postoperative, and follow-up information.

Results. The study included 73 patients who underwent VAAFT alone and 75 patients who underwent VAAFT + LIFT. Compared to the VAAFT group, patients in the VAAFT + LIFT group were significantly older and had longer surgery durations. There was a significant difference in the distribution of anal fistula types between the two groups, with the VAAFT + LIFT group having a higher proportion of suprasphincteric fistulas. However, there were no significant differences in postoperative recurrence rates or length of hospital stay between the two groups. Neither group experienced postoperative incontinence complications.

Conclusion. Our study found no significant difference in postoperative recurrence rates or incontinence complications between the two treatment methods for complex anal fistulas. Both approaches are similarly effective and safe, but larger studies with longer follow-ups are needed to confirm their efficacy.

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Complex anal fistulas pose a significant therapeutic challenge in proctology due to their complex anatomy and propensity for recurrence. Traditional treatment options, such as fistulotomy and seton placement, often result in complications and functional impairments. A variety of innovative surgical techniques have emerged in response to these challenges, including Video-Assisted Anal Fistula Treatment (VAAFT) and Ligation of the Intersphincteric Fistula Tract (LIFT);[1,2] these techniques represent promising alternatives for the management of complex anal fistulas.

The treatment landscape for anal fistulas has evolved, with recent advancements aiming to overcome the limitations of conventional approaches. VAAFT and LIFT represent notable innovations in this regard, and each offer unique advantages for the management of anal fistulas. VAAFT leverages advanced endoscopic technology to visualize and treat anal fistulas via a minimally invasive approach. This technique enables precise identification of fistula tracts and facilitates thorough debridement and optimal closure of internal openings. Studies have demonstrated the efficacy of VAAFT to improve surgical outcomes and reduce the rate of recurrence,[3] and demonstrates variable success rates with short-term (< 1 year) healing rates ranging from 67% to 100%.[4-6] In contrast, the LIFT technique involves ligation of the intersphincteric fistula tract, and thus preserves sphincteric muscle integrity and reduces the risk of fecal incontinence. Favorable outcomes for LIFT have been reported in patients with simple fistulas,[7-9] which has prompted the integration of LIFT with VAAFT as a comprehensive approach for complex cases.

The rationale for the combined LIFT and VAAFT approach lies in addressing the limitations of each technique when used independently. VAAFT enables high-resolution imaging for identification of the fistula tract and LIFT ensures secure closure of the tract without compromising sphincteric function. Thus, the combination of these approaches offers a comprehensive solution for managing complex anal fistulas. The surgical procedure for the combined VAAFT and LIFT approach involves sequential steps of fistula tract identification, debridement, irrigation, ligation of the intersphincteric fistula tract, and closure of internal and external openings. Postoperative monitoring and follow-up are essential components of the treatment protocol to assess outcomes and ensure patient satisfaction.

In this multiple-center retrospective analysis, we aimed to compare the effectiveness of VAAFT alone versus VAAFT combined with LIFT for the management of complex anal fistulas. By evaluating the outcomes and recurrence rates, we sought to obtain insights to inform clinical decision-making and optimize treatment strategies for patients with this challenging condition.

Materials and Methods

A retrospective analysis was conducted on consecutive patients undergoing VAAFT or VAAFT + LIFT procedures at Chi Mei Medical Center (Tainan), Show Chwan Memorial Hospital (Changhua), and Chang-Bing Show Chwan Memorial Hospital (Changhua). Patients aged 18 years or older with complex anal fistulas were included. The exclusion criteria were rectovaginal fistulas, malignant neoplasms, congenital anorectal malformations, inflammatory bowel diseases such as Crohn's disease, and those lost to follow-up in subsequent outpatient department visits.

Complex anal fistulas are characterized by several challenging features.[10,11] Firstly, they may be located high in the intersphincteric space, making them difficult to access surgically. Secondly, these fistulas often display complex branching patterns or multiple tracts, necessitating comprehensive surgical management to ensure complete healing. Additionally, some fistulas have secondary extensions that reach into adjacent structures such as the rectum or vagina, further complicating treatment. Recurrent or previously treated fistulas also fall into this category, indicating a persistent or relapsing condition despite prior interventions. Lastly, complex anal fistulas can be associated with underlying inflammatory bowel diseases like Crohn's disease, which complicates healing and increases the risk of recurrence.

Prior to surgery, patients underwent a thorough

proctological examination, including MRI (Fig. 1), computed tomography scan, and digital rectal exam as diagnostic tools. Anal fistuloscopy was also utilized to diagnose anal fistulas, allowing for a detailed visualization of the fistula tract and internal opening.[1] The fistulas were then classified according to Park's classification, and these classifications were recorded (Table 1). For patients over 50 years old, colonoscopy was performed in accordance with our cancer screening program. It should be noted that some patients sought a second opinion at our facility and had not undergone the standard preoperative examinations and tests.

The decision to use VAAFT alone or in combination with LIFT was influenced by factors such as the complexity of the fistula, the location of the internal opening, and the surgeon's experience and judgment. For patients where the internal opening could not be identified, VAAFT was chosen to visualize and treat the fistula tract directly using a video-assisted endoscope. Patients with a clearly identified internal open-

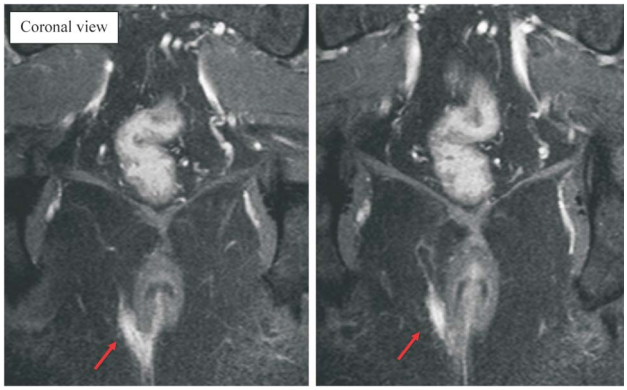

Fig. 1. Coronal MRI of the pelvis in a 64-year-old male (Patient A) with a suprasphincteric anal fistula (arrow site).

Table 1. Comparison of VAAFT and VAAFT + LIFT in patients with complex anal fistulas

	VAAFT (N = 73)		VAAFT + LIFT (N = 78)		*p*
	N	%	N	%	
Sex					0.116
Female	1	1.37	6	8.00	
Male	72	98.63	69	92.00	
Age (years) (mean ± SD)	43.81 ± 11.93		48.10 ± 10.18		0.022
Perioperative exam					
MRI	8	10.96	9	12.00	1.000
ECHO	0	0.00	2	2.67	0.497
CT	12	16.44	10	13.33	0.649
Type of anal fistula					0.023
Suprasphincter	22	30.14	37	49.33	
Trans-sphincter	25	34.25	24	32.00	
Extra-sphincter	1	1.37	1	1.33	
No internal opening	8	10.96	1	1.33	
Multiple tract	7	9.59	2	2.67	
Not available	10	13.70	10	13.33	
Duration of surgery (minutes) (mean ± SD)	35.45 ± 27.29		45.57 ± 25.57		< 0.001
Length of hospital stay (days) (mean ± SD)	2.25 ± 0.56		2.22 ± 0.48		0.798
Duration of observed (days) (mean ± SD)	200.98 ± 128.69		217.66 ± 140.38		0.537
Recurrence					0.712
No	52	71.23	56	74.67	
Yes	21	28.77	19	25.33	
Complication					
Incontinence	0	0.0	0	0.0	
Infection	1	1.4	4	5.3	
Bleeding	1	1.4	1	1.3	
Poor healing	1	1.4	0	0.0	

p-value by Fisher's exact test or Mann-Whitney U test when appropriate.

ing were selected for VAAFT + LIFT. In these cases, VAAFT managed the fistula tract, while LIFT addressed the internal opening to minimize recurrence. In some cases, even with a known internal opening, VAAFT alone was performed. The internal opening was either laid open or managed with a simple fistulotomy. None of the patients underwent the endorectal advancement flap procedure to cover the internal opening. Instead, the internal opening was managed using simple fistulotomy or lay open techniques, ensuring the feasibility and effectiveness of the chosen surgical methods.

Surgical techniques followed the steps outlined by Meinero et al. for VAAFT.[1] A specialized endoscope called an anal fistuloscope is then introduced through the external opening of the fistula tract. This allows the surgeon to directly visualize the tract and identify the internal opening and any secondary tracts or abscesses. The fistula tract is cleaned using saline irrigation, and any secondary tracts or abscesses are addressed with specialized instruments. Next, the fistula tract is ablated with a diathermy electrode, which cauterizes the tract to promote healing. This is done under direct vision through the fistuloscope. The external opening is then cleaned and may be left open to heal naturally or closed with sutures, depending on its size and location.

In the VAAFT + LIFT Group, a fistuloscope was used instead of a standard fistula probe. Identify the internal and external opening of anal fistula and incise the external opening of anal fistula and enlarge the opening to allow the fistuloscope to enter (Fig. 2). The fistuloscope was inserted through the external opening to identify the fistula tract, any additional branches, and the internal opening (Fig. 3). The intersphincteric groove was then incised circumferentially over the fistula tract, allowing for dissection of the intersphincteric space and isolation of the fistula tract with support from the fistuloscope shaft internally. Electrocautery was applied to all branches of the external part of the tract under direct vision, akin to the VAAFT procedure (Fig. 4). Ligatures were placed around the tract, which was ligated in the intersphincteric space and cut between ligations (Fig. 5). The internal opening was curetted and closed using a "figure-of-eight" absorbable suture. Suturing of the wound in the intersphincteric groove was performed using interrupted absorbable sutures, followed by excision of the external opening, leaving the wound open for drainage.[12]

Patients underwent ambulatory checks weekly until wound healing was complete and were followed up at 3-monthly intervals if they remained asymptomatic. Clinical examinations were preformed to define healing, failure, or recurrence of the fistula. Healing was characterized by scarring at the intersphincteric

Fig. 2. Patient (B), a 47-year-old male who was diagnosed with suprasphincteric type anal fistula and received VAAFT + LIFT. Identify the internal and external opening of anal fistula (The arrow site: Internal opening; the circle site: incised external opening).

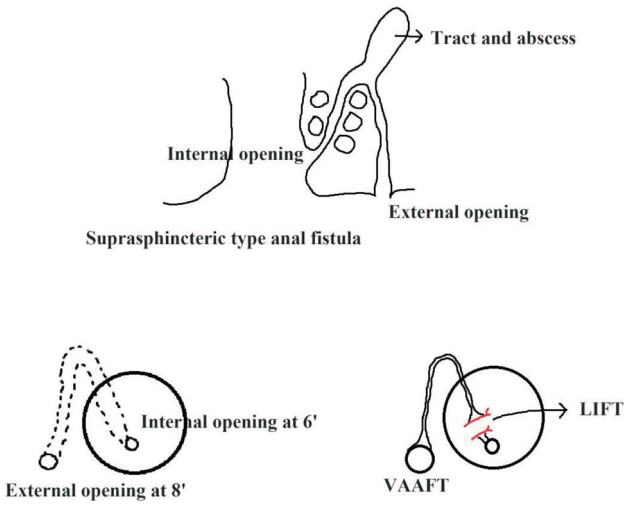

Fig. 3. Identify the fistula tract, any additional branches, and the internal opening by the fistuloscope. Patient (B).

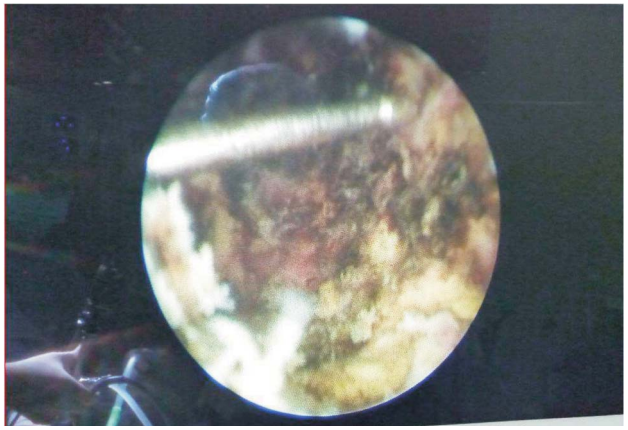

Fig. 4. Electrocautery was applied to all branches of the external part of the tract under direct vision. Patient (B).

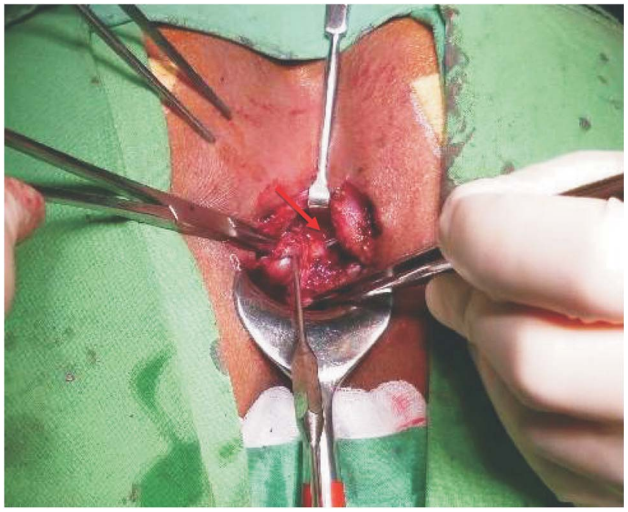

Fig. 5. Dissected intersphincteric space (arrow site), ligation of the intersphincteric part of the fistula tract. Patient (B).

wound and original external opening without discharge at 3 months (Fig. 6). Failure was defined as the persistence of a non-healed wound at 3 months, while recurrence was confirmed by observation of purulent secretion from any previously healed wound. The study endpoints were the safety and efficacy of the two procedures in terms of complications (incontinence), length of stay, duration of surgery, and the rate of postoperative recurrence.

Statistical analysis

Categorical variables are presented as frequencies

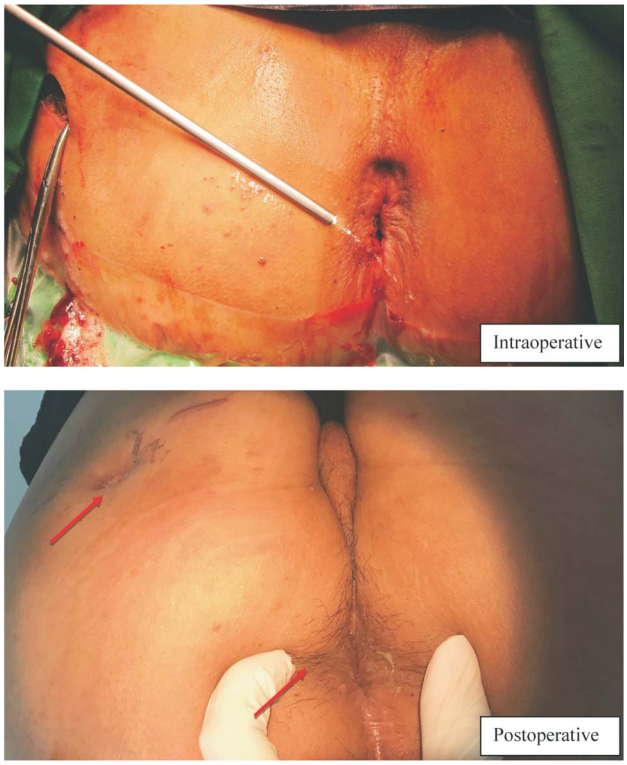

Fig. 6. Intraoperative wounds and postoperative scars of patient (C), a 40-year-old male who was diagnosed with suprasphincteric type anal fistula and received VAAFT + LIFT.

and percentages and continuous variables are presented as mean and standard deviation (SD). Fisher's exact test was performed to compare the sex distribution and the rate of postoperative recurrence between patients who underwent VAAFT (with or without other procedures) and VAAFT + LIFT. As the length of hospital stay and duration of surgery were not normally distributed ($p < 0.05$ in the Kolmogorov-Smirnov test), the Mann-Whitney U test was used to compare the age distribution, length of hospital stay, and duration of surgery between the two groups. All statistical analyses were performed using SPSS Version 18.0 for Windows (IBM SPSS Statistics) and the level of significance was set at 0.05.

Results

A total of 148 consecutive patients with complex anal fistulas underwent surgery between January 2017

to December 2022 at our center; 73 patients underwent video-assisted anal fistula treatment (VAAFT) alone and 75 patients underwent VAAFT combined with ligation of the intersphincteric fistula tract (LIFT). There was no significant difference in the sex distribution (VAAFT, 98.63% male vs. VAAFT + LIFT, 92.00% male, $p = 0.116$) or length of hospital stay (VAAFT, 2.25 ± 0.56 days vs. VAAFT + LIFT, 2.22 ± 0.48 days, $p = 0.798$) between the two groups. However, the patients in the VAAFT + LIFT group were significantly older (48.10 ± 10.18 years vs. 43.81 ± 11.93 years, $p = 0.022$) and had significantly longer durations of surgery (45.57 ± 25.57 minutes vs. 35.45 ± 27.29 minutes, $p < 0.001$) compared to the VAAFT group. Regarding perioperative examinations, a small proportion of patients underwent MRI (VAAFT, 10.96% vs. VAAFT + LIFT, 12.00%) or CT scans (VAAFT, 16.44% vs. VAAFT + LIFT, 13.33%), there was no significant difference in the use of these imaging modalities between the two groups. There was a significant difference in the distribution of anal fistula types between the two groups ($p = 0.023$). The VAAFT + LIFT group had a higher proportion of suprasphincteric fistulas (49.33% vs. 30.14%), while the VAAFT group had more cases with no internal opening (10.96% vs. 1.33%) and multiple tract fistulas (9.59% vs. 2.67%). Although there was a slight difference, the rate of postoperative recurrence was not significantly different between the two groups (VAAFT, 28.77% vs. VAAFT + LIFT, 25.33%; $P = 0.712$), indicating VAAFT alone or VAAFT combined with LIFT have comparable treatment efficacy for complex anal fistulas. Regarding complications, no patients in either group experienced postoperative incontinence. However, other complications were observed: infection (VAAFT 1.37% vs. VAAFT + LIFT 5.33%), bleeding (VAAFT 1.37% vs. VAAFT + LIFT 1.33%), and poor healing (VAAFT 1.37% vs. VAAFT + LIFT 0%). The mean observation duration did not differ significantly between the two groups (VAAFT, 200.98 ± 128.69 days vs. VAAFT + LIFT, 217.66 ± 140.38 days).

In summary, compared to the patients who underwent VAAFT alone, patients undergoing VAAFT combined with LIFT for the treatment of complex anal fistulas were older, had longer durations of surgery, and were more likely to have suprasphincteric fistulas. While there were no significant differences in the rate of postoperative recurrence or length of hospital stay, the VAAFT + LIFT group showed a slightly higher rate of postoperative infection. Both procedures demonstrated a good safety profile with no incontinence reported in either group.

Discussion

The management of complex anal fistulas presents a significant therapeutic challenge. While fistulotomy is often regarded as the gold standard treatment modality,[13] it can lead to undesirable functional outcomes such as flatus and mucus incontinence in a subset of patients. Although fistulotomy remains a viable option, the applicability of this technique is limited in cases where patients find the potential functional impairment unacceptable or when there is a high risk of exacerbating functional damage. To address these concerns and strive for optimal disease management while minimizing functional consequences, there has been a growing interest in sphincter-preserving techniques. Among such emerging approaches, both the ligation of intersphincteric fistula tract (LIFT) and video-assisted anal fistula treatment (VAAFT) procedures have garnered substantial attention from colorectal surgeons.[14] The aim of these sphincter-preserving techniques is to effectively treat anal fistulas, while minimizing the risk of functional impairment. This shift towards such conservative approaches reflects a broader commitment within the surgical community to prioritize patient outcomes and quality of life during the management of complex anal fistulas.

Traditionally, the diagnosis of anal fistulas has relied on magnetic resonance imaging (MRI), transanal ultrasound, and fistulography.[13] However, in our study, we employed the method described by Meinero et al.,[1] which allows for the intraoperative identification of the fistula tract under visual control via fistuloscopy and localization of the internal opening. This technique serves as a diagnostic method, eliminating the need for preoperative fistulography or other visualization examinations. It facilitates precise mapping of the

fistula anatomy, identification of secondary tracts or abscess cavities, and grading of the fistula complexity. By providing a clear and magnified view, the fistuloscope may circumvent the need for fistulography, which involves the injection of contrast material and radiation exposure. The direct endoscopic approach offers potential advantages, including reduced invasiveness, improved patient comfort, and real-time assessment during the surgical procedure. However, further research is needed to validate the diagnostic accuracy and reliability of fistuloscopy compared to traditional imaging modalities in the preoperative evaluation of anal fistulas.

The findings from our multiple-center retrospective comparison of VAAFT alone versus VAAFT combined with LIFT provide valuable insights into the management of complex anal fistulas. Our study confirms the effectiveness of both treatment modalities in addressing complex anal fistulas, although some differences in patient demographics and surgical outcomes were observed between the groups. Patients undergoing VAAFT combined with LIFT were older and experienced longer durations of surgery compared to patients who received VAAFT alone. Older patients may also present with more advanced or complicated fistulas, necessitating a longer and more involved surgical procedure. Moreover, the distribution of anal fistula types differed significantly between the groups. The VAAFT + LIFT group had a higher proportion of suprasphincteric fistulas, which are generally more complex and challenging to treat. This may explain why the combined approach was more frequently used in this group, as it allows for comprehensive management of both the fistula tract and the intersphincteric component. On the other hand, the VAAFT group had more cases with no internal opening and multiple tract fistulas. These types of fistulas might be more suitable for treatment with VAAFT alone, given its minimally invasive nature and precise visualization capabilities. Despite these differences in patient demographics and fistula types, the length of hospital stay and the rate of postoperative complications, including infection, bleeding, and poor healing, were comparable between the two groups. This suggests that both VAAFT alone and VAAFT combined with LIFT are safe and effective treatment options for complex anal fistulas. The good safety profile observed in both groups, with no incontinence reported, underscores the reliability of these techniques in preserving sphincter function while effectively treating the fistulas. The comparable length of hospital stay between the two groups indicates that the additional complexity and duration of surgery associated with the combined approach do not result in prolonged hospitalization. This is an important consideration for both patient recovery and healthcare resource utilization.

Recurrence rates of complex anal fistula treatments remain a significant concern in colorectal surgery. According to the literature, the recurrence rates for VAAFT and LIFT are reported to be 16-29% and 28-30%, respectively.[15-17] These data indicate that while these techniques are relatively reliable, they still face challenges in completely preventing recurrence. In our study, the recurrence rate for VAAFT was found to be 28.6%, which aligns with the higher end of the recurrence rates reported in the literature. This suggests that while VAAFT is a promising minimally invasive technique, its effectiveness can vary, potentially due to patient-specific factors or differences in surgical execution. Interestingly, when we combined VAAFT with LIFT, the recurrence rate dropped to 25.3%. Although our study did not find a statistically significant difference in the rates of postoperative recurrence between the two groups, this combined approach shows a modest improvement over VAAFT alone, suggesting a potential synergistic benefit. The slight reduction in recurrence rates with VAAFT + LIFT approach could be attributed to the complementary mechanisms of action: VAAFT allows for precise visualization and management of the fistula tract, while LIFT addresses the intersphincteric component, potentially reducing the likelihood of residual disease.

While this multiple-center retrospective analysis provides valuable insights into the management of complex anal fistulas, several limitations should be acknowledged. Firstly, the retrospective nature of our study introduces inherent biases and limitations, such as selection bias and potential confounding variables. Additionally, the reliance on medical records for data collection may have introduced inaccuracies or miss-

ing information. Secondly, the relatively modest sample size of our study may limit the generalizability of our findings. Analysis of a larger sample size would enhance the statistical power of our study and allow us to conduct subgroup analyses to explore potential differences in treatment outcomes among different subgroups of patients. Thirdly, our study was conducted at three hospitals, which may limit the external validity of our findings. Additional studies involving a broader range of medical centers are needed to validate our results and ensure the applicability of our findings across different healthcare settings. Furthermore, the follow-up period in our study was relatively short, which may have led to underestimation of the true rates of recurrence of complex anal fistulas. Thus, longer-term follow-up studies are warranted to assess the durability of treatment outcomes and identify late recurrence. Overall, our study confirms the safety and efficacy of both VAAFT alone and VAAFT combined with LIFT for the management of complex anal fistulas. VAAFT may be the preferred option for simpler cases, while the combination of VAAFT with LIFT may potentially enhance the cure rate for more complex scenarios. Nevertheless, the limitations of our study, including its retrospective nature, relatively low sample size, and multiple-center design, underscore the need for larger-scale, multicenter randomized controlled trials to further validate and generalize our findings.

Conclusion

Our study found no significant differences in postoperative recurrence rates between the two treatment modalities for complex anal fistulas. Neither group experienced postoperative incontinence complications. Therefore, both treatment approaches demonstrate comparable efficacy and safety, making them viable options for managing complex anal fistulas. This comprehensive retrospective study might provide valuable insights into the comparative effectiveness of VAAFT and VAAFT + LIFT for the management of complex anal fistulas. A large-scale randomized controlled trial is needed to compare the efficacy of LIFT, VAAFT, and VAAFT + LIFT in managing complex anal fistulas.

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原　著

比較單獨使用肛門廔管內視鏡治療 (VAAFT) 與併用括約肌間廔管結紮術 (LIFT) 治療複雜性肛門廔管的療效：多中心回顧性分析

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目的　複雜性肛門廔管由於其複雜性和復發傾向，對確定最佳手術方法構成了相當大的挑戰。這項回顧性研究旨在比較單獨使用肛門廔管內視鏡治療 (VAAFT) 與聯合括約肌間廔管結紮 (LIFT) 治療複雜性肛門廔管的效果。透過評估結果試圖為臨床決策提供治療策略。

方法　對符合納入標準的 148 例患者進行回顧性分析。根據醫療記錄中收集相關數據並加以分析。

結果　研究包括 73 名僅接受 VAAFT 的患者和 75 名接受 VAAFT + LIFT 的患者。與 VAAFT 組相比，VAAFT + LIFT 組患者年齡較大，括約肌上廔管比例較高，手術時間明顯較長。然而，兩組術後復發率和住院時間無顯著差異。兩組均無術後失禁併發症。

結論　我們的研究發現兩種治療複雜性肛門廔管的方法在術後復發率或失禁併發症方面沒有顯著差異。這兩種方法同樣有效且安全。為了驗證兩者對於複雜性肛門廔管的治療效益，仍需要進行更大樣本和更長追蹤期的研究。

關鍵詞　複雜性肛門廔管、肛門廔管內視鏡治療 (VAAFT)、括約肌間廔管結紮術 (LIFT)。