Comparison of Treatment Outcomes Between Transanal Opening of the Intersphincteric Space (TROPIS) and Ligation of Intersphincteric Fistula Tract (LIFT) for Complex Fistula in ano: A Retrospective Cohort Study

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ABSTRACT

Background: Sphincter-preserving surgery is a treatment option for complex fistula in ano (FIA). However, the healing rate was still not satisfactory. The Transanal Opening of the Intersphincteric Space (TROPIS) procedure involved cutting the internal sphincter to drain the intersphincteric infection. It had a high healing rate and a low risk of incontinence.

Methods: Complex FIA patients who underwent surgery at Rajavithi Hospital between January 2017 and September 2023 were retrospectively reviewed. The primary outcomes were the rates of fistula healing and recurrence between TROPIS and traditional LIFT. Incontinence after treatment was evaluated for TROPIS.

Results: One hundred twenty eight (128) patients who had undergone TROPIS (n=30) and LIFT (n=98) were included. The results showed that TROPIS had a similar healing rate (80.0% vs. 83.7%, p=0.782) compared to LIFT. However, these procedures might have a lower recurrence rate (12.5% vs. 29.3%, p=0.116), which was more notable in the posterior semi-horseshoe type (7.7% vs. 36%, p=0.086). Additionally, the incidence of incontinence was relatively low in the TROPIS group.

Conclusion: The TROPIS procedure showed promise as a feasible alternative for complicated cases of FIA. Robust large-scale studies were necessary to definitively establish its efficacy.

Key words: Complex fistula in ano, LIFT, TROPIS

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Fistula in ano (FIA) is a common, benign anorectal disorder characterized by the presence of a tract between the anal canal and the perianal skin, and in complicated cases involves the anal sphincters. FIA are labelled as complex FIAs when the tract crossed more than 30% of the external anal sphincter, recurrent, with multiple tracts, associated with preexisting anal incontinence, with history of local radiation, secondary to diseases such as Crohn's disease, tuberculosis, HIV, and malignancy, or anteriorly located in females.[1] Simple fistulas, including low transphincteric and intersphincteric fistulas that crossed less than 30% of the external sphincter, were easy to treat with good outcomes, while complex fistulas were prone to recurrence and could lead to incontinence following surgery.[2]

The fundamental objectives of fistula surgery were to remove the intersphincteric infection and preserve the integrity of the sphincter muscles, which could cause fecal incontinence if damaged. In recent years, the concept of sphincter-preserving surgery gained popularity. Ligation of the Intersphincteric Fistula Tract (LIFT) was the preferred choice of treatment in our institution for several years, because of the preservation of the anal sphincters. However, the healing rate of LIFT was still not satisfactory; healing was reported in the literature at around 76.5%.[3] In 2017, Garg introduced a new surgical procedure called Transanal Opening of Intersphincteric Space (TROPIS), which involved deroofing of the intersphincteric space from the luminal side to adequately clear all the pus and heal by secondary intention, and claimed to result in no incontinence and a high healing rate.[4] As LIFT was commonly used to treat complex FIA in our institution, when it was not possible to ligate the tract in the intersphincteric plane or when recurrence occurred after performing LIFT, the TROPIS operation became an alternative option to treat these patients. The primary outcome is to demonstrate

treatment outcomes such as healing rate, recurrence, and incontinence of TROPIS compared to previous treatment, i.e., LIFT.

METHODS

Patient and Study Setting

Patients with complex FIA who received the following surgical procedures, either LIFT or TROPIS, performed by certified colorectal surgeons (S.S. and K.V.) at the Division of Colorectal Surgery, Department of Surgery, Rajavithi Hospital, between January 2017 and September 2023 were included in the study. Complex FIA, with fistulas involving more than one-third of the sphincter complex, assessed on clinical examination and pelvic MRI, or with a horseshoe fistula, were included in the study. Patients with complex FIA from other causes, such as inflammatory bowel disease, radiation, malignancy, preexisting incontinence, or chronic diarrhea, were excluded. Other procedures for complex FIA, such as seton drain, endoanal flap, core-out fistulectomy, and others, were not included in the study.

Sample Size

The estimated sample size required for the study is 51. The sample size was determined by estimating the population proportion of the healing rate of complex anal fistula using the formula provided by Wayne W.D. in 1995. The healing rate referenced for this calculation was derived from a study conducted by Garg in 2017, which reported a healing rate of 84.6%.

Data Collection

The patient's medical records were retrospectively reviewed after receiving approval from the Institutional Ethics Review Board. Baseline characteristics, such as age, BMI, gender, underlying diseases (i.e., diabetes, HIV infection), smoking status, previous surgery and preoperative imaging, were collected. Complex FIA was categorized into three types according to the location of the internal opening and direction of the fistula tract, regardless whether straight or curved: anterior high trans-sphincteric FIA, posterior semi-horseshoe (high trans-sphincteric) tract and posterior horseshoe tract (Figure 1).

The treatment outcomes assessed included healing rate, recurrence and incontinence. Successful fistula healing was defined as the complete closure of both the internal and external openings, without any presence of pus. Recurrence was identified as the development of a new fistula following initial healing. There is no specific timeframe for healing. Our institution typically follows up with patients for 4-6 months before considering further management. Incontinence was documented during outpatient department (OPD) visits as the occurrence of gas, liquid and solid leakage. Additional surgical outcomes, such as operative time and blood loss, were also recorded.

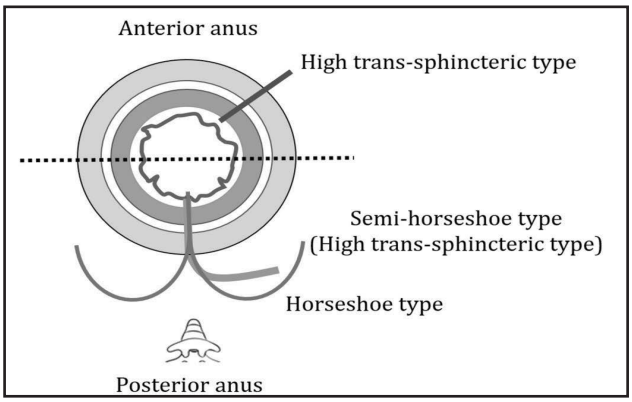

Figure 1. Complex fistula in ano type.

Operative Techniques of LIFT and TROPIS

LIFT was performed following the study of Rojanasakul A.[5] A curvilinear incision and dissection of the intersphincteric tract were carried out. After the tract was isolated, it was suture-ligated with 2-0 absorbable sutures as close as possible to the lateral margin of the internal anal sphincter. The tract was then divided. The fistula was cleaned with a curette and washed with saline. The medial margin of the external anal sphincter was suture-ligated later. The intersphincteric wound was closed. A tube drain was placed when abscess collection was observed.

TROPIS followed the study of Garg P.[4] The procedure involved unroofing of the intersphincteric space by dividing the internal anal sphincter in a circular direction while sparing the external sphincter. Our operation was modified by dissection of the intersphincteric tract as in LIFT to perform internal sphincterotomy. The intersphincteric space was opened and curetted to clean the intersphincteric space. In the case of a horseshoe fistula with a deep postanal collection, it was opened from the inside to achieve adequate drainage into the anal canal. In the case of superior extension of the fistula into the rectum, the incision was extended from the internal opening upward to the supralevator rectal opening. The external openings were widened, and a rubber tube drain was placed when a collection was observed.

Follow up

All patients were discharged the day after surgery and were advised to resume normal activities after discharge. Patients were required to attend a follow-up colorectal clinic every 4 weeks until the fistula had healed. Thereafter, patients were advised to visit the clinic every 4 months or whenever they experienced symptoms suggestive of recurrence. Incontinence was evaluated in TROPIS.

Statistical Analysis

Statistical analysis was performed using SPSS version 29 (IBM Corporation, IL, USA). The chi-square or Fisher's exact test was used to analyze categorical data. The odds ratio (OR) and 95% confidence interval were calculated. Where zeros caused problems with the computation of the odds ratio, 0.5 was added to all cells. Binary logistic regression was utilized to ascertain the clinical variables linked to treatment failure, and a p-value < 0.05 was considered statistically significant.

RESULTS

A total of 128 patients with complex FIA were included in the study. The baseline characteristics of the patients were summarized in Table 1. The mean age (SD) was 40.36 (±11.16) years, and the majority were male (83.6%). The mean BMI (SD) was 26.24 (±5.46) kg/m². Forty percent (40.6%) of patients smoked. Eight point six percent (8.6%) and 2.6% of patients had diabetes and HIV infection, respectively. Twenty two percent (22.7%) of patients had a recurrent fistula. Preoperative MRI was performed in 74.2% of all patients, and it was performed significantly more in 93.3% of the TROPIS group. Based on the type of anal fistula, 77.3% of the patients had a posterior tract. The posterior semi-horseshoe tract was the most common type (61.7%). There was a significant difference in the type of fistula between groups. TROPIS had a high ratio of the posterior tract of 93.3% and had a higher horseshoe fistula (40.0% vs. 8.2%) than the LIFT group.

The median follow-up period for all patients was 32.78 (range 0.97-89.6) months. The median follow-up times for TROPIS and LIFT (range) were 22.4 (0.97-89.60) months and 39.9 (2.9-72.4) months, respectively.

Healing Rate

The overall healing rate of complex FIA in the study was 82.8%. TROPIS had a similar healing rate to LIFT (80.0% vs. 83.7%, p=0.782). The anterior high trans-sphincteric fistula had a higher healing rate than the posterior horseshoe fistulas, semi-horseshoe and horseshoe (96.6% vs. 79.7% and 75%) among the types of fistulas. TROPIS also had a similar healing rate to LIFT among the operation groups: 100% vs. 96.3% in anterior high trans-sphincteric FIA, 81.3% vs. 79.4% in semi-horseshoe FIA, and 75% vs. 75% in horseshoe FIA. Univariate analysis of identified factors did not demonstrate any significant factor.

Recurrence

A total of 106 patients who achieved successful fistula healing were included in the analysis for recurrence. Twenty-seven patients (21.1%) had a recurrent fistula after the external opening completely healed. TROPIS had 3 recurrent fistulas during the follow-up period and had a lower recurrence rate than LIFT (12.5% vs. 29.3%, p=0.116), which was not statistically significant. According to the type of fistula, TROPIS might have had a lower recurrence rate than LIFT in all fistula types: 0% vs. 15.4% in anterior high trans-sphincteric FIA, 7.7% vs. 36.0% in semi-horseshoe FIA, and 22.2% vs. 33.3% in horseshoe FIA. Univariate analysis of identified factors did not demonstrate any significant factor.

Incontinence

Due to insufficient data, LIFT outcomes for incontinence could not be reviewed. Among TROPIS patients, one horseshoe patient had gas incontinence, one semi-horseshoe patient had liquid stool incontinence and no patient experienced solid stool incontinence.

Surgical Outcomes Between Operations Performed

Operative time was not different between TROPIS and LIFT (56.3 and 52.8 minutes, respectively) and there was minimal blood loss (16 ml vs. 8.85 ml, respectively).

DISCUSSION

The treatment of complex fistula in ano has evolved over the years, with a shift from high healing rate but non-sphincter preserving procedures such as fistulotomy or cutting seton to sphincter-preserving procedures. Many options, such as endoanal advancement flap, fibrin glue, and fibrin plug, were proposed to preserve anal sphincter function. The LIFT procedure was developed by Rojanasukal in Thailand in 2007.[5] This procedure became

Table 1. Demographic data of patients.

Variable	All patients (N=128)	TROPIS (N=30)	LIFT (N=98)	p-value
Age (yr.)	40.36 (±11.16)	42.44 (±10.99)	39.79 (±11.15)	0.776
BMI (kg/m^2)	26.24 (±5.46)	28.06 (±6.77)	26.01 (±5.20)	0.904
Male	107 (83.6%)	22 (73.3%)	85 (86.7%)	0.096
Past medical history				
Smoking	52 (40.6%)	10 (33.3%)	44 (44.9%)	0.297
Diabetes	11 (8.6%)	4 (13.3%)	7 (7.1%)	0.456
HIV	3 (2.6%)	1 (3.3%)	2 (2.0%)	0.554
Recurrent case	29 (22.7%)	10 (33.3%)	19 (19.4%)	0.136
Previous fistulotomy	17 (58.6%)	6 (60.0%)	11 (57.9%)	
Previous LIFT	12 (41.4%)	4 (40.0%)	7 (42.1%)	
Preoperative MRI	95 (74.2%)	28 (93.3%)	67 (68.4%)	**0.008***
Type of fistula				**<0.05***
Anterior tract				
High trans-sphincteric	29 (25.4%)	2 (6.7%)	27 (27.5%)	
Posterior tract				
Semi-horseshoe	79 (61.7%)	16 (53.3%)	63 (64.3%)	
Horseshoe	20 (15.6%)	12 (40.0%)	8 (8.2%)	

***p < 0.05**

Table 2. Outcomes of treatment.

Outcome	All patients	TROPIS	LIFT	p-value
Healing rate				
All patients	106/128 (82.8%)	24/30 (80.0%)	82/98 (83.7%)	0.782
Fistula type				
Anterior high trans-sphincteric	28/29 (96.6%)	2/2 (100%)	26/27 (96.3%)	1.000*
Semi-Horseshoe	63/79 (79.7%)	13/16 (81.3%)	50/63 (79.4%)	1.000*
Horseshoe	15/20 (75%)	9/12 (75%)	6/8 (75%)	1.000*
Recurrence				
All patients	27/106 (21.1%)	3/24 (12.5%)	24/82 (29.3%)	0.116
Fistula type				
Anterior high trans-sphincteric	4/28 (13.8%)	0/2 (0%)	4/26 (15.4%)	1.000*
Semi-Horseshoe	19/63 (24.1%)	1/13 (7.7%)	18/50 (36.0%)	0.086*
Horseshoe	4/15 (20.0%)	2/9 (22.2%)	2/6 (33.3%)	1.000*
Incontinence		2/30 (6.7%) 1 gas in horseshoe type 1 gas & liquid in semi-Horseshoe type	N/A**	
Operative time (min)		56.3	52.8	
Intraoperative blood loss (ml)		16	8.85	

*Fisher's Exact Test, **Not available data

Table 3. Univariate analysis for healing and recurrence.

Variables		Healing rate (N=128) n(%)	p-value	Recurrence (N=106) n(%)	p-value
Age	≥50 yr.	22/28 (78.6%)	0.572*	7/22 (31.8%)	0.583
	<50 yr.	84/100 (84.0%)		20/84 (23.8%)	
BMI	≥25kg/m^2	41/67 (61.7%)	0.802	13/54 (24.5%)	0.816
	< 25 kg/m^2	37/61 (61.1%)		15/52 (28.3%)	
Gender	Male	86/107 (80.4%)	0.122*	24/86 (27.9%)	0.272
	Female	21/21 (95.2%)		3/20 (15.0%)	
Past medical history	Non-smoking	65/74 (87.8%)	0.098	15/65 (23.1%)	1.000
	Smoking	41/54 (75.9%)		12/41 (29.3%)	
	Non-diabetes	96/117 (82.1%)	0.688*	24/96 (25.0%)	0.713*
	Diabetes	10/11 (90.9%)		3/10 (30.0%)	
	Non-HIV	103/125(82.4%)	1.000*	26/103(25.2%)	1.000*
	HIV	3/3 (100%)		1/3 (33.3%)	
Recurrent case	Non-recurrent	80/99 (80.8%)	0.402*	21/80 (26.3%)	0.802
	Recurrent	26/29 (89.7%)		6/26 (23.1%)	
Type of fistula	Anterior high trans-sphincteric	28/29 (96.6%)	0.053*	4/28 (14.3%)	0.285
	Semi-horseshoe	63/79 (79.7%)		19/63 (30.2%)	
	Horseshoe	15/20 (75%)		4/15 (26.7%)	
Operation	LIFT	82/98 (83.7%)	0.782	24/82 (29.3%)	0.116
	TROPIS	24/30 (75%)		3/24 (12.5%)	

*Fisher's Exact Test

a widely used treatment option for complex fistulas at Rajavithi Hospital.

The cryptoglandular origin theory was first described by Eisenhammer and Park in the 1950s.[6,7] Infection arising from the anal glands extended into the intersphincteric space. The intersphincteric space was considered key in forming complex cryptoglandular fistulas.[8] The objective of the LIFT procedure was to close the internal opening to remove any infection in this space.[5] The healing rate of LIFT was reported to range from 54% to 97%.[9-11] However, the LIFT procedure can be technically challenging in cases of high fistula and could preclude ligation in patients with a large intersphincteric tract or the presence of an abscess collection in the intersphincteric space, making closure difficult.

Newer methods of fistula treatment such as the anal fistula plug, OTSC clip and Video-Assisted Anal Fistula Treatment (VAAFT), focused on closing the internal opening. However, the results were not satisfactory.[12-14], Introduced in 2017, the TROPIS procedure aimed to eliminate infection in the intersphincteric space by opening or deroofing the tract under the skin and internal sphincter, allowing the wound to heal by secondary intention. The external sphincter was not affected, thus preserving continence. The study showed an overall healing rate of 90.4% without any deterioration of continence.[4] Later reports indicated a promising healing rate for TROPIS, ranging from 78.4% to 93.4%.[15] This procedure might have been considered an option when the intersphincteric tract could not be ligated.

In the current study, 98 of 128 complex FIA cases (76.56%) underwent the LIFT operation, with a healing rate of 83.7%. In approximately 20% of cases, ligating the tract in the intersphincteric plane was not feasible due to the presence of an intersphincteric collection or recurrent intersphincteric fistula after performing the LIFT procedure. In these cases, the TROPIS procedure was considered an appropriate alternative. In the current study, 23.4% (30 out of 128) of patients underwent the TROPIS operation, which had a healing rate of 80.0% (24 out of 30 patients). Additionally, the overall recurrence rate was lower in TROPIS as compared to the LIFT procedure, although this difference was not statistically significant (12.5% vs. 29.3%, p=0.116). This result suggested that TROPIS is a feasible option, as compared to LIFT for complicated cases, with more beneficial results in the posterior tract semi-horseshoe type (7.7% vs. 36%, p=0.086). In literature, among the complications associated with the TROPIS procedure, incontinence posed the highest risk. However, according to the current study, the incidence of incontinence was relatively low, with only one case of gas incontinence, one case of occasional liquid stool incontinence, and no cases of solid incontinence in patients who underwent TROPIS.

Univariate analysis of the factors affecting healing rate and recurrence, the type of complex fistula was

found to have a significant difference in healing rate but was not different in terms of recurrence. Posterior tract types of complex FIA had a lower healing rate as compared to anterior tract type of fistulas. Subgroup analysis showed anterior tract type of complex fistula had a higher healing rate and lower recurrence as compared to posterior horseshoe tract of fistulas.

In this cohort study, we acknowledge several limitations. Firstly, the LIFT procedure was commonly performed for complex FIA cases in our institution. TROPIS was selectively used for intersphincteric collections that could not be ligated or closed off from the fistula tract. This inherent selection bias affected our findings. Furthermore, the small sample size of TROPIS cases prevented us from drawing definitive conclusions about outcomes. Additionally, the retrospective nature of the healing outcome data in the current study precluded the inclusion of time-to-healing data, thereby limiting the comprehensiveness of the healing outcome assessment. Moreover, the incontinence outcomes of LIFT could not be reviewed due to lack of data available in the medical records of patients. There was no standardized form for incontinence data used in our institution. Collecting data for prospective analysis is recommended in future studies. Finally, to establish more robust results, larger cohort studies or randomized trials are recommended.

CONCLUSION

In conclusion, managing complex FIA continued to present significant challenges. Given the high healing rates and low incidence of incontinence associated with it, the TROPIS procedure emerged as a viable treatment option.

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