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Research Article

LIFT in Anal Fistula-A Systematic Review

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Abstract

Background: The procedure known as ligation of the intersphincteric fistula tract (LIFT) is used to treat anal fistulas while preserving the sphincter. Numerous studies have been conducted to evaluate the effectiveness of this procedure, yielding different outcomes.

Aim of the Study: The aim of this review is to evaluate the pertinent literature related to this subject.

Methods: The review used the PRISMA statement. The search engines PubMed, Google Scholar and Medline were searched for articles published in English.

Result: Fifteen papers were reviewed from a pool of 108 papers. The total number of patients included was 539.The main outcomes measured were healing rates, duration of follow-up, recurrence rate, and post-operative incontinence. Specifics of the surgical method were the following goals. The majority of studies examined in this review involved patients who had trans-sphincteric or complex fistulas that were not suitable for treatment with fistulotomy.

Conclusion: The LIFT procedure is considered a relatively new, cost-effective, and easily learnable method for preserving the sphincter muscle while treating fistulas. It has shown promising results in terms of safety, feasibility, and positive outcomes in both the short and long term.

Keywords: *Incontinence; Recurrence; Complex Fistula; LIFT*

Introduction

Rationale

A fistula is an abnormal pathological tract that communicates between two epithelial organs [1]. Anal fistula is an abnormal connection between the anal canal and the perianal skin, which leads to persistent purulent drainage or intermittent perianal swelling and tenderness followed by spontaneous discharge [2]. The desired outcome for treating an anal fistula is achieving complete healing without compromising anal continence. When dealing with low-lying fistulas that only affect a small part of the sphincter muscle, an effective approach is fistulotomy. However, managing larger fistulas that involve a significant portion of the sphincter muscle can be more

challenging. There are several treatment options available that aim to preserve the sphincter muscle, including the use of a loose seton, fibrin glue, endorectal advancement flap (ERAF), anal fistula plug (AFP), and ligation of the intersphincteric tract (LIFT). These techniques help in treating the fistula while minimizing the risk of compromising anal continence [3-7].

The theory behind LIFT is that by ligating and excising the intersphincteric tract, the intersphincteric septic nidus might be eliminated by preventing fecal particles from entering the fistula tract. In 2006, Rojanasakul., *et al*. [8] from Bangkok, Thailand, described a new sphincter-saving and the named it LIFT. The procedure entails separating the internal opening from the fistula tract and eliminating the infected anal gland without dividing any portion of the anal sphincter complex. Numerous surgeons have embraced this technique, which has gained significant popularity, mainly due to its ability to preserve continence effectively. Since 2008, several authors have used a combination of techniques for treating anal fistulas. These include performing the LIFT procedure followed by coring out of the external fistula tract (referred to as LIFT plus coring out) [9-11]. Another approach involves placing a bio-mesh in the intersphincteric plane to reinforce the closure of the fistula tract (known as bio-LIFT) [12]. Additionally, some surgeons have utilized a fistula plug placed in the external fistula tract after performing the LIFT procedure (referred to as LIFT plus fistula plug) [13]. Furthermore, the impact of using a pre-LIFT drainage seton on treatment success requires further investigation, as setons have traditionally been effective in managing the acute stage of anal fistulas [14]. Surgery for anal fistula frequently results in recurrence and incontinence. These undesirable outcomes depend on many factors, the surgical technique used being the most important. The aim of this review is consider the outcome of the LIFT procedure: incontinence status, recurrence rate, the outcomes considered for the analysis were those with a longer follow-up and a larger number of patients.

Objective of the Study

The objective of this this review was to evaluate the pertinent literature related to this subject.

Methods

Eligibility criteria

Inclusion criteria:

a. Adequate case definition using a physical examination or preoperative physiologic test (endoanal sonography or magnetic resonance image),

b. Clear patient selection, if possible, consecutive or obviously representative case series,

c. Control group for comparison,

d. Validated subjective outcome measures about incontinence state, and

e. Adequate postoperative outcomes including disease recurrence and follow-up.

Exclusion criteria: Case reports, abstracts, letters, publications written in languages other than English, and comments were not included.

Information sources

This review was conducted using PRISMA guidelines. The review consisted of 5 steps: (1) problem identification; (2) literature searching; (3) data review and evaluation; (4) data synthesis and analysis; and (5) data presentation.

Search strategy

The current review performed a search for relevant articles in electronic databases: PubMed, Google Scholar and Medline. We searched all articles from 2009 to 2023.The reference list of each article was searched manually for other potentially relevant articles. The following keywords were used: Incontinence, recurrence, complex fistula, LIFT.

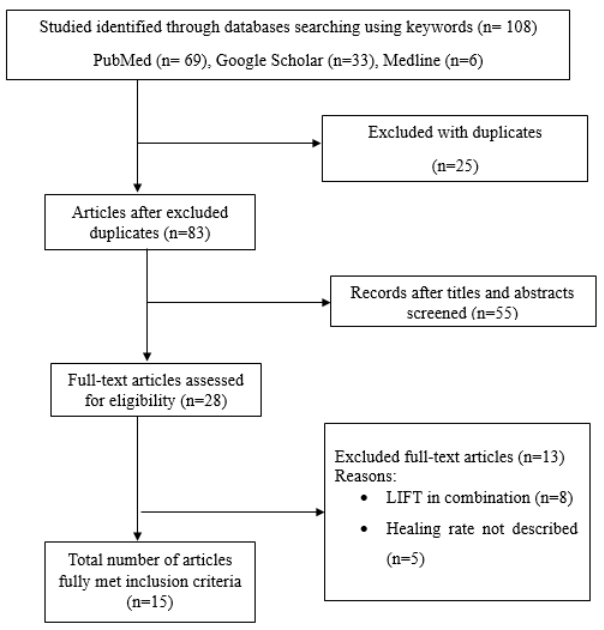

Figure 1: *Flow chart of systematic review of literature selection process for the present research.*

Data collection process

All types of fistulas managed by LIFT were included in the present review. We retrieved the following data regarding each study: study type, patient number, patient age, patient follow-up data, surgical method, incontinence, healing rate, and recurrence rate. Healing was indicated by complete skin as well as internal and external opening closure without discharge. Recurrence was indicated by complete healing in the presence of another fistula tract at the same site.

The search resulted in 108 articles which were identified in the initial databases (Figure 1). After duplicates were removed, 68 articles remained. Of these, 55 were excluded based on titles and abstracts screened; 13 full articles were excluded for other reasons, such as focus on HF patients (not caregivers) and articles with non-empirical data. Finally, 15 publications met the criteria and were included in this review.

Data items

a. Outcomes:

I. Complete healing: The primary goal of the LIFT procedure is to achieve complete healing of the anal fistula. This means the closure of the abnormal tract and resolution of symptoms, such as persistent drainage, perianal swelling, and tenderness.

II. **Preservation of anal continence:** Unlike some other surgical techniques, the LIFT procedure aims to preserve anal continence. It does not involve dividing any portion of the anal sphincter complex, minimizing the risk of post-operative incontinence.

b. Variables:

I. Participant characteristics:

- **Age:** The age of the participants in each study.
- **Gender:** The distribution of male and female participants.
- **Previous treatments:** Information on any prior treatments or surgeries for anal fistulas.

II. Intervention characteristics:

- **Type of fistula:** The classification of the anal fistulas treated (e.g. intersphincteric, transsphincteric).
- **Follow-up duration:** The length of time over which participants were followed after the LIFT procedure.
- **Surgical variations:** Details of any variations of the LIFT procedure used, such as LIFT plus coring out, bio-LIFT, LIFT plus fistula plug.
- **Pre-LIFT drainage seton:** Whether a pre-LIFT drainage seton was used in the treatment.

III. Outcome measures:

- **Incontinence status:** The post-operative assessment of anal continence, which may include measures like the Wexner score.
- **Recurrence rate:** The rate at which anal fistulas recurred after the LIFT procedure.
- **Healing rate:** The proportion of participants who achieved complete healing after the procedure.

Study risk of bias assessment

We used Assessing the Methodological Quality of Systematic Reviews (AMSTAR) for systematic review and meta-analysis, Cochrane risk of bias for clinical trials, the Newcastle-Ottawa scale for cohort studies, and a scale for the quality assessment of narrative review articles (SANRA) for traditional reviews. Studies of low quality were excluded.

Effects measure

Common effect measures for various outcomes include:

1. **Success rate:** The success rate is usually presented as a percentage and represents the proportion of patients who experienced complete healing or resolution of their anal fistula after undergoing the LIFT procedure. It's a measure of treatment effectiveness.
2. **Recurrence rate:** The recurrence rate is also presented as a percentage and indicates the proportion of patients who experienced a return of their anal fistula symptoms after initially achieving healing. A lower recurrence rate is generally considered better.
3. **Incontinence rate:** This rate indicates the proportion of patients who experienced fecal incontinence as a result of the procedure. It's an important measure of functional outcomes and potential complications.
4. **Follow-up period:** The mean follow-up period is typically reported in weeks or months and represents the average duration for which patients were observed after the LIFT procedure. It's important for understanding the duration of the study and the stability of treatment outcomes over time.

5. **Comparative measures:** In studies that compare different treatments or variations of the LIFT procedure, measures like risk ratios may be used to compare the effectiveness of one approach to another. For example, in the study comparing LIFT to ERAF, the effectiveness of the two procedures was compared using success rates and recurrence rates, which may involve calculating risk ratios.
6. **P-values:** P-values are often used to assess the statistical significance of observed differences in outcomes. For example, if one study reports a difference in success rates between two procedures, a p-value may be presented to indicate whether this difference is statistically significant.

Synthesis methods

1. **Defining inclusion and exclusion criteria:** At the outset, the researchers define clear inclusion and exclusion criteria. These criteria specify the characteristics of the studies that will be considered for inclusion in the synthesis. Criteria may include the type of intervention, the patient population, study design, outcomes of interest, and publication status.
2. **Literature search:** A comprehensive literature search is conducted using relevant databases (e.g. PubMed, Scopus, Web of Science) to identify all potentially relevant studies. Search terms and strategies are developed to retrieve studies that meet the inclusion criteria.
3. **Study selection:** Two or more independent reviewers screen the search results to identify potentially eligible studies. They review titles and abstracts to determine whether a study meets the inclusion criteria. If a study's relevance is uncertain based on the title and abstract, the full-text article is retrieved for further assessment.
4. **Data extraction:** For studies that meet the inclusion criteria, data extraction is performed. This involves systematically collecting relevant information from each study, including details about study design, patient characteristics, interventions, outcomes, and effect measures. Data extraction is typically done using a standardized data extraction form.
5. **Quality assessment:** The quality of each included study is assessed using established criteria or tools relevant to the study design. This assessment helps evaluate the risk of bias in the individual studies and informs the synthesis.
6. **Synthesis and meta-analysis:** Depending on the research question and data availability, a meta-analysis may be conducted to combine the results of individual studies statistically. In this step, effect measures (e.g. risk ratios, mean differences) are calculated or extracted from each study to quantify the treatment effects.
7. **Publication bias assessment:** The possibility of publication bias (the tendency to publish studies with positive results) is evaluated using methods such as funnel plots or statistical tests. Publication bias can affect the validity of the synthesis.
8. **Reporting:** The findings of the synthesis are reported in a systematic review or meta-analysis manuscript, following established reporting guidelines (e.g. PRISMA for systematic reviews). The methods used for study selection, data extraction, and statistical analyses are described in detail to ensure transparency.
9. **Peer review:** The synthesis manuscript undergoes peer review, where independent experts evaluate the methodology and interpretation of results. Revisions may be made based on peer reviewer feedback.
10. **Publication:** If accepted, the synthesis is published in a peer-reviewed journal, making the findings accessible to the broader scientific community.

Reporting bias assessment

1. **Publication bias assessment:**

- Funnel plots: Funnel plots are graphical representations that plot the effect size or treatment effect against a measure of study precision (e.g. sample size or standard error).

2. **Sensitivity analyses:** Conducting sensitivity analyses involves reanalyzing the data while excluding studies with characteristics that may make them more susceptible to publication bias. For example, sensitivity analyses may be performed by excluding studies with small sample sizes, studies funded by the industry, or studies with high risk of bias.

3. **Trial registration and gray literature:**

- Check for evidence of selective reporting by comparing the outcomes reported in published articles to those listed in trial registries or protocols. If outcomes are missing or selectively reported, it may indicate publication bias.
- Include gray literature (unpublished studies, conference abstracts, dissertations) in the review to reduce the impact of publication bias. However, be cautious about the quality and reliability of gray literature.

4. **Contact study authors:** Reach out to study authors to inquire about missing data or results. Authors may provide additional information on outcomes that were not reported in the published articles.

5. **Assess reporting practices:** Evaluate the completeness of reporting in the included studies. If studies lack sufficient information on methods, results, or outcomes, it may raise concerns about selective reporting.

Certainty assessment:

1. **Grading of recommendations assessment, development, and evaluation (GRADE):** GRADE is one of the most widely used frameworks for assessing the certainty of evidence. It involves the following steps:

- Rating the quality of evidence for each outcome (high, moderate, low, or very low) based on factors such as study design, risk of bias, inconsistency, indirectness, imprecision, and publication bias.
- Considering the balance of desirable and undesirable effects.
- Formulating recommendations based on the quality of evidence and the balance of benefits and harms.

GRADE provides a structured approach to systematically assess and communicate the confidence in the evidence.

Result

Reference	Study design	Sample size	Age	Surgical method	Healing rate	Recurrence rate	Incontinence	Follow-up
Rojanasakul [15], 2009, Thailand	Retrospective	18	NA	LIFT	94%	R 5.6%	NA	NA
Bleier., *et al*. [7] 2010, USA	Retrospective/ Prospective	39	49	LIFT	57%	43%	0 (NAO)	20 wk (0-58)
Shanwani., *et al*. [9] 2010, Malaysia	Prospective	45	41.5 (27-56)	LIFT+ coring out	82.20%	R 17.7%	0 (NAO)	9 m (2-16)
Ellis [12] 2010, USA	Prospective	31	48 (30-68)	BioLIFT	94%	R 2 (6%)	NA	15 m (12-30)
Ooi., *et al*. [16] 2011, Australia	Retrospective	25	40 (21-67)	LIFT	68%	R 28% (all IS)	Basal WS 2 PostOp Global WS 4 Heal WS 0	2 wk (3-43)

Aboulian., *et al*. [14] 2011, California	Retrospective	25	39	LIFT	68%	Fa 32%	NA	27 wk (8-158)
Sileri., *et al*. [17] 2011, Italy	Prospective	18	39 (4-62)	LIFT	83%	R 3 (17%; 1 IS, 2 TS)	NA	6 mo (4-10)
Tan., *et al*. [18] 2012, Singapore	Retrospective	31ERAF 24 LIFT	ERAF 49 (19-74); LIFT 41 (16-75)	LIFT	ERAF 93.5%; LIFT 62.5%. P = 0.006	ERAF Fa 6.5%; LIFT Fa 37.5%. P = 0.006	NA	ERAF 6 mo (2-26); LIFT 13 mo (4-67
Wallin., *et al*. [19] 2012, United States	Retrospective	93	43 (21-76)	LIFT	40% Secondary 57%	Fa 34% R 26%	WS 10%-10% Solid incontinence none (NAO)	19 mo (44-55)
Abcarian., *et al*. [20] 2012, USA	Retrospective	40	43	LIFT	74% 1st 90% 2nd 75% 3rd 65%	26% RFUVA: obesity, CS, PS	0 (NAO)	18 wk (2-64)
Mushaya., *et al*. [21] 2012, Australia	Randomised control trial	39 LIFT 25 ERAF 14	47.8	LIFT	At 1 mo ERAF 85% vs LIFT 68% Finally 93% vs 92%	R ERAF 7% vs LIFT 8%, P = NS	NAO Report equal functional outcomes	20m
Liu., *et al*. [22] 2013, USA	Retrospective	38	42	LIFT	61%	Fa 15 12 early type 3 late type	0 (NAO)	26 mo (3-44)
Lehmann., *et al*. [23] 2013, Sweden	Retrospective	17	49 (30-76)	LIFT	Complete 47%	40% R 13% Fa	0 (NAO)	13.5 mo (8-26)
Sirikurnpiboon., *et al*. [24] 2013, Thailand	Prospective	41 20 LIFT 21LIFT plus	40.7	LIFT	83% LIFT 83% vs LIFT-plus 85% P = 0.059	Fa 7 LIFT 4 LIFT-plus 3	0 (NAO)	19 wk
Ovi., *et al*. [25] 2023, Bangladesh	Observational	40	37.3	LIFT	LIFT 95%, 75% fistulectomy group, (p = 00.18)	40%	35%, (p = 00.18)	4, 8, 12 wk. 1year

Table 1: *Summary of the study selection.*

Some studies might have comprehensive data on patient selection, control groups, and validated outcome measures but lack adequate reporting of postoperative outcomes, such as disease recurrence and follow-up. If the study does not provide sufficient data on these critical outcomes, it may be excluded.

Study characteristics

In the present review, we included 15 papers: nine were retrospective, four were prospective, one was a randomized controlled trial and one was an observational (Table 1). The total number of patients was 539. Only a few studies included patients not mentioned with the following characteristics: rectovaginal fistula, cigarette smoking, inflammatory bowel disease, diabetes, and HIV. Other special characteristics also didn't mention but were not numerically specified were the presence of obesity, ischemic heart disease, rheumatoid arthritis, and cancer. The types of fistulas treated using LIFT were rectovaginal, intersphincteric, suprasphincteric, and transsphincteric (low, middle, or high). The patients enrolled either had a recurrent fistula after having undergone different treatments. Some authors excluded fistulas that had previously received treatment using a different method. All patients underwent the LIFT procedure, except for those in one study published by Ellis., *et al*. [12] in which bioprosthetic grafts were used to reinforce LIFT (Bio LIFT). The study that included the greatest number of patients who underwent the LIFT procedure was that by Wallin., *et al*. [19] from United States (Table 1).

In 2009, Rojanasakul [15] first described the technique and reported a success rate of 94%. They had 18 patients total, and the recurrence rate was 5.6%. Bleier., *et al*. [7] conducted a retrospective and prospective trial. They included 39 patients. The mean age of the population was 49 years. The average follow-up period was 20 wk. The success rate was 57%. Out of the total recurrences, there were 4 intersphincteric, 3 transsphincteric, and 1 horseshoe-type recurrences. The incontinence rate was 0%. The same group, recently reported on the treatment of 93 patients, with a mean age of 43 years [19]. The healing rate dropped to 40% with a failure rate of 34%, and 26% of patients suffered a recurrence. Nine patients had fistulotomy treatment after the fistula was downstaged to intersphincteric, with a secondary healing rate of 57%. The average Wexner score reported was 1. No patient had solid stool incontinence. Shanwani., *et al*. [9] performed a prospective study. A total of 45 patients were included and the mean age was 41.5 years. During an average follow-up period of 9 mo and the recurrence rate was 17.8%. There were no incidents of fecal incontinence that were recorded.

There are also variations to the conventional LIFT procedure. Ellis [12] based on the treatment of rectovaginal fistulas with approximately 92% of success, described the use of a bioprosthetic graft to reinforce the ligation and the closure of the fistula tract, calling it the BioLIFT procedure in a prospective study of 31 patients and an average age of 48 years. The external anal sphincter and puborectalis muscle were fixed with absorbable material. BioLIFT achieved a 94% success rate during an average follow-up period of 15 mo. There were two recurrences (one hemi-horseshoe and one intersphincteric) occurred. In 12 patients, there was local induration and drainage from the surgical site, but it went away with only regular postoperative treatment.

Ooi., *et al*. [16] conducted a trial including 25 patients. The mean age was 40 years. The cohort's pre-operative Wexner score was 2. The healing rate was 68% with a mean follow-up of 22 weeks. The mean operative time was 39 min. There was no morbidity. The global postoperative Wexner score was 4. In the subgroup of healed patients, the Wexner score was 0. All recurrences (28%) were intersphincteric fistulas.

Aboulian., *et al*. [14] treated 25 patients. The average follow-up period was 27 weeks. The healing rate was 68%. In a later report with a larger cohort and longer follow-up, patients who fully healed were monitored every 6 months to check for any recurrence of symptoms. The study followed a total of 38 patients. The mean follow-up period was 26 mo. Following the first LIFT procedure, the research found a 61% healing rate. A total of 15 patients with failures, 12 failures were early type, and 3 failures were late type. Among the failures observed, there were 4 cases of blind infected sinus, 2 cases of down-staging effect with intersphincteric fistula, and 9 cases of recurrent trans-sphincteric fistula. No incontinence was reported [22].

Sileri., *et al*. [17] in a prospective study, treated 18 patients, with a mean age of 39 years. The healing rate was 83% with only 3 recurrences (one was intersphincteric treated with fistulotomy, and the others were 2 transsphincteric fistulas treated with seton placement and ERAF). The average follow-up period was 6 mo. No incontinence was reported.

Abcarian., *et al*. [20] the study reported the outcomes of 40 patients, with an average age of 43 years. The average number of previous surgeries in the cohort was 2. The healing rate was 74% overall, but for patients primarily treated with the LIFT procedure, it was 90%. In contrast, the patients with one previous surgery had a healing rate of 75%, and the patients with two or more previous surgeries had a success rate of 65%. The mean follow-up period was 18 wk. No functional changes incontinence were reported by the authors.

Tan., *et al*. [18] in a retrospective study compared the effectiveness of the endorectal advancement flap (ERAF) procedure versus the LIFT procedure after all patients underwent seton placement. 31 ERAF procedures were performed, and the mean age of the population was 49 years. The total healing rate was 93.5%. A total of 24 patients were included in the group treated with the LIFT procedure with 87.5% of the patients and the mean age was 41 years. The mean follow-up period was 13 mo. A success rate of 62.5% was reported. The ERAF procedure was found to be more effective compared to the LIFT procedure. The healing rate for ERAF was 93.5% compared to 62.5% for LIFT, while the failure rate was 6.5% for ERAF and 37.5% for LIFT (P = 0.006).

Mushaya., *et al*. [21] in a randomized and controlled trial compared the LIFT and ERAF procedures, involving 39 patients with a mean age of 47.8 years. In the LIFT group, there were 25 patients, and in the ERAF group, there were 14 patients. The mean follow-up period was 20 mo. One-month healing rates were 85% for ERAF and 68% for LIFT. The overall success rates at the end of the study were 93% for ERAF and 92% for LIFT. Recurrence rates were similar (7% for ERAF and 8% for LIFT).

Ovi., *et al*. [25] in an observational study, treated 40 patients, with a mean age of 37.5 years. LIFT was found to be better than fistulectomy in terms of post-operative incontinence (p = 0.008). LIFT was found better in term of 40% recurrence. The healing rate was 95% of LIFT, 75% of fistulectomy group.

Lehmann., *et al*. [23] the study exclusively examined the efficacy of the LIFT procedure for recurrent anal fistulas. They included 17 patients, with a mean age of 49 years.

During a mean follow-up period of 13.5 months, the study reported a 47% complete healing rate, a 13% incomplete healing rate, and a 40% persistence or recurrent fistula rate.

With a new modification of the surgical technique, Sirikurnpiboon., *et al*. [24] compared the effectiveness of adding a partial fistulotomy until the external sphincter (called the LIFT-PLUS procedure) in a prospective study of 41 patients. Twenty patients underwent the LIFT procedure with tract curettage and external opening widening, while 21 patients underwent the LIFT-plus procedure. The average age of the population was 40.7 years, and the healing rate achieved was 83% with a mean follow-up of 19 weeks. No incontinence was reported. Treatment failures included 4 cases in the LIFT group (3 recurrences, 1 sinus abscess) and 3 cases in the LIFT-plus group (2 recurrences, 1 intersphincteric fistula). The healing rate was 81% in the LIFT procedure group and 85% in the LIFT-plus group (P = 0.0529).

Risk of bias in studies:

1. **Rojanasakul., *et al*. (2009):**

- Bias may arise from the small sample size (18 patients).
- Limited information is available about patient selection and potential sources of bias.

2. **Bleier., *et al*.:**

- Potential bias may arise from the retrospective design.
- Selection bias could occur, as the study included a specific group of patients. The study reports some recurrences, which could indicate potential bias.

3. **Shanwani., *et al*.:**

- The study design is prospective, which reduces some sources of bias.
- However, more information is needed to assess potential sources of bias.

4. **Ellis:**

- This is a prospective study with relatively small sample size (31 patients).
- Bias might arise from the limited sample and potential patient selection.

5. **Ooi., *et al*.:**

- Bias assessment requires more detailed information on study methodology.

6. **Aboulian., *et al*.:**

- This is a case series with a relatively small sample size (25 patients).
- Bias may arise due to limited sample and potential patient selection.

7. **Sileri., *et al*.:**

- The study is prospective, which reduces some sources of bias.
- However, further details are needed for a comprehensive bias assessment.

8. **Abcarian., *et al*.:**

- This is a case series with a moderate-sized sample (40 patients).
- Bias might occur due to limited sample size and potential patient selection.

9. **Wallin., *et al*.:**

- Potential bias due to a drop in healing rate to 40%, 34% failure rate, and secondary treatments.

10. **Tan., *et al*.:**

- It's a retrospective study with unequal group sizes.
- Bias may arise due to differences in patient groups and retrospective design.

11. **Mushaya., *et al*.:**

- Being an RCT, the study design minimizes some sources of bias.
- However, more information is needed to assess the quality of randomization and blinding.

12. **Liu., *et al*.:**

- Potential bias due to a 61% healing rate, 15 cases of failure, and various types of failures observed, but no incontinence reported.

13. **Ovi., *et al*.:**

- The study is observational, which can introduce various biases.
- Limited information is provided for a comprehensive bias assessment.

14. **Lehmann., *et al*.:**

- This is a case series with a small sample (17 patients).
- Bias may arise due to the small sample size and potential patient selection.

15. **Sirikurnpiboon., *et al*.:**

- This is a prospective study with a relatively small sample (41 patients).
- Bias assessment requires more detailed information on methodology.

Reporting biases

1. Rojanasakul., *et al*. (2009): It's unclear if there was reporting bias in this study because limited information is available about patient selection and potential sources of bias. The absence of detailed results may raise concerns about selective reporting.
2. Bleier., *et al*. (Retrospective and prospective trial): The study reported recurrences, indicating that at least some results were reported. However, the absence of detailed results and outcomes could potentially introduce reporting bias.
3. Shanwani., *et al*.: There were no reported incidents of fecal incontinence, suggesting that relevant results were reported. However, more detailed reporting on outcomes and potential biases would provide a clearer picture.
4. Ellis (Bio LIFT procedure): The study reported a 94% success rate but didn't provide detailed information about potential complications or failures. More comprehensive reporting of results would be beneficial.
5. Ooi., *et al*.: The study lacks detailed information on study design and results, making it challenging to assess the risk of bias due to missing results. More complete reporting is needed.
6. Aboulian., *et al*.: The study reported a healing rate of 68%, but additional information on outcomes and potential complications is required to assess the risk of bias more thoroughly.
7. Sileri., *et al*.: The study reported a healing rate of 83% and mentioned three recurrences. While some results were reported, more comprehensive reporting would enhance the assessment of bias due to missing results.
8. Abcarian., *et al*.: The study reported the overall healing rate but didn't provide detailed results for different patient groups. More detailed reporting of outcomes would help assess potential bias due to missing results.
9. Tan., *et al*. (Comparing ERAF and LIFT): The study reported differences in healing rates between ERAF and LIFT but didn't provide detailed results for each group. More comprehensive reporting of outcomes is needed.
10. Mushaya., *et al*. (Randomized controlled trial): Being an RCT, it's expected to have more complete reporting. However, the assessment of risk of bias due to missing results would require access to the full study report with detailed outcomes.
11. Researchgate.net (Observational study): The study reported differences between LIFT and fistulectomy but didn't provide a comprehensive breakdown of outcomes. More detailed reporting would be beneficial.
12. Lehmann., *et al*. (Exclusive for recurrent anal fistulas): The study mentioned healing rates and recurrence rates but didn't provide a detailed breakdown of results. More comprehensive reporting would aid in assessing bias due to missing results.

13. Sirikurnpiboon., *et al*. (LIFT-PLUS procedure): The study reported overall healing rates and treatment failures but could benefit from more detailed reporting of outcomes for a thorough assessment of bias due to missing results.

Discussion

In 1993, Matos., *et al*. [26] described a technique of excision of intersphincteric anal gland infection. They excised the entire fistula tract, in addition to primary repair, by means of an intersphincteric approach by suturing the internal anal sphincter defect.

The success rate with 20 patients was 45%. The poor results were attributed to blood supply issues causing wound breakdown. In the studies comparing ERAF and LIFT procedures, effectiveness rates were 94% vs. 62.5% and 93% vs. 92%, respectively [18,21]. In the former study, the follow-up was shorter for the ERAF group [18]. It is also important is the larger proportion of patients with previous fistula surgeries in the ERAF group, a possible selection bias. The reported success rate of the ERAF group was unusually higher than previously reported in other trials [27,28]. In these previous studies, the authors did not objectively evaluate functional outcomes. However, there have been reports indicating incontinence rates of up to 35% after the endorectal advancement flap (ERAF) procedure [30].

Not all studies specified the types of fistulas treated, but the most common type observed was transsphincteric. In addition, van Onkelen., *et al*. [29] described the results of the procedure in the treatment of low transsphincteric fistulas. The study reported a 100% final and secondary healing rate without any impact on continence. Bokhari., *et al*. [30] reported that major and minor incontinence after fistulotomy for low fistulas reached up to 5% and 11%, respectively. The authors identified female sex and anterior fistulas or a history of obstetric risk as additional factors associated with a higher risk of incontinence [30].

Two studies reported the routine ligation of the primary internal orifice in their application of the LIFT technique [14,19]. During the LIFT procedure, Wallin., *et al*. [19] no-touched the primary opening in 87% of cases, ligated them in 8% of cases, performed a partial internal sphincterotomy in 4% of cases, used Alloderm in 5% of cases and created a mucosal flap in 1% of cases. In a univariate analysis, only the use of biologic mesh displayed a tendency for healing, but the proportions of patients were scarce and did not reach statistical significance. In the study written by Aboulain., *et al*. [14] the primary internal opening was closed in the mucosal side within the anal canal to prevent the entry of new infective agents. They achieved a healing rate of 68%.

Specifically, the use of a bioprosthetic mesh (Bio-LIFT procedure) reported a 94% success rate. The BioLIFT technique has two potential disadvantages. First, it requires a more extensive dissection in the intersphincteric space. The physiological consequences of this dissection are unknown, and both techniques are also associated with the relatively high cost of bioprosthetic materials. The addition of partial fistulotomy in the LIFT procedure (LIFT-plus) or combining LIFT and ERAF procedures did not demonstrate any significant advantages compared to the individual techniques [24].

The cure rate for patients with only recurrent fistulas was 47%, despite most studies including a high percentage of previously treated patients. Following the resolution of the inflammatory post-surgical response, scarring can occur, leading to fibrosis and obliteration of the intersphincteric space. This can make the dissection in the intersphincteric plane difficult. Tan., *et al*. [18] concluded that given the simplicity of the LIFT procedure, clinicians should still perform the LIFT procedure in patients presenting for the first time and recommend the ERAF procedure in patients with multiple previous surgeries and a scarred perianal region. Tan., *et al*. [18] considered that meticulous dissection along the intersphincteric plane while maintaining the integrity of the internal sphincter and the anal mucosa is critical. The presence of any breach or buttonhole in the anal canal mucosa during the procedure can increase the risk of failure. Based on the previously described classification for recurrences and the results of 12 studies, there were nine cases classified as type 1 (blind sinus), 32 cases classified as type 2 (intersphincteric fistula), and 47 cases classified as type 3 (transsphincteric fistula) [4-7,12,13,16,17,23].

Recommended treatments for recurrent anal fistula failures are as follows: local measures for type-1 failures, fistulotomy for type-2 failures, and reperforming the LIFT procedure or ERAF procedures for type-3 recurrences.

The risk factors for failure were obesity, smoking, multiple previous surgeries and the length of the fistula track [14,22]. In a retrospective study, the healing rate for patients without previous surgery was 95%, whereas the rate for those with multiple surgeries was 65% [14]. A previously unreported finding was that for every one-centimeter increase in fistula length, the odds ratio for healing decreased by 0.55 (95%CI: 0.34-0.88, P = 0.01). To ensure the effectiveness of the LIFT procedure, it is advised to have an epithelialized, well-formed tract. In theory, if the tract is inflamed or lacks sufficient granulation tissue, there may not be enough tissue strength to safely perform ligation during the LIFT procedure. However, Mitalas., *et al*. [31] no correlation was found between prior seton drainage and the presence of epithelium. None of the studies included in the review indicated a benefit in using a seton before the LIFT procedure.

Limitations of the Study

Most of the studies were non-randomized; only one was randomized control trial, no study included an objective assessment of incontinence. Only studies written in English were included in this analysis, and relevant literature in other languages was not considered.

Conclusion

The currently available information indicates that the LIFT procedure is a feasible and effective surgical technique, with low impact on fecal continence. The main indication for the LIFT procedure is transsphincteric fistulas in patients who have not undergone previous surgery and have relatively short fistula tracts. Patients with more complex fistulas, particularly those who have undergone multiple previous surgeries, should be considered for the endorectal advancement flap (ERAF) procedure. At present, there is inadequate evidence to support the recommendation for the combined use of prosthetic materials or the performance of the combined LIFT-ERAF procedure. Additional randomized controlled trials are required to establish the routine recommendation of the LIFT procedure over other surgical techniques for the treatment of anal fistulas.

Conflict of Interest

None.

Payment/Services Info

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