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Is the ligation of the intersphincteric fistula tract (LIFT) procedure truly a sphincter preserving procedure for anal fistula? A scoping review of the literature

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Abstract

Introduction The ligation of the intersphincteric fistula tract (LIFT) procedure has garnered popularity with its success rates and purported sphincter–continence preservation. However, there remains a paucity in the literature on the objective evaluation of sphincter integrity and fecal continence after the LIFT procedure.

Objectives The present study undertakes a scoping review to systematically explore and map the published literature, to evaluate the sufficiency of data on the impact on continence in patients after the LIFT procedure.

Design A systematic search of MEDLINE, PubMed, EMBASe, CINAHL was performed from January 2007 to April 2020 and 597 publications were identified. Forty-two satisfied the inclusion and exclusion criteria. We performed a scoping review in accordance to the PRISMA–ScR guidelines.

Results Only 3 (7.1%) of publications were randomized controlled trials, of which just 1 (2.4%) measured incontinence as a primary outcome. Continence was measured both pre- and post-LIFT in 30 (71.4%), of which 19 (45.2%) had a fixed protocol for continence assessment, which was heterogeneous between the studies. Continence was assessed using subjective scoring systems in 27 (64.3%) and objective measurement was performed in just 6 (14.3%). No studies performed post-operative anatomical assessment of the anal sphincter complex.

Conclusions Long-term continence in post-LIFT patients is not supported with adequately powered prospective longitudinal trials using rigorously protocoled pre- and post-operative assessment of continence. Future research that focuses on a combination of objective assessment using anal manometry as well as anatomical assessment of the sphincter complex on top of subjective evaluation is needed before we can be certain if LIFT is indeed a sphincter and continence preserving technique.

Keywords Colorectal, Anal fistula, Incontinence

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Introduction

Management of complex anal fistula continues to be a perennial challenge to any surgeon. When faced with a complex anal fistula, one cannot simply perform a fistulotomy, which is often the procedure of choice in low and simple anal fistulae. This is due to the fear of division of the anal sphincters, which may render the patient incontinent. Whilst numerous surgical techniques have been described to address complex anal fistula, none has truly been able to achieve good success rates, low recurrence rates and at the same time, preserve continence.

The ligation of the intersphincteric fistula tract (LIFT) is one promising technique that has been popularized over the past decade. Not only does it have reported success rates of 68–94%, it is also purported to be sphincter and continence preserving [1–5]. Despite increasing adoption of the LIFT procedure, there remains to be paucity in the literature on the objective evaluation of sphincter integrity and anal continence after the LIFT procedure in anal fistula 6.

Due to the observed lack of consistency in the published literature demonstrating an empirical understanding of anal continence post-LIFT procedure, as well as and the dearth of reviews examining this knowledge gap, the aim of this scoping review was, therefore, to systematically explore and map the literature, so as to evaluate the sufficiency of data on the impact on continence in patients after they undergo the LIFT procedure 7.

Methods

Protocol

This scoping review was conducted in accordance with the PRISMA–ScR Guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) and in accordance to published guidelines by the EQUATOR (Enhancing QUAlity and Transparency of health Research) Network 8 (Supplemental File PRISMA–ScR Checklist).

Search strategy

To identify all relevant literature, we performed a systematic search of MEDLINE, PubMed, EMBASE, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Scopus on 24th April 2020 with Medical Subject Headings (MeSH) terms where possible. The following search strategy was used:

("Ligation of the intersphincteric fistula tract" OR "LIFT") AND ("incontinence" OR "anal incontinence" OR "fecal incontinence" OR "faecal incontinence" OR "continence" OR "anal continence" OR "fecal continence" OR "faecal continence") AND ("anal fistula" OR "fistula-in-ano" OR "transsphincteric fistula" OR "perianal fistula" OR "complex fistula" OR "high fistula" OR "perianal disease").

We restricted the search to literature published between 1st January 2007 and 24th April 2020 as the LIFT procedure was first described in 2007 by Rojanasakul A et al 2.

Inclusion and exclusion criteria

We included (1) all primary studies that investigated the LIFT procedure, including both original LIFT and its modifications for the treatment of anal fistula, that were (2) published in English. Reference lists of identified articles were screened for additional publications of interest.

Studies were excluded if they (1) were reviews, meta-analyses, or grey literature, (2) did not measure continence as an outcome of interest, (3) enrolled participants with anal fistula of specific etiology, such as Crohn's disease, tuberculosis, or those associated with malignancy, or (4) enrolled fewer than 10 patients.

Article selection and data extraction

Four reviewers (BES, JL, CY and SMS) independently reviewed all records by title and abstract, followed by an independent review of full-texts by five reviewers (BES, JL, CY, SMS and IT) for records meeting both the inclusion and exclusion criteria. To ensure consistency of the article selection process, 10% of each reviewer's screened records was randomly assigned to another reviewer for a second round of screening. Any discrepancies in agreement were resolved by group consensus (Fig. 1). A data-charting form was jointly developed by all authors to determine variables of interest for extraction (see Table 1).

Data items extracted

See Table 1.

Results

Search results

A total of 597 articles were identified from searches of electronic databases and review article references, 171 of which were excluded as duplicates. 426 citations were then evaluated based on their title and abstract. 328 articles were excluded based on our inclusion and exclusion criteria. Of the remaining 98 full text articles, 56 were excluded for the following reasons: 48 were conference abstracts and not published in a peer reviewed journal, three were focused on patients with anal fistula and Crohn's disease, four did not measure continence as an outcome of interest, and one enrolled less than 10 patients. The remaining 42 studies were considered eligible and were included in this review (Fig. 1).

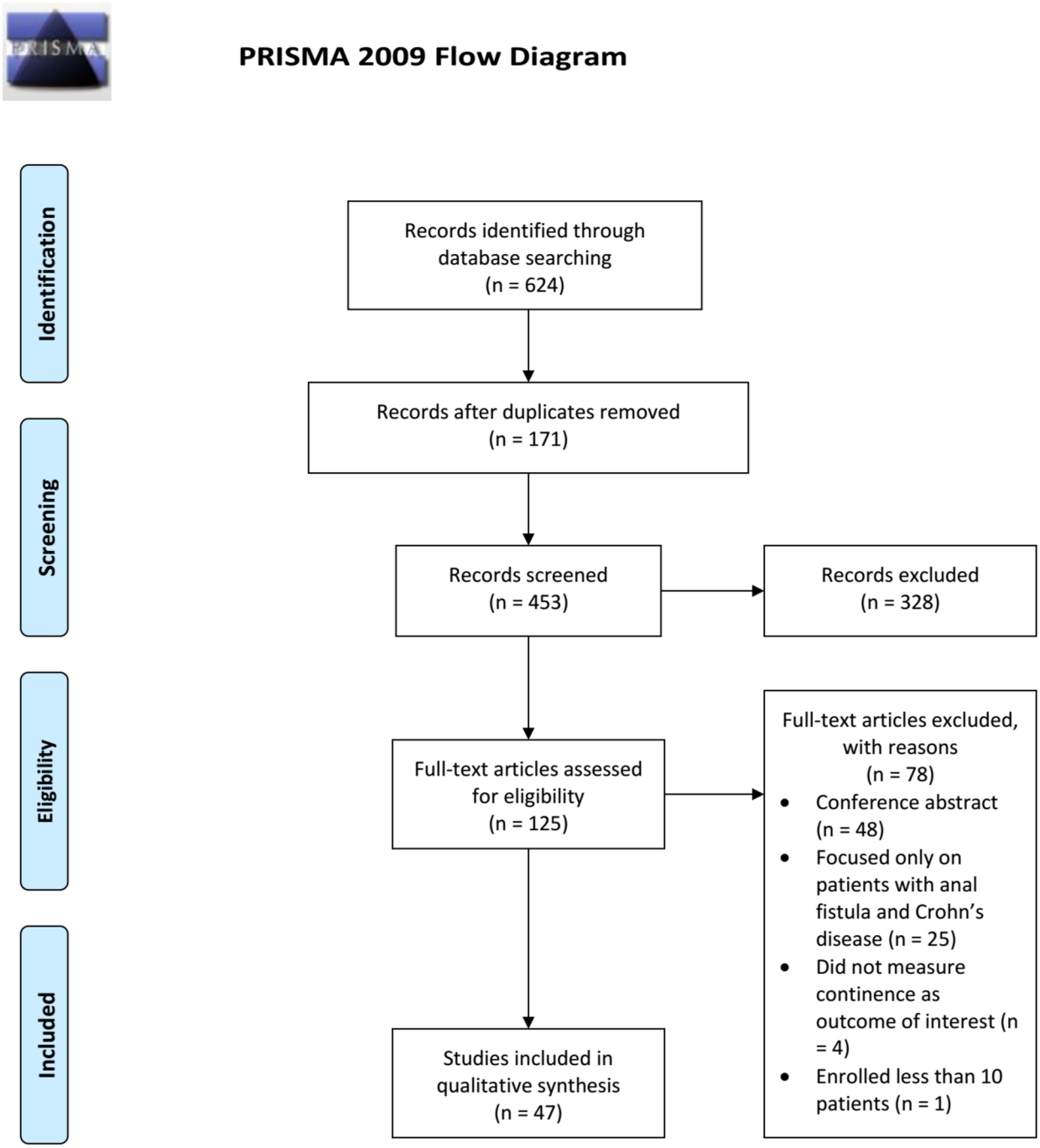

Fig. 1 PRISMA flow diagram detailing article identification and selection process

Characteristics of included articles

All 42 included studies were published in peer-reviewed journals; 39 (92.9%) were case series, whilst 3 (7.1%) were randomized controlled trials (RCT) [2, 5, 6, 9–47].

The median sample size was 41 patients (range: 10–258) patients. The median follow-up was 14.5 months (range: 4–71). Twenty-nine (69.0%) studies had a median follow-up of less than 20 months. Follow-up was not reported in seven (16.7%) studies (Supplemental File Table 2) [2, 21, 27, 30, 38, 42, 47].

Twenty-four (57.1%) studies were published in or prior to 2015. Majority of studies originated from Asia (18, 41.7%) and there was representation from

Table 1 Data items extracted

Publication characteristics	Title of publication Journal of publication Year of publication Country of origin Study design Sample size Time horizon of study (study start and end dates)
Patient characteristics	Patient age Patient sex Type of anal fistula
Assessment of continence	Timing of assessment - Pre- and post-operatively - Post-operatively only - Only for symptomatic patients Frequency and timepoint of assessment Method of assessment - Subjective assessment: scoring system - Objective assessment: anal manometry - Anatomical assessment: MRI or EAUS
Publication results	Duration of follow-up Study outcomes

North and South America, Europe, Africa and Oceania (Annex 1/Supplemental File Annex 1).

Patient characteristics

Age was reported as median age in 31 (73.8%) studies and as mean age in 10 (23.8%) studies. Age was not reported in 1 (2.4%) study. The median and mean age was less than 50 years in 30 (96.8%) and 10 (100%) of studies, respectively.

Majority of studies had predominantly male patients, with 38 (90.5%) and 28 (66.7%) of studies having more than 50% and 60% of male patients, respectively.

In 2 (4.8%) studies, the sex of the patients was not reported.

Thirty-seven (88.1%) studies included patients with complex anal fistula, whilst 5 (11.9%) of studies included patients with only transsphincteric fistula [18, 20, 28, 40, 44]. Although there was a variation with the term "complex fistula" among the studies, overall it included the following definitions: tract crossing > 30% of external sphincter, anterior fistula in females, multiple tracts, recurrent fistula or pre-existing incontinence.

Table 2 Study numbers of continence assessment

Assessment of continence	Number of articles (n)	Percentage
Post-operative assessment only	12	28.6
Both pre- and post-operative assessment	30	71.4
Post-operative assessment only		
Fixed assessment protocol	3	7.1
Measured on > 1 occasion	2	4.8
Scoring system used	4	9.5
No scoring system used	8	19.0
Objective measurement used (anal manometry)	1	2.4
Anatomical assessment (MRI/EAUS)	0	0
Both pre- and post-operative assessment		
Fixed assessment protocol	19	45.2
Measured on > 1 occasion	10	23.8
Scoring system used	23	54.8
No scoring system used	7	16.7
Objective measurement used (anal manometry)	5	11.9
Anatomical assessment (MRI/EAUS)	0	0

Assessment of continence

Continence was assessed both pre- and post-LIFT procedure in 30 (71.4%) of studies, whilst continence was assessed only post-operatively in 12 (28.6%) studies (Table 2).

In studies in which continence was only assessed post-LIFT procedure, 3 (7.1%) had protocoled assessment of continence, and continence was measured on more than one occasion in 2 (4.8%) studies. A subjective scoring system (Cleveland Clinic Fecal Incontinence Score (CCFIS)/Wexner Fecal Incontinence Score, Fecal Incontinence Severity Index (FISI), Rockwood Score or Park's Fecal Incontinence Score) [48–50 to assess continence was utilized in 4 (9.5%) studies, whilst no scoring system for the assessment of continence was utilized in the remaining 8 (19.0%) studies.

One study (2.4%), by Sileri et al., described the use of anal manometry to objectively assess fecal incontinence in patients with a FISI Score of > 6 26. However, no patient in this study suffered from incontinence post-LIFT that necessitated the need for assessment with anal manometry.

In studies in which continence was assessed both pre- and post-LIFT procedure, protocoled assessment of continence was performed in 19 (45.2%) studies and continence was measured on more than one occasion post-operatively in 10 (23.8%) studies. A subjective scoring system to assess continence was utilized in 23

(54.8%) studies, whilst 7 (16.7%) studies did not utilize any scoring system to assess continence.

Anal manometry was used in 5 (11.9%) studies to objectively assess resting sphincter pressure and maximal squeeze pressures pre- and post-LIFT procedure 24, 38, 43, 46, 47. Chew et al., Wen et al., Lau et al. and Torre et al. demonstrated no significant change in resting sphincter pressure or maximal squeeze pressures post LIFT procedure 24, 38, 46, 47.

Sun et al. reported a statistically significant reduction in mean squeezing pressure from 41.01 ± 3.82 kPa pre LIFT procedure to 41.38 ± 3.77 kPa post LIFT procedure ($p = 0.007$). However, there was no change in clinical significance with similar Wexner Scores pre- and post-LIFT procedure 43.

No study reported statistically significant changes to continence post-operatively. One study reported that 3/116 (2.6%) and 1/116 (0.9%) of patients developed a post-operative CCFIS of 1 and 2, respectively, with a median follow-up of 26.2 (range: 13–63) months 35. Another study reported that 9/46 (19.6%) of patients developed mild post-operative incontinence with a mean post-operative FISI of 2 (SD 2.5), with a mean follow-up of 9.5 (SD 11.9) months 45.

Discussion

Instinctively at first sight, the review of 42 studies would suggest that the LIFT procedure is truly a continence sparing procedure for anal fistula. However, the authors have numerous concerns regarding this seemingly established conclusion.

First, there were only three (7.1%) RCTs, whilst the majority (92.9%) were case series. And of the RCTs, only one study had incontinence as a primary outcome measure 27 and in the other two studies, incontinence was a secondary outcome measure 15, 16. None of the RCTs reported significant differences in continence pre- and post-LIFT procedure. However, as incontinence was a secondary outcome measure in two of these, the RCTs would hence not be powered to identify differences in continence pre- and post-LIFT procedure, giving rise to a possible type 2 error. In the only RCT, whereby incontinence was a primary outcome measure, this variable was unfortunately not considered as part of the power calculation.

Next, of the 30 studies where continence was measured both pre- and post-operatively, only 19 (45.2%) had a fixed protocol for continence assessment. However, there was heterogeneity between the studies in terms of follow-up protocol. There were also inconsistencies in the number of times continence was assessed, the timing of continence assessment post-operatively, the type of subjective scoring systems and objective manometric assessments utilized, and finally, the selection of patients to have continence assessed was not uniform.

Scoring systems such as the CCFIS/Wexner Fecal Incontinence Score, FISI, Rockwood Score or Park's Fecal Incontinence Score encompass both incontinence as well as the mechanisms adopted by the patient to cope with incontinence [48–53. The usage of subjective, unstandardized quantifiers results in measurement concerns and precludes comparison among the established literature. For example, even validated questionnaires such as CCFIS and FISI use the terms "rarely", "sometimes", "usually" and "always". These are up to the discretion and definition of the patient. Nonetheless, even with the usage of scoring systems, clinicians are unable to eliminate subjectivity in the assessment of continence due to self-reporting. Only 23 (54.8%) studies utilized scoring systems to assess continence pre and post LIFT procedure, and despite this, one must be cognizant of the risk of recall bias when interpreting the results.

To make the matter more confusing, as the vast majority of patients in the included studies were young, male and had a median follow-up of just 14.5 months (range 4–71). Most importantly, these young patients will have a robust anal sphincter complex and other pelvic floor musculature, where significant disruption to the anal sphincter anatomy may not be evident till many years later as the pelvic floor musculature would be able to "compensate" subjectively and even possibly objectively for the now weakened anal sphincter complex after surgery. There is no study to date that describes the progression of incontinence post-LIFT procedure into the later years of life.

Next, a review of all retrospective case series carries its most evident bias of selection bias. To surmount any initial learning curve and to justify their theory of LIFT being a sphincter preserving procedure, surgeons would carefully select well patients with good continence for this LIFT procedure. The selection bias and possibly even interviewer biases would result in optimistic reporting of the continence scores.

Although objective measurement of continence was performed in five (11.9%) studies, some of the results could have still been compensated for by the reasons mentioned above and hence once again portrayed a more optimistic evaluation.

Whilst, perhaps, anatomical assessment of the external anal sphincter using MRI or EAUS would have enabled proper evaluation of the anatomical integrity of both the internal and external anal sphincter complex, this was not performed in any study. Pre- and post-surgery imaging would have been necessary. The issue of operator-dependence in EAUS is a potential bias as well.

Hence, we propose a multimodal approach to the assessment of fecal incontinence with a combination of both validated scoring systems as well as objective assessment using anal manometry.

In addition, the impact on continence after the LIFT procedure is likely dynamic as it changes synchronously with post-operative pain control, healing, and fibrosis. The assessment of continence at multiple points over a period of time would give a better representation of continence post-operatively. However, only 10 (23.8%) studies assessed continence both pre-operatively and more than once post-operatively. Considering all these factors, there is a lack of clear data regarding the impact of the LIFT procedure on anal continence. We propose that these assessments of fecal incontinence be performed pre-operatively, as well as at regular pre-determined timepoints post-operatively.

The presence of a simple or complex fistula will also affect continence outcomes, with different amounts of the anal sphincter complex being involved. In our scoping review, we found that the literature was heterogenous, including both simple and complex fistulae in the studies. We propose that future studies must differentiate between simple and complex fistulae on top of a multi modal approach in the assessment of anal continence using both subjective and objective measurements.

In comparison with a systematic review, which formally evaluates the quality of evidence and synthesizes the data to address a specific research question, our scoping review outlines the current state of the literature on the impact of continence after the LIFT procedure, as well as identifies, where gaps exist.

There are, however, limitations to this review. First, extraction of accurate data from all publications is challenging, and some studies do not disclose all methods used and results obtained. Second, categorizing studies by type, despite the assistance of predefined data extraction and charting tools, is partially subjective. Finally, despite searching a multitude of databases using comprehensive search strategies, studies that were not published in English and non-published literature such as abstracts from conferences were not included. Nevertheless, it is unlikely that our search would have missed impactful papers published in peer-reviewed journals.

Conclusions

LIFT has been widely touted to be a sphincter and continence preserving technique, with acceptable success and recurrence rates. However, as long-term continence in post-LIFT patients is not supported with adequately powered prospective longitudinal trials using rigorously protocoled pre- and post-operative objective assessment of continence, we advise that caution be exercised. Future research should focus on a combination of objective assessment using anal manometry as well as anatomical assessment of the sphincter complex with the use of MRI or EAUS on top of the already widely adopted subjective evaluation. Only with this, can we be absolutely certain if LIFT is a sphincter and continence preserving technique.

Supplementary Information

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Supplementary material 1.

Supplementary material 2.

Author contributions

Ian Jse-Wei Tan—Conceptualisation, formal analysis, writing—original draft, writing—review and editing; Bei-En Siew—Formal analysis, data curation, writing—review and editing; Jerrald Lau—Conceptualisation, formal analysis, writing—review and editing; Carol Pei-Ling Yap—Formal analysis, data curation, writing—review and editing; Stephanie Marie May-Ee Soon—Data curation, writing—review and editing; Ker-Kan Tan—Conceptualisation, supervision, writing—review and editing.

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Data Availability

The authors confirm that all data generated or analysed during this study are included in the published article and supplementary material.

Declarations

Ethics approval and consent to participate

Not applicable.

Competing interests

The authors declare no competing interests.

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