

World Journal of *Gastrointestinal Surgery*

World J Gastrointest Surg 2022 May 27; 14(5): 374-527



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The primary aim of *World Journal of Gastrointestinal Surgery* (*WJGS, World J Gastrointest Surg*) is to provide scholars and readers from various fields of gastrointestinal surgery with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

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INDEXING/ABSTRACTING

The *WJGS* is now abstracted and indexed in Science Citation Index Expanded (SCIE, also known as SciSearch®), Current Contents/Clinical Medicine, Journal Citation Reports/Science Edition, PubMed, and PubMed Central. The 2021 edition of Journal Citation Reports® cites the 2020 impact factor (IF) for *WJGS* as 2.582; IF without journal self cites: 2.564; 5-year IF: 3.378; Journal Citation Indicator: 0.53; Ranking: 97 among 212 journals in surgery; Quartile category: Q2; Ranking: 73 among 92 journals in gastroenterology and hepatology; and Quartile category: Q4.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: Rui-Rui Wu, Production Department Director: Xiang Li, Editorial Office Director: Ya-Juan Ma.

NAME OF JOURNAL

World Journal of Gastrointestinal Surgery

ISSN

ISSN 1948-9366 (online)

LAUNCH DATE

November 30, 2009

FREQUENCY

Monthly

EDITORS-IN-CHIEF

Peter Schemmer

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/1948-9366/editorialboard.htm>

PUBLICATION DATE

May 27, 2022

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INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

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<https://www.wjgnet.com/bpg/gerinfo/240>

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<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>

Comparison between recent sphincter-sparing procedures for complex anal fistulas-ligation of intersphincteric tract vs transanal opening of intersphincteric space

Pankaj Garg

Specialty type: Gastroenterology and hepatology

Provenance and peer review: Invited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's scientific quality classification

Grade A (Excellent): A
Grade B (Very good): 0
Grade C (Good): 0
Grade D (Fair): D
Grade E (Poor): 0

P-Reviewer: Parellada CM, Guatemala; Yang BL, China

Received: December 29, 2021

Peer-review started: December 29, 2021

First decision: January 27, 2022

Revised: January 29, 2022

Accepted: April 27, 2022

Article in press: April 27, 2022

Published online: May 27, 2022



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Abstract

Complex anal fistulas are difficult to treat. The main reasons for this are a higher recurrence rate and the risk of disrupting the continence mechanism because of sphincter involvement. Due to this, several sphincter-sparing procedures have been developed in the last two decades. Though moderately successful in simple fistulas (50%-75% healing rate), the healing rates in complex fistulas for most of these procedures has been dismal. Only two procedures, ligation of intersphincteric fistula tract and transanal opening of intersphincteric space have been shown to have good success rates in complex fistulas (60%-95%). Both of these procedures preserve continence while achieving high success rates. In this opinion review, I shall outline the history, compare the pros and cons, indications and contraindications and future application of both these procedures for the management of complex anal fistulas.

Key Words: Anal fistula; Fistulotomy; Incontinence; Ligation of intersphincteric fistula tract; Transanal opening of intersphincteric space; Recurrence

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Core Tip: Ligation of intersphincteric fistula tract (LIFT) and transanal opening of intersphincteric space (TROPIS) are two of the more recent innovative procedures introduced in the last decade. Both of these procedures have been shown to be quite effective in complex anal fistulas. As both procedures are primarily sphincter-sparing, they do not lead to deterioration in continence. The advantages and disadvantages, indications and contraindications of LIFT and TROPIS have been discussed in this opinion viewpoint as well as the role both these procedures are likely to play in the future.

Citation: Garg P. Comparison between recent sphincter-sparing procedures for complex anal fistulas-ligation of intersphincteric tract vs transanal opening of intersphincteric space. *World J Gastrointest Surg* 2022; 14(5): 374-382

URL: <https://www.wjgnet.com/1948-9366/full/v14/i5/374.htm>

DOI: <https://dx.doi.org/10.4240/wjgs.v14.i5.374>

INTRODUCTION

The management of complex anal fistulas is challenging[1]. This is because complex fistulas involve a significant part of the sphincter complex [internal anal sphincter (IAS), external anal sphincter (EAS) or both] and if adequate care is not taken, then the sphincters may be damaged leading to permanent incontinence[1,2]. Fistulotomy is the most common procedure performed for anal fistulas but fistulotomy is contraindicated in complex fistulas as the risk of sphincter injury is high[2]. Therefore, several new sphincter-sparing procedures have been developed over the last two decades like video-assisted anal fistula treatment (VAAFT)[3-7], anal fistula plug (AFP)[8,9], over the scope clip (OTSC)[10-12], fistula laser treatment (FiLac)[2], stem cells[13,14], fixcision[15], fibrin glue[16-18], ligation of intersphincteric fistula tract (LIFT)[19-25], Bio-LIFT[26] and transanal opening of intersphincteric space (TROPIS)[27-31].

The main feature of all of these newer procedures is that they are largely sphincter-preserving especially for the EAS. Though most of these procedures demonstrated a moderate success rate in simple fistulas (40%-75%), their success rate in complex fistulas was either not satisfactory or not studied. Only two of these procedures, LIFT[19,21,22,24,25] and TROPIS demonstrated encouraging results (60%-95%) in highly complex fistulas[27-30,32]. Though these two procedures (LIFT and TROPIS) are not very old, we now have enough evidence (published studies), including a few studies with long-term results on the basis of which preliminary comparison can be done between these two procedures.

DEFINITIONS-PROCEDURE STEPS

LIFT

A curvilinear incision is made in the intersphincteric groove on the perianal skin in the quadrant where the internal opening of the fistula is located. The plane between the two sphincters (IAS and EAS) is dissected and the fistula tract traversing through the intersphincteric space is identified and a loop is passed around it. The tract in the intersphincteric space is divided. The proximal end of the intersphincteric fistula tract (towards the IAS) is suture ligated with an absorbable suture. The distal end of the intersphincteric fistula tract (towards the EAS) is suture ligated or excised along with the tract in the ischioanal fossa. The dissected out intersphincteric plane may be left open to drain or loosely sutured.

TROPIS

In this procedure, through the transanal route, an artery forceps is inserted into the fistula tract which is present in the intersphincteric plane through the internal opening. The mucosa and the internal sphincter over the artery forceps are incised and its edges are trimmed with electrocautery. Thus, the intersphincteric space is opened into the anal canal. This wound is left open to heal by secondary intention. The fistula tract lateral (external) to the EAS can be managed by any method convenient to the surgeon (excision or curettage with insertion of a drainage tube or laser ablation).

HISTORY

Until 1958, anal fistulas were classified only as per their relationship to the anorectal ring without any

importance being attached to the intersphincteric space. Eisenhammer highlighted the importance of the intersphincteric space in pathogenesis and management of anal fistula for the first time in 1958[33]. After that, it was understood that intersphincteric abscesses could be drained into the anorectum through the transanal route thereby saving the EAS from iatrogenic injury. However, for several decades (till 2017), this concept of transanal drainage of intersphincteric sepsis was limited to high intersphincteric abscesses only[29].

In 1993, Matos *et al*[34], for the first time, dissected into the intersphincteric space through the intersphincteric groove. They excised the fistula tract in the intersphincteric space and then the defect in the IAS was oversewn with 2-0 polyglactin suture[34]. In a small cohort of 13 patients, they reported a success rate of 53.8% (7/13)[34]. However, the main credit of developing and popularizing this technique goes to Rojanasakul *et al*[25,35]. Instead of excising the fistula tract in the intersphincteric space, he ligated this tract[25,35]. This made the closure more secure, the procedure simpler and the success rate higher[35]. In the last decade, LIFT has made significant inroads into the armamentarium of fistula surgeons all across the globe. Success rates ranging from 42% [8] to more than 90% [23,24] have been reported (76% in recent reviews[22,36]), implying that proper execution of the procedure is one of the key determinants to achieving a high success rate[22].

In 2017, a new dimension was added to the importance of the intersphincteric space by Garg *et al*[29]. It was postulated that the fistula tract in the intersphincteric space, whenever present in any fistula, is sepsis between two sphincter muscles and is thus similar to an abscess in a closed space[2]. As any abscess is best treated by deroofting and healing by secondary intention, therefore, this intersphincteric 'abscess' (fistula tract in the intersphincteric space) should be treated by deroofting it into the anorectum through the transanal route. This is done by the TROPIS procedure. TROPIS is quite different from just drainage of high intersphincteric abscesses into the rectum. First, whereas the latter was only for pure high intersphincteric abscesses (which accounts for less than 10% of anorectal suppuration[37]), the TROPIS procedure is applicable in all fistulas including transsphincteric, suprasphincteric and supralelevator fistulas as all fistulas have at least some intersphincteric component. Second, the intent in drainage of high intersphincteric abscesses was resolution of acute sepsis and the fistula was managed later in many cases. On the other hand, in TROPIS, the intent is curative in all fistula cases including even those presenting with acute abscess[29,37]. This happens because the fistula tract in the intersphincteric space is thoroughly cauterized and opened into the anal canal, the infected crypt glands are destroyed and the resulting wound is allowed to heal by secondary intention[37]. Though this takes 6-10 wk to heal completely but the chances of recurrences are reduced substantially[37]. It is known that in presence of infection, healing by secondary intention is better and more assured than healing by primary intention[29,37]. Therefore, TROPIS is the first procedure in complex fistulas in which the internal opening is allowed to heal by secondary intention. In simple fistulas, fistulotomy also follows the same principle and therefore results in high healing rates[37].

Thus, both these procedures, LIFT and TROPIS, are different because rather than primarily focusing on closure of the internal opening (as was done by other newer procedures), these two procedures lay equal, rather more, emphasis on the fistula tract in the intersphincteric space. This could be the reason for the much higher success rate of these procedures.

Malakorn *et al*[24] published their long-term experience with LIFT in 251 anal fistula patients and reported a primary healing rate of 87.65% at a median follow-up of 71 mo. Garg *et al*[37] published their long-term experience with TROPIS in 408 patients suffering from high complex fistulas and reported healing rates of 86% at a median follow-up of 30 mo. Both these procedures have also been shown to be effective in managing fistulas associated with acute abscess definitively in the first surgery (rather than draining the abscess first and then operating to treat fistula later)[23,29,37].

PROS AND CONS

The main advantage of LIFT is that both sphincters, IAS and EAS, are completely preserved and therefore, the risk of incontinence is negligible[23,24]. Another main advantage is that the resultant wound is allowed to heal by primary intention due to which recovery is much faster (Table 1).

The disadvantages of LIFT are that it is technically demanding and it takes time and patience to master this procedure. Another disadvantage is that the tackling of infected crypt glands is less thorough in LIFT as compared to TROPIS. The healing in LIFT is by primary intention and as discussed above and in presence of infection, healing by secondary intention gives better long-term healing rates. Due to these reasons, the success rate of LIFT is perhaps less as compared to TROPIS. Recent meta-analysis has highlighted the healing rate of LIFT in 26 studies (1378 patients) to be 76.5% [22] while in the single largest study on LIFT, Malakorn *et al*[24] published healing rates of 87.65%. However, in both these, the sample consisted of simple as well as complex fistulas. There are only a few studies in which LIFT has been studied in exclusive high complex anal fistulas. A randomized controlled trial by Jayne *et al*[38] in 2020 reported a dismal success rate of 42% with LIFT in an exclusive cohort of complex fistulas.

On the other hand, the advantages of TROPIS are that it is technically simpler than LIFT. While performing the LIFT procedure, it is not uncommon to enter the submucosal space while dissecting the

Table 1 Comparison between ligation of intersphincteric fistula tract and transanal opening of intersphincteric space procedures

	LIFT	TROPIS
Fistula tract in intersphincteric space	Ligated	Deroofed into anal canal
Healing of wound	Primary intention	Secondary intention
Tackling of infected crypt glands	Done	Much better
Technically	Difficult	Simpler
Indications	Not possible/ very difficult to perform in: Pure intersphincteric fistulas; Fistulas with more intersphincteric component like horseshoe fistulas; Fistulas in which intersphincteric component is high up like supralelevator fistulas, suprasphincteric fistulas	Effective in all complex fistulas
Preferred over the other (LIFT or TROPIS)	Complex high fistula with minimal fistula component in the intersphincteric space (Figure 1); Patients having simple low fistula but they are not keen for fistulotomy	Horseshoe fistulas with extensive intersphincteric component (Figure 2); Recurrent fistulas especially fistulas recurring after undergoing LIFT; High transsphincteric (involving upper one-third of EAS); Suprasphincteric fistula (Figure 3)
Healing in postoperative period	Faster	Slower
Internal sphincter	Preserved	Partially incised; Study in a large number of patients with long-term follow-up have demonstrated that if patients did regular Kegel exercises in the postoperative period, then there was no significant deterioration in continence.

LIFT: Ligation of intersphincteric fistula tract; TROPIS: Transanal opening of intersphincteric space.

intersphincteric space. In this scenario, continuation of the LIFT procedure becomes difficult. Occurrence of this digression does not make any difference to the TROPIS procedure as both the submucosal and intersphincteric spaces have to be laid open into the anal canal. Therefore, TROPIS is easy to learn and reproduce. In the LIFT procedure, a useful trick to avoid entering the submucosal space is to dissect the fistula in the intersphincteric space along the medial edge of the external sphincter.

In TROPIS procedure, the infected crypt glands are thoroughly destroyed as the fistula tract in the intersphincteric space is laid open and the resultant opened intersphincteric space is completely cauterized with electrocautery. The complete removal of infected crypt glands also happens in the LIFT procedure but the difference is that healing in LIFT occurs by primary intention whereas in TROPIS, the healing of the wound occurs by secondary intention. In the presence of infection, the healing by secondary intention is preferred and this could be the reason for high healing rates (80%-93%) by TROPIS in complex fistulas[27-29,37]. In the single largest study of TROPIS, 408 patients suffering from high complex fistulas (all fistulas involving > 1/3 of EAS), the reported healing rate was 86% at a median follow-up of 30 mo[37]. The data of 408 patients in this study[37] included 325 patients reported in an earlier study[29]. The study had several strong points. Apart from a large cohort with a fairly long follow-up, pre-operative MRI was done in all the patients and all 408 patients were documented to be high (involving > 1/3 of EAS) on clinical as well as on MRI assessment[37]. Additionally, the clinical fistula healing in the postoperative period was also documented on postoperative MRI assessment in the majority of cases[37]. So, from the evidence available so far, the healing rate of TROPIS seems better than LIFT in high complex fistulas. But, an important point to consider is that LIFT has been performed, studied and published from far more centers across the globe than the TROPIS procedure. Therefore, TROPIS would be considered highly successful in high complex fistulas only when its high success rate is replicated in many more centers in different regions of the world. For translation into practical guidelines, comparative prospective studies of LIFT and TROPIS in complex fistulas still need to be done.

The main disadvantage of TROPIS is that the intra-anal wound heals by secondary intention and the time taken for complete wound healing is relatively longer. Another disadvantage of TROPIS is that IAS is partially incised while laying open the fistula tract in the intersphincteric space. Though it is known that EAS is more important for continence mechanism than IAS[34], yet division of IAS can also lead to continence disturbances especially urgency and flatus incontinence[39]. But, studies of TROPIS in a large cohort of exclusive complex fistulas highlighted no significant deterioration in continence on long-term follow-up[29,37]. The reason for this could be that the patients were advised to do pelvic floor exercises (Kegel exercises) meticulously in the postoperative period[29,37]. These exercises perhaps compensated for the decrease in resting anal pressure (as IAS is primarily responsible for maintaining resting anal pressure)[34].

In a recent study (not published, under submission), the efficacy of Kegel exercises (KE) in improving incontinence was evaluated in 102 complex anal fistula patients in whom TROPIS procedure was performed. There were 65 recurrent fistulas, 92 had multiple tracts, 42 had associated abscess, 46 had horseshoe fistula and 34 were supralelevator fistulas. All were MRI-documented high fistulas (> 1/3 EAS involved). The incontinence was evaluated objectively by Vaizey's incontinence scores [a score of 0 (minimum score) implies no continence problem while score of 24 (maximum score) implies total incontinence][40]. The scoring was done initially in the immediate postoperative period before commencement of KE (pre-KE group) and then on long-term follow-up at 18 mo after surgery (post-KE group). The incontinence scores in both groups were compared to evaluate the efficacy of KE. Overall continence disturbance occurred in 31% patients (pre-KE group) [urge and gas incontinence accounting for the majority of cases (28.3%)] but after doing regular KE, continence disturbance disappeared completely in 18 % and improved in 13 % (of 31% patients with continence disturbance in pre-KE group). The mean incontinence scores in the pre-KE group were 1.19 ± 1.96 (in 31 patients, solid = 0, liquid = 7, gas = 8, urge = 24) and in the post-KE group were 0.26 ± 0.77 (in 13 patients, solid = 0, liquid = 2, gas = 3, urge = 10) ($P = 0.00001$, *t*-test). Division of the IAS led to mainly urge incontinence and all continence disturbance due to partial division of IAS by TROPIS improved significantly with regular Kegel exercises. Thus, the negative effect of partial division of IAS by TROPIS can be countered by regular KE in postoperative period for one year.

The IAS is primarily responsible for maintaining resting anal pressures. Division of the IAS leads to a decrease in resting anal pressure. Normally, the anal canal is free of fecal matter and only when the IAS relaxes during the act of defecation, the feces enter the anal canal. The human mind is tuned to associate the presence of fecal matter in the anal canal with impending passage of feces. Therefore, in patients with a divided IAS and decreased resting anal pressure, feces when present in the lower rectum passes unrestricted into the anal canal giving the feeling that 'feces are about to pass out of the anus' (urge incontinence). That's why the urge incontinence was seen in significant numbers of patients after the TROPIS procedure but it improved substantially with Kegel exercises[37].

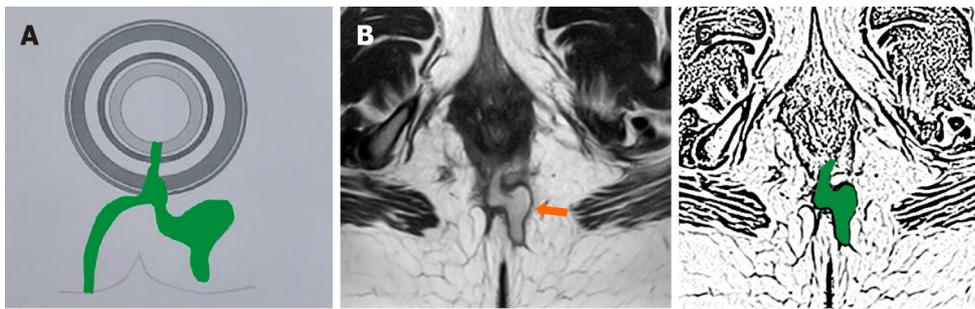
INDICATIONS AND CONTRAINDICATIONS

The LIFT procedure can be performed in all simple as well as most complex fistulas (Figure 1). LIFT would be difficult to perform in fistulas with a greater intersphincteric component like horseshoe fistulas (Figure 2), fistulas in which the intersphincteric component is high up (like suprasphincteric fistulas (Figure 3), supralelevator fistulas, high transsphincteric fistulas involving the upper-third of the EAS) as the procedure would be technically difficult to perform in these fistulas and pure intersphincteric fistulas (Table 1)[22]. The results of LIFT are lower in recurrent fistulas as the postoperative fibrosis and scarring obscure the anatomic planes making the surgery more challenging [22]. In horseshoe fistulas, the curved anatomic location of the tract renders complete eradication of fistula pathology more challenging[22].

TROPIS can be performed in all complex fistulas including high transsphincteric fistulas. Additionally, TROPIS can also be conveniently performed in fistulas in which LIFT is difficult to perform (fistulas with a high intersphincteric component-supralelevator fistulas, suprasphincteric fistulas, high transsphincteric fistulas, fistulas with a greater intersphincteric component-horseshoe fistulas, recurrent fistulas and pure intersphincteric fistulas)[29,37] (Table 1).

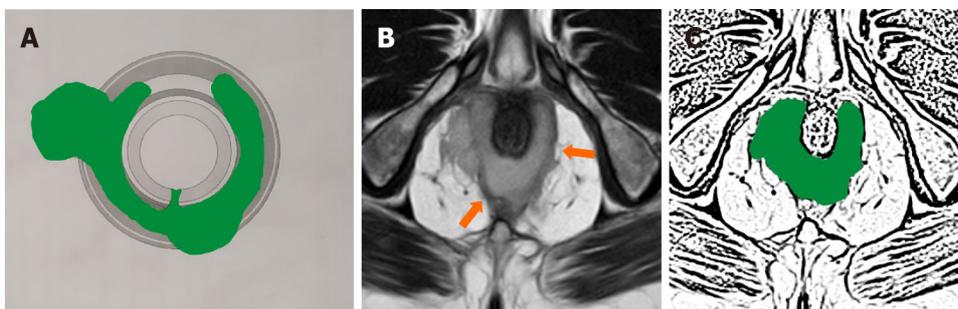
PRESENT AND FUTURE SCENARIO

Both LIFT and TROPIS have added immense value to the management of complex anal fistulas. Both procedures have shown moderate to high success rates in complex fistulas without negatively impacting continence. This makes these procedures stand out from all other newer procedures developed in last two decades. LIFT is a 14 year old procedure and more evidence is available whereas TROPIS is only 5 years and the evidence is just emerging. In my opinion, both these procedures are conceptually sound and are coupled with good available evidence. It is likely that these two procedures are going to stay and become useful for the treatment of complex anal fistulas. These procedures complement each other and together they could become an important tool in the armamentarium of fistula surgeons. In complex high fistula in which the fistula component in the intersphincteric space is minimal, LIFT would be a better choice than TROPIS (Figure 1). Similarly, in a simple fistula, if the patient is not keen to undergo fistulotomy, then LIFT would be a better choice. In horseshoe fistulas with an extensive intersphincteric component (Figure 2), recurrent fistulas especially fistulas recurring after undergoing LIFT procedure, high transsphincteric (involving upper one-third of EAS) and suprasphincteric fistulas (Figure 3), TROPIS would be a better choice. Comparative studies comparing LIFT and TROPIS, preferably randomized, would provide vital insight into the efficacy of these procedures and the future role each procedure would likely have in the surgical practice of complex fistulas.



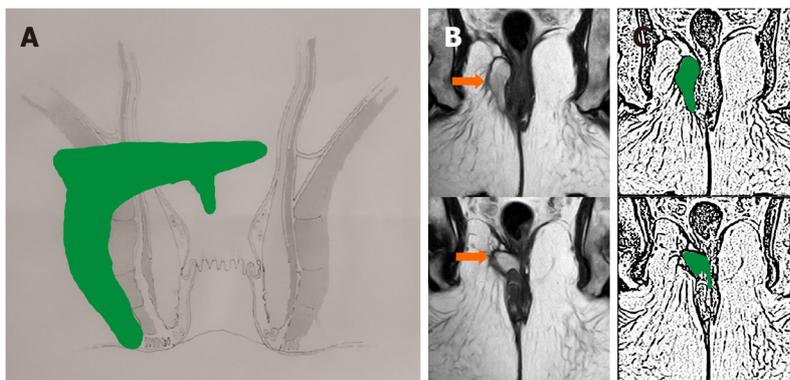
DOI: 10.4240/wjgs.v14.i5.374 Copyright ©The Author(s) 2022.

Figure 1 A 43-year-old female patient with recurrent high transsphincteric posterior anal fistula with multiple branches. The intersphincteric component of fistula is a single linear tract at 6 o'clock (posterior) and the rest of all the fistula tracts are outside the external sphincter. This fistula is better managed by ligation of intersphincteric fistula tract procedure. A: Axial section-schematic diagram; B: T2-weighted magnetic resonance imaging axial section (orange arrow pointing the fistula tract); C: Sketch of B (fistula tract being shown in green color).



DOI: 10.4240/wjgs.v14.i5.374 Copyright ©The Author(s) 2022.

Figure 2 A 47-year-old male patient with high posterior intersphincteric anal fistula with abscess. This fistula is difficult to manage by ligation of intersphincteric fistula tract and is better managed by transanal opening of intersphincteric space procedure. A: Axial section-schematic diagram; B: T2-weighted magnetic resonance imaging axial section (orange arrows pointing the fistula tract); C: Sketch of B (fistula tract being shown in green color).



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Figure 3 A 39-year-old male patient with right sided suprasphincteric anal fistula with abscess. This fistula is difficult to manage by ligation of intersphincteric fistula tract and is better managed by transanal opening of intersphincteric space procedure. A: Coronal section-schematic diagram; B: T2-weighted magnetic resonance imaging coronal section (orange arrows pointing the fistula tract); C: Sketch of B (fistula tract being shown in green color).

It would be incorrect to conclude without discussing the third procedure which has been shown to be effective in complex anal fistulas, fistulectomy or fistulotomy with primary sphincter repair (FPR)[11,41-44]. In this procedure, the fistula tract is excised/ cored out (fistulectomy) or laid open (fistulotomy) and then the sphincter complex (IAS and EAS) is repaired primarily (sutured together) with the healing occurring by primary intention[11,41-44]. Long-term studies have shown that a high success rate (85%-95%) can be achieved with FPR in complex fistulas without having any negative effect on continence. However, the main disadvantage of this procedure is that it is technically quite demanding, the prospect of cutting a major part of anal sphincters is frightening to many patients and it is not recommended for fistulas involving the upper one-third of the EAS (especially suprasphincteric fistulas which involve

almost 100% of the EAS)[11,41-44].

CONCLUSION

To conclude, both LIFT and TROPIS are new useful continence-preserving procedures to treat complex anal fistulas with high success rates. In complex anal fistulas, newer sphincter-saving procedures (VAAFT, AFP, OTSC, FiLac, stem cells and fixcision) can also be carried out if the surgeon is more well-versed with these as they are safe procedures. However, if recurrence or repeated failures occur, then one of these three procedures-LIFT, TROPIS or FPR-should be performed depending on the fistula and the expertise of the surgeon in these procedures.

ACKNOWLEDGEMENTS

I wholeheartedly thank Prof Sushil Dawka for English language editing.

FOOTNOTES

Author contributions: Garg P conceived and designed the study, collected and analyzed the data, revised the data, granted final approval and submitted the manuscript (guarantor of the review).

Conflict-of-interest statement: There is no conflict of interest.

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S-Editor: Zhang H

L-Editor: Filipodia CL

P-Editor: Zhang H

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