

# Initial Experience of A New Technique for Sphincter Preserving Anal Fistula Repair Using a Radial Emitting Laser Probe

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## Abstract:

**Background:** *Fistula in ano has been a troublesome pathology to both patients and surgeons throughout surgical history. Several techniques have been described for the management of fistula-in-ano but all carry their own risks of recurrence and incontinence. To overcome this problem, a novel technique called distal laser and proximal ligation (DLPL) was developed using a newly invented radial emitting laser probe. This study is aimed to see the outcome in terms of recurrence and incontinence of newly described technique.*

**Materials and methods:** *This prospective study was conducted in a single private institute in*

*The Dhaka city between January 2018 and July 2019. All patients with fistula in ano of cryptoglandular origin are included in this study and evaluated in outpatient department. Fistulogram done beforehand only those with recurrent fistula tract. Patients having fistula with chron's disease, abscess cavity, side tract or malignancy were excluded from this study. A total of fifty two (52) male patients were*

*selected. All patients were followed up and results were evaluated.*

**Results:** *The median age of the patients was 46 years (range 22-60 years), 39 patients were primary fistula, 9 patients were recurrent fistula with history of previous fistula surgery and 4 patients were bilateral anal fistula. All patients underwent DLPL (distal laser proximal ligation) operation by radial emitting Laser probe. The mean follow up was 11 months (range 6-24 months). Forty three out of 52 fistulas showed primary healing (82.6 %) without any problem of anal incontinence. Only 6 patients developed recurrent fistula (11.53%) within 3 months of Surgery.*

**Conclusion:** *The use of a diode laser source and a radial emitting laser probe in addition to conventional surgery in treating different types of anal fistula for selected group of patients is a very promising new technique in sphincter-preserving anal fistula repair.*

*(J Bangladesh Coll Phys Surg 2022; 40: 153-158)*

DOI: <https://doi.org/10.3329/jbcps.v40i3.60296>

## Introduction:

An anal fistula is a chronic phase of anorectal sepsis and is characterized by chronic purulent discharge or cyclical pain associated with abscess formation followed by intermittent spontaneous decompression [1,2]. Symptoms generally affect quality of life significantly and they ranges from minor discomfort and discharge with resultant hygienic problem to sepsis.

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Received:

Accepted:

Over the past few decades many authors have presented new techniques and case series in an effort to minimize recurrence rates and incontinence complications but despite more than two millennia of experience, fistula-in-ano remains a perplexing surgical disease [3,4]

Treatment of fistula in ano is challenging [4,5]. Persistent fistulas occur in up to 30% of cases following definitive surgery despite many improvements in surgical skills and technique [6,7]. The main reasons for surgical failure are a missed and untreated internal opening, insufficient drainage of the intersphincteric space, missed side tracks and a persistent primary fistula track with remnants of fistula epithelium or granulating tissue [8,9]

The goals in the treatment of an anal fistula are of draining infection, eradicating the fistulous tract, and avoiding persistent or recurrent disease while preserving anal sphincter function [10,11]. Most anal fistulae are simple and can be treated using a fistulotomy which has a low recurrence rate and an acceptable rate of morbidity with a success rate of up to 100% [12-14]. However, for the more complex fistulae where a

significant proportion of the anal sphincter is involved, great concern remains about damaging the sphincter and subsequent poor functional outcome, which is quite inevitable following conventional surgical treatment<sup>[15-16]</sup>. Over the last two decades, many sphincter-preserving procedures for the treatment of anal fistula have been introduced to minimize the injury of the anal sphincters and preserving optimal sphincter function. Among them, the ligation of intersphincteric fistula tract procedure (LIFT) appears to be safe and effective for the complex anal fistula.<sup>[16]</sup> Advancement flap may be considered the gold standard treatment for a complex anal fistula. However minor and major anal incontinence has been found in up to 31% patients 12% of patients respectively<sup>[17,18]</sup>. Even new other inventions such as the anal fistula plug or fibrin glue showed poor and variable healing rate (14%-74%) have not proven successful in the long-term<sup>[16]</sup>.

Despite the advent of many new techniques and technologies perfect treatment of anal fistula that has ensured acceptable healing rates while preserving continence has still not been discovered.<sup>[19]</sup> Laser ablation of fistula tract (LAFT) was introduced in 2011 as a new technique with high potential<sup>[20]</sup>. This technique is based on ablation of granulation tissue in the fistula tract by the use of a radial emitting laser probe. Ablation of granulation tissue from the tract is believed to allow healing of fistula tract. The technique was developed to preserve sphincter integrity and continence.<sup>[20,21,22]</sup>

DLPL (distal laser proximal ligation) is a sphincter preserving novel technique which is a further modification of LAFT has developed. Initial result showed high rate of healing without impairments of continence.

This article aims to evaluate the effectiveness and implementation of new sphincter preserving technique the DLPL (distal Laser proximal ligation) used in the management of anal fistulae.

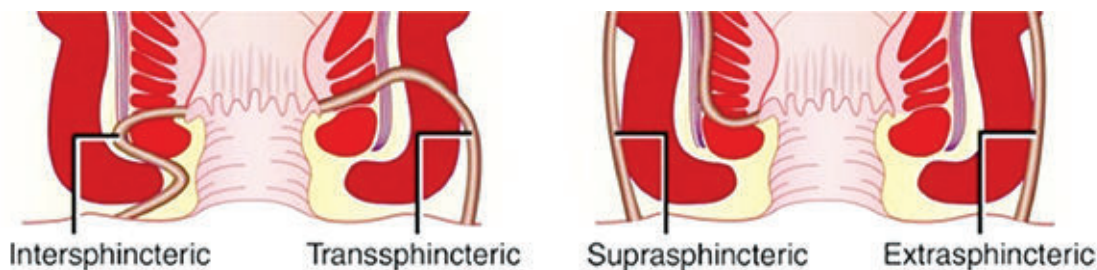
## Materials and Methods

### Implementation:

DLPL was implemented in our hospital after getting proper training of our surgical team with certificate from AMRI hospital Kolkata, India, in the use of this new technique. A preliminary risk assessment was performed; no serious risks were expected, and the procedure was deemed as 'low risk'. Patients follow up was carried out up to 24 months after surgery.

### Patient characteristics

Patients were offered DLPL (Distal laser proximal ligation) as a treatment option for their fistula in ano at the outpatient clinic between January 2018 and December 2019, in the different private hospital in the capital city of Dhaka. All patients were fully informed about the novelty of the treatment and they were informed about the technique that it is a relatively new and has no long term follow up till now. They were offered and discussed about the alternative options available for treatment of fistula and all patients gave informed consent. Digital rectal examination and other preoperative assessment including fecal incontinence (from patients history) were recorded at the outpatient clinic. Inclusion criteria were anal fistula of cryptoglandular origin. Exclusion criteria were Crohn's disease, presence of undrained collections or side tracts and malignancy-related fistula. Preoperative fistulogram was performed in recurrent fistula (9 patients) and bilateral fistula (4 patients) for assessment of the fistula tract and visualization of side tracts. As most of our



**Fig.-1.** Illustrations in coronal plane show classification fistula in ano according to Parks et al.<sup>[15]</sup>: Intersphincteric, Transsphincteric, Suprasphincteric, and Extrasphincteric. Published in: "Imaging of Fistula in Ano1" Halligan and Stoker Radiology Vol. 239, No. 1: 18-33©RSNA, 2006 [9]. Permission from RSNA, 23 Sept 2015.

patients are poor and there was no facilities of doing MRI in our hospital and reporting system of MRI is not satisfactory so we could not do MRI in any patient in this study. The primary outcome was the healing rate after DLPL. A fistula was considered healed if the external opening was completely closed, without signs of sepsis or abscess. DLPL was considered unsuccessful if there was a recurrence of the external opening after initial healing or recurrence of symptoms after 12 weeks. Secondary outcomes were postoperative fecal incontinence (POFI), change in continence status, and patient satisfaction.

#### **Surgical technique:**

All patients were given prophylactic antibiotic during surgery but no formal bowel preparation was given. Oral laxatives were given in the previous night in the day of operation. All patients had spinal anesthesia and all are operated in a lithotomy position. A disposable plastic retractor was used for exposure of the anal canal. The external opening was probed gently to identify the fistula tract. The location of internal opening was identified by injection of hydrogen peroxide or methylene

blue through the external opening or by gently probing the fistula tract. A 1.5 to 2.0 cm curve incision was made at the intersphincteric groove overlying the fistula tract. The dissection is kept close to the external sphincter to avoid cutting through the internal sphincter and breaching the anal mucosa. After the intersphincteric tract has been identified and dissected out, the tract is ligated close to the internal sphincter. Secure ligation of the intersphincteric tract close to the internal opening is the key to success. The tract next to the suture site is divided

The radial emitting laser fiber was used with a wave length of 980nm to perform the laser ablation of distal fistula tract. Laser energy of 12W was used to seal the tract. The probe was withdrawn incrementally at a speed of 100Joules/1cm to seal the tract, starting at the divided point of fistula tract in the intersphincteric space. The total energy (in Joules) used to seal the tract was recorded. No additional treatment (flap or suture) was used to close the internal opening. We did not perform any dissection or curettage of the external part of the fistula tract. All procedures were performed as day care procedures. Postoperatively patients were prescribed mild analgesic and oral laxatives and were advised to clean the external wound in the shower and take hip bath 1–2 times daily and optionally after defecation.

#### **Follow up**

Healing of wound and fistula tract and postoperative fecal incontinence was evaluated at our outpatient clinic during follow-up at 1 week, 3 weeks 6 weeks and 12 weeks. Patients were instructed to visit the outpatient clinic when symptoms of recurrence like pain, discharge or signs of an abscess occurred. We also asked whether they would choose DLPL again. Patients with healing after 3 months were instructed to plan a new visit at our outpatient clinic when symptoms occurred.

#### **Results**

A total 52 patients, all are male, mean age 46 years ( range 22-60 ) underwent DLPL with mean follow up of 11 months( range 6-24 ). Patients characteristics, fistula types and outcome are described in tables. Thirty nine (39) patients had a primary fistula, nine patients (9) had a recurrent fistula and four patients had a bilateral anal fistula. Forty three (43) of 52 patients healed primarily (82.6%). Three fistula had a minor complications( 5.7%) which heals ultimately within 8 weeks. Six patients



**Fig.-2:** Radial fiber has introduced within the fistula tract for ablation of granulation tissue and subsequent collapsed of remaining fistula tract. (It was a recurrent fistula showing the scar of previous surgery)

developed recurrent fistula (11.53%) in which four patients was a history of previous fistula surgery, one patient had a extrasphincteric high variety fistula and other patient had a transsphincteric fistula following complicated drainage of horseshoe abscess. Five patients (9.6%) had a draining seton for a period of 6 weeks before surgery. No patient developed anal incontinence during follow up.

**Table-I**

<i>History of Previous Surgery in Study population (n=52)</i>		
Previous surgery	frequency	percent
Abscess drain with seton	5	9.6
Fistulectomy/ Fistulotomy	9	17.3

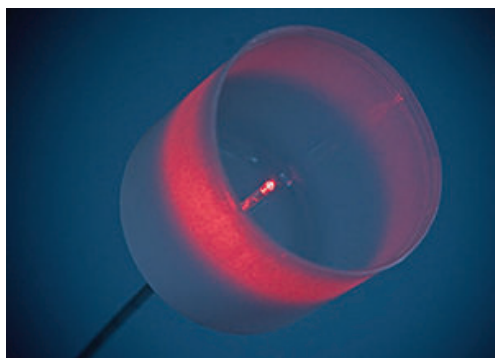
**Table-II**

<i>Park's classification of fistula in study population (n=52)</i>		
Type of fistula	Frequency	percent
Intersphincteric	41	78.84
Transsphincteric	7	13.4
Suprasphincteric	2	3.84
Extrasphincteric	2	3.84

**Table-III**

<i>Result after DLPL in Study Group (n=52)</i>					
No of Patient	Healing	Recurrence	Incontinence	Follow up/ month	Percent
46	Yes	Nil	No	6-24	88.3
6	No	yes	No	3-6	11.7

(Separate table for each variable could be given.)



**Fig.-3:** The radial-emitting laser probe "FILACTM".  
Source: presented with the permission of Biolitec AG, Germany

**Table-IV**

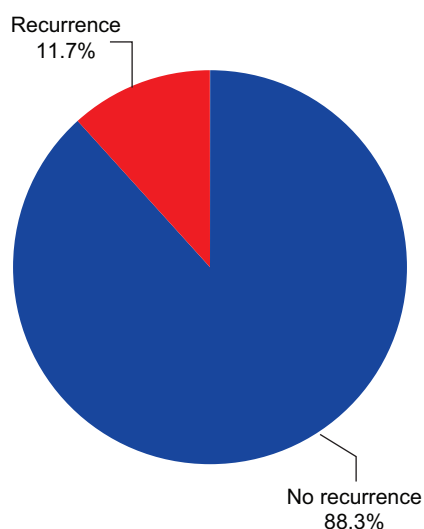
<i>Outcome</i>			
outcome	Fistula healed n- (52)	Fistula not healedn-(52)	Percentage
Healing	46	6	88.3

Outcome	No recurrence n- (52)	Recurrence n- (52)	Percentage
Recurrence	46	6	88.3

Outcome	Number	Percentage
Incontinence	Nil	Nil

**Fig.-4:** Rate of recurrence**Discussion:**

Anal fistula represents an important aspect of colorectal practice but fistula treatment still remains challenging. Unto 30% of fistula persist after surgery despite many improvements in surgical skills and technique [20]. Optimal management is aimed at eradicating the fistula, preserving the anal sphincter function, preventing recurrence, and allowing an early return to normal activity for the patient. Achieving these aims however, represents a real challenge to the surgeon. Over the years, many different surgical techniques have been devised for sphincter-preserving anal fistula repair. Many of these novel techniques do not result in sustainably successful long term outcome [23,24]. There

are different reasons for fistula recurrence. Firstly, the internal opening is often cited as a principal cause for persistent/recurrent disease [21]. Secondly, the intersphincteric space is often not adequately drained and side tracks are frequently missed [24]. So appropriate primary surgery has to be performed when patients present with perianal abscesses or persistent fistulas. (This are repeatations)

DLPL (distal laser proximal ligation) is a relatively new technique for the treatment of perianal fistula. Our Initial results are promising with high success rates shown above. The lack of or very minimum pain, absence of large wounds, relatively easy surgical technique (This were not present in the results), and low impact on fecal continence are all aspects which made DLPL an attractive alternative to the already existing techniques in the treatment of perianal fistulas.

There are different reasons for persistent/recurrent fistula mentioned above. One of the principal reasons is improperly treated internal opening. In DLPL, fistulous tract is ligated or transfixed securely closed to the internal opening is the key to success. Another reason of recurrent or persistent of the fistula is the presence of epithelial remnants or granulation tissue in the fistulous tract<sup>[25,26]</sup> and this is the main reason for the use of laser ablation in the distal fistulous tract in this study.

Usually persistent residual epithelium has been removed either mechanically or destroyed chemically (most commonly with hydrogen peroxide) <sup>[20]</sup>. The main disadvantage of these methods is a lack of control of their efficiency. For complete removal of persistent or residual epithelium from fistulous tract it needs layout or complete excision of fistulous tract. Both these technique may causes injury to the sphincter muscle whereas uses of laser results in minimal trauma to the sphincter muscle resulting with a reduced risk of developing troublesome fecal incontinence<sup>[27]</sup>. In order to destroy the fistula epithelium and to minimize the trauma to the anal sphincter we performed sphincter-preserving laser procedure (DLPL) for anal fistula repair using a newly invented radial emitting laser probe.

The diode laser of 1,470 nm wavelength has an optimal adsorption curve in water with a defined penetration depth limited to 2–3 mm. The radial-emitted laser energy results in an improvement in the control of tissue

radiation particularly when used intraluminally or in hollow organs .With this novel laser technology, the complications seen in fistula in ano or haemorrhoids surgery have been essentially eliminated.

There are several advantages to using this new laser technology in anal fistula repair. Firstly, the radial application of energy destroys remnants of fistula epithelium or granulation tissue in a predictable, reliable, circular manner. Secondly, the laser power shrinks surrounding tissue to obliterate the fistula track <sup>[27]</sup>. Thirdly, surgical trauma to the anal sphincter is diminished due to the low infiltration depth of laser energy. As a result, the incidence of persistent fistula appears to be low and postoperative incontinence is likely to be diminished although larger and longer term studies are required.

In conclusion anal fistula repair using a radial-emitting laser probe (DLPL) is a very promising procedure in sphincter-preserving anal fistula repair. The observed healing rates along with the results of postoperative continence are good without significant complications. In the future, with the result of our preliminary findings in this pilot study, it is our intention to incorporate other institutions into a multicenter study to standardize the technique.

#### References:

1. Han KS, Cho HM, Kim DH, Kim JG. Retrospective analysis of a fistula-in-ano: focus on an anal-sphincter-preserving procedure. *J Korean Soc Coloproctol.* 2007;23:403–409.
2. Whiteford MH, Kilkenny J, Hyman N, Buie WD, Cohen J, Orsay C, et al. Practice parameters for the treatment of perianal abscess and fistula-in-ano (revised) *Dis Colon Rectum.* 2005;48:1337–1342.
3. Manwaring ML, Fazio VW, Church JM, Delaney CP, Kiran RP, eds. *Current Therapy in Colon and Rectal Surgery.* 3rd ed. Philadelphia: Elsevier; 2017. 24-9.
4. Cosman BC. All's Well That Ends Well: Shakespeare's treatment of anal fistula. *Dis Colon Rectum.* 1998 Jul. 41(7):914-24.
5. Phillips J, Lees N, Arnall F. Current management of fistula-in-ano. *Br J Hosp Med.* 2015 Mar. 76 (3):142, 144-7.
6. Ellis CN, Rostas JW, Greiner FG. Long-term outcomes with the use of bioprosthetic plugs for the management of complex anal fistulas. *Dis Colon Rectum.* 2010; 53:798–802
7. Cirocchi R, Farinella E, La Mura F et al. Fibrin glue in the treatment of anal fistula: a systematic review. *Ann Surg Innov Res.* 2009; 14:3–12

8. Litza EM, van Wijk JJ, Gosselink MP, Doornebosch P, Zommerman DDE, Schouten WR Seton drainage prior to transanal advancement flap repair: useful or not? *Int J Colorectal Dis.*2010; 25:1499–1502
9. Sygut A, Mik M, Trzcinski R, Dziki A How the location of the internal opening of anal fistulas affect the treatment results of primary trans-sphincteric fistulas. *Langenbecks Arch Surg.*2010; 395:1055–1060
10. Vasilevsky CA, Gordon PH. The incidence of recurrent abscesses or fistula-in-ano following anorectal suppuration. *Dis Colon Rectum.* 1984;27:126–130.
11. van Tets WF, Kuijpers HC. Continence disorders after anal fistulotomy. *Dis Colon Rectum.* 1994;37:1194–1197.
12. Lim SW. Surgery in an intersphincteric fistula. *J Korean Soc Coloproctol.* 2009;25:365–371.
13. Kronborg O. To lay open or excise a fistula-in-ano: a randomized trial. *Br J Surg.* 1985;72:970.
14. Westerterp M, Volkers NA, Poolman RW, van Tets WF. Anal fistulotomy between Skylla and Charybdis. *Colorectal Dis* 2003; 5: 549-551 [PMID: 14617238]
15. Hwang SH, Bang MJ. Surgery for a complex anal fistula. *J Korean Soc Coloproctol.* 2008;24:77–82.
16. Elsa Limura, Pasquale Giordano. Modern management of anal fistula. *World J Gastroenterol* 2015 January 7; 21(1): 12-20
17. Kodner IJ, Mazor A, Shemesh EI, Fry RD, Fleshman JW, Birnbaum EH. Endorectal advancement flap repair of rectovaginal and other complicated anorectal fistulas. *Surgery.* 1993;114:682–689.
18. Mizrahi N, Wexner SD, Zmora O, Da Silva G, Efron J, Weiss EG, et al. Endorectal advancement flap: are there predictors of failure? *Dis Colon Rectum.* 2002;45:1616–1621.
19. Kontovounisios C, Tekkis P, Tan E, Rasheed S, Darzi A, Wexner SD (2016) Adoption and success rates of perineal procedures for fistula-in-ano: a systematic review. *Colorectal Dis* 18(5):441–458.
20. Wilhelm A (2011) A new technique for sphincter-preserving anal fistula repair using a novel radial emitting laser probe. *Tech Coloproctol*15:445–449
21. Giamundo P, Geraci M, Tibaldi L, Valente M (2013) Closure of fistula-in-ano with laser—FiLaCTM: an effective novel sphinctersaving procedure for complex disease. *Colorectal Dis* 16:110–115
22. Ozturk E, Gulcu B (2014) Laser ablation of fistula tract: a sphincter- preserving method for treating fistula-in-ano. *Dis Colon Rectum* 57:360–364
23. Roig JV, García-Armengol J, Jordán JC, Moro D, García-Granero E, Alós R Fistulectomy and sphincteric reconstruction for complex cryptoglandular fistulas. *Colorectal Dis.*2009; 12:E145–E152
24. Pierpaolo S., Federica C., Stefano D. U., Luana F., Giovanna D. V. B., Elisabetta D. L., et al. Surgery for fistula-in-ano in a specialist colorectal unit: a critical appraisal. *BMC Gastroenterology* 2011; 11: 120.
25. Krisztina B. G., Willem B., Michael A. K., Jaap S., Reena K., Siew C. N., et al. A global consensus on the classification, diagnosis and multidisciplinary treatment of perianal fistulising Crohn's disease. *Gut* 2014; 63: 1381–1392.
26. Gale SS, Lee JN, Walsh ME, Wojnarowski DL, Comerota AJ A randomized, controlled trial of endovenous thermal ablation using the 810-nm wavelength laser and the ClosurePLUS radiofrequency ablation methods for superficial venous insufficiency of the great saphenous vein. *J Vasc Surg.*2010; 52:645–650
27. Doganci S, Demirkilic U Comparison of 980 nm laser and bare-tip fibre with 1470 nm laser and radial fibre in the treatment of great saphenous vein varicosities: a prospective randomised clinical trial. *Eur J Vasc Endovasc Surg.*2014; 40:254–259