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Laser Therapy: A Breakthrough for Treating Complex High Intersphincteric Fistulas

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Abstract

Introduction: High Intersphincteric Tracts can be present in high complex, intersphincteric or complex transsphincteric fistulas. The tracts usually seen traversing up the intersphincteric plane while performing the Trans anal opening of intersphincteric plane, they can end blind or rectal perforation can be traced up. Treating these very thin tracts is challenging and if untreated, can cause of recurrence of fistula.

Methods: Retrospective analysis of 12 patients with high complex fistula treated with trans anal opening of intersphincteric space approach and Diode 1470 Laser.

Results: Out of 12 patient's majority were male presented with Trans sphincteric fistula, anterior type of fistula. VAS scale readings for pain showed progressive improvement postoperatively during follow up. The difference between pre-operative VAS score and at the end of 2weeks,1 month & 3 months follow up was found statistically significant. Anal sphincter pressure (both ARD & AMD) showed statistically significant difference in preoperative and postoperative readings at 1 month, 3 month & 6 months follow up period.

Conclusions: The intersphincteric component is present in most high complex fistulas and drainage of the intersphincteric space with identification and treatment of superior extensions of tracts in the Intersphincteric plane is crucial to prevent recurrence. Diode 1470 Laser is a new novel tool to treat higher extensions of IS tracts, the tracts can be curettaged using the round tip fistula fibre, which comes in 2 diameters, for use as per the diameter of the tracts. The very thin intersphincteric superior extensions can be finely cored and dissected up using the bare fibre which gives a very neat dissection.

To conclude, Laser enables fine meticulous dissection or ablation, of the higher IS tracts in a minimal invasive way, thus minimising recurrences & damage to anal sphincter complex, as well as early postoperative recovery in high complex anal fistulas.

Keywords: Anal Fistula, Fistula-In-Ano, Intersphincteric Space, Fistula Recurrence, High Complex Fistula.

Introduction

Fistula in Ano is debilitating yet commonest anorectal condition associated with a high chance of incontinence and recurrence. Classification of fistula in relation to internal and external anal sphincter is given by Park [1]. In practice, intersphincteric and transsphincteric fistulas are commonly seen than extrasphincteric, suprasphincteric, and submucosal tract. It can be also categorised as 'Simple' or 'Complex Fistula'. Broadly, complex fistulas are those which are not low trans-sphincteric or intersphincteric fistulas and involve less than 30% of the external sphincter.[2] Complex anal fistulas include transsphincteric fistulas that involve more than 30% of the external sphincter, extrasphincteric, suprasphincteric or horseshoe shaped fistulas as well as fistulas associated with IBD, radiation, malignancy, pre-existing fecal incontinence or chronic diarrhea.[3] Also recurrent or branching fistulas can be classified as complex.[3] Traditionally, a "complex fistula" is defined by a high risk of recurrence or incontinence following treatment.[2] Review of literature reveals that the increased chances of recurrence and incontinence following fistula surgery are associated with certain conditions. These risk factors include elements related to the basic anatomy of the fistula, the presence of comorbidities, lack of comprehensive preoperative assessment of the patient, flaws on part of the surgeon, poor choice of operation, and lack of postoperative care etc.[4]

The length of the fistula tract may also play a role in influencing the success rate[5]. Some authors consider the length of the fistula the 'Achille's heel' of laser treatment [6], others consider that longer the fistula the better the shrinkage effect elicited by laser energy.[7] The concept is based on the assumption that the presence of a longer tract around the sphincters increases the chance of tract closure as opposed to a short tract crossing only small amounts of soft adipose tissue.[5].Tracing these thin , high intersphincteric tracts is challenging and can be a cause of recurrence. Technology has evolved over the past two decades that may enable surgeons to deal with this troublesome issue with greater success. We have Diode 1470nm laser fistula fibre which comes in 2 diameters, and is a very effective tool to treat such high [IS] tracts.

The authors present a pilot study investigating our single centre experience of using Diode 1470 laser fibre in patients with high complex fistula.

Methods / Interventions

The retrospective analysis of patients with high complex fistula treated with trans anal opening of intersphincteric space approach and Diode 1470 Laser during a period January 2023 to December 2023 was planned with purposive sampling after getting the ethics committee approval. Data collected included socio demographic data, type and location of fistula, MRI report, preoperative complaints, duration of surgical procedure and hospital stay, post-operative complications, time required for resumption of normal routine and complete healing. Pain measured on VAS scale preoperatively, postoperatively and during the follow up period of 2weeks, one month & 3 months. Anal sphincter pressure both the Anal resting pressure [ARD] and AMD (post contraction relaxation) was collected Data on Tonometry findings preoperative, postoperatively and on each follow up visit was noted.

The operative procedure done for all patients was same, trans anal opening of intersphincteric space and laser ablation using Diode 1470 laser fibre. Following were the steps observed during surgery.

A Thorough clinical examination and a blood work up was performed in all patients including pre-operative MRI. The patients were operated under spinal anaesthesia (saddle block) and a modified Trendelenburg

position with hip joint in hyperextension. The pre-operative antibiotic prophylaxis of ceftriaxone 1gm/iv and metronidazole 500mg/iv 2 hours prior to surgery.

1. The internal opening identified; it was widened /cored till the IS (intersphincteric space).
2. The higher extensions could be seen going up the Intersphincteric space, ending blind or as rectal perforations.
3. In some there were needle thin tracts. The tracts were cored out with bare fibre or ablated with laser (round tip) fibre.
4. The Intersphincteric space was left open for drainage.
5. Haemostasis achieved.

The tissue samples were sent for histopathological examination and pus sent for culture sensitivity. PCR was sent in suspicion of TB. The patients were discharged in 24 to 48 hours. The patients were evaluated for postoperative symptoms, and a record was made for each. Anal Tonometry and Biofeedback were performed as per schedule.

All the data collected was organized and analysed using MS Excel and SPSS version 23.

Results

Total 12 patients (2 females & 10 males) of high complex fistula were enrolled. As per table no 1the mean age of patients was 42.75 years (SD= 13.40). Most of the patients presented with Trans sphincteric fistula (TS) while in 75% of cases location was anterior (Table no 2). After identifying the internal opening in each case of anterior or posterior fistula, TAOIS was performed. As the IS plane opened, the high extensions could be visible and traced upward. In 2 patients there were 2 high IS tracts. None of the patients had visible Intersphincteric high extensions apparent on MRI. The tracts were curettage carefully and then treated with1470 diode laser, using round tip fistula fibre on CW settings. In some cases, the tracts were excised using bare fibre of Laser.in cases with rectal perforation, figure of eight was taken at the site with 2-0 polyglycolic. The transsphincteric tracts and external openings of fistula were also treated with laser fibre. The operative outcomes are given in Table 3. The mean duration of surgery was 44.00 minutes (SD 16.85), mean duration of postoperative hospital stay was 1.08 day (SD 0.29). Most of the patients resumed normal routine in 8 days (Mean 8.17 SD 5.17). The recovery was uneventful in all the patients. Mild bleeding, discharge per Anum reduced with wound healing, and itching during final stages of wound healing were common post-operative symptoms.

Anal sphincter pressure (both ARD & AMD) showed statistically significant difference in preoperative and postoperative readings at 1month,3month & 6 months follow up period (Table no 4). VAS scale readings for pain showed progressive improvement postoperatively during follow up. The difference between pre-operative VAS score and at the end of 2weeks,1month & 3 months follow up was found statistically significant (Table no 5). Overall satisfaction was high in all patients.

Discussion

The use of Laser for proctological conditions specially fistulas is gaining popularity in recent years. Laser ablation by using thin radial fibre is limited to the lumen of fistulas tracts hence these laser techniques are 'sphincter-saving'.[5] The clinical results of novel, minimally invasive sphincter saving approach were promising compared to invasive techniques, in context to complications like recurrence and incontinence. The studies published so far have shown divisible results as far as success rate, persistence of fistula tract and recurrence is concerned.[6,7,8,9,10,11]

The data available on laser procedures like VAAFT[12], LIFT[13], Filac[14], PERFACT[15], DLPL [16] etc had given

several explanations for failures. Most common reasons reported for low success rate were size and type of fistula, length of fistula tract, debridement of tract and aetiopathological reasons.

The shrinkage of fistula tracts caused by laser depends on the wavelength and the amount of energy of the laser beam delivered within the tract. The amount of energy released during procedure depends on energy setting, length of fistula and speed of the fibre withdrawal, Amount of energy used in different studies was different. [5,8]

De Bonnechose et al.[17]studied the healing rate according to joules per cm and could get only a statistical trend, exact association is still not clear.

De Bonnechose et al.[17] in their study further stated that delivering too much laser energy to a few millimetres of tissue may result in over burning the fistula and can hamper the shrinking effect of the laser while too little energy could be insufficient to close the tract. Also mentioned that the size of internal opening may have poor correlation with the diameter of the fistula tract.[5,17]

Closure of internal opening is one of the concerns and it is seen that the shrinkage effect of laser on the internal opening of the fistula is sufficient to cause its sealing. This shrinkage effect cannot be measured or controlled. Hence it is considered as Blind procedure and further research on calibrating amount of energy for healing is a need of an hour.[5]

Inter sphincteric space has a significance in pathogenesis and management of Anal fistula. The intersphincteric component is present in most of the complex fistulas. Adequate drainage of the IS space, identification and treatment of superior extensions of tracts in the IS plane becomes crucial to prevent recurrence in complex fistula. Diode 1470 Laser is a new novel tool to treat higher extensions of IS tracts, the tracts can be curettaged and then treated using the round tip fistula fibre, which comes in 2 diameters, for use as per the diameter of the tracts.

In present study, we observed that minimally invasive sphincter sparing approach using laser is effective in managing high complex fistulas and it takes care of most of the issues responsible for failure and recurrence of complex fistula as discussed above.

Conclusions

To conclude, Laser enables fine meticulous dissection or ablation of the higher IS tracts in a minimal invasive way, thus minimising recurrences, minimising damage to anal sphincter complex, and early postoperative recovery in high complex anal fistulas.

Limitations

The present study is a single centre study conducted in a central part of India. The high complex fistula is one of the complications and the prevalence is less as compared to simple fistulas. The laser procedure is bit costlier and affordability of patient is one of the crucial factors in seeking it, especially in area catered by our hospital. A prospective, multicentred study with long term follow up is required to validate results.

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Legend Tables

Table 1: Distribution of cases as per Age and sex of patients

AGE (Yrs)	Female		Male		Total	
	No.	%	No.	%	No.	%
20-29	2	16.67	1	8.33	3	25.00
30-39			2	16.67	2	16.67
40-49			3	25.00	3	25.00
50-59			2	16.67	2	16.67
60-69			2	16.67	2	16.67
Total	2	16.67	10	83.33	12	100.00

Table 2: Distribution of cases as per type and position of fistula

TYPE of fistula	Female		Male		Total	
	No.	%	No.	%	No.	%
HTS			1	8.33	1	8.33
IS			3	25.00	3	25.00
P INJ., IS			1	8.33	1	8.33
TS	2	16.67	5	41.67	7	58.33
Total	2	16.67	10	83.33	12	100.00
Position of Fistula	Female		Male		Total	
	No.	%	No.	%	No.	%
ANT	2	16.67	7	58.33	9	75.00
POST			2	16.67	2	16.67
Total	2	16.67	9	75.00	11	91.67

Table 3: Operative outcomes

SURG. TIME (Min)	Female	Male	Total
Mean	45.00	43.80	44.00
SD	21.21	17.22	16.85
Hospital STAY (DAYS)			
Mean	1.00	1.10	1.08
SD	0.00	0.32	0.29
WORK RESUME (Days)			
Mean	6.50	8.50	8.17
SD	4.95	5.40	5.17

Table 4: Comparison of Anal Tonometry at different follow up

	Anal Tonometry	Mean	Std. Deviation	P Value
Pair 1	ANAL TONO PRE ARD	70.42	14.969	0.002
	TONO POST 1MNTH ARD	61.50	13.728	
Pair 2	TONO POST 1MNTH ARD	61.50	13.728	0.134
	TONO POST 3MNTH ARD	57.33	9.059	
Pair 3	TONO POST 3MNTH ARD	57.33	9.059	0.012
	TONO POST 6MNTH ARD	52.33	5.449	
Pair 4	ANAL TONO PRE AMD	62.67	13.891	0.055
	TONO POST 1MNTH AMD	57.50	11.743	
Pair 5	TONO POST 1MNTH AMD	57.50	11.743	0.089
	TONO POST 3MNTH AMD	52.50	8.857	
Pair 6	TONO POST 3MNTH AMD	52.50	8.857	0.044
	TONO POST 6MNTH AMD	48.33	5.176	

Applied Wilcoxon Signed Ranks Test, $p<0.05$= statistically significant

Table 5: Comparison of VAS at different follow up

	Paired Samples	Mean	Std. Deviation	P Value	Statistical Significance
Pair 1	VAS PRE	6.50	1.68	0.0019	Highly Significant
	VAS 2WK	2.33	0.89		
Pair 2	VAS 2WK	2.33	0.89	0.0017	Highly Significant
	VAS 1MNTH	0.33	0.49		
Pair 3	VAS 1MNTH	0.33	0.49	0.0455	Significant
	VAS 3MNTH	0.00	0.00		

Applied Wilcoxon Signed Ranks Test, $p<0.05$= statistically significant