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Laser Surgery for Treatment of Haemorrhoid and Anal Fissure and its Outcome

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Abstract **Original Research Article**

Background: Haemorrhoids and anal fissure are a common source of pain, and no surgical technique achieves a painless outcome. Endovascular laser surgery for varicose veins as described in an experimental study is a method that could be used in the treatment of haemorrhoids and anal fissure, but there are few clinical trials described in the literature. In the past decade, several studies have investigated the effect of laser therapy on haemorrhoids and anal fissure but few have explored its use in anal fissure. ***Objectives:*** The present study aimed to evaluate the outcome and efficiency of laser surgery for treating haemorrhoids and anal fissure. ***Materials & Methods:*** This was a cross-sectional study carried out in the tertiary care and mid-level private hospital in the Cumilla region. This clinical trial was conducted on all the patients referred to same surgeon in 05 different tertiary care and midlevel private hospital in Cumilla city. Patients were from Cumilla, Chandpur, B-Baria, Noakhali and Feni districts of Bangladesh. The study was conducted on short term (12 months) effects of laser surgery on haemorrhoids and anal fissure. ***Results:*** Laser surgery for haemorrhoids and anal fissure is a simple, minimum-invasive and nearly painless surgical procedure with a low rate of complications. No significant intraoperative complications occurred. The follow-up was 12 months. Postoperative pain was null in most patients. Symptoms and HD downgrading reached a ‘‘plateau’’ at 3 to 6 weeks after the laser treatment. At this evaluation, frequency of bleeding, pain, itching, and haemorrhoidal syndrome decreased by 80% to 92%. HD grade showed a significant reduction. ***Conclusion:*** The diode laser surgery can be viewed as an effective treatment for patients with haemorrhoids and anal fissure. Haemorrhoidal laser surgery is newly potential approach and patents are getting benefitted from this treatment and this can be adopted as a modality of treatment for Hemorrhoids and anal fissure. However, this procedure has some limitations. Although it is not a good method for big piles, this technique opens new possibilities for surgical treatment of Hemorrhoids and anal fissure.

Key words: Haemorrhoids; Anal Fissure; Laser surgery; Treatment.

INTRODUCTION

Hemorrhoids and Anal fissures (Chronic conditions) are a difficult topic for discussion for patients, because of the fact that they do not feel comfortable to disclose enough information about these complications. Nonetheless, modern technological advances have made the treatment of these conditions easier. New techniques are often used as a dual procedure, when patients are affected by a mixture of rectal problems. Nowadays, the treatment is easier, faster and safer to treat an anal fissure and hemorrhoids in one operation, with subarachnoid block and sedation of the patient. Surgeons are able to conbine a lateral internal sphinc-terotomy (LIS) to treat anal fissure by laser also, in one session. Patients witness the advantages of one hospital admission, shorter operating time (<30 min for both), a 2-in-1 procedure ensuring them less pain, less costs and a shortened rehabilitation period. Haemorrhoidal veins normally occur in the human body. When these veins become dilated they turn to a morbid condition called haemorrhoidal disease, which affects more than 80% of the world population at least once in a lifetime. A chronic anal

fissure likely has a deeper tear, and may have internal or external fleshy growths. An anal fissure looks like a fresh tear, somewhat like a paper cut. A fissure is considered chronic if it lasts more than eight weeks. The fissure's location offers clues about its cause. A fissure that occurs on the side of the anal opening, rather than the back or front, is more likely to be a sign of another disorder, such as Crohn's disease. Straining promotes the congestion of these veins and speeds the development of the hemorrhoids; heredity also plays an important role and it is common to observe many cases in a same family [1, 2]. Pregnancy, weightlifting, and any-thing that increases intra-abdominal pressure contributes to vein dilation. Since Milligan and Morgan's surgical description of open haemorrhoidectomy, many methods have focused on curing hemorrhoids [3-5]. Photocoagulation [1, 6–9] and stapling [10, 11] depending on the severity of the disease [12] which is not easily defined. The use of laser in proctology began in the 1960s, when the Nd: YAG laser was first used for anorectal surgery. After that, new lasers such as the CO_2 laser and new technologies such as the pulsed and the scanned laser resulted in improved outcomes [13, 14] Laser action on biological tissues is not yet a ''closed'' issue, however, and the use of laser energy on haemorrhoidal tissue remains controversial despite recent improvements in technology. [15] Plapler et al. [16] studied 120 patients submitted to CO_2 laser open haemorrhoidectomy during the course of a year, in terms of pain and local healing. They concluded that laser has advantages compared to ''conventional'' surgery, specifically less postoperative pain and a more aesthetic scar [17]. They concluded that laser leads to minor postoperative pain even though it is an open surgical technique like the ''traditional'' surgery, which requires the extraction of the haemorrhoidal tissue, leaving an exposed surface. A new technique permits surgeons to treat varicose veins of the inferior limbs with a diode laser applied inside the vein [18]. This endovascular technique allows enlarged veins to be treated without requiring several skin cuts, and it can be performed as an ambulatory surgery. An anal fissure is a disruption in the anoderm distal to the dentate line, which leads to internal anal sphincter spasm, more pain and tearing, as well as reduced perfusion to the anoderm. It is one of the most common benign anorectal conditions arising from high anal pressure. Its specific presentation is tearing pain accompanying a bowel movement and rectal bleeding. Patients may complain of severe rectal pain and spasms that persist for several hours after a bowel movement. Treatment focuses on pain relief and resolution of spasm and ischemia. Fiber therapy to keep the stool soft and formed and a warm sitz bath following bowel movements, to relax the sphincter, are the first-line treatment for reducing trauma to the anus. Application of 2% lidocaine gel, or any other analgesic ointment, provides a more symptomatic resolution. Healing may be further facilitated by application of 2% topical nitroglycerine ointment, which increases local blood flow and reduces pressure in the internal anal sphincter, but headache can be a major side-effect of topical nitroglycerine. Diltiazem (oral and topical) has fewer side-effects. Newer drugs, such as arginine (a nitric oxide release) and local bethanechol (a muscarinic antagonist; Myotonine, Glenwood, Munich have also been used. Medical treatment is effective for most fissures and 50–60% of chronic fissures.

OBJECTIVES

1. To evaluate the outcome and efficiency of laser surgery for treating haemorrhoids and anal fissure.
2. To determine and assess the performance of Lasotronix Smart M 1470 nm diode laser.

MATERIALS AND METHODS

Type of Study	**Cross-sectional observation study**
Place of Study:	The study carried out in the different tertiary care and mid-level private hospital at Cumilla City, Cumilla, Bangladesh.
Study Period:	September 2019 to August 2020 (One year)
Sample size and population:	120 patients under the Laser surgery treatment for haemorrhoids and anal fissure
Sampling technique:	Perspective sampling

This was a cross-sectional study. This study carried out in the tertiary care and mid-level hospital in the Cumilla City. From September 2019 to August 2020, 120 patients under the Laser surgery treatment for haemorrhoid and anal fissure procedure at the Department of General Surgery at 05 Tartary care and mid-level private hospital at Cumilla City, Cumilla, Bangladesh. A total of 120 patients with anal fissure, who were unresponsive to medical therapy and had an indication for surgery. The written informed assent was obtained by all patients enrolled in the study. All subjects were preoperatively studied through medical history evaluation, routine blood tests, and physical examinations (digital examination and/or anoproctoscopy). The assessment of the prolapse was made on the basis of digital rectal examination and endoscopy. Information was collected on patients' age, sex, medical treatment duration, healing time (days), response to pain management, laser therapy sessions, relapse and indication for further surgery. Descriptive statistical analysis as well as a chi-squared test, an independent t-test, a logistic regression test and a generalized linear model were performed using SPSS (Statistical Product and Service Solutions) version 16 (SPSS Inc., Chicago, IL, USA).

Fig-1: Laser surgery inside the hemorrhoid

Surgical Technique and Postoperative Management

All procedures were carried out using the Lasotronix Smart M 1470 nm diode laser (Poland). For Anal fissure 70-100 W energy given, for 2° Haemorrhoid 650 – 700 W and for 3° Haemorrhoid 750 – 900 W and for 4° Haemorrhoid 850 – 1100 energy given. Specially designed proctoscope was inserted into the rectum, with the patients in lithotomy position. Through the small window at the proctoscope distal part, the diode laser applied in three stage for each haemorrhoidal segments (3, 7, 11 o'clock). First intraluminally in a virtual area of 4 sq. cm^2 laser used/given. During withdrew another shot of laser given directly to the pile mass. For each haemorrhoidal treatment 3 courses of laser energy given. Then if indicated LIS was done by a simple puncture in the mucosa and directly laser given on previously palpated internal sphincter. All these procedures done with spinal anesthesia. Appropriate NSAIDS and sedation done. Patients were admitted to hospital for a 12 hours or overnight stay. No intestinal preparation was needed, only one preoperative enema given. All patients were discharged after a 12 hr. or overnight hospital stay. Antibiotic prophylaxis was routinely adopted. Data on duration of the surgery, perioperative complications, postoperative pain and downgrading of HD, resolution or persistency, and recurrence of disease were prospectively collected. ''Mild pain'' was attributed to an occasional disturbance not affecting daily life and activities at follow-up; it corresponded to 1 point in the evaluative scale. ''Moderate pain'' (corresponding to 2 points) was regarded as a pain that interfered with normal activities after discharge. At each evaluation, we also recorded the presence of scars in perianal skin, the recurrence of symptoms, and performed an accurate proctoscopic examination (for classification of eventual persistent or recurrent Haemorriedal D). All patients were evaluated 3 weeks, 6 weeks, 6 months and 1 year after surgery.

Fig-2: Before Laser Treatment

Fig-3: After Laser Treatment

How is laser surgery better than conventional surgery?

Laser surgery is a nominally invasive procedure that can be done even as a day-care procedure that offers several advantages over traditional surgery. Compared to conventional haemorrhoidectomy, laser effectually treats hemorrhoids, improves symptoms and reduces post-operative pain. Similar benefits are seen for patients with severe anal spasms, external thrombosis, fissure, and sentinel tags and fistula.

Advantages for Laser Surgery are namely

Less operation time, discharge/may be given within a few hours,

Within a day patents can go back to normal routine work

Greater surgical precision and fastest recovery

Fewer blood loss during surgery and No or minimal post-operative pain

Reduced risk of infection and rectal stenosis or prolapse
Rapid relief from the symptoms
High success rates
The anal sphincter action is well preserved, (no chances of incontinence fecal leak)
Aesthetically the best procedures – helps as a confidence-booster for the patient
Least recurrence rates and fewer doctor visits post-surgery

STATISTICAL ANALYSIS

Statistical analysis was carried out using the chi-square test or Fisher exact test, when appropriate, for categorical variables. Odds ratios and 95% confidence interval were calculated when required. The Mann–Whitney U test was used to compare continuous variables not normally distributed (presented as median and interquartile range [IQR]). Normality of the distribution of variables was determined using the D'Agostino–Pearson test. A P value less than .05 was considered as statistically significant. All tests were 2 sided. Statistical analysis was performed with statistical software for biomedical research (McCalc Software for Windows; version 10.2.0.0).

Ethical considerations

This study was conducted in accordance with the ethical principles of the Helsinki Convention. Patients were free to participate in this study and a written consent form was completed prior to the start of study. Moreover, the surgical procedure was chosen by the patients.

RESULTS

This was a cross-sectional study carried out in the tertiary care and midlevel private hospital in the Cumilla region. From September 2019 to August 2020, 120 patients under the Laser surgery treatment for haemorrhoid and anal fissure surgery at the Department of General Surgery at 05 Tartary care and mid-level private hospital at Cumilla region, Cumilla, Bangladesh. A total of 120 patients with haemorrhoid and anal fissure, who were unresponsive to medical therapy and had an indication for surgery.

Table-1: Distribution of patients according to age (n=120)

Age group	Frequency	Frequency (%)
≤30	25	20.83
31 – 40	49	40.83
41 – 50	20	16.67
51 – 60	7	5.83
>60	19	15.83
Median (in years)		55
Age range (in years)		29 – 68

Table-1 shows that out of 120 patient's maximum 49 (40.83%) patients belonged to 31-40 years age group which was subsequently followed by 25 (20.83%) in ≤30 years age group. 20 (16.67%), 19 (15.83%) and 7 (5.83%) patients belonged to 41-50 years, >60 years and 51–60 years age group respectively.

Table-II: Distribution of the patients by sex (n=120)

Sex	Number of patients	Percentage (%)
Male	95	79
Female	25	21
Total	120	100

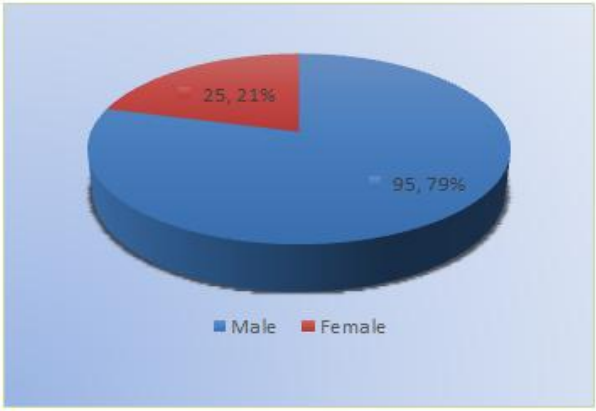

Fig-4: Distribution of patients according to sex (n=120)

Table-II shows that out of 120 patients 95 (79%) and 25 (21%) were male and female respectively. The male to female ratio was 3.80:1.

Table-III: Pre- and postoperative symptoms of the patients who underwent the Laser surgery for treatment of haemorrhoid and anal fissure (N=120 Patients)

Symptoms (any grade of intensity)	Preoperative (120 pts.), n (%)	3 weeks (120 pts.), n (%)	6 weeks (120 pts.), n (%)	6 months (120 pts.), n (%)	1 year (120 pts.), n (%)	P*
Bleeding	63 (52.5)	12 (10.0)	5 (4.17)	2 (1.7)	1 (0.8)	<.001
Pain	55 (45.8)	10 (8.3)	6 (6.2)	5 (4.2)	5 (4.2)	<.001
Itching	21 (17.5)	15 (12.5)	10 (8.3)	5 (4.2)	3 (2.5)	.037
HS	15 (12.5)	3 (2.5)	0	0	0	<.001

HS = haemorrhoidal syndrome; HD = haemorrhoidal disease; pts.= patients.
*Between preoperative data and 1 year postoperatively.

Table-III shows the median age of the patients enrolled in the study (95 men and 25 women) was 36 years (IQR 31 to 40 years; range 29 to 68 years). The most frequently reported symptoms (of any grade of intensity and frequency) were bleeding in 63 (52.5%) cases, pain in 55 (45.8%), and itching in 21 (22%). Recurrent hemorrhoidal syndrome (HS) was recorded in 15 (12.5%) cases (Table II1). The HS was defined by the presence of pain, mucous discharge, and bleeding lasting for 5 to 7 consecutive days at least 2 times/y during the last 1 year. One day postoperatively, 80 patients (83%) disclosed grade 0 to 1 pain on VRS. The remaining subjects (18%) had moderate pain during the first 24 to 36 hours postoperatively and were successfully treated with oral painkillers (usually ketorolac). Median pain at 1 week postoperatively was 0 (IQR 0 to 1; range 0 to 2) on VRS. Three weeks postoperatively, no scars were present at proctoscopy in any patient. No major complications were observed. No patient was bothered by rectal tenesmus or defecation habits alteration. HD recurrence rate was 5% at 1 years. No significant complications were recorded at longer follow-up in particular stenosis of the anal canal.

DISCUSSION

In this study, the laser surgery procedure showed excellent long-term outcome in terms of resolution of haemorrhoid-related symptoms, anal fissure, postoperative pain, and low incidence of persistent or recurrent disease. These results support the ‘‘vascular’’ theory in the pathogenesis of HD. In recent years, this theory has been getting broad consensus among surgeons [19–24, 28–33]. It is based on the anatomical finding of arteriovenous haemorrhoidal shunting system with no capillary interposition. It also supports the possibility that the arterial overflow in the superior haemorrhoidal arteries should be responsible of the dilatation of the haemorrhoidal venous plexus [28-33]. As a consequence, the reduction of blood flow to the hemorrhoids should lead to shrinkage of the haemorrhoidal piles and healing of supportive tissue and, therefore, symptom improvement [19–24, 28–33]. The vascular theory does not replace the ‘‘mechanical’’ theory based on degeneration of the fibro muscular supportive tissue of the haemorrhoidal plexus but rather complements the former for better understanding and treatment of HD. Following the vascular theory, 2 non-excisional techniques for symptomatic hemorrhoids have been developed in the last few years, namely the THD and HAL [20, 21]. Both of them are based on the reduction of the haemorrhoidal arterial flow that supports the haemorrhoidal plexus by means of Doppler-guided identification and ligation of the terminal branches of the superior rectal artery. Best results were reported when dealing with patients bothered by second- to third-degree hemorrhoids. Conversely, the results obtained in case of fourth-grade hemorrhoids were unsatisfactory, with recurrence or persistence rate of 50% to 60% [29, 34, 35]. In our study laser energy was given in pile mass and in artery also. In fact, we did many cases as OPD basis but these were excluded from the study. In addition, the effect of the laser beam on the arteries is highly selective, and the damage to the tissues and mucosa around the vessels is minimal compared with other techniques [24, 25]. Significantly, scar tissue and retraction of the rectal mucosa are less common compared with the THD or HAL [24, 25, 36, 37]. On the other hand, this could explain the less evident healing effect on mucosal prolapse following this procedure, compared with the HAL or THD. Specifically, such procedure is commonly reserved to patients having symptomatic second to third-degree HD with minimal or moderate mucosal prolapse. Following these restricted criteria, we achieved very interesting results. Our study showed that the postoperative pain was graded 0 to 1 on VRS by most patients. The improvement of preoperative symptoms was observed within 3 to 6 weeks postoperatively in more than 75% of patients and downgrading of the hemorrhoids (at least 1 grade reduction) in more than 85% of subjects. The absence of significant modification in the percentage of patients with second-grade HD from preoperative data to 6 to 12 months follow-up can be easily explained by equally effective reduction of hemorrhoids size both among third and second-grade HD subjects. Not only patients who presented HD reduction reported an improvement of preoperative symptoms but also patients without significant HD grade modifications could experience symptom relief. These findings were still present up to 1 year postoperatively. More specifically, at 1 year follow-up, more than 90% of patients reported a resolution of their initial symptoms. Our results confirmed the good findings previously reported by others. It would be interesting to know the recurrence rate of symptoms and HD size on long-term evaluation on the whole-study group.

Limitation of the Study

A major limitation of this study is the lack of long-term follow-up because our median follow-up 12 months’ evaluation was available only. Female patient’s number is less possibly due to religious and social bindings. However, all patients included in this study are still in follow-up for further future evaluations.

CONCLUSION

Laser Surgery for Treatment of Haemorrhoid and Anal Fissure is newly introducing surgical method was found to be a successful, easy and quick way of treating Haemorrhoid and Anal Fissure. The technique also increased blood supply and decreased pain. The benefits of laser therapy include effective resolution of all clinical symptoms, decreased recovery time and minimal risks and side-effects. The technique is painless and patients are more likely to accept and be satisfied with treatment; however, there are some limitations to this procedure. Surgical techniques and

biostimulation effects and the methods of employing the hand pieces should be taught to surgeons. Safety is also important when working with the laser.

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