

# CO<sub>2</sub> Laser Therapy for Chronic Anal Fissure Resistant to Non-Invasive Treatment: A Single Centre Experience

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## Abstract

**Background:** The treatment of chronic anal fissure is predominantly conservative. However, failure of conservative measures obliges the use of more potent treatments, such as Botulinum Toxin (BT) injections to relax the internal anal sphincter. Furthermore, surgical intervention represented by lateral internal sphincterotomy (LIS) is used to treat resistant cases but imposes the risk of faecal incontinence. The aim of our study is to assess the degree of post-operative pain, recovery time and the rate of post-operative faecal incontinence in patients where CO<sub>2</sub> laser is used to perform LIS.

**Methods:** 236 patients clinically diagnosed with chronic anal fissure through 2012-2014 were included in the study. The selected patients were those who did not benefit from conservative treatment. The approach we took starts with Examination Under Anaesthesia (EUA), followed by excision of the fibrotic anal fissure using CO<sub>2</sub> laser on continuous mode with defocus technique for haemostasis. Wound healing was induced by secondary intention. The follow-up period extended for 2 years post-operatively.

**Results:** The effectiveness of laser LIS was tested over two domains, pain score and post-operative complications. On a pain scale of 1-10, all patients had a pain score of one or less on day seven. Three patients (1.27%) had recurrent pain and bleeding within two years and were treated conservatively. No patients had incontinence at the last follow-up. Six patients (2.5%) developed minimal mucus discharge for three months post operatively.

**Conclusion:** The treatment of resistant chronic anal fissure with CO<sub>2</sub> laser shows promising outcomes when compared to conventional LIS. Laser surgery offers the advantage of being a minimal surgical intervention in addition to a reduced risk of incontinence and recurrence when compared to other methods such as BT injections and conventional LIS.

**Keywords:** Chronic anal fissure, CO<sub>2</sub> Laser, Lateral internal sphincterotomy

## Introduction

Anal fissure is defined as the presence of a

longitudinal tear in the distal anal canal which can be classified as acute and chronic [1,2]. Anal fissure is a common proctological condition with a cumulative lifetime incidence of 11% in the general population [3]. The pathophysiology of chronic anal fissure is not well established but it is thought that strained evacuation of hard stool, low-fiber diet and hypertonicity of the

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internal anal sphincter significantly increase the risk of developing anal fissure [1,4,5].

Conservative measures such as the use of analgesics, local vasodilators and laxatives are the first line treatment and is effective in healing anal fissure in the majority of cases [1]. The second line treatment is Botulinum Toxin (BT) injections which aims to reduce the sphincter tone thus, promoting the healing process.

If the above treatments fail, patients are offered operative measures, specifically, lateral internal sphincterotomy (LIS). A review of studies published between 1993-2011 comparing BT injections to surgery concluded that LIS is more effective and is associated with significantly lower rate of recurrence [5]. However, LIS are associated with a higher rate of faecal incontinence post-operatively [5].

In the last decade, CO<sub>2</sub> laser has been utilised in surgeries of the neck to remove malignant tumors due to the advantages of laser when used in the removal of malignancies such as tonsillar carcinomas, glottic cancer and hypopharyngeal carcinomas [6-8]. Similarly, laser surgery for anal fissure is associated with reduced post-operative pain, shorter recovery time and less operative complications [10].

In this study we aim to further validate the effectiveness of using CO<sub>2</sub> laser in the management of chronic anal fissure not responsive to conservative treatment. Despite that fissurectomy as a surgical technique may not be widely used nowadays, we introduce a new technique for the excision of chronic fibrotic and symptomatic fissures using CO<sub>2</sub> laser due to its gentle effects on the tissue, favourable healing rate and absence of major side-effects.

### **Materials and Method**

A total of 236 patients clinically diagnosed with chronic anal fissure between January 2012 and

September 2014 were selected for the study [Table 1]. The diagnosis was based upon the presentation of chronic anal pain and a long history of per rectum (PR) bleeding, with chronic use of ointments, including Glyceryl Trinitrate (GTN) ointment without achieving symptomatic relief. Furthermore, all included patients complained of chronic constipation for a minimum of 3-6 months. On examination, all patients had a skin tag and PR bleeding indicating chronic fibrosis. Four patients presented with perianal abscess and two patients presented with perianal fistula. Those who had abscess (n=2) were treated with incision and drainage along with Metronidazole 500 mg three times daily for 5 days (n=4) before laser treatment, which took place three weeks later. All patients received prophylactic Ciprofloxacin 400 mg and Metronidazole 500 mg on induction.

### **Procedure:**

All operations are performed as day cases. Patients receive general anaesthesia followed by positioning to lithotomy position. The perineal area is disinfected using Betadine 100mg/ml followed by classical draping. The surgeon uses the hand piece of CO<sub>2</sub> laser machine (CL20 with wavelength of 10 600 nm) utilising a power of 4-6 Watts on 'continuous mode' and adopting a non-touch technique with 2-cm distance from the skin. With the assistance of the red light pointer in the hand piece, the surgeon starts cutting the skin down to the subcutaneous tissue by holding the sentinel skin tag with tissue forceps or tooth forceps. Then, the dissection continues superiorly by the laser, passing the muco-cutaneous junction caudally under the fibrotic fissure. This continues until reaching a healthy anal mucosa then transfixing the proximal end of the mucosa using 3/0 Vicryl suture. Haemostasis of the raw area under the fissure is achieved by defocus technique, making the distance between the hand piece and the skin 3-4 cm.

Operations are done in a well isolated theatre room specialised for laser use. The surgeon, the assistant, the anaesthetist, and the theatre nurses wear protective glasses for the full duration of the procedure.

Prophylactic antibiotics were given for five days post-operatively. The choice of antibiotic was oral Metronidazole 500 mg 8-hourly. The analgesic

regimen involved Diclofenac 50 mg IM once only followed by topical Xylocaine gel (2%) and oral Paracetamol 500mg as required. Patients were advised to apply daily wash with water and cleaning soap and to rest for five days post-operatively. Follow-up was conducted in the outpatient clinic at three days, one and three weeks then one year and two years after surgery.

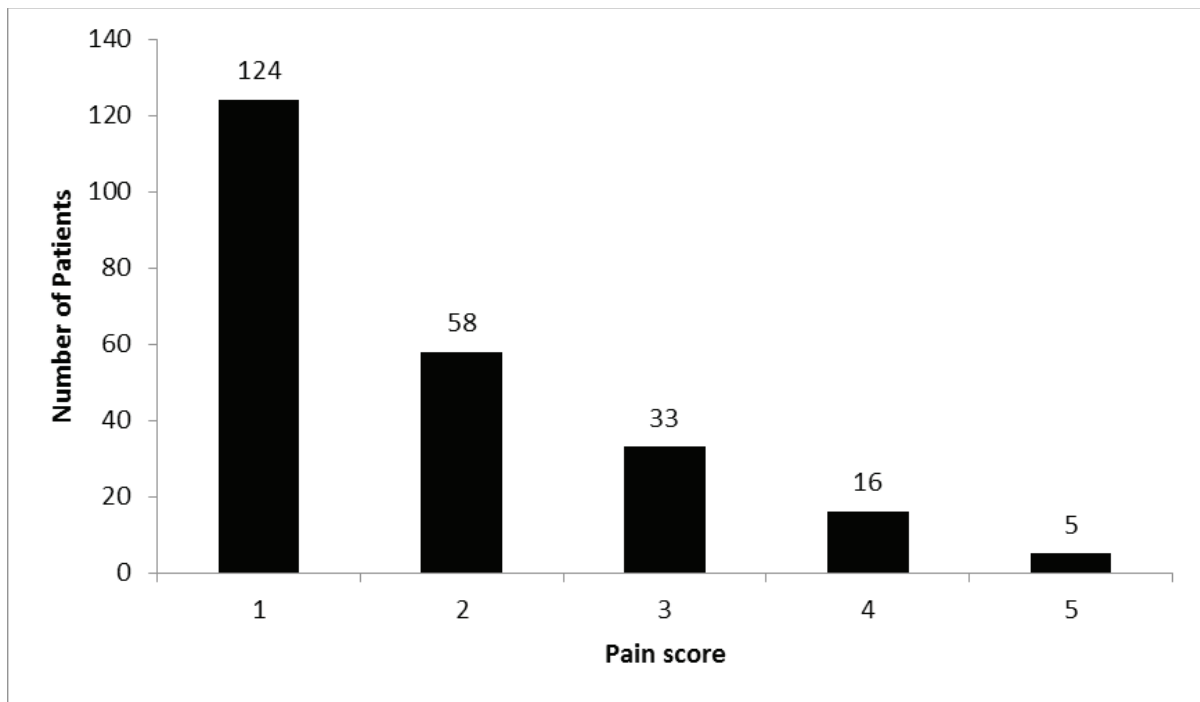
## Results

**Table 1. Patient Characteristics**

	N=236
<b>Age</b>	42.7 ± 8.8 *
<b>Gender</b>	173:63 (M:F)
<b>Pain</b>	236 (100%)
<b>Bleeding</b>	176 (74.6%)
<b>Constipation</b>	142 (60.2%)
<b>Pruritus</b>	74 (31.4%)
<b>Symptom burden (n from 4)</b>	2.7 ± 0.8 *
	* mean ± standard deviation

Pain scores were registered three days post-operatively on a scale of 1-10, one being the least pain and 10 being the severest pain (Fig 1). 182 patients (77.11%) reported pain scores of 1-2 three days after surgery. 230 (97.45%) patients were healed,

asymptomatic, and able to resume their activities of daily living (ADL) at seven days post-operatively. Figure 1 demonstrates pain scores on day 3 post-operatively.



**Fig 1. Pain scores on Day 3 post-operatively.**

Six patients (2.54%) had persistent mucous discharge and itching after three weeks, with no pain or PR bleeding. Five patients continued to have a minor discharge for 3 months. One patient had persistent mucopurulent discharge and itching for three weeks and continued to have pain with intermittent PR bleeding for three months even after the use of antibiotics with Procto-Glyvenol suppository, Xaluron and GTN ointment. This patient underwent another EUA with biopsy of the ulcer which was reported as tuberculosis (TB) by histopathology and culture. The patient was referred to a TB clinic and received anti-TB regimen for six months. Which resulted in complete healing after three weeks of treatment without residual evidence of any fissuring or grooving.

Within the first year of follow-up, three patients presented with recurrent symptoms of PR bleeding and pain. They were treated conservatively with Ciprofloxacin 500mg twice daily and Metronidazole 500mg three times daily for seven days as they displayed signs of infection on clinical assessment. Additionally, they received Proctoglyvenol suppositories and laxatives. Their symptoms resolved within two weeks of treatment. There were no further recurrence symptoms reported during the second year of follow-up. In general, manometric studies were deemed unnecessary as no patients complained of faecal or gas incontinence. Table 2 demonstrates the follow-up findings.

**Table 2. Follow-up findings for 24 months following operation.**

	N=236		
	No. of Patients, at 3 weeks	No. of Patients, at 12 months	No. of Patients, at 24 months
Parameter			
Incontinence	0	0	0
Mucous discharge	6 (2.54%)	0	0
Pain	0	3 (1.27%)	0
Itching	6 (2.54%)	0	0
Bleeding	0	3 (1.27%)	0

## Discussion

Treatment choices for chronic anal fissure are variable and include both conservative and surgical options depending on the severity of symptoms and the limitation of ADL. While conservative treatment is considered the first line therapy, resistant anal fissures require more invasive treatment. Surgical treatment, although not currently used as a first line, appears to be the most effective treatment. Ebinger et al., concluded that the overall healing rate of LIS is 93.1%<sup>[3]</sup>. However, LIS has a considerable disadvantage represented by an incontinence rate of 9.4%<sup>[3]</sup>.

Minguez et al., conducted a long-term study to follow the efficacy of BT injections<sup>[12]</sup>. The results showed that the recurrence rate following BT injection was 41.5%. This shows that the effect of BT is temporary in a significant proportion of patients. Furthermore, the incontinence rate following BT management is marked at 4.1%<sup>[3]</sup>. On the other hand, patients treated with GTN report a wide range of side

effects that include headache, anal burning sensation, bleeding, wound infection and incontinence<sup>[13]</sup>. Additionally, the effects of GTN take 6-8 weeks to appear while the cure rate does not exceed 60%<sup>[13]</sup>.

Our study shows that when compared to GTN, BT injection and LIS, laser surgery result in better outcomes. Only three (1.3%) patients had recurrence after 24 months of follow-up. This is less than the recurrence rate of BT injection and LIS which has been reported at 41.5% and 2.5% respectively<sup>(14)</sup>. Adverse effects such as bleeding, pruritus and wound pain were not reported by any patient. However, six patients (2.5%) experienced chronic minimal mucous discharge for three months postoperatively. Furthermore, no patient experienced any episode of incontinence after 12 months of follow-up. Our outcomes compare favourably to existing published data<sup>[11]</sup>.

These outcomes suggest that laser surgery may have the least risk of incontinence and other

complications compared to other routinely available treatments for chronic anal fissure.

Moreover, this study shows that the use of CO<sub>2</sub> laser in the treatment of chronic anal fissure combines the advantages of conservative, chemical and surgical treatments with a reduced recurrence rate of 1.3%. The advantages include no use of diathermy, minimal levels of post-operative pain, minimal risk of infection, and no risk of incontinence. Hence, we suggest that the use of laser surgery as an alternative to conventional surgery in patients who do not benefit from conservative management is well justified by its low-complication profile.

### Conclusion

Treatment methods of anal fissure is controversial and the search for the most effective treatment has been ongoing for years. This study further presents an approach to the treatment of chronic anal fissure by CO<sub>2</sub> laser in one of the largest studies by case volume to date. We have shown that the use of CO<sub>2</sub> laser in surgical treatment of chronic anal fissure offers the advantage of being a minor surgical intervention and avoids the disadvantages of LIS and BT injection in addition to being cost effective. In combination with previously published literature, this study shows that laser therapy warrants serious consideration for routine inclusion as an option available to patients in treating this condition, particularly in patients who do not benefit from less invasive treatment.

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**Ethics (IRB) statement:** Ethical approval was granted by the local hospital board. No unique patient identifiers were gathered. The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki.

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