

## Initial Experience of Anorectal Surgery with Laser Technique

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### Abstract

**Background:** The first applications of laser energy in the gastrointestinal tract occurred just a decade ago. Since then, laser therapy has been widespread in the management of many fields of the medicine, also in colon and rectum disease. In the present study, we report the experience in Mexico of the use of the laser in the treatment of anorectal conditions in the period from January 2013 to July 2019 in different hospitals in the City of Puebla, Mexico.

**Material and Methods:** No experimental study: Descriptive, retrospective and cross-sectional study. We included patients from the Colon and Rectal Surgery Service of four hospitals in Puebla, Mexico from January 2013 to July 2019, operated with laser. Inclusion criteria: patient with diagnosis of grade II and III hemorrhoids, anal fistula, non-abscessed pilonidal cyst, perianal and anal canal condylomatosis and patients with acute chronic anal fissure. The analysis of the variables was through the program SPSS version 22 (IBM). Results were expressed using descriptive statistics.

**Results:** A total population of 715 patients attended by laser application for anorectal disease, of which 423 (59.16%) were men and 292 (40.83%) were women. The largest group with anorectal disease was Group A with 467 (65.31%) patients with hemorrhoidal disease using the HLP® technique. Group B with 135 cases of anal fissure, Group C anal warts with 31 cases, and in the case of Group D 53 (7.4%) patients with fistula diagnosis we used FiLaC® with 12% relapse. Also 29 patients with cyst pilonidal disease (Group E) were treated with SILAC® technique- All patients were hospitalized less than 24 hours for the procedure. Surgical time average of 11.23 +- 3.5 minutes with an average bleeding of 4 ml/patient. The return to work of patients took place between the second and third postoperative week.

**Conclusion:** Laser surgery in colorectal diseases is a safe minimal invasive procedure. Laser hemorrhoidectomy proved to be an effective surgical intervention. However, there is a need of longer follow up and comparative studies with other techniques.

**Keywords:** Laser Therapy; Anal Canal; Anal Fistula; Laser Surgery; Mexico

### Abbreviations

Laser CO<sub>2</sub>: Carbon Dioxide Laser; Nd:YAG: Neodymium-Doped Yttrium Aluminum Garnet; FiLaC: Fistula Laser Closure

### Introduction

Proctological diseases are a widespread conditions affecting millions of patients around the world.

The laser energy is absorbed by the tissues depending of several factors, the conductivity tissue, blood supply, length of laser energy and all these elements state the depth tissue penetration [1].

The first therapeutically applications of laser energy in the gastrointestinal tract occur just two decades ago. Since then, laser therapy has been used in the treatment of several anorectal diseases [2]. The three different types of laser energy are CO<sub>2</sub>, argon and Nd: YAG [3]. Laser technology have been applied in the treatment of hemorrhoidal disease, anal warts and anorectal neoplasms.

Hemorrhoidal disease is a widespread anorectal disease affecting many patients and their quality of life. Hemorrhoidal columns are submucosal cushions containing venules, arterioles and smooth muscle fibers and are essential in the maintenance of continence. Patients complains of bleeding and prolapse and it justify the surgical treatment. There are many surgical options and the classical techniques open Milligan-Morgan or closed Ferguson leads to a low recurrence rate but the pain and discomfort in the postoperative period are important [4].

Nowadays, surgical technique leads patients experience in the postoperative to have less intensity of pain, postoperative bleeding and earlier return to daily activities [5].

Laser Hemorrhoidoplasty (LHP®) is a new minimal invasive and painless procedure causing the shrinkage of the hemorrhoidal piles by mean of diode laser. Laser beam causes shrinkage of tissues and degeneration at different depths depending on the laser power and the duration of laser light application [6].

More than 50% of the population older than 50 years old, have suffered any kind of symptom about hemorrhoidal disease. The objective of the hemorrhoidal disease treatment are the decrease in the vascularity and redundant tissue and increase the attachment to the rectal wall.

Currently, patients undergoing a laser surgery with hemorrhoidal disease could experience painless with the shrinkage of the hemorrhoidal piles by mean of a diode laser [14].

Anal fistula is a common anorectal disease. It has been reported nine cases per each 100 000 people. Surgical treatment has three important topics: treatment of the infection, closure of the fistula tract and to preserve the integrity of the sphincter. The new FilaC® (Fistula Tract Laser Closure) technique [6,7], closes the fistula tract using laser while preserving the sphincter function. The indications of this technique includes trans-sphincteric fistula, high intersphincteric anal fistulas, anal fistula in patients with low sphincter anal tone, cases of multiple recurrences (Crohn's Disease) and patients already treated with loose setons. The contraindication of FilaC® are rectovaginal fistula, superficial fistula and cases with several tracts which cannot be addressed individually.

The recovery of the patient is sooner than with the traditional technique [8,9]. Giamundo describes the use of the seton in the fistula tract, which helps in causing fibrosis and it make easier the laser application for the closure of the fistula tract [10]. No complications, less postoperative pain and the excellent results are the main topic of the FilaC® technique [11,12]. FiLaC® is a good option in the treatment of patients with complex fistula who have failed previous treatment.

Complex perianal fistula can be a surgical challenge when treatment is directed at sphincter preservation and avoiding fistulotomy. In the series of De Hous., *et al.* in two Belgian hospitals, were included 10 patients (15 fistulas) if they were treated more than 1 year and had at least three previous unsuccessful surgical interventions and were treated with FilaC®.

The surgical technique consist of blind cauterization of the tract with the radial emitting laser probe and closure of the internal orifice as described initially by Wilhelm., *et al.* FilaC® has some advantages compared to other sphincter-preserving techniques and it is easy

to perform, no open wounds are created, the operating time is short. Not a single case of fecal incontinence has been reported and the primary healing rate of FilaC® for simple perianal fistula is comparable with other sphincter preserving techniques and range 65 - 80%.

In a recent study, Wilhelm., et al. reported 117 patients with 88% of healing rate at a median follow up of 25 months.

FilaC® seems a good option in the management of complex perianal fistula and the observed healing rate after one or more FilaC® session is promising [13].

Pilonidal cyst is a rare frequent condition appearing mainly in young men, with a rate between men/women) of approximately 3 or 4:1.

Despite the fact that it affects the most active part of the society, point an important burden to health and economy, the best strategy for managing this condition remains unclear. The treatment includes the combination of laser CO<sub>2</sub> and in five days patients are able to return to their activities [15-18].

Anal warts represent an important and frequent anorectal disease. In this condition, laser surgery could be performed and the energy supplied had a depth of 0.1 mm under the skin [19-21].

Anal fissure is a common, mostly benign anorectal condition. It is a longitudinal tear or defect in the skin of the canal anal distal to the dentate line and can be acute or chronic and located in the posterior or anterior position. An acute anal fissure heals after four or six weeks of conservative treatment. If this therapy fails and become chronic, surgery is required.

The gold standard surgical operation for anal fissure is lateral internal sphincterotomy, which involve division of the internal anal sphincter from its distal end to either the proximal end. Lateral internal sphincterotomy has an excellent healing rate of approximately 95%.

Laser technique for anal fissure is feasibility, with less pain and decrease the muscular tone [22].

Complications of anorectal laser surgery includes urinary retention, subcutaneous abscess, anal fissure, fecal incontinence, anal stenosis, anal fistula.

### Aim of the Study

The aim of the present study is to analyze the efficacy and feasibility of laser technique in the treatment of anorectal diseases and the outcomes in the patients about pain and discomfort.

### Materials and Methods

This is a descriptive, retrospective and transversal study. Between January 2013 and July 2019, patients with anorectal diseases were treated in four different hospitals in Puebla, Puebla, Mexico (Hospital Angeles, Hospital Puebla, Hospital Beneficencia Española and General North Hospital). The surgical procedures were performed with laser technology by the same surgical team.

Patients were selected in five different groups treated with laser technique. Group A includes patients with hemorrhoidal disease (LHP® and HELP® technique). Group B patients with anal fissure. Group C patients with anal warts, Group D patients with anal fistula (treated with FiLaC® technique) and Group E patients with cyst pilonidal disease (SILAC® technique).

### Inclusion criteria

- Patients of the colorectal clinic.
- Patients > 18 years.

- Symptomatic Hemorrhoidal disease of II and III degree.
- Patients with anal fissure.
- Patients with anal fistula.
- Patients with cyst pilonidal disease.
- Patients with anal warts.
- Age 15 to 75 years.

### Exclusion criteria

- Patients with fecal incontinency.
- Patients with no complete medical protocol and file.
- Colorectal cancer patients.
- Patients with Intestinal bowel disease involving rectum or anus.
- Patients who not accept a signed written informed consent.

All patients were assessed preoperatively and data about bowel function, pregnancies, previous surgery, pregnancies, episiotomy were collected. Before surgery laboratory tests, chest X ray and electrocardiogram were performed.

Patient underwent a laser technique treatment using a 1470 nm diode laser (Biolitec) and all the surgical procedures were performed by the same surgeon and surgical team. All patient were informed about the study protocol and the short and long-term results of the technique

### Operative technique

The procedures were performed in the Kraske or Jack-Knife position under regional blockage. No mechanical bowel preparation. Antibiotic prophylaxis with metronidazole (500 mg IV) was administered.

Regional blockade were provided to all patients.

We used the Ceralas<sup>®</sup> and Leonardo<sup>®</sup> Biolitec<sup>®</sup>, Germany and used LHP and FiLaC fibers to perform the procedures.

We used the FiLaC<sup>®</sup> (Fistula laser closure) for the Group D and it causes occlusion of the fistula tract. LHP<sup>®</sup> (laser hemorrhoidoplasty) fiber of 2.6 length were used.

After debridement of the perianal abscess, a loose seton should be placed in the fistula tract for proper drainage. A vessel loop type is recommended for this. The FilaC<sup>®</sup> fiber is inserted in the separated loose seton at the external opening of the fistula tract for several mm. Then it is guided through the tract by pulling the seton towards the internal opening of the fistula tract.

When the FilaC<sup>®</sup> tip has passed the inner ostium (opening of the fistula) and entered the rectum, the loop is removed from the laser fiber tip and discarded. At this point, FiLaC treatment can be initiated and Laser power settings is in continuous mode 12 W.

The operator initiates laser radiation by pressing the footswitch and gently pulls back the fibre with a speed of 1 - 2 mm/s for the first 5 mm. The ostium shrinks and the inflammatory tissue is destroyed. After that, laser action is stopped and the operator tries to move the probe back by pushing towards inner ostium to sense successful collapsing of the tract. Pushing backward should not be possible. Otherwise region can be retreated the same way once again. The next step is that the next 5 - 10 mm is addressed repeating previous until leaving the outer ostium.

The technique includes the possibility of closure of internal opening and without closure of internal opening. The length of fistula track is important (less than 3 cm without closure of internal opening).

In the SiLaC<sup>®</sup> procedure (cyst pilonidal disease treatment), Diode Laser 1470 nm in pulse mode at 10 Watts power (with settings 1 sec on, 0.50 sec off, apply an energy sum of 80 - 120 Joules/cm<sup>2</sup> with a radial fiber or 13 Watt continuous mode according for the fistulas treatment. It is not necessary to excise the primary pit of the pilonidal cyst. The pit could be used as an entrance gate for the laser fiber. Removal of granulating tissue and hairs from the cyst by a small curettage is advisable before starting the laser procedure. The surgical laser procedure is similar to the technique in anal fistula treatment. Insert the fiber up to the end of the track or cyst and start applying energy. By slow removal of the fiber the track will close step by step. Repeat the maneuver until the track is almost closes completely. Sometimes it is not possible to close the track completely. Leave the rest open. It will close over time with ongoing wound healing. In the postoperative period, the wound will drain fluid until it closes completely and it will take up to six weeks. The patient will only need plain wound dressing to cover the entrance gate, sitz baths are not necessary. In all patients the permanent removal of hair within the area of the cyst is a key factor to prevent recurrence.

Reviewing medical files and collecting data base were used to the study. Demographic characteristics were collected in the clinic and in the follow up of the patients.

### Follow up

Patients were hospitalized for a 24 hours period. They were evaluated in the clinic office periodically one week, two weeks and 3 days after the surgical treatment.

Finally, we reviewed patients three and six months in clinic.

Mean operative time was evaluated in minutes. Postoperative pain was considered as the main outcome and was evaluated with the visual analogue scale (VAS) at 7, 14, 30, 90 and 180 postoperative days. The need of analgesics after discharge was evaluated at days 1, 7, 14, 30. Bleeding and complications were evaluated.

### Statistical analysis

Data were analyzed using the SPSS version 22 program (IBM Software, Chicago, IL). Qualitative data are expressed by descriptive outcomes.

### Results

715 patients with anorectal benign diseases were treated with laser technique between January 2013 until July 2019 by the same surgical team.

The follow up was about 12 months after the procedure and patients who do not meet the inclusion criteria, were excluded of the study.

423 male and 292 female. Mean age was 32.3 years (18 - 73 years old).

Group A included 467 patients (65.31%) with hemorrhoidal disease grade II-III and IV. Group B 135 (18.8%) patients with anal fissure. Group C included 31 patients with anal warts (4.33%). Group D included 53 patients (7.14%) with anal fistula who present 12% recurrence.

Group E included 29 cases of pilonidal cyst (4.42%).

LHP<sup>®</sup> were performed in group A patients with an average time of 20.3 +- 3 minutes. The intensity of the postoperative pain was 4 in the first week.

Group B patients were attended with a continuous mode 10-13 W with an operative time 8.35 + - 1.2 minutes.

Group C is anal warts patients, where the average operative time was 10.4 +- 2.3 minutes. Patients had more than six anal warts.

There were no complications during the surgery and all were able to perform follow up in the clinic.

Anal fistula patients were subjected to a two step procedure. In the first one, we settled a drain seton and in the second procedure (2 - 3 months later), the FilaC® procedure. Average time in these cases was 12.5 ± 3.1 minutes. All cases were transsphincteric fistula. The length of the fistula tract was 5.1 cm (2.3 - 9.4 cms). There were no complications during the procedures

Group E included 29 patients with pilonidal cyst (4.42%) with an average operative time of 14.5 +- 1.2 minutes.

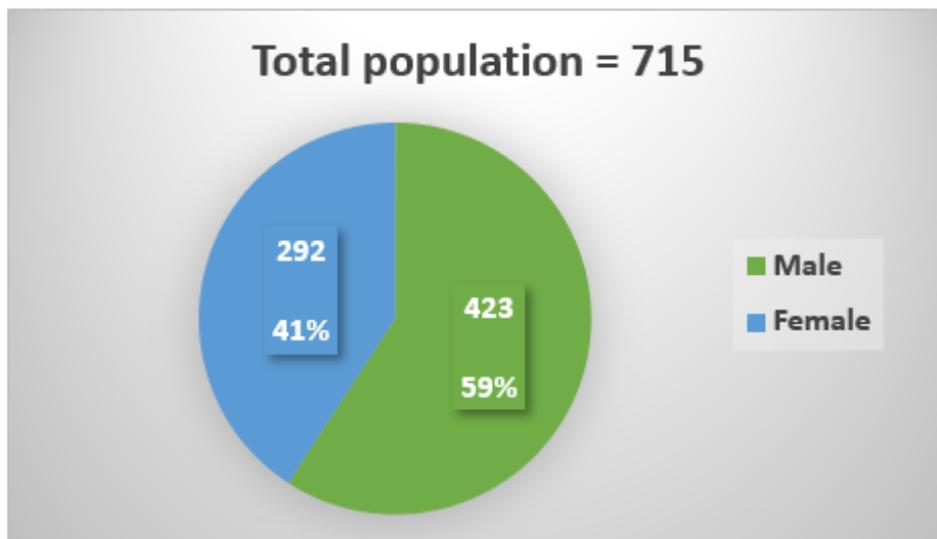
No patient suffered of spontaneous bleeding after surgery in the first 24 postoperative hours. However, 3 patients present bleeding at 10, 12 and 13 postoperative day (2 of them were with anticoagulant therapy). No patient experienced sero-mucous discharge, no fecal incontinence were found.

100% of our population came back to daily activity at day 5 after surgery.

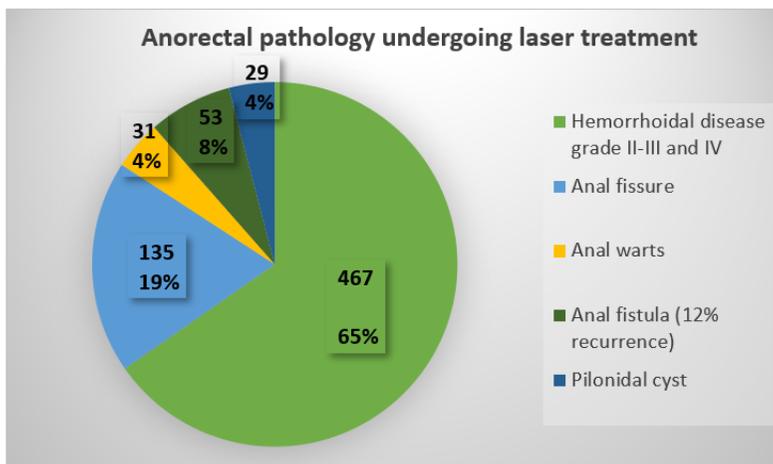
They developed 18 cases had anal tag (2.5%) and 6 cases of anal abscess (0.8%) No complications were documented in Group C and E.

All the patients in the study remained hospitalized for 24 hours. 100% of the population analyzed attended their control and follow-up appointments in a timely manner. None of the patients operated by laser procedure showed fecal or urinary incontinence postoperatively.

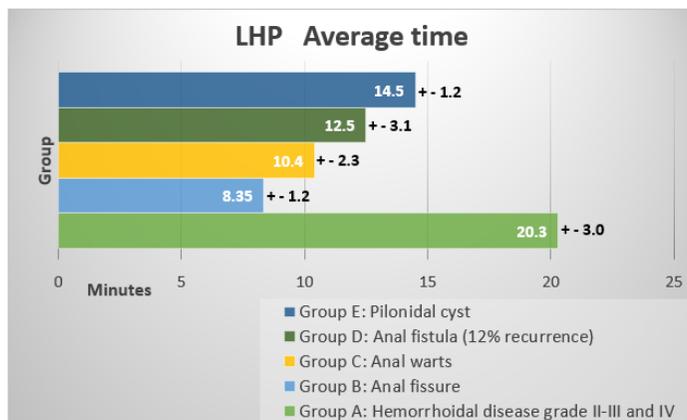
<b>Total Population</b>	<b>715</b>	
Male	423	59%
Female	292	41%



Anorectal pathology undergoing laser treatment			
Group	Pathology	Patients	Percentage
Group A	Hemorrhoidal disease grade II-III and IV	467	65.31%
Group B	Anal fissure	135	18.80%
Group C	Anal warts	31	4.33%
Group D	Anal fistula (12% recurrence)	53	7.14%
Group E	Pilonidal cyst	29	4.42%



LHP Average time. Continuous mode 10-13 W		
Group	Minutes	
Group A: Hemorrhoidal disease grade II-III and IV	20.3	+ -3
Group B: Anal fissure	8.35	+ -1.2
Group C: Anal warts	10.4	+ -2.3
Group D: Anal fistula (12% recurrence)	12.5	+ -3.1
Group E: Pilonidal cyst	14.5	+ -1.2



Results		
	Patients	Percentage
Bleeding at first 24 postoperative hours	0	
Bleeding at 10, 12, 13 postoperative day	3	0.41%
Sero-mucous discharge	0	
Fecal or urinary incontinence	0	
Anal tag	18	2.50%
Anal abscess	6	0.80%



Came back to daily activity at day 5 after surgery	100%
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### Discussion

The LHP® technique (laser hemorrhoidoplasty) is well established for the treatment of hemorrhoidal disease grades I and II, some cases for grade III, where the prolapse is not total. This technique has been successfully extended in the United Kingdom, Italy, Czech Republic, Spain, Turkey and also in Mexico and Argentina among other countries. Despite the experience described in this study, new publications with larger samples and longer follow-up are necessary, always with the aim of achieving excellence in the treatment of these cases [14,23].

In a comparative study between ligation and laser hemorrhoidectomy for hemorrhoidal diseases of grades II and III showed for laser surgery less postoperative pain ( $p < 0.001$ ), greater resolution of symptoms ( $p < 0.001$ ) and better quality of life ( $p = 0.002$ ). Therefore, although it is a higher cost technique, it has very satisfactory results in the short and long term [21].

Maloku, *et al.* [24] emphasizes the preference of laser hemorrhoidectomy compared to conventional surgery since postoperative pain is much less and shortens surgical time as mentioned in his study [24].

Giamundo, *et al.* [10] developed a retrospective study using laser diode with a wavelength of 1470 nm for the treatment of anorectal fistulas using the fistulous path laser closure technique (FilaC®) reporting a of the largest series documented in the medical literature with excellent results since there were no postoperative complications such as incontinence also recommending the previous placement of seton for this procedure.

Laser therapy is applied to stimulate healing and reduce pain, being effective for the management of open wounds. Some of the known effects of the laser focus on the production of ATP, which acts as a trigger in the effects of biostimulation, promoting adequate microcirculation, and accelerating the cycling process. It is also known to impact the increase in the diameter of collagen fibers in experimental models in rats [25].

Despite the series that have been made in terms of the use of laser in dermatology, vascular surgery, and in coloproctology, there are still spaces to be filled, in the recommendations of the type of laser and the optimal wavelength as well as the parameters of the diode equipment laser to obtain results that positively impact the patient's quality of life as well as the resolution of his condition.

The surgical management of anorectal conditions such as hemorrhoidal disease, anal fissures, condylomas, anal fistulas and the pilonidal cyst not abscessed among others, by laser surgery have marked a totally non-invasive era because the reported complications are minimal, pain Postoperative is less and there is evidence of a rapid recovery of patients compared to conventional surgery.

### Conclusion

Laser technique is a minimal invasive technique, safe, painless in the treatment of anorectal disease. It preserves the anoderm and the anal sphincter integrity with high success rates.

It represents a reliable option for the patients and lead to a sooner recovery. However, there is a need of longer follow up and comparative studies with other techniques.

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