

High fistula in ano, treatments with CO₂ laser, challenges, In Thi – Qar governorate

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Abstract

Background: High Fistula-in-ano is a common surgical problem, it is regarded a challenge to the surgeons due to carry a high risk of recurrence and complications especially of anal incontinence, the aim of the surgical procedure is to altogether remove the fistula, prevent recurrence and avoiding the main complications like anal incontinence. The need to reduce the anal sphincter damage lead to the use of fibrin glue, collagen plug, clip closure, mucosal flap advancement techniques, ligation of intersphincteric fistula tract (LIFT), Video-assisted anal fistula treatment (VAAFT) and Fistula laser closure (FiLaC™). Carbon dioxide (CO₂) laser used as a tool in the treatment of anal fistula. The CO₂ 10600nm laser allowing increased surgical precision and accuracy, thin depth (0.03mm) penetration, thereby reducing unnecessary damage to underlying tissues, and the procedure was with no bleeding, resulting in improving visualization of the surgical field, eliminating the need for electro-cautery which can cause more damage, also closed the lymphatic and nerve endings reduce the oedema and pain. The aim of this study is to evaluate the benefit of CO₂ laser to remove anal fistula.

Methods: 26 patients between 23 to 45 year old with a mean age of 32-year-old (SD±6.4) with high fistula in ano measured 7.5 to 10 cm, mean 8.41 (SD±0.85), all were direct fistula except one was complicated & only one was a recurrent fistula. Operation (fistulotomy) was done under spinal anaesthesia,

Result: On following all patients, the pain was moderate in four patients, no primary bleeding, no recurrence or faecal incontinence; all patients started their Routine work in about five days.

Conclusion: The CO₂ laser may a good tool for anal fistula excision because of almost bloodless surgery, reduce the risk of infection and precisely controlled surgery which limits injury to surrounding tissue.

Keywords: Anal fistula surgery, carbon dioxide laser, CO₂ 10600nm, fistula in ano, laser in anal surgery

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Introduction

Fistula-in-ano is a common surgical problem with a prevalence of 1.2 to 2.8/10000¹. It is characterized by severe infection signs and discharge. They arise following infection near the anal canal. It is a challenge to the surgeon because of a significant risk of recurrence and complications especially of anal incontinence after surgery especially in high transphincteric fistulae, suprasphincteric fistulae, recurrent cases or anterior fistula in women^{2, 3}. It is uncommon that fistula in ano to be healed spontaneously. In most cases, the operation is required to treat the fistula. The type and technique of operation will depend on the classification and situation of the fistula⁴. The treatment of fistula in ano is diverse because no

single technique is universally effective. Surgery is the main type of treatment of anal fistulae. The principles of fistula in ano surgery are to remove the fistula, prevent recurrence and avoiding complications like anal incontinence⁵. The need to reduce the anal sphincters damage lead to use of collagen plug, fibrin glue, clip closure, mucosal flap advancement techniques, ligation of intersphincteric fistula tract (LIFT), video-assisted anal fistula treatment (VAAFT) and Fistula laser closure (FiLaC™)⁶⁻¹³, aim of these procedures to avoid sphincter injury during surgery. Carbon dioxide (CO₂) laser used as tool in treatment of anal fistula¹⁴, CO₂ lasers are attracting attention as cutting tools because of its wavelength 10600nm, CO₂ lasers emit a longer wavelength than those transmitted by other types of lasers (figure 1), which absorbed in water which presents in all cells. Cellular rupture occurs from the photothermal effect when intracellular water absorbs the energy from the CO₂ laser, lead to incision, excision, evaporation, and coagulation of tissues.¹⁵ The aim of our study to evaluate the usage of carbon dioxide 10600nm laser in the treatment of fistula in ano.

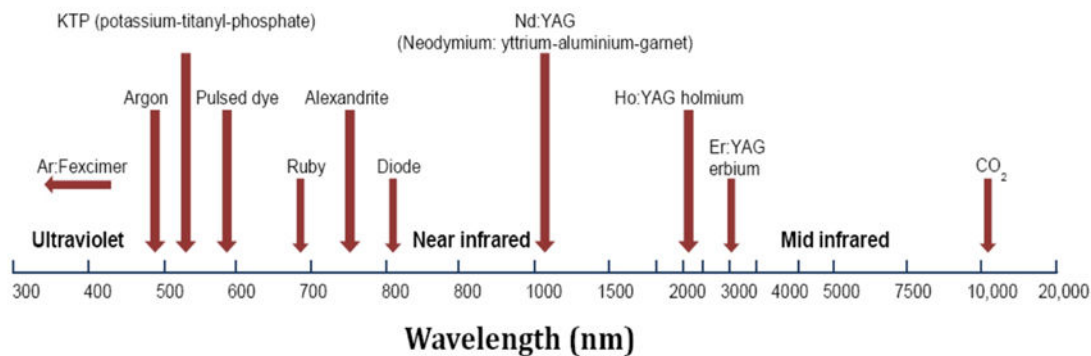


Figure 1. The wavelength of medical lasers¹⁶

Material and methods

The laser system used in this procedure is CO₂ laser (Invisible far-infrared wavelength :10600nm, KLS MARTIN, MCO 50plus) continuous wave mode using non-contact method through seven articulated arm as delivery system, 2-50 watt at tissue level, while the low power red diode laser (5 mW) with wavelength :635nm is used as aiming beam. The procedure was done in Al-Huseinteachinghospital in Thi-Qar, Iraq. Between February 2017 and February 2019. The study was approved by the local hospital (Al-Husein teaching hospital) ethics committee under No. 125 on the 27th of January 2017, the details of the laser surgery procedures were explained to patients. Patients signed informed consent for using the laser in surgery, and patients were prepared for laser surgery and viral screen (HBsAg, HCV, and HIV) was requested. Fistulae were classified in accordance with the Parks' classification system, and all patients were preoperatively assessed by clinical examination and proctosigmoidoscopy, sinography and MRI with contrast. The length of the fistula was measured using sinography and MRI with contrast. Low anal fistulae were excluded from the study.

The theatre prepared for laser surgery include highly reflective surfaces were removed from the field of operation, the CO₂ laser system is set in a CW mode, Power of 10 W, power density was 7692 W/cm² for cutting and 4615 W/cm² for hemostasis and sterilization. Intraoperative precautions were undertaken; Surgeon, assistants and the patients' eyes and skin were protected.²⁶ patients between 23 to 45 year old with mean age of 32-year-old (SD±6.4) all of them was males, with high fistula in ano measured 7.5 to

10 cm, mean 8.41(SD±0.85) were treated, all were direct fistula except one was complicated & only one was recurrent fistula, (table 1). Operation was done under spinal anesthesia, in the lithotomy position. A metal probe inserted through the external opening of fistula & directed along the track toward the internal Opening of fistula. The probe passed easily. Ceftriaxone one gram and metronidazole 500 mg were given intravenously one hour before the start of the operation. Metronidazole continued 500 mg three times a day orally for 3 days. A laser beam [CO₂ 10600nm] was used for excision of fistula tract without affecting the surrounding Tissues, in the clear field and good hemostasis. The internal orifice was left to heal spontaneously & the tract was packed with sterile gauze. The patient was discharged after a few hours and kept on a fluid diet for 3 days & then the patient started to have a path. The packing of the tract was changed daily until the healing which occurs in about 5 wk. (27 - 45 days, mean 35.1 (SD±4.97)). The follow up of the patients period for recurrence was for 6 months, (table 1).

Table No. 1: fistula in ano; length, type, site and healing time

No.	Age (yrs)	Length of fistula (cm)	Type of fistula	Site	healing time about (days)
1	30	7.5	Direct	Transsphnector	32
2	25	9	Direct	Transsphnector	30
3	26	9	Complicated	Intersphnector	41
4	28	10	Recurrent	Transsphnector	44
5	43	8	Direct	Transsphnector	30
6	35	7.8	Direct	Intersphnector	33
7	25	8.6	Direct	Transsphnector	36
8	33	9.5	Direct	Transsphnector	45
9	34	9.5	Direct	Intersphnector	38
10	23	7.5	Direct	Intersphnector	37
11	27	7.8	Direct	Intersphnector	29
12	45	8.5	Direct	Transsphnector	39
13	31	9	Direct	Intersphnector	41
14	29	7.7	Direct	Intersphnector	27
15	20	7.5	Direct	Transsphnector	30
16	30	9	Direct	Intersphnector	33
17	26	9	Direct	Intersphnector	38
18	27	7.5	Direct	Transsphnector	28
19	34	8	Direct	transsphnector	35
20	38	7.5	Direct	Intersphnector	35
21	39	10	Direct	Intersphnector	38
22	23	8	Direct	Transsphnector	34
23	30	7.5	Direct	Intersphnector	35
Mean	30	8.4			35.1
SD ±	6.4	0.85			4.97

Result

Laser fistulectomy under spinal anesthesia was done for all patients in our study as a day case. All patients were seen on 3rd & 7th, 14th postoperative day & then once monthly till 6 months, the anal fistula was healed between 27 and 45 days, with mean 35.1 days (SD±4.97). We followed the patients for pain, bleeding, infection, fecal incontinence and recurrence of anal fistula. For pain; only three patients had moderate pain required non-steroidal anti-inflammatory analgesia in the first & second post-operative days.

For bleeding; no patient had significant primary bleeding, only 3 patients had mild reactionary bleeding manifested as wet dressing & continues for 2 days & treated conservatively, change the dressing. For infection: one patient complained of wound infection needs antibiotics for one week. All patients ambulated on the same day of operation (day case clinic, discharged home same day of operation) & all patients started their Routine work in 4 - 7 days. For the fecal incontinence; all patients had no fecal incontinence in the current study. During the six months of the follow up, no recurrence found in all patients in the current study.

Discussion

Most fistulae in anorectal type and are not involve the anal sphincter that can be treated by a fistulotomy, which has a low recurrence rate and an acceptable rate of morbidity, but the treatment of a complex (high) fistula, has increased risk of incontinence, still represent a challenge to the surgeon and require multiple operations¹⁶⁻²¹.

To avoid complications of sphincter damage and faecal incontinence more than one procedure done. These treatments have included ligation of the intersphincteric fistula tract, fistula clip closure technique, video-assisted anal fistula treatment (VAAFT), fistula plugs, fibrin glue, ‘‘Fistula Laser Closing’’ (FiLaC™). But the incontinence and the recurrence of the fistula still occurring^{22, 23}. In our study, we were using the carbon dioxide 10600nm laser as a tool for excision of anal fistula, in which, photothermal interaction with tissue is the basic concept of carbon dioxide surgical laser. Laser light within the tissue will be converted to thermal energy, that when appropriately applied, can produce reactions ranging from incision, vaporization, to coagulation. This wavelength (10600 nm) has an affinity for water which is present in all cells in the body and extremely thin depth in range of 0.03 mm and collateral thermal zone of 150 microns^{15, 24}. The CO₂ 10600nm laser allowing increased surgical precision and accuracy, thereby reducing unnecessary damage to underlying tissues, and the procedure was with no bleeding in all cases, resulting in improving visualization of the surgical field, eliminating the need for electro-cautery which can cause more damage (figure 2) and increase chance of infection, which needed in case of scalpel surgery²⁵.

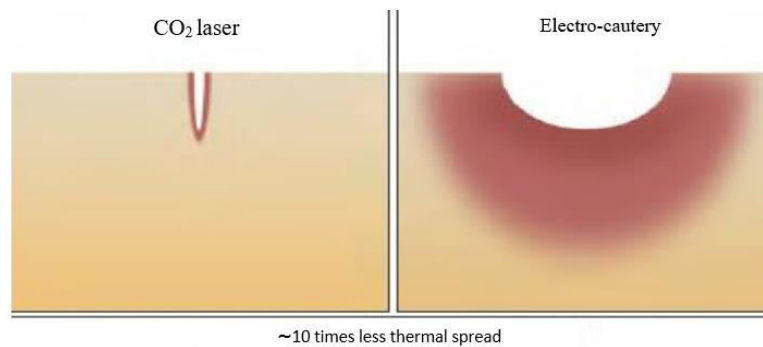


Figure. 2: thermal laser

spread after CO₂ vselectrocautery²⁶

In this study, the use of CO₂ 10600nm laser shortens the operation time, probably the efficiency of the laser allows sealing lymphatic and blood vessels that renders a bloodless surgical field even operation

done in infected fistula²⁵. They can seal lymphatic and blood vessels less than 0.5-mm wide may reduce intraoperative bleeding and the occurrence of postoperative swelling, and small peripheral nerves were sealed, this sealing alleviates postoperative pain²⁷. The wound less chance to be infected because the effect of laser on microorganism^{28, 29}. We failed to find the study in which the anal fistula excised by CO₂ laser, but Sam sultazi et al.³⁰ was used CO₂ laser for core out (deroofting) of fistula for 3 cases in 1981. And Moy J. And Bodzin J¹⁴ used it to ablation (deroofting) of anal fistula in patients with Crohn's disease with high success rate. "Radical operation for fistula-in-ano was performed by means of irradiation of 20-25w. the focused or defocused laser beam and pathological tissue for the fistula were completely vaporized." That mentions by Ishii et al.¹³ we didn't know is it complete excision of tract or granulation tissue only. Nevertheless, they concluded that "The CO₂ laser proved significantly more effective for ano-rectal surgery especially to fistula-in-ano in comparison to routine method." Diode laser used in the treatment of anal fistula, A. Wilhelm et al.¹² used diode 1470nm which well absorbed in water, the use of this wavelength by the radial-tip laser fiber permits destruction of the granulation and epithelial tissue causing a 2- to 3-mm zone of controlled tissue damage. In spite of no faecal incontinence or recurrence in our study but the limitations are small number of patients and a short period of follow up to give a good idea about CO₂ 10600nm laser in excision of anal fistula.

Conclusion

The CO₂ laser may a useful tool for anal fistula excision because of almost bloodless surgery, reduce the risk of infection and precisely controlled surgery which limits injury to normal tissue.

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