



Outpatient laser treatment of primary pilonidal disease : the PiLaT technique

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Abstract

Background The aim of the present study was to assess the effectiveness of the minimally invasive technique pilonidal disease laser treatment (PiLaT) in treating primary (non-recurrent) pilonidal disease in an outpatient setting under local anaesthesia.

Methods A prospective observational study was conducted on consecutive patients suffering from primary pilonidal disease that were treated at Iasi Private Medical Center, Ioannina, Greece, between April 2015 and December 2016, using a 1.470 nm diode laser (BioLitec, Germany) emitting energy through a radial optic fiber that was inserted in the cyst and accompanying sinus tracts. Patients were discharged half an hour after completion of the procedure. Pain scores [visual analogue scale (VAS)], complications and patient satisfaction were assessed. Follow-up lasted 12 months.

Results There were 60 patients, 51 males and 9 females, with a mean age of 22.7 years (range 15–58). Successful treatment (complete epithelization of cyst and tracts) was documented in 55 out of the 60 patients (92% success rate). VAS pain scores were low and no major complications were recorded. Healing was achieved in 25.4 days (range 17–40) and 53.3% of patients were able to return to work the same day (the rest within 3 days). Of the failures, four patients did not heal and one patient recurred after 5 months. All failures were treated successfully with a second laser procedure except for one who denied re-intervention. Overall patient satisfaction reached 98%.

Conclusions PiLaT seems to be very close to the ideal treatment of pilonidal disease, since it is safe, easy to perform, almost painless and highly effective.

Keywords Pilonidal sinus · Laser · Minimally invasive surgical procedures

Introduction

In the era of minimally invasive surgical and endoscopic methods (such as laparoscopic or robotic techniques), patients have greatly benefited from an ever-growing number of almost painless procedures associated with rapid recovery and good cosmetic results. However, certain types of diseases, such as pilonidal sinus disease, are widely managed in an old-fashioned, strictly ‘grossly invasive’ manner.

Pilonidal disease affects mostly young males and it is nowadays regarded as an acquired condition, probably due to excessive hair in the intergluteal region, poor hygiene and prolonged stressing of this particular area while sitting or driving [1–3]. It may not be life-threatening or cause severe

disability; however, it is still painful (mostly during the acute phase), and stressful for the patient and his family [4]. Eradication of the pilonidal cyst through wide surgical excision is still the cornerstone of treatment in many countries, yielding good long-term results, but at the expense of postoperative complications, prolonged hospital stay and delayed resumption of normal daily activities, substantial pain and discomfort, sub-optimal aesthetic results and recurrence [5–7].

A minimally invasive procedure would be the ideal treatment for pilonidal sinus disease, one that is pain-free, fast, effective and reproducible (plus acceptable from the patient) in case of recurrence. Given encouraging preliminary data with the use of a 1.470 nm diode laser for treating this condition [8], the present prospective observational study was performed to examine the results of the Pilonidal disease Laser Treatment (PiLaT) in patients with primary (non-recurrent) chronic pilonidal disease.

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Materials and methods

Consecutive patients with primary pilonidal disease were prospectively enrolled in this cohort study. Informed consent was obtained from all individual participants included in the study. Exclusion criteria were recurrent disease (any case of prior operation for this condition such as ‘open’ or ‘closed’ pilonidal cyst excision, any kind of laser procedure, Karydakis operation) and cases of hidradenitis suppurativa. Acute abscesses were drained through a small incision, common antibiotics (cefuroxime or amoxicillin together with clavulanic acid) were prescribed and the laser procedure was performed after a minimum of 6 weeks. Whenever a pit could be identified in this acute situation it was used as a route through which pus was drained. After the acute infection had clinically subsided, the candidates for laser procedure were seen in the office 1 week prior to the procedure, to establish that the disease had reverted to its chronic phase (absence of pain, no purulent discharge). All patients were operated on in the same outpatient private surgical center by the author between April 2015 and December 2016.

Surgical technique

All laser procedures were performed in the prone position, with the patient fully awake and alert (no sedation) and the buttocks spread apart with tape. A single dose of cefuroxime was administered orally prior to the procedure. Removal of hair at the site surrounding the sinus pits was done at the time of surgery using simple shaving razors. Only local anaesthetic agents were used without the presence of an anaesthesiologist, but with monitoring of the patient’s vital signs: a mixture of 10–20 ml of xylocaine 2% plus 10 ml of ropivacaine 7.5% plus 10 ml of sodium chloride 0.9% (as a dilution agent) was administered in all cases. The pit openings were identified through careful inspection and if narrower than 2–3 mm they were enlarged using a common clamp (Fig. 1). The cyst and sinuses were debrided of any hair and/or necrotic material (with the aid of ‘mosquito’ clamp and Volkmann curette) and flushed with normal saline (NaCl 0,9%) administered under pressure. A 1 or 2 mm thick metallic probe was inserted through the pit to investigate the course of the sinus tracts and the tip of the radial optical

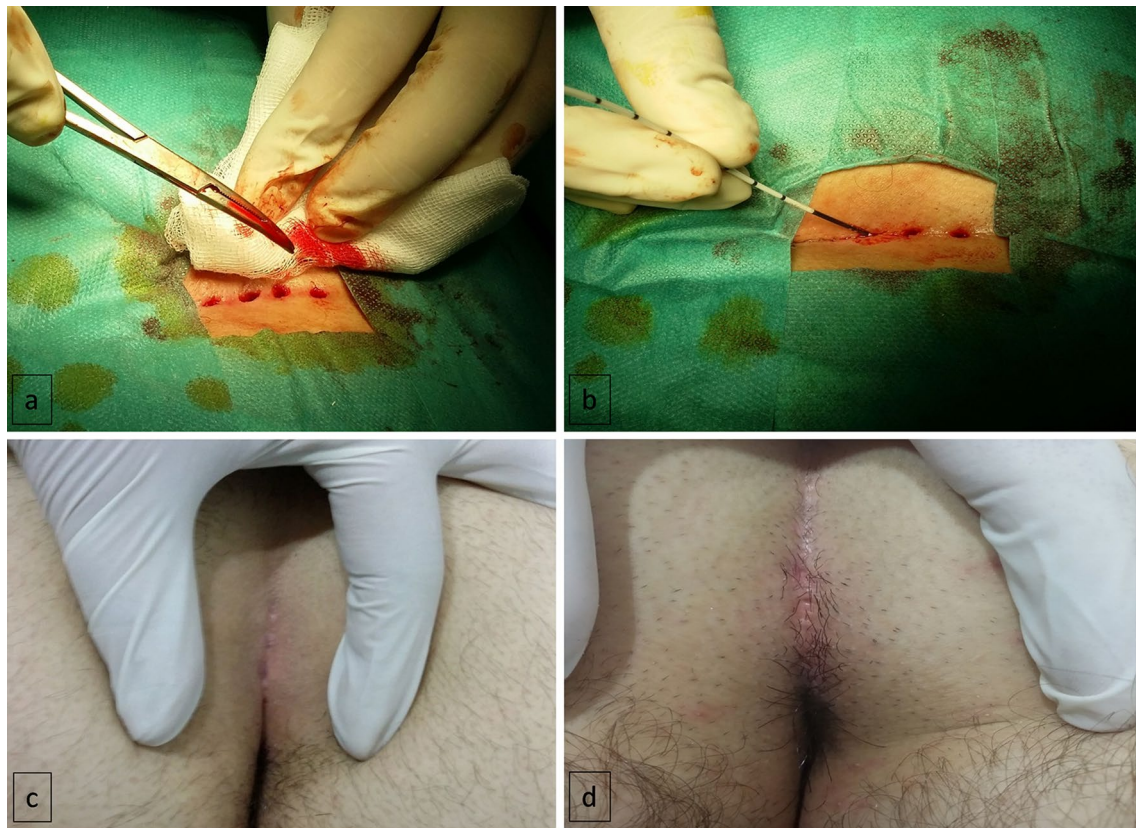


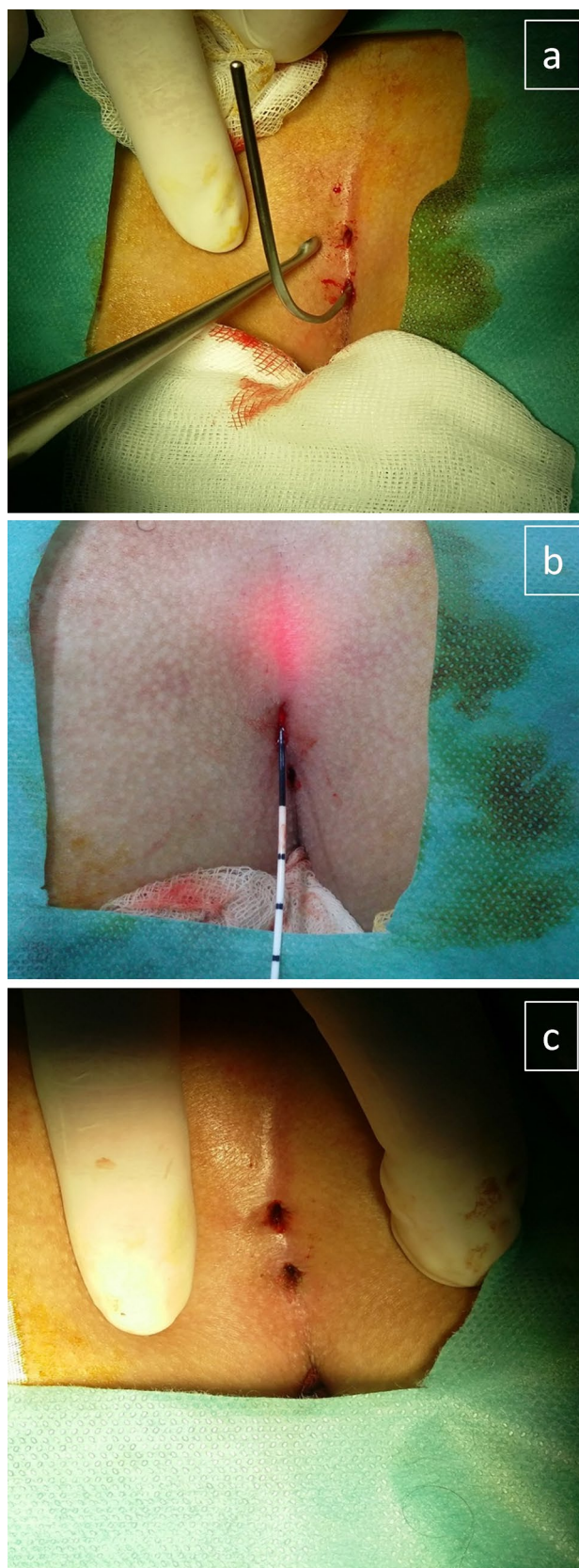
Fig. 1 PiLaT in a 22-year-old male patient **a** widening of the existing pits using a mosquito clamp, **b** laser application (the fiber is marked at distances of 1 cm so as to permit depth measurements), **c** successful healing at 6 weeks, **d** the same patient 12 months later

Fig. 2 PilaT in a 25-year-old male patient: **a** identification of tracts with metallic probe and curettage of tracts, **b** eradication of the cystic wall epithelial lining using a radial 1.470 nm optical fiber (if lights are put away from the operating field the tip of the fiber can be seen inside the cyst as it emits red light when activated, thus guiding the operator regarding cyst depth and pace of fiber removal), **c** immediate post-operative result after PiLaT treatment

fiber (same as FiLAC™, BioLitec, Germany) was then inserted in the first (proximal to the anus) sinus (Fig. 2). The generator was set at 8 W and the tip of the fiber emitted pulses of energy of 1.5 s of duration in a circumferential manner. The fiber was removed outwards 1–2 mm each time so as to deliver a total of 100–120 J of energy per cm of sinus tract. Proper obliteration of the tract was demonstrated by the inability to push back the fiber to the original depth of the sinus, as a result of the shrinkage effect onto it. Then the fiber was placed to the next pit until all sinus tracts were treated in the same way. The procedure was terminated after covering the sinus openings with povidone iodine ointment and sterile gauzes.

The patients were discharged 30 min after completion of the procedure and were advised to take simple analgesics (1.000 mg of paracetamol and/or anti-inflammatory agents) in case of pain or discomfort. Follow-up visits were scheduled on post-operative days 1, 7, 15, 30, and 45 and subsequently at 3, 6 and 12 months after the procedure. Patients whose cysts were found to contain residual hair or debris intraoperatively were prescribed antibiotics (the same ones used in the acute phase) for a period of 4 days postoperatively. The patients were advised to bathe themselves from postoperative day 1 on, but they were also urged to avoid any strenuous activities that would compromise proper healing (such as driving for hours, sitting too long in an inappropriate position and going to the gym) during the first week. Hair removal from the intergluteal cleft was once a week throughout the whole study period was recommended.

Successful treatment (primary endpoint of the study) was the healing of the pilonidal cyst (complete obliteration of the cyst/sinus tracts by subcutaneous scar formation and epithelization of the dermal pits) at 8 weeks (postoperative day 60) and preservation of this result up to 12 months. If any pit or sinus tract was found to be still open and presenting with ongoing discharge after postoperative week 8 was reported as primary failure. Any cyst that seemed to have healed within the first 8 weeks but recurred later on during the study period (either re-opening of a primarily healed pit or emerging of a new one) was documented as secondary failure. A visual analogue scale (VAS) score was used to assess pain and patient satisfaction was recorded using a predetermined questionnaire (not validated).



Statistical analysis

Descriptive statistics were performed using SPSS version 17.0 (Chicago, ILL, USA) software for Windows. The results were expressed as mean (\pm SD, standard deviation) and absolute values or percentages.

Results

A total of 60 patients with primary pilonidal sinus disease were included in the study. There were 51 males and 9 females with a mean age of 22.7 (SD \pm 6.23) years. Patient characteristics can be seen in Table 1. Operation time was around 30 min for most cases. Forty patients (66.6%) reported no pain at all after the procedure, while 20 (33.3%)

reported low pain scores (Table 1), but only 6 (10%) required per os analgesics the first day (one of them continued them on day 2 as well). About half the patients were able to work on the day of the procedure. Only 6 (10%) had to wait more than 3 days to resume normal everyday activities. Complications are documented in Table 1. No patients reported bleeding, hematoma formation or fever after the laser procedure. Thirteen patients presented with seroma between postoperative days 7 and 15. In the majority of patients cysts and sinuses healed properly within a month, but patients with extensive disease required up to 40 days for complete healing.

All patients were assessed during the follow-up period (12 months), at the end of which, 55 patients had their pilonidal sinuses successfully treated (overall success rate 92%). Four patients failed to heal at the end of the 8th week

Table 1 Patient characteristics and procedural results

Patients	60	
Male	51	
Female	9	
Age (years)	15–58	(Mean: 22.7, SD: \pm 6.23)
Operative time (minutes)	23–65	(Mean: 32.3, SD: \pm 8.12)
Number of pits treated	1–8	(Mean: 3, SD: \pm 2.3)
Total length of cyst/sinuses treated (cm)	5–18	(Mean: 12.87, SD: \pm 10.16)
VAS (during 1st week)		
0	42	(70%)
1–3	16	(26.6%)
4–6	2	(3.3%)
7–10	0	0
Painkiller demand		
On POD 1	6	(10%)
On POD 2	1	(1.6%)
On \geq POD 3	0	0
Days to return to work/activities		
0	32	(53.3%)
1	7	(11.6%)
2	6	(10%)
\geq 3	15	(25%)
Complications		
Seroma	13	(21.6%)
Abscess	1	(1.6%)
Healing time (days)	17–40	(Mean: 25.4, SD: \pm 13.7)
Primary success	55	(92%)
Primary failure	4	(6.67%)
Secondary failure	1	(1.6%)
Patients satisfaction		
Highly recommended	54	(90%)
Recommended	5	(8.3%)
Considerable	1	(1.6%)
Not recommended	0	0

POD postoperative day, VAS visual analogue scale

(primary failure) and 1 patient experienced initial healing but the pits reopened after 5 months (secondary failure). In three out of the five failed cases, hair was found inside the cyst and sinuses. Patients that had not healed after the first PiLaT procedure were willing to undergo this procedure for a second time, except for one individual with primary failure, who refused a second treatment and chose to have his condition treated elsewhere. The remaining four had a repeat PiLaT successfully, but these results are not presented in this study. Overall patient satisfaction reached 98%.

Discussion

In Greece, as in many other countries, ‘traditional’ surgical excision of the cyst and accompanying sinus tracts is currently the treatment of choice, leaving the remaining cavity to be managed by primary suture closure, left to secondary healing or even marsipulization (although the efficacy of the latter is largely disputed) [3, 5]. A 2014 meta-analysis argued that deep excision with secondary healing should be abandoned [9]. Moreover, midline closure using deep fascia suture seems to be inappropriate after cyst excision and an asymmetrical wound closure technique offers better results [9, 10]. Other, more radical procedures using the Limberg flap or other types of advancement flaps have been tried with varying results [11]. It seems that these techniques should be better reserved for extensive primary disease (multiple tracts with scarring or ongoing purulent discharge) or for cases of recurrence when a less invasive method has failed [10]. Less invasive procedures, such as phenol instillation or the Bascom procedure are not as popular as the ‘classical’ surgical approach, even though they were first described more than half a century ago and reported to have satisfying results [12–15]. These techniques should probably receive more attention and undergo further investigation and evaluation, since they are seldom incorporated in randomized trials or meta-analysis [3].

Fistula Laser Closure (FiLAC) is a method that was originally applied in the treatment of perianal fistulas [16]. Because of promising results, diode lasers were later on used to treat pilonidal sinus disease, but this experience has not been appropriately reported in the literature mainly due to the fact that it is performed largely in private practice. To date, there is only 1 study (from Belgium), in which a radial diode laser probe was used to eradicate pilonidal cyst and accompanying sinuses, with results similar to the ones presented here [1].

The present prospective observational study shows a single cohort of patients suffering from primary pilonidal disease who were treated successfully using the PiLaT technique. Although the laser generator and optic fiber used here are the same as in FiLAC, the energy settings are different

and the aim is to wall-off the cyst and its tracts, rather than to obliterate them by shrinkage. The present study describes my experience with PiLaT as an outpatient procedure under local anaesthesia, using a diode laser with a wavelength of 1.470 nm (FiLAC™, BioLitec, Germany). The generator produces energy which is delivered through the tip of a 1.85 mm thick optical fiber in a circumferential manner (radial fiber). This enables permanent destruction of the epithelial lining of the pilonidal cyst and its accompanying sinus tracts, thus allowing for proper healing and treatment *in situ*, without the need to excise the cyst out of the body together with some portion of surrounding healthy tissue.

I chose to use the pulsed mode and 8 W of energy, in contrast to the original description by Dessily and colleagues (using continuous mode at 10 W), since I find it easier and safer to control the energy delivery this way [1]. In continuous mode, the tip of the fiber sometimes sticks to the cystic wall, so one may accidentally deliver more energy at this particular point before removing the fiber outwards. Energy settings in the laser generator may vary according to surgeon’s preference but experience has shown that approximately 100–120 J of energy (Watts × sec) is sufficient. Another difference between my treatment method and that of Dessily et al. was the prescription of antibiotics to all patients preoperatively as well as postoperatively in some patients with excessive hair and serous discharge at the time of surgery. This was done due to fear of infection after laser application, but with growing experience it seems that antibiotic use may not be necessary at all.

Primary healing was achieved in 55 out of the 60 patients enrolled (92%). This is a relatively high success rate and similar to that of other minimal invasive techniques such as Endoscopic Pilonidal Sinus Treatment (EPSiT) or the Gips procedure [12, 14, 19, 20]. Mean duration of soiling before healing was 25.4 days (range 17–40 days). The four patients that failed to heal received a second laser treatment, successful this time (overall success rate 98.3%). Overall patient satisfaction was as high as 98%, similar to that reported by Dessily et al. [1].

With an ever-growing number of studies favoring minimally invasive methods such as PiLaT for treating pilonidal disease, we may not be far from the ideal treatment for this condition, while more radical procedures may only be applied in extensive forms of disease (hidradenitis suppurativa, excessive scarring) or repeated recurrences). The results of this study show that PiLaT can be performed as an outpatient procedure, since it is simple, fast, requires no sedation on anaesthesiological support, and the patient can be discharged almost immediately after its completion. Painkillers are not generally necessary and normal activities can be resumed even on the evening of the procedure. It is suitable for all types of disease, from a small cyst with one sinus tract opening towards the skin surface to cases with multiple

and extensive sinus tracts, as shown by our results (up to eight sinuses treated). One point that should be emphasized is the need for proper hygiene and hair removal from the intergluteal region postoperatively, although the literature is poor regarding this practice [17]. Since in three out of the five cases of failure hair was found in the non-healing cyst, this fact that could possibly explain the recurrence. This has been proposed in other studies as well [18, 19]. However, current experience suggests that PiLaT is also equally effective in recurrent forms of disease, but these data were not included in the present study. From the surgeon's point of view, it is an easy-to-learn method, repeatable in case of recurrence and complications are minor and easy to manage. Overall patient satisfaction is another important reason to further investigate all the above mentioned advantages of this treatment modality.

One potential drawback of this method is the financial cost, since the laser generator and the optical fiber (consumable part) are expensive. In our center, the cost is around 600 Euros per case (optic fiber cost and generator amortization). This may be offset for the patient by more rapid return to work and for the healthcare system by the lack of aftercare required. Moreover, despite the fact that the technique of discovering and obliterating the sinus tracts may be 'blind', it yields similar results to other methods that incorporate much more expensive instrumentation and require a surgical facility, such as EPSiT [20, 21], although other minimally invasive procedures also show promise [22]. Although this minimally invasive approach seems to be very close to the ideal method of treating pilonidal disease in a simple, safe and effective way, its advantages must be validated in large scale prospective randomized trials.

This study has some limitations, such as the relatively small number of patients, the short follow-up period and the absence of a control group, treated with the 'traditional' methods as well as the use of non-validated tools to assess results.

Conclusions

PiLaT seems to be very close to the ideal treatment of pilonidal disease, since it is safe, easy to perform, almost painless and highly effective.

Compliance with ethical standards

Conflict of interest The author declares that he has no conflict of interest.

Ethical approval All procedures performed in this study involving human participants were in accordance with the ethical standards of the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all participants included in the study.

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