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ORIGINAL PAPER

## Pilonidal sinus destruction with a radial laser probe: technique and first Belgian experience

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### ABSTRACT

**Background:** The treatment of pilonidal sinus disease still remains challenging. Despite many non-surgical and surgical methods, no consensus emerged for the best treatment. We describe a new innovative technique consisting in the destruction of the pilonidal cyst with a radial laser probe (FILAC™, Biolitec, Germany). The energy delivered causes the destruction of the sinus epithelium and the simultaneous obliteration of the tract.

**Method:** In December 2015, we retrospectively studied the data of our 40 first patients operated with this technique between September 2014 and September 2015. The mean follow-up period was 234 days (92–316). There were 33 men and 7 women. The mean age of the patients was 25.2 years (15–46).

**Results:** The success rate was 87.5% (35 patients/40). Recurrence rate was 2.9% (1 patient/35). Hospital stay was 1 day for all the patients with no re-hospitalisation during the follow-up. The mean duration of soiling before healing was 18.6 days (2–35). The mean duration of pain-killers intake was 4.9 days (0–14). Four patients presented complications: 2 hematomas (5%) and 2 abscesses (5%), all medically treated.

**Conclusion:** The destruction of a pilonidal cyst with a laser probe is a safe, simple and minimally invasive technique. The success rate is good. Hospital stay is short, pain is light and complications are few as well as the number of patients needing post-operative care, allowing a rapid return to work or school. This technique could be proposed as a first-line treatment to the majority of patients with a pilonidal sinus disease.

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Pilonidal sinus; pilonidal cyst; sacrococcygeal sinus; laser; minimal invasive surgery

### Introduction

Described for the first time by Mayo in 1833 and first considered as a congenital pathology, the pilonidal sinus disease is now accepted as an acquired disease due to hair entering under the skin in the natal cleft and developing a subcutaneous sinus and a secondary abscess [1–4]. The estimated incidence is 26 per 100,000 people and most of the patients are aged between 15 and 30 years [2–5]. The male/female ratio is 3 or 4 to 1 [2,4,6]. The disease is mostly encountered in Caucasian people, seldom in people with black skin and never among Asians [4]. Factors implicated in the pathology are large buttocks with deep natal cleft, obesity, long-lasting sitting like travelling or driving and poor local hygiene, but the most important factor is excessive body hair [6–9].

At initial presentation, the patient may have an acute abscess with intensive pain, swelling in the natal cleft, leucocytosis and fever. This acute phase can be easily treated in the outpatient clinic [1,2,4,10]. Others present a chronic sinus ostia

discharge, staining of the underclothes, erythema, long-lasting discomfort or recurrent pain [1,2,4,5].

The inner wall of the sinus is lined by stratified squamous epithelium and there are almost always free hairs, debris and granulation tissue in the sinus [3,8]. A simple examination is generally sufficient to establish the diagnosis of a pilonidal sinus disease [4,10]. If conservative approaches may control the disease, most of the time surgery is required [11,12].

The techniques range from simple incision of the sinus with or without marsupialisation or radical excision of the cyst with the wound laying open and healing by second intention to closed methods with midline or off midline sutures like the Karidakis or Bascom procedures [10,13,14]. For more complex cases, plastic procedures like V–Y, V–Z plasty, Dufourmentel or Limberg flaps can be used [6,8,9,15].

In an attempt to perform a minimally invasive surgery, to shorten hospital stay and duration of post-operative care, to quicken return to work or

school and to reduce the cost for the patient, we decided in September 2014 to radically change our procedure and to adopt for the first time in our institution and in Belgium a new innovative technique consisting in the destruction of the pilonidal cyst with a radial laser probe (FILAC™, Biolitec, Germany) [16,17].

This paper describes the technique and presents the results of the first Belgian experience with this laser technique.

## Material and method

From September 2014 to September 2015, a total of 40 consecutive patients were operated on with the laser technique by a single surgeon (first author). Informed consent was obtained from all the patients. Exclusion criteria for the laser technique were acute pilonidal abscess and recurrence after a previous surgical treatment. After an acute abscess, time to operate the patient was at least 6 weeks. A persistent secondary opening at the site of a previous abscess more than 6 weeks after the acute phase was not a counter-indication.

In December 2015, we retrospectively studied the data prospectively entered into a database including patient demographics (age, gender), the number of pits, the size of the laser probe, post-operative complications, duration of pain evaluated by the duration of pain killers intake, duration of post-operative soiling, non-healing characterized by persistent open sinus or persistent discharge 2-month post-operatively and recurrence after a complete healing.

## Technique

No antibiotic is given per-operatively. Most of the patients are operated on under rachi-anaesthesia. Patients refusing loco-regional anaesthesia receive a general anaesthesia. They are placed in a prone position. After shaving, cleaning and scrubbing the skin with alcoholic chlorhexidine, the different pits are enlarged with a mosquito clamp and the hairs are removed from the sinus. A stylet is then inserted in each sinus to determine the length, direction and size of each one and to choose the right size of the laser probe as two diameters are available. Before beginning the procedure, saline water is injected under the skin around the pits and the tracts to cool it and to avoid burning of the surrounding tissues. Then a radial diode laser probe at 1470 nm wavelength is used. Laser energy is 10 Watts. The fibre delivers energy

homogeneously at 360° in a continuous way. While the probe is withdrawn at an approximate speed of 1mm per second, the sinus shrinks and closes. If the tract is not closed after a first withdrawal, a second performance is done. At the end of the procedure, a compress protects the pits. Patients are allowed to leave hospital on the day of the operation. In the post-operative period, no particular care is required except covering the pits with a compress after washing the region or after taking a shower. Only in case of persistent open orifice at the site of a previous abscess, post-operative care by a nurse is prescribed. In the post-operative period, patients are also asked to take pain-killers (generally paracetamol) as long as they need to.

Follow-up is scheduled in the outpatient clinic every two weeks until patients are considered cured. Post-operative clinical evaluation only includes physical examination. Intake of pain-killers, discharge from the pits and complications are recorded at each visit. At the end of December 2015, we called all the patients by phone to make sure no recurrence or complication had appeared after the last visit.

## Statistics

Results were reported in descriptive statistics using Microsoft Excel and expressed as mean and range.

## Results

All the 40 patients treated by the laser technique between September 2014 and September 2015 took part in the study. None of them were lost of follow-up. The mean follow-up period was 234 days (range 92–316). Patients and operative characteristics are presented in [Table 1](#).

All the patients were discharged on the day of the operation and none of them had to be re-hospitalised. The results and complications of the technique are summarized in [Table 2](#).

Thirty-five patients healed (overall healing rate 87.5%). The mean duration of discharge before healing was 18.6 days (range 2–35). One patient out of 35 recurred two months after healing (recurrence rate 2.9%). The mean duration of pain-killers intake was 4.9 days (range 0–14) and complications

**Table 1.** Patients and operative characteristics.

Mean age (yr) (range)	25.2 (15–46)
male/female ratio (%)	33/7 (82.5/17.5)
Mean number of pits (range)	2 (1–5)
NI/slim probes (%)	25/15 (62.5/37.5)

were 2 abscesses (5%) treated medically and 2 hematomas (5%), one punctured and one discharging through the pit. The characteristics of the patients who failed to heal or recurred are summarized in Table 3.

## Discussion

Since the first description of the disease by Mayo in 1833 and the first description of treatment by Anderson in 1847, many articles have been published on the subject and many procedures have been advocated to treat pilonidal sinus disease, but until now, no consensus has emerged [1,2].

The ideal treatment should heal the sinus tract and the overlying skin and prevent recurrence. It should be simple and minimally invasive in order to shorten hospital stay and the period off-work or school, to reduce pain, post-operative care and the cost with the best aesthetic result [1,3,4,11]. Non-operative methods used to treat pilonidal disease include improved perineal hygiene, natal cleft shaving, laser epilation and phenol application [1,4,11,12].

In 2012, C. Lindholt-Jensen proposed to treat pilonidal cysts with Nd-YAG laser waves percutaneously. In a series of 41 patients, healing rate was 75.7% but the patients had to undergo laser sessions every two weeks for an average duration of 5.1 months [5].

Phenol injection in the sinuses under local anaesthesia is easy to perform in the outpatient clinic with success rates similar to various surgical procedures and no scar other than the sinuses, but it is painful in the post-operative period and generally multiple sessions are necessary. Recurrence rate is reported to be between 7% and 27% [4,11].

**Table 2.** Results and complications.

Healing (%)	35/40 (87.5)
Recurrence (%)	1/35 (2.9)
Mean duration of soiling (days) (range)	18.6 (2–35)
Mean duration of pain-killers intake (days) (range)	4.9 (0–14)
Mean duration off activities (days) (range)	5 (5–5)
Complications	
Abscess (%)	2/40 (5)
Hematomas (%)	2/40 (5)

Among the numerous surgical techniques, one of the two simplest ones consists in wide excision with the wound laid open. It has a low recurrence rate (5%), but the wound takes time to heal (a mean time of 8 weeks) with daily wound dressing, delayed return to normal activities and frequent follow-up visits [1,4]. The second one consists in just opening the skin over the tract with marsupialisation of the fibrotic wall to the skin. Marsupialisation seems to have a more rapid recovery (4–8 weeks) for the same recurrence rate, but is more painful and now considered obsolete. Nevertheless, for both techniques healing time can sometimes take several months [1,4,6,9,13].

To reduce healing time, techniques with a suture of the wound have been proposed. Suture on the midline is no longer recommended because it is frequently associated with wound dehiscence, infection and pain and recurrence rate may be as high as 38% [1,2,4,9]. Most experts recommend asymmetrical incision and closure like the Karidakis procedure or Bascom flap. Healing time is 3–4 weeks and recurrence rate 8% [8,10,13,14]. For large chronically infected pilonidal sinus, in more hirsute patients and when other operations have failed, more complex flaps can be used like Dufourmentel or Limberg flaps, V–Y, V–Z advancement flaps and large musculo-cutaneous flaps. Recurrence rates are low (6–8%) to very low for Dufourmentel and Limberg flaps (1.5–5.3%), but are associated with prolonged hospital stay and a greater morbidity [6,8,9,10,14,15].

As no operative technique meets the ideal standard, we decided to adopt a radically different minimally invasive surgical technique needing no incision or excision at all: the destruction of the pilonidal sinus with a radial laser probe. This technique is already being used to treat varicose veins, fistula tract (FILAC technique) and haemorrhoids.

The device is composed of a generator and a radial emitting laser probe. The energy delivered at the tip of the probe and applied homogeneously at a wavelength of 1470 nm and 10 Watts induces the destruction of the squamous epithelium lining the sinus and the shrinkage of the tract [16,17]. With the 1470 nm wavelength, radial penetration

**Table 3.** Characteristics of non-healing and recurrence<sup>a</sup>.

Patients	Age	Sex	Number of pits	Size of probe	Other
1	15	Male	2	NI	Open secondary orifice
2	21	Male	3	NI	Open secondary orifice and tract directed to the anus
3	24	Male	1	NI	Open secondary orifice
4	20	Male	3	NI	Open secondary orifice
5	25	Male	2	NI	Tract directed to the anus
6 <sup>a</sup>	15	Male	3	NI	Nothing

<sup>a</sup>Correspond to the patient who recurred as written in the title of the table, the first 5 patients were non-healing patients.

depth is only 2–3 mm limiting injury of the surrounding tissue [16]. In comparison, simple electrocoagulation is less efficient for the shrinkage and less easy to control thermal effect on the surrounding tissue [17]. In case of persistent secondary open orifice at the site of a previous abscess, laser is also applied on the wall of the remnant cavity.

The technique is easy to perform with a very short learning curve. Operative time is short, less than 15 minutes and is easily reproducible. All our patients spent only one day at hospital and none of them were re-hospitalised for complications. Post-operative pain is generally light and short in time as thermal damage to the tissues is limited and no wound is created. Patients generally take only paracetamol for a mean duration of 5 days. Post-operative care is easily performed by a family member and not necessarily by a nurse. Post-operative period off work or school is very short compared to classical open or closed surgical techniques. In our series, all 40 patients were operated on a Wednesday and return to normal activities on the next Monday. The success rate was good (87.5%) after one performance and only one patient (2.9%) recurred during the follow-up period.

All the patients who failed to heal or who recurred were males. The bigger probe was used in all of them. Two of them had the tract going down to the anus, so secretions could not go out by gravity and four of them had a secondary open orifice at the site of a previous abscess. None of them presented a new painful abscess, but only occasional painless staining of the underclothes. Post-operative complications were few (2 abscesses and 2 hematoma) easily treated medically. No patient needed re-operation. Another advantage of the technique is the final aesthetical aspect.

Nevertheless, this technique also has some drawbacks. It is a blind procedure [16,17]. If the sinus has some ramifications, we cannot detect them intra-operatively and cannot be sure of their destruction, a possible cause of non-healing. The speed of probe removal in the sinus is surgeon dependent. If the speed is too high, destruction of the lining epithelium of the sinus will not be sufficient; if the speed is too slow, the surrounding tissue can be burned. We also have to choose between two sizes of probes to fit the diameter of the sinus best. And after pulling back the probe for first time, collapse of the sinus is sometimes not complete, so the probe can be pushed again into the sinus and a second procedure can be performed but with the risk of damaging the surrounding tissue.

In term of cost, the laser technique requires more expensive equipment compared to all other techniques available, but the laser generator is easily transportable and can be used for other applications like the treatment of varicose veins, fistula tracts and haemorrhoids [17]. Moreover, we have to take into account the reduction of hospital stay, pain-killers intake, post-operative care and duration of days off work, which certainly compensate greatly the operative cost. This financial aspect could be really interesting to investigate.

This study gives promising results, but has also some limitations: the small number of patients and the short follow-up period. So, randomised control trials comparing the laser technique to other techniques available in the treatment of the pilonidal sinus disease are needed. But, as there is no consensus on the best method to perform, which technique will be chosen for the control group?

## Conclusion

Our study suggests that destroying the pilonidal sinus with a laser probe is a safe procedure with good results and a low morbidity. The procedure meets the characteristics of minimal invasive surgery, is easy to perform and reproducible. The main advantages are a shorter hospital stay, less post-operative pain and care and the final aesthetic aspect.

This technique could be proposed as the first line treatment for the majority of the patients with a pilonidal sinus disease. Nevertheless, larger series and multicentre randomized trials will be needed to confirm our first results.

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## Disclosure statement

No conflicts of interest are declared.

## Notes on contributors

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