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Research Article

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Treatment of Pilonidal Sinus Using 1470nm Diode Laser as Minimally Invasive Technique

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Abstract

Background: The term pilonidal sinus refers to a condition that exists in the natal cleft above the coccyx. The incidence rate among males is 2.2-4 times that of females. Sacral abscess characterizes the acute phase, while cyst development or continuous sinus drainage may occur during the chronic phase. In this study, a 1470nm diode laser was used for the treatment of 50 cases of the pilonidal sinus as SiLaT Sinus Laser Therapy.

Aim of the study: to assess the safety and the effectiveness of the use of 1470nm-diode laser for treatment of pilonidal sinus by internal destruction of the granulation tissues and epithelialized sinus using radially emitting probe and assessment of any possible complications and patients' satisfaction.

Patients, Materials & Methods: This is a prospective study with 50 patients; all patients were operated on, in the private clinic under local anesthesia, using a 1470 nm diode laser for SiLaT (Sinus Laser Therapy) between February 2023 and February 2024, all patients surveyed and reported having one or more of complications listed in questionnaire paper (if any).

Results: The surgery was tolerated by all of the patients. According to the sex and Tezel's classification the patients are divided into five types, type I ten cases all are male, type II seven cases (five are male and two are female), type III 21 cases (20 cases are male and one case is female), type IV five cases all are male, type V seven cases all are male. All cases have no major complication in the early postoperative period, closure of sinus pit(s) have occurred between 9-22 days. (74%) of cases have mild pain, (6%) of cases have no pain on analgesic regimen, (20%) of cases have moderate pain No patient experienced significant primary bleeding, 16% of cases experienced a serous discharge that lasts for few days until it ceases on its own. No patient experienced infection. 78% of cases return to work on next day post-operatively, 16% of cases after 1 day of sick leave, 6%of cases after 2 days of sick leave. 2% of cases have been suffered from P.N.S. abscess. All patients were satisfied with the outcome of the operation.

Conclusion: Diode 1470nm laser sinus laser therapy (SiLaT) is a safe and effective procedure associated with a low incidence of postoperative complications, it is an acceptable, and remarkable substitute for traditional surgical treatment techniques and can be regarded as reliable, effective, and easy to use.

Keywords: 1470nm, diode laser, pilonidal sinus, pilonidotomy, pilonidoplasty.

1. Introduction

The term pilonidal sinus refers to a condition that exists in the natal cleft above the coccyx. This may consist of one or more normally uninfected midline holes that connect with a fibrous tract, which is lined by granulation tissue and may contain loosely lying hair within the tract [1]. The Caucasian population has the highest incidence rate; in Europe and the United States, the incidence is 26/100,000, and the majority of patients are between the ages of 15 and 30 [2]. The sinus tract has squamous epithelium lining its smooth interior. The sinus tract eventually ends up in a subcutaneous chamber filled with granulation tissue and hair nests. In actuality, the sinus tract apertures represent the deep cavity's expansion. Because of this, an abscess development might appear lateral to the midline or in the midline itself [3]. The incidence rate among males is 2.2-4 times that of females [4-5]. The PNS can be presented as asymptomatic, but may present as a cyst or a sinus, and can be presented as an abscess. The hair may be projecting from the sinus orifice [6]. The specific etiology of PNS is unclear. It is assumed to be caused by the wrong orientation of developing hair, which leads to a hair follicle rupture [7].

Treatment options:

- In the past decades, several techniques have been offered to treat pilonidal sinus disease, but no gold standard treatment has been established, particularly for complicated patients [8].
- Recurrence differs depending on the primary closure procedure used. A recent meta-analysis showed that regardless of technique, individuals with primary midline closure had a higher recurrence rate (67%) than those with off-midline closure; the least common recurrence rates at any follow-up interval were Bascom cleft-lift and Karydakis flap [9].
- Wilhelm was the first to suggest laser ablation utilizing 1470 nm radial emitting diode laser fiber, which was initially used to treat anal fistulas with an 82% cure rate. The fistula closes as the tissue within gasifies and contracts due to the energy emitted by the circumferential laser at the end of fiber optic [10]. When Dessily et al. employed this method for the first time in 2016 to treat pilonidal sinuses, the results were an 87.5% success rate, a 2.9% recurrence rate, minimal postoperative pain, and small incisions [11].
- A simple operation with little tissue damage and a low chance of recurrence would be ideal. It should also only necessitate a brief hospital stay and a speedy return to normal activities. As a result, there is increasing evidence from small patient series that using a diode laser to treat pilonidal sinuses may be a useful option since it is a minimally invasive operation that does little harm to nearby tissues and has success rates of 80–90% [3,12].
- According to reports, the optimal treatment method should include low rates of wound dehiscence and infection, low rates of recurrence, good cosmetic outcomes, and a brief recovery period [13].

1.1 Study objectives

To assess the safety and the effectiveness of the use of 1470nm-diode laser for treatment of pilonidal sinus by internal destruction using radial optic fiber and assessment of any possible complications and patients' satisfaction.

2. Patients, material & procedure

2.1 Patients

This is a prospective study with 50 patients; three are female and the others (47) are male. They were operated on, in the private clinic as local anesthesia is used for operation and no need for hospitalization, using a 1470 nm diode laser for sinus laser treatment (SiLaT) between February 2023 and February 2024,

due to conditions of pilonidal sinus disease. Patients' ages ranged from 15 to 42 years, with a mean age of 26.5±6.5 years, following a thorough description of the procedure and a discussion of its potential benefits and complications. Preoperative evaluation: A case sheet was designed exclusively for the purpose of reviewing each patient's healthcare details and records. Age, symptoms (history of pus collection, pus discharge, bloody discharge, nodule, itching, pain), any prior surgeries (if any), and past medical history are all considered as part of the patient's history. A verbal agreement was obtained, a clinical evaluation of the patients, and hematological investigations for virological infection. Clinical examination of sinus site and fix its Tezel's classification. Tezel's classification: there are five types according to this classification as shown in Table 1.

Table 1. Tezel's classification types [14]

Type of pilonidal sinus	Presentation
Type I	Asymptomatic pit(s) with no history of drainage or abscess
Type II	Acute pilonidal abscess
Type III	Pit(s) in the navicular area with an abscess or prior drainage history
Type IV	A severe condition in which one or more sinus pit(s) are situated outside the navicular area
Type V	History of recurrent pilonidal sinus

Navicular area: lies between the natal cleft's lateral edges and their posterior extensions, the posterior borders of the anal triangle make the posterior borders of the navicular area as shown in figure 2-1[14].

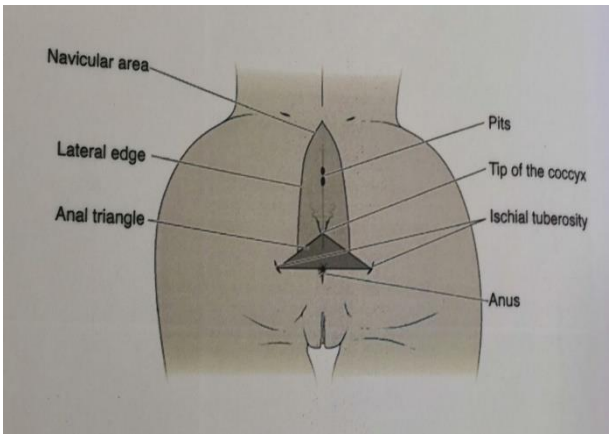

Fig. 1: Navicular area [14].

2.1.1 Inclusion criteria

This study includes all patients who have pilonidal sinus disease regardless the Tezel's classification of the case.

2.1.2 Exclusion criteria

We excluded from our study patients with severe co-morbid illnesses. (None was excluded).

2.2 The Material

The medical laser system and accessories:

2.2.1. Laser system Specification

The laser system employed in this study was a class IV Medical laser system, a 1470nm diode laser, which emits laser at a wavelength in the near-infrared spectrum. The surgeon configured the laser aperture power output to vary between 0.5 and 15 Watts. Wuhan Dimed Laser Technology Co., Ltd. is the Chinese manufacturer of the diode laser (CHEYLAS-45JN) that is utilized. As shown in Figure 2.

Fig.2: laser device used.

2.2.2 Equipment

The following items are arranged on a tray with drapes Figure 3: hypo-allergic surgical tape (4 inches), medical steel kidney dish, two syringes of 10 milliliters, Gauze swabs, Lidocaine solution 1% (50 milliliters), 100 milliliter of 0.9% isotonic normal saline, hydrogen peroxide solution 20%, methylene blue solution (optional), gloves, surgical scalpel size 22, large and small malleable steel probes, curette size 3 and 4mm, brushes, skin biopsy punch tool size 2-4mm, blunt steel cannula, 10 ml sodium bicarbonate solution 10%.

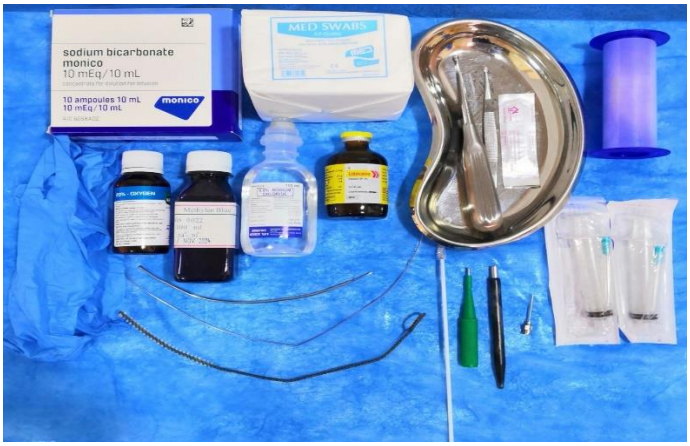

Fig. 3: Equipment.

Also, Doctor Google and completely shielded patient goggles are used during laser irradiation as shown in Figures (4-5).

Fig. 4: Doctor Google.

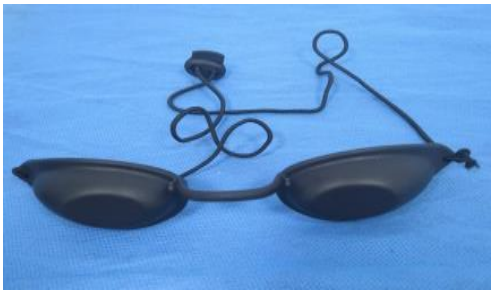

Fig.5: Completely shielded patient goggles.

2.3 Procedure

With the patient in the prone position and stretching of the natal cleft by using surgical tape (4 inches) on each gluteal area to the side of the surgical couch, an antiseptic 10% povidone-iodine solution was applied, No sedation or IV N.S.A.I.D. was used; instead, one ml of $NaHCO_3$ is added to the 100ml of normal saline (0.9%), a five ml of this solution is used to dilute 5 ml of lidocaine solution 1% without epinephrine (up to total 10 ml) was injected into the skin and subcutaneous tissue around the sinus in the superficial and deep plane around the sinus, using 25-40 ml of diluted lidocaine to anesthetize the area around the sinus. Following the administration of local anesthesia, if the sinus has a pit(s) try to advance the probe in the sinus to identify the sinus space in the subcutaneous area; if not, use the skin biopsy punch tool to create one or two to access to the sinus (at the two ends of the sinus according to its size). Next, using a suitable curette handle curettage the inside of the sinus and get rid of all possible hair, granulation tissue, and debris from inside the sinus, then use the brush the same way as a curette to get rid of all remaining hair and debris, then using one ml of H_2O_2 20% diluted by four ml of normal saline (0.9%), to reach 4% concentration that is needed, and injected inside the sinus using the blunt steel cannula; after that wash the sinus with normal saline (0.9%). Using a radial emitting laser fiber optic of 600μm diameter with a SMA905 connector, the laser energy is delivered at 11W power in continuous wave (CW) mode, entering from one hole to the other and vice versa. The speed of pulling the fiber optic is kept as steady as possible at a rate of 1mm/sec, so each 1mm of the sinus is exposed to 11W for 1sec= 11 joules. The total amount of energy is 11J/mm. Wet gauze with 0.9% normal saline was applied to a sinus site after each full irradiation of the sinus. The skin opening is kept open if it is 2-3 mm in diameter, if larger approximate the edges of the opening using nylon suture 2/0 in mattress pattern to facilitate its closure, and kept for 10-14 days. Then at the end of the operation, use of antiseptic to sterilize the operation site and then dressing. Procedure time is 15-32 minutes with a mean of operation time 23.9±3.9 minutes (mean±S.D.). Figures (6-9) show some cases operated under local anesthesia in the clinic

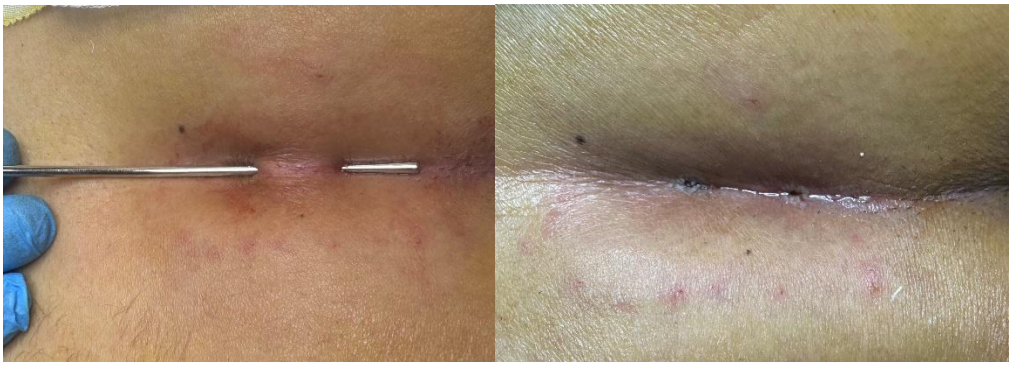

Fig. 6: left: probing of sinus, right: after completion of the procedure. Tezel's type I.

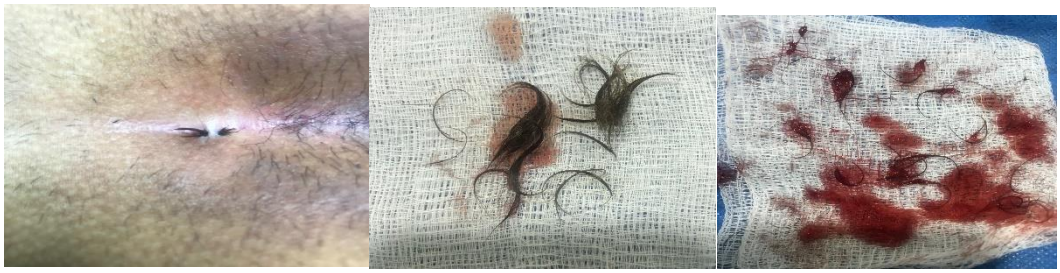

Fig.7: left: hair exit from the sinus, middle: hair extracted prior to cleansing, right: hair extracted after cleansing the sinus. Tezel's type I.

Fig.8: left: PNS with granulation tissue at the upper pit, right: after laser irradiation, excision of granulation tissue and closure of the wound. Tezel's type III.

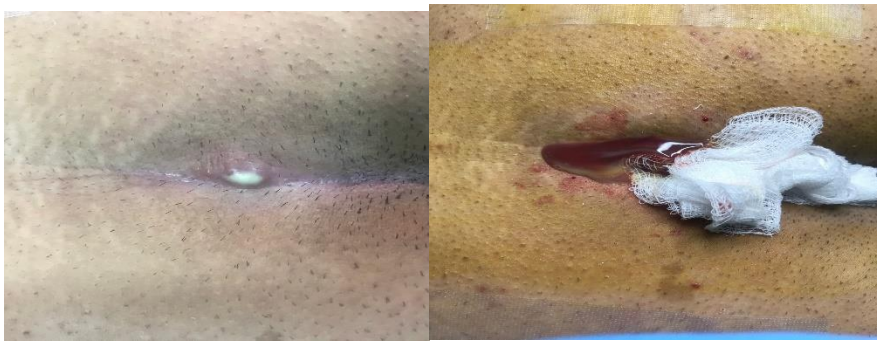

Fig.9: left: PNS abscess, left: drainage of pus prior to complete the steps of procedure. Tezel's type II.

2.4 post-operative treatments

For each patient postoperative follow-up date is fixed after 10 days, giving him a prescription of antibiotics and analgesia as follows:

1- Injectable antibiotic for 3-5 days followed by oral one for another 5 days.(ceftriaxone vial 1gm 1*1 / cefixime tab. 400mg 1*1)
2- Single injectable analgesic on the first day (diclofenac sodium amp. 75mg on need), followed by oral analgesia (diclofenac potassium 50mg 1*2 after meal) for 3-5 days.
3- Use of fucidin cream local antibiotic cream (fusidic acid 20mg 2% w/w) for the hole(s) of the sinus and instruction of dressing.

3. Result and discussion

3.1 Results

The results of this study are based on the clinical evaluation of every patient through examination, complaints made by the patient during the procedure, post-operative and clinical follow-up. Under local anesthetic, the surgery was tolerated by all of the patients. Fifty patients, three are female and 47 are male. According to the sex of the patients and their Tezel's classification they were divided into five types: type I ten cases all are male, type II seven case (five are male and two are female), type III 21 cases (20 cases are male and one case is female), type IV five cases all are male, type V seven cases all are male. As shown in Table 2.

Table 2. Patients' sex and Tezel's classification of 50 cases.

Tezel's classification	No. of male Patients	Percentage (%)	No. of female Patients	Percentage (%)	Grand total	Grand percent
Type I	10	20%	0	0	10	20%
Type II	5	10%	2	4%	7	14%
Type III	20	40%	1	2%	21	42%
Type IV	5	10%	0	0	5	10%
Type V	7	14%	0	0	7	14%
Total	47	94%	3	6%	50	100%

First post-operative visit after 7-10 days to check for surgical site infection and removal of suture if used (or maybe post ponded to the next visit), second visit after three weeks to ensure closure of PNS pit(s), all cases tolerate the pain of anesthetic drugs infiltration and the operation itself the pain is simple, all cases have no major complication in early postoperative period (until the closure of PNS pit(s)), closure of sinus pit(s) have occurred between 9-22 days, mean days of closure 15.04±2.8 days. None of the patients experienced any serious intraoperative or postoperative complications; therefore there was no need for hospitalization. All patients have been followed for four months for any recurrence, and only one patient suffered of PNS abscess after primary healing that occurred three months and 17 days, who have been re-operated again as the case of Tezel's classification V, (was primarily type I); yet he was not re-encountered as a new case.

3.2 Post-operative complications / follow-up

Patients were followed on the 7th or 10th day and after 3 weeks post-operatively.

A. Pain was classified as mild, moderate, and severe. As the patient's description, to simplify the pain assessment by patients. As shown by Table (3-2), no patients were suffering from severe pain (0%); 10 patients (20%) (7 with Tezel's type II, 3 with Tezel's type IV) had moderate pain, most patients with Tezel's classification type II (acute PNS abscess) and type IV (PNS outside the navicular area or with granulation tissue that is resected and closure of its defect with suture) were suffering of moderate pain, the first postoperative day's pain necessitated the use of an injectable NSAID analgesic (olfen ampoule) to manage the pain, and then the pain decreased in the following days, the second and third day the pain is mild, later on the pain is mild and occasional (the pain is not always present), or disappeared. The other 37 patients (74%) have mild pain from the start; 29 patients (58%) for two days and 8 patients (16%) for only one day. The last three patients (6%) have no pain on the analgesic regimen mentioned (post-operative treatments), those with Tezel's type I.

B. Bleeding and discharge: As shown by Table (3-2), no patient experienced significant primary bleeding (spontaneous bleeding after surgery) or reactionary bleeding (after six hours). Eight patients 16% experienced a serous discharge; five patients with Tezel's type II (10%), and three patients with Tezel's type IV 6% Postoperative serous discharge is identified by simple dressing soiling that lasts for one to two days until it ceases on its own without medical intervention.

C. Infection: as shown by Table 3, no patient (zero%) developed an infection during the early postoperative period (until the closure of the sinus pit(s)), and the postoperative period passed unnoticeably regarding the infection of the surgical.

D. *Return to work*: 39 patients (78%) return to work on the next day post-operatively, 8 patients (16%) after 1 day of sick leave, the last 3 patients (6%) after 2 days of sick leave (all with Tezel's type II).as shown in table (3-2).

E. *Recurrence*: As seen in Table (3-2), One patient (2%) suffered of P.N.S. abscess after complete primary healing and closure of sinus pits, after three months and 17 days; that is operated on again as a case of SiLaT without re-encountered as a new case, as it is operated no loose hair is found in the pus, so it may be caused by sebaceous cyst infection, sweat gland infection, or even soft tissue cellulitis of the area. After the re-operation, the case is followed up again for new four months. No new recurrence of this specific case.

F. *Satisfaction*: all patients (100%) were satisfied with the procedural results and postoperative conditions, even those who have been suffering from pain and serous secretion as they have lasted for a maximum 2 days, later on, the general condition stabilized as shown in Table 3. Yet they are generally completely satisfied with the result as no active bleeding, no severe pain, and the operation has been finished under local anesthesia with minimal pain, and no major wound or wick drain left.

3.3. Discussion

This prospective study uses a diode laser operating at 1470 nm to treat Pilonidal Sinus Disease (PSD) by minimally invasive laser-induced interstitial thermotherapy by internal destruction of the granulation tissue of the sinus tract using radial emitting laser fiber that irradiates 360° (circumferentially) to enhance sinus healing. The following characteristics were to be prospectively assessed in this study: pain, bleeding, surgical site infection, return to work, overall patient satisfaction, and recurrence. Some cases in this study had post-procedural pain, a few cases had serous discharge, and only one case had recurrence. A 2014 meta-analysis argued that deep excision with secondary healing should be abandoned [15].

Table 3. The results of the patients

Post-operative complications / follow up	No. of Patients	Percentage (%)	Tezel's classification	No. of days
No pain	3	(6%)	I	
Mild	37	(74%)	Different types	
Moderate	10	(20%)	7 of type II 3 of type IV /	
Sever	0	(0%)		/
Bleeding & discharge				
Primary and secondary bleeding	0	(0%)	/	/
Serous discharge	8	(16%)	5 of type II 3 of type IV	Max. 3 days
Infection	0	(0%)	/	/
Return to work				
	39	(78%)	Different types	Next day
	8	(16%)	Different types	After one day sick leave
	3	(6%)	II	After two days sick leave
Satisfaction	50	100%	Different types	/
Recurrence	1	(2%)	Primarily type I	After 3 months and 17 days

Regarding postoperative pain, mild pain had been occurred in (74%) of cases, moderate pain in (20%) of cases, and no pain in (6%) of cases. This is in agreement with three studies that showed significantly lower pain scores after a conservative approach (like sinusectomy or sinusotomy) as compared to en bloc excision.[15] Janjua et al. reported that in the first 24 hours following surgery, the Limberg flap group's mean postoperative pain levels (2.63±0.76) were considerably lower than those of the primary excision group (5.63 ± 0.72) [16]. Likewise, Naeem G. et al. reported that patients in the Limberg group had lower pain on the early postoperative period, higher levels of satisfaction, and starting routine activity compared with primary midline closure [17].

Lim J and Shabbir J found that two methods of limited excision: de-roofing and curettage of the pilonidal sinuses (instead of excision), and that a relatively recent surgery called sinusectomy which entails the removal of the PSD sinuses alone. Researchers found that limited excision causes less pain and allows for an earlier return to work than extensive excision [18]. This is agreed with Girolamo Geraci et al., On the first day, the mean score for postoperative pain was 3.2 ± 1.5; on the third day, it was 2.5 ± 0.8; and on the seventh day, it was 1.2 ± 0.8. Only 30% of patients needed painkillers [19]. So as the procedure is minimally invasive, it is associated with less pain.

Regarding bleeding and discharge in this study, it is classified as:

- Primary bleeding in the early postoperative period (first six hours).
- Secondary bleeding (after six hours).
- Serous discharge post-operatively.

No patient experienced significant primary bleeding (spontaneous bleeding after surgery) or reactionary bleeding (after six hours). Eight patients 16% experienced a serous discharge; five patients with Tezel's type II (10%), and three patients with Tezel's type IV 6% Postoperative serous discharge is identified by simple dressing soiling that lasts for one to two days until it ceases on its own without medical intervention.

In Tavangari et al., we used electrosurgery to unroof the sinus. The only tissue that was removed was nonviable tissue, which included the cavity of the chronic abscess, if any. The base of the sinus was fully cauterized after all granulation tissue, hair, and debris were extracted using a curette. On the seventh postoperative day following surgery, one patient (1.1%) out of 94 was assessed in the emergency room due to wound bleeding, which stopped once a pressure dressing was applied. The patient showed no signs of hemodynamic instability, and a follow-up test revealed normal hemoglobin levels [20].

In Gaurav Wadhawan et al., Fluid collection occurs in 20% of the excision and closure group and 13% of the Limberg flap group; while Hematoma occurs in 20.1% of the excision and closure group and 11.3% of the Limberg flap group [21]. Bugalia RL stated: that hematoma occurred in 4% of cases as follows (Marsupialization 1%, Unroofing 0%, Primary closure 1%, Limberg flap transposition 2%) [22]. In this study, this specific issue is better in SiLaT than in other operations.

Regarding infection and abscess formation, no patient (zero %) developed an infection during the early postoperative period (until the closure of the sinus pit(s)), and the postoperative period passed unnoticeably regarding the infection of the surgical site. Bugalia RL stated: that the most commonly encountered postoperative complication is infection which occurred in 10% of cases as follows (Marsupialization 3%, Unroofing 2%, Primary closure 2%, Limberg flap transposition 3%) [22]. Dessily et al, treated 40 patients with a pilonidal sinus using a radial emitting diode laser probe in order to destroy the sinus epithelium by the delivered energy and achieve obliteration of the tract. The success rate was 87.5%, the recurrence rate 2.9%, and the complication rate 10% (two cases of hematoma and two abscesses "5 %"), all medically treated [7]. The Karydakis flap was associated with a higher wound infection rate than the Limberg flap group in a randomized trial of 100 patients (13/50 vs 4/50 patients) respectively [23].

In Soliman et al., Wound infection was 1 (3.3%) in the Limberg flap group and 6 (20.0%) in the excision and primary closure group [24].

In this study, the primary infection is null, which is better than other surgical procedures, yet we have had 1 case (2%) of recurrence that falls within the accepted ratio.

Return to work: 39 patients (78%) return to work on the next day post-operatively, 8 patients (16%) after 1 day of sick leave, and the last 3 patients (6%) after 2 days of sick leave (all with Tezel's type II).

In Vartanian et al., return to work in excision and midline closure after 10.4–17.5 days, while in excision and off-midline closure return to work after 7–9.3 days and in sinusectomy return to work after 2–16 days [25]. In contrast, in Naeem G. et al., 23 patients (76.6%) start routine activity in the third week in the Limberg flap group, and 18 patients (60%) started routine activity in the same week in the excision and primary midline closure group [17]. As the operation is as minimally invasive as possible, it is faster to return to work.

Recurrence: During the four-month follow-up phase, One patient (2%) suffered of P.N.S. abscess after complete primary healing and closure of sinus pits, after three months and 17 days; that is operated again

as a case of SiLaT without reencountered as a new case, as it is operated no loose hair is found in the pus, so it may be caused by sebaceous cyst infection, sweat gland infection, or even soft tissue cellulitis of the area. After the re-operation, the case is re-followed for new four months. No new recurrence of this specific case. In Soliman et al., Recurrence occurs in 0 cases (0.0%) in the Limberg flap group, while it occurs in 4 cases (13.3%) in the excision and primary closure group, (Follow up period 1 year) [24]. In contrast, in Naeem G. et al., recurrence occurs in 13 cases (43.3%) of the Limberg flap group, primary cases in this group(56.6%); while it occurs in 2 cases (6.6%) of excision and primary midline closure group, primary cases in this group (93.3%), (Follow up period few months in both groups) [17].
Twelve to thirty-six months following our surgical technique, only four recurrences (8.32%) were found; one patient had previously had one operation, two to three surgeries, and lastly one to four surgeries. A second treatment that resulted in permanent healing involved subcutaneous tract excision and pseudocystic cavity unroofing [19].
In Vartanian et al., the lowest rate of recurrence is found in the excision and off-midline closure group (0-6%) in comparison to the sinusectomy group (3-25%) and excision and midline closure group (4-45%) [25].
The operation is as minimally invasive as possible, as it has a better recurrence rate because no need for excessive dissection of normal healthy tissue.

In terms of satisfaction: all patients (100%) were satisfied with the procedural results and postoperative conditions, even those who have been suffering of pain and serous secretion as they have been lasted for a maximum 2 days, later on the general condition stabilized as shown in table (3-2). Yet they are generally completely satisfied with the result as no active bleeding, no severe pain, and the operation has been finished under local anesthesia with minimal pain, and no major wound or wick drain left. In Naeem G. et al., patient satisfaction is assigned that 26 patients (86.6%) were satisfied in the Limberg flap group, while 22 patients (73.3%) were satisfied in primary midline closure [17]. In Girolamo Geraci et al., the questionnaire's results, which assessed patients' satisfaction and pleasure, revealed that 46/48 (96%) of the patients were completely satisfied, and every patient suggested the operation to others (unroofing of pseudocystic cavity)[19].
When the patients were asked if they were satisfied with the outcome of the procedure, 94% of patients in Group I (minimally invasive surgery) said they were, while 5.7% of patients said they were not. In Group II (Karydakis procedure), 31.9% of patients were not satisfied with the surgical procedure's outcome, whereas 68.1% of patients were [26]. From all these studies the satisfaction and recommendation of operation is associated with minimally invasive surgery and primary closure of the wound, in our study the procedure is minimally invasive and no major wound that necessitates primary closure, so associated with high rates of satisfaction.

3.4 Limitations of the study

In this study there are some limitations:

1. The sample size is small.
2. The follow-up period (four months) is short.
3. No specific surgical management group is involved to be compared with.
4. The procedure is the blind control of the tracts that may still contain foreign bodies or untreated epithelium. For this reason, in order to reduce the risk of recurrence, careful cleaning of the cavity is deemed mandatory prior to laser treatment.

4. Conclusions

Diode (1470nm) laser sinus laser therapy (SiLaT) is a safe and effective procedure associated with a low incidence of post-operative complications, despite this study's limitations, which primarily focused on the feasibility, safety, and short-term outcome of the procedure. However, it does require the availability of

instruments (Diode laser system) and a skilled, well-trained surgeon. For the treatment of PNS, these are superior tools to traditional surgical methods.

The benefits of using a laser include its ability to stop bleeding, eradication of the granulation tissue from within the sinus that prevents its healing, the tolerance of laser by patients under local anesthesia, and its decreased risk of complications during or even after the operation, Post-operative pain is minimal, Serous discharge is minimal, Return to work is faster than traditional surgical procedures with very short sick leave (if any), Satisfaction rate is high in SiLaT in comparison to traditional surgical procedures, Recurrence rate is low in this study and Post-operative pain and serous discharge are mostly associated with Tezel's classification II, IV.

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علاج الناسور العصعصي باستخدام ليزر الصمام الثنائي 1470 نانومتر كتقنية طفيفة التوغل مقارنة بالطرق الجراحية

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الخلاصة

الخلفية: مصطلح الناسور العصعصي يشير إلى حالة موجودة في منطقة الشق الولادي فوق العصعص. يحتوي الناسور العصعصي (الشعري) عادة على الشعر والأوساخ والأنسجة الحبيبية غير الصحية. يسبب الناسور العصعصي معاناة شديدة ، وفي الغالب تحدث عدوى واخماج فيه، مما يؤدي إلى تسرب القيح ذو رائحة كريهة. معدل الإصابة بين الذكور2.2 - 4 مرات أعلى منها بين الإناث. تتميز المرحلة الحادة بوجود خراج عجزي، في حين خلال المرحلة المزمنة يمكن ملاحظة تكوين الكيس أو إفرازات الناسور العصعصي المستمرة. العملية المثالية يجب ان تكون بسيطًة، مع الحد الأدنى من فقدان الأنسجة ومعدل رجوع للحالة منخفض, علاوة على ذلك، يجب أن تتطلب العملية إقامة قصيرة في المستشفى وعودة سريعة إلى الأنشطة اليومية.

في هذه الدراسة تم استخدام ليزر الصمام الثنائي 1470 نانومتر لعلاج 50 حالة من الناسور العصعصي كعلاج بالليزر SiLaT (بغض النظر عن تصنيف تيزيل للحالات المعالجة) كتقنية طفيفة التوغل ليتم استخدامه ببضع الناسور العصعصي ورأبه دون جرح او استئصال الانسجة السليمة لمنطقة الناسور.

الهدف من الدراسة: مشاركة خبرة فعالية وسلامة استخدام ليزر الصمام الثنائي 1470 نانومتر لعلاج حالات الناسور العصعصي (الشعري) عن طريق تدميرانسجة الناسور داخليا باستخدام الليف البصري ذو الأنبعاث الشعاعي ومقارنة وتقييم أي مضاعفات محتملة ورضا المرضى مع الطرق الجراحية الأخرى.

المرضى والمواد والطريقة: هذه دراسة مستقبلية شملت 50 مريضًا (47 مريضًا ذكرًا و3 مريضات إناث)؛ كان جميع المرضى من العيادة الخاصة وخضعوا لعملية جراحية باستخدام ليزر الصمام الثنائي 1470 نانومتر (علاج الناسور العصعصي بالليزر) SiLaT في الفترة ما بين شباط 2023 وشباط 2024، وقد تم استطلاع رأي جميع المرضى وأفادوا بوجود واحد أو أكثر من المضاعفات المدرجة في ورقة الاستبيان (إن وجدت) . تم استخدام المخدر الموضعي أثناء العملية.

النتائج: تم اجراء العملية لجميع المرضى تحت التخدير الموضعي. حسب الجنس وتصنيف تيزل للناسور العصعصي ينقسم المرضى إلى خمسة أنواع، النوع الأول عشر حالات جميعهم ذكور، النوع الثاني سبع حالات (خمسة ذكور واثنتان إناث)، النوع الثالث 21 حالة (20 حالة ذكور وحالة واحدة أنثى)، النوع الرابع خمس حالات جميعهم ذكور، النوع الخامس سبع حالات جميعهم ذكور. جميع الحالات ليس لها مضاعفات كبيرة في الفترة المبكرة في فترة ما بعد الجراحة (حتى إغلاق الفتحات للناسور العصعصي)، وقد حدث التئام للفتحات بين 9-22 يومًا، متوسط أيام الألتئام 15.04 ± 2.8 يومًا. (74٪) من الحالات عانت من ألم خفيف، (6٪) من الحالات لم تعاني من اي ألم بأستخدام المسكنات، (20٪) من الحالات عانت من ألم متوسط, لم يعاني أي مريض من نزيف أولي (نزيف بعد العملية أو نزيف تفاعلي)، ثمانية مرضى 16٪ عانوا إفرازات مصلية استمرت لمدة يوم أو يومين حتى توقفت دون تدخل طبي. لم يتعرض أي مريض للعدوى. عاد 39 مريضًا (78%) إلى العمل في اليوم التالي بعد العملية الجراحية، و8 مرضى (16%) بعد إجازة مرضية ليوم واحد، وآخر 3 مرضى (6%) بعد إجازة مرضية لمدة يومين, أصيب مريض واحد (2%) من خراج الناسور العصعصي بعد الشفاء الأولي الكامل وإغلاق فتحات الناسور العصعصي بعد ثلاثة أشهر و17 يومًا؛ والتي تم اجراء العملية مرة أخرى كحالة علاج ناسور عصعصي بالليزر دون إعادة احتسابها كحالة جديدة ضمن حساب حالات العمليات. كان جميع المرضى بصورة عامة راضين عن نتائج العملية على الرغم من المضاعفات الطفيفة التي حدثت بعد العملية.

الاستنتاج: العلاج بليزر الصمام الثنائي 1470 نانومتر للناسور العصعصي هو إجراء آمن وفعال وذو معدل منخفض لحدوث المضاعفات ما بعد العملية، وهو بديل مقبول ورائع لتقنيات العلاج الجراحي التقليدية كما ويمكن اعتباره عمليًا وفعالًا. وسهل الاستخدام.