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Efficacy of laser obliteration with limited excision of pilonidal sinus

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Abstract

Objective: This study was performed to compare the effectiveness of laser obliteration with limited excision (LOLE) versus wide excision (WE) of the pilonidal sinus.

Methods: A prospective, cross-sectional observational study of 152 patients with chronic pilonidal sinus disease was performed from September 2019 to September 2022. Of the 152 patients, 76 underwent LOLE and 76 underwent WE. The main evaluation criteria were complete wound healing, recurrence, and the complication rate.

Results: Complete healing was achieved in 74 (97.4%) patients in the LOLE group and 76 (100%) patients in the WE group. The duration of wound healing was significantly shorter in the LOLE group than in the WE group (6.5 ± 2.4 vs. 14.5 ± 2.6 weeks, respectively). Recurrence developed in six (7.9%) patients in the LOLE group and one (1.3%) patient in the WE group, with no significant difference.

Conclusion: According to our study and the data available in the literature, laser surgery should be included in the guidelines for the treatment and management of pilonidal disease.

Keywords

Chronic pilonidal sinus disease, laser obliteration, limited excision, open surgery, wound healing, recurrence, complication

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Introduction

There is a strong worldwide trend toward the introduction of less invasive operations. Pit picking, which is a safe minimally invasive procedure, has long been used to treat pilonidal sinus disease. However, the recurrence rate may reach 13.2% after 5 years and 16.2% after 10 years.[1] Recurrence is likely due to oversight of the lateral and deep canals during the excision process. Trephines, which are commonly used for excision, only cut tissue in a straight line. In addition, when conducting limited excision with diathermy (such as sinusectomy) and removing a large amount of deep tissue, a residual cavity is formed. The small hole that is left on the surface does not match the size of the cavity, resulting in recurrence or complications. Consequently, the recurrence rate after limited sinus excision is high, reaching 16.2% (95% CI, 14.3%–18.2%) at 60 months and 34.0% (95% CI, 26.3%–41.6%) at 120 months.[1–3] A diode laser device has been used for the treatment of pilonidal disease since 2013, enabling the deep and lateral sinus canals to be obliterated without damaging the skin on the surface. Dessily et al.[4,5] was one of the first research groups to evaluate this treatment method. They reported that when the radially emitting diode laser probe (FiLaC^{TM}; Biolitec AG, Jena, Germany) of 1470-nm wavelength is removed from the sinus tract in a reverse direction at a speed of 1 mm/s, the sinus shrinks; the tract is then either obliterated or the procedure is repeated until it is completely closed. However, the action of laser energy on the surrounding tissue is soon followed by an inflammatory reaction and exudation. As a result, 1 to 3 weeks after the operation, a seroma or abscess develops secondary to premature closure of the external hole. The authors found that at the 5-year follow-up, complications had occurred in 10.0% of patients, treatment failure in 12.5%, and recurrence in 14.9%.[4,5] We believe that if we perform limited excision of the shrunken sinus after laser obliteration, the rates of treatment failure, complications, and recurrence will decrease, and this will further prevent prolongation of the duration of rehabilitation and hospitalization.

The present study was performed to evaluate the effectiveness of a combined minimally invasive method for the treatment of pilonidal disease, namely sinus laser obliteration with limited excision (LOLE), and compare it with the most commonly used traditional method, namely wide excision (WE) with the wound left open. A comparative analysis of these methods will allow us to develop a treatment algorithm tailored to individual patients and optimize the management of pilonidal disease.

Methods

This study is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.[6]

Patient selection

A prospective, cross-sectional observational study was performed from September 2019 to September 2022 at Todua Clinic, Tbilisi State Medical University. The sample size was calculated according to the reported 5% prevalence of pilonidal disease (based on data from the Georgian National Center for Disease Control).[7] In total, 152 consecutively referred patients with pilonidal disease underwent surgical treatment after providing written informed consent. The patients were allocated into two study groups according to the principle of consistency of applications, although the patient's choice between traditional and minimally invasive methods was taken into account.

If the patient did not specifically request any method, we assigned the patient to a group to ensure that both groups contained an equal number of patients. In total, 35 patients requested laser surgery and 8 patients requested traditional surgery. The inclusion criterion was the presence of chronic pilonidal disease. The exclusion criteria were an age of <18 years and the presence of a pilonidal abscess. We collected each patient's anamnesis and performed visual and physical examinations. According to the findings, we determined the severity and form of the disease as follows.

- Simple: single hole directly on midline of intergluteal groove
- Moderate: multiple holes directly on midline of intergluteal groove
- Severe: lateral holes
- Recurrent: recurrence after surgery performed elsewhere or in our clinic before study commencement

All procedures performed in the study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study protocol and a draft consent agreement for participation in the study were approved by the Ethics Committee of the Institutional Review Board of Tbilisi State Medical University (#2-2019/86; February 18, 2019). Written informed consent was obtained from all individual participants included in the study. We de-identified the patients' details so that they may not be identified in any way. The authors affirm that all patients provided written informed consent for publication of the images in Figures 1, 2, and 3.

Study groups

The LOLE group comprised 76 patients who underwent limited sinus excision after laser obliteration, and the WE group comprised 76 patients who underwent WE with the wound left open. No significant differences in age, sex, or disease severity were found between the two groups (Table 1).

Surgical methods

Laser surgery was performed on an outpatient basis. The patients were placed in the prone position and received local infiltration anesthesia with a solution of lidocaine 2% + epinephrine 0.005% and a solution of procaine hydrochloride 0.5% + epinephrine 0.005%. We cleaned out the sinus using a mosquito clamp and Folkman spoon. We then applied a 1470-nm-wavelength, 12-W radially emitting diode flexible laser probe with a diameter of 1.83 mm (FiLaC^{TM}; Biolitec AG). This probe emitted laser energy in all directions, covering 360 degrees and targeting the walls of the sinus and its canals. The average energy delivered was 100 to 120 J/cm^2, which caused the sinus to shrink and its tracts to be obliterated. During this process, we precisely defined the size and shape of the sinus by means of the lamp on the laser fiber. Next, using an ultrahigh-frequency radio wave device (Dr Oppel ST-501, electrodes

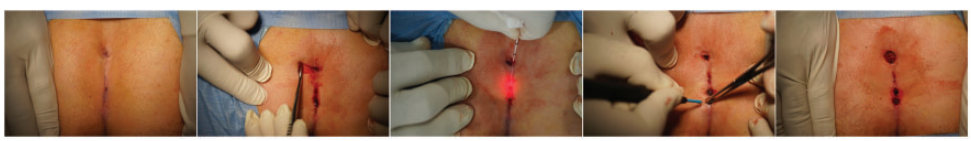

Figure 1. Moderate pilonidal disease with a small sinus.

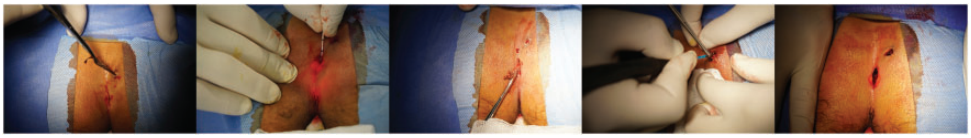

Figure 2. Severe pilonidal disease with a large sinus.

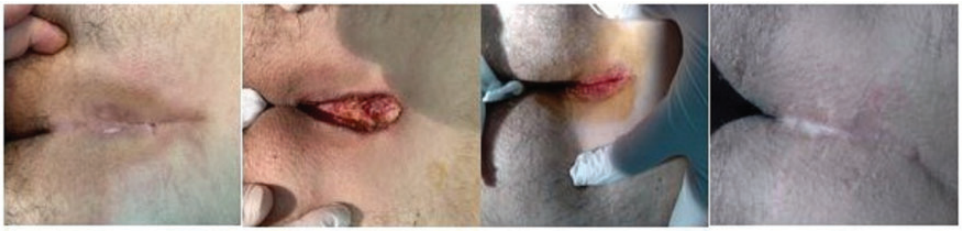

Figure 3. Wide excision with open wound healing.

Table 1. Characterization of study groups

Parameters	LOLE (n = 76)	WE (n = 76)	χ^2, P
Sex			
Female	8	7	$\chi^2 = 0.07$
Male	68	69	P = 0.79 (NS)
Age, years	18–63	18–61	P = 0.14 (NS)
	28.6 ± 8.2	31.0 ± 11.2	
Disease severity			
Simple	23 (30.3)	21 (27.6)	$\chi^2 = 1.29$
Moderate	17 (22.4)	23 (30.3)	P = 0.73 (NS)
Severe	18 (23.7)	17 (22.4)	
Recurrent	18 (23.7)	15 (19.7)	

Data are presented as n, range, mean ± standard deviation, or n (%).
LOLE, laser obliteration with limited excision; WE, wide excision; NS, not significant.

J03 and E04; Sometech, Seoul, South Korea), we performed limited removal of the sinus, the diameter and depth of which were variable depending on the size and shape of the sinus. We then placed an Alice clamp on the external orifices and excised the fistula tracts according to the directions in which they coursed. Excision was performed using a thin cutting electrode (J03), and hemostasis was achieved using a coagulation electrode (E04). If the external orifices were too close to each other, they were united during the excision process (Figures 1 and 2). We performed curettage again with the Folkman spoon, rinsed the wound with hydrogen peroxide and povidone iodine solution, placed gauze with povidone iodine ointment superficially over the surgical site, and applied an aseptic bandage.

Traditional surgery was performed on an inpatient basis. The patients were placed in the prone position and received spinal anesthesia. After treatment of the surgical field with betadine solution, two semiarch-shaped or ellipsoid incisions were made.

Table 2. Indicators for the evaluation of surgical methods in the study groups

Parameters	LOLE (n = 76)	WE (n = 76)	χ^2 or t test, P
Duration of surgery, minutes	21.0 ± 5.5	15.7 ± 3.6	t test = 7.1 P < 0.001
Hospital delay, hours	2.6 ± 0.7	23.9 ± 0.1	t test = 254.3 P < 0.001
Return to work, days	3.6 ± 2.4	8.8 ± 6.9	t test = 6.2 P < 0.001
Complication rate	3 (3.9%)	1 (1.3%)	$\chi^2 = 1.02$ P = 0.31 (NS)*
Healing period, weeks	6.5 ± 2.4	14.5 ± 2.6	t test = 19.6 P < 0.001
Success rate	74 (97.4)	76 (100)	
Recurrence rate*	6 (7.9)	1 (1.3)	$\chi^2 = 3.72$ p = 0.054 (NS)
Level of satisfaction, score	79.6 ± 4.7	74.4 ± 8.2	t test = 6.2 P < 0.001
Degree of satisfaction			
Low	2 (2.6)	12 (15.8)	$\chi^2 = 17.22$ P < 0.001
Moderate	45 (59.2)	54 (71.1)	
High	29 (38.2)	10 (13.2)	
Degree of satisfaction in patients with severe pilonidal disease			
Low	2 (5.6)	12 (37.5)	$\chi^2 = 12.39$ P = 0.002
Moderate	21 (58.3)	16 (50.0)	
High	13 (36.1)	4 (12.5)	
Pain 1 day after surgery			
No pain (score of 1–2)	37 (50.0)	38 (50.0)	
Mild pain (score of 3–4)	39 (51.3)	38 (50.0)	
Moderate pain (score of 5–6)	0 (0.0)	0 (0.0)	
Severe pain (score of 7–10)	0 (0.0)	0 (0.0)	
Number of patients with mild pain			
1 day after surgery	39 (51.3)	38 (50.0)	$\chi^2 = 29.58$ P < 0.001
1 week after surgery	5 (6.6)	57 (75.0)	
3 weeks after surgery	5 (6.6)	15 (19.7)	
5 weeks after surgery	0 (0.0)	0 (0.0)	

Data are presented as mean ± standard deviation or n (%).
*Average period of follow-up observation was 28 months.
LOLE, laser obliteration with limited excision; WE, wide excision; NS, not significant.

The pilonidal sinus was then prepared with electrocautery, and its canals were widely excised within the healthy tissue up to the sacrococcygeal fascia (Figure 3). The surgical wound was treated with hydrogen peroxide and povidone iodine solution, gauze with povidone iodine ointment was placed on the wound, and an aseptic bandage was applied. The patient was discharged from the hospital the day after bandaging.

After surgery, the patients in both groups were instructed to rinse the wound with povidone iodine soap in the shower once daily and to bandage the incision with povidone iodine ointment once daily. As a preventive measure, azithromycin was prescribed at 500 mg every 24 hours for 3 days. We carefully monitored hair growth and shaving around the incision in a timely manner. The patients in both study groups were monitored during the operation; the day after the operation; at 1, 3, 5, 7, and 9 weeks postoperatively; and every subsequent week if necessary. The main evaluation criteria were the healing time, number of complications, and recurrence rate. The

secondary outcomes were the duration of surgery, hospital delay, intensity of pain (determined using a visual analogue scale), duration of disability, and degree of patient satisfaction at the last visit (determined using a special questionnaire prepared by the authors). The visit during which complete healing was confirmed served as the last visit. A follow-up examination was performed 1 year after the surgery. During the rehabilitation period, we collected photo video material from the patients after receiving their additional verbal consent (for research purposes only; no videos are included in the present report). Recurrences that developed beyond 6 months postoperatively were considered cases of postoperative recurrence, whereas recurrences that developed within 6 months postoperatively were considered cases of treatment failure. The effect of disease severity on the primary and secondary study endpoints was also assessed.

Statistical analysis

The study results were statistically analyzed using SPSS 22.0 software (IBM Corp., Armonk, NY, USA). Continuous variables are expressed as mean ± standard deviation, and differences were assessed by analysis of variance. Categorical variables were compared using the chi-square test or Fisher's exact test. P values of <0.05 were considered statistically significant.

Results

In the LOLE group, complete healing was achieved in 74 (97.4%) patients. Patients who did not achieve complete healing were retreated with the laser procedure at 14 and 16 weeks with successful results, and complete healing was achieved at 3 and 5 weeks. In the WE group, the treatment was successful in all 76 (100%) patients. Indicators for the evaluation of surgical methods in the study groups are presented in Table 2.

No significant differences in complications were found between the two groups. In the WE group, one patient developed bleeding on the night of surgery, which stopped spontaneously. Bleeding occurred in one patient in the LOLE group on the second day after surgery, 2 hours after bandaging. The bleeding was stopped under local anesthesia with an ultrahigh radio frequency device. In two patients, a seroma was noted at 1 and 3 weeks after surgery; these seromas had developed secondary to premature closure of the external incisions. The external openings were dilated and rinsed under local anesthesia, and complete healing was achieved at 7 and 9 weeks. Recurrence was noted in six (7.9%) patients in the LOLE group and one (1.3%) patient in the WE group (Table 2). Most cases of recurrence were observed within the first year. All seven patients underwent repeated laser treatment with satisfactory results, and complete healing was achieved in 4.5 ± 2.2 weeks. Notably, no recurrence was observed in female patients.

The mean level of patient satisfaction in the LOLE group was 79.6 ± 4.7 points, which was significantly higher than that in the WE group (74.4 ± 8.2 points; $P < 0.001$). A low, average, and high level of patient satisfaction was defined as ≤ 60, 61 to 79, and ≥ 80 points. The distribution of patients according to these indicators is shown in Table 2. The difference between the groups was statistically significant ($\chi^2 = 17.22$, $P < 0.001$).

Because of the lack of a significant difference in the incidence of recurrence between the groups, we evaluated the degree of satisfaction in patients with severe disease. The mean level of satisfaction in the LOLE group was 78.4 ± 5.7 points, and that in the WE group was 68.8 ± 10.0 points ($P < 0.001$). The distribution of patients with severe disease

according to low, medium, and high degrees of satisfaction is shown in Table 2. A significant difference was observed between the groups ($\chi^2 = 12.39$, $P = 0.002$). The data clearly indicate that the level of satisfaction among patients who underwent LOLE was reliably high.

Interesting results were obtained in terms of the dynamics of pain manifestation within each group. In the WE group, the percentage of patients with mild pain increased from 50.0% at 1 day postoperatively to 75.0% at 1 week postoperatively ($\chi^2 = 10.07$, $P = 0.002$). In the LOLE group, the percentage of patients with mild pain reliably decreased from 51.3% at 1 day postoperatively to 6.6% at 1 week postoperatively ($\chi^2 = 36.73$, $P < 0.001$). Two weeks after surgery, the percentage of patients with mild pain in the LOLE group remained unchanged, and after 3 weeks, the pain had resolved. In the WE group, the percentage of patients with mild pain significantly decreased from 75.0% at 1 week postoperatively to 19.7% at 3 weeks postoperatively ($\chi^2 = 46.24$, $P < 0.001$) and had resolved by 5 weeks (Table 2).

Notably, the difference between the costs of these operations was not fixed in our clinic at the time of this study. The main cost of laser surgery was the use of disposable probes, whereas the cost of open surgery was determined by the use of regional anesthesia and the relatively long hospitalization and rehabilitation times.

Discussion

Management strategies for pilonidal disease vary, are often controversial, and in some cases are quite complex. According to current guidelines, treatment of an acute abscess is recommended to be confined to simple drainage of the abscess; however, if minimal excision of the primary orifices and curettage are performed, the probability of recurrence decreases.[8,9]

Performing WE of the sinus canals and leaving the incision open is still the most commonly used method to treat chronic pilonidal disease in many countries. This strategy requires hospitalization, frequent follow-up visits, and long-term wound care. Because of these disadvantages, many other methods of wound closure after excision have been developed. However, these methods also have some drawbacks.[10,11] According to the new guidelines, marsupialization and direct midline closure are not recommended because of the high risk of complications and recurrence.[12] Asymmetric excision and non-midline reconstruction with the Karydakis technique and Bascom technique are characterized by fewer complications and a lower recurrence rate.[13,14] Limberg plasty, rotational plasty, Z-plasty, and V-Y-plasty also have good results. However, in addition to their radicality and difficulty of performance, these methods of treatment are associated with a risk of recurrence and characterized by a high rate of severe complications; moreover, they require general or regional anesthesia and hospitalization. In addition, these methods are cosmetically suboptimal; therefore, incision restoration with a plastic flap is recommended in patients with complex, repeated chronic disease when it is necessary to straighten and flatten the deep intergluteal fold.[15] The most commonly used traditional method is WE with the wound left open or direct midline reconstruction using various types of sutures. Because midline repair is associated with high complication and recurrence rates, we chose to evaluate WE with second-intention wound healing as a form of traditional surgery and compare it with a minimally invasive procedure in the present study.

Minimally invasive procedures have been used to treat pilonidal disease for years.

Such procedures are characterized by short treatment periods, although they also have some drawbacks.[16] A relatively modern method is treatment with phenol injections, which have a low recurrence rate (8%–30%) only in selected patients. In addition, because of the toxic effect of phenol, its use is prohibited in some countries.[12,17] Endoscopic methods have also been used for the treatment of pilonidal disease during the last decade. A study of 250 patients showed treatment failure in 5.2% and recurrence in only 5.0%.[18] Endoscopy is characterized by a short recovery period, and although the operation is relatively long, it is often necessary to excise several holes to introduce the fistuloscope. In addition, the method requires the purchase of additional expensive equipment and time to learn its use.[18,19] Current evidence is inconclusive regarding the usefulness of fibrin glue in the treatment of pilonidal disease, both as monotherapy and as an adjunct to a surgical procedure.[20] According to a 2017 systematic review, the recurrence rate after laser hair removal is lower than that after cream hair removal, shaving, or leaving hair.[21] However, laser hair removal is used as an adjunct to primary treatment to prevent postoperative recurrence.[21] The pit picking method introduced by Bascom[22] in 1980 is an easily performed operation in the outpatient setting, has a short rehabilitation period and only mild complications, and is easily tolerated by the patient. In the long term, however, it has a relatively high recurrence rate, reaching 51% at 10 years in one study.[23] Such a high recurrence rate must be due to the overlooking of deep and laterally located canals during the excision process. Obliteration of these canals is convenient with a flexible, radially emitting diode (1470-nm wavelength) laser probe (FiLaC^{TM}; Biolitec AG), which has previously been successfully used to treat anal fistulas.[24] The first studies using this probe in the treatment of pilonidal disease showed encouraging results. Pappas and Christodoulou[25] conducted a prospective randomized study of 237 patients with a method similar to that described by Dessily et al.,[4,5] using the same device and fiber (FiLaC^{TM}; Biolitec AG). The rate of unsuccessful treatment after the first procedure was 9.7%, and the complication rate was 7.2%. After repeated procedures in 23 patients, a positive result was observed in only 78.3% of cases.[25] Georgiou[26] conducted a randomized study involving 60 patients with primary (nonrecurrent) pilonidal disease using a similar method and device. The procedure was carried out under local anesthesia, and laser energy (with a wavelength of 1470 nm and power of 8 W) was emitted with a radial probe in an intermittent mode with pulses of 1.5-s duration, unlike previous studies. The rate of unsuccessful treatment was 8.0%, and the recurrence rate was 2.9%. Complications in the form of seroma formation were noted in 13 (21.6%) patients, and an abscess developed in 1 (1.6%) patient.[26] As we mentioned in the Introduction, such a high complication rate is likely caused by leaving a small hole on the surface of the skin inconsistent with the sinus, which is closed before the end of the current exudative phase in the underlying sinus; as a result, a seroma develops. Use of the probe in an intermittent rather than continuous mode may have played a role in the development of complications, although it is difficult to draw conclusions from one study. In India, Porwal et al.[27] performed a prospective study using a similar method in 228 patients with chronic pilonidal disease. In addition to sinus laser obliteration, however, the external holes were enlarged with crisscross incisions. The duration of follow-up after surgery was 12 months. The procedure was performed under local anesthesia for an average of 33.32 minutes. The patients

stayed in the hospital for 12.25 hours, returned to usual life at 2.28 days, and achieved complete wound healing in 6.44 weeks. The complication rate was 8.78%. The procedure was repeated for patients with recurrence. The overall rate of successful treatment reached 97.37%, and the recurrence rate was 2.9%. Better results were obtained than in the previous study, although the authors noted that a follow-up visit was necessary at 5 days and at 2 weeks after the operation to prevent seroma formation due to rapid closure of the external holes.[27] The cause of the complications in their study was probably the same as in previous studies. An additional crisscross incision appears to be insufficient to prevent premature closure of the external orifices. In our study, we performed limited excision of the external holes, the diameter of which depended on the size and shape of the sinus cavity. This is probably why the complication rate in our study in the laser group (seroma, 2.6%; bleeding, 1.3%) was lower than that in the reviewed studies. Khubezov et al.[28] conducted a comparative prospective, cross-sectional study of laser ablation of the pilonidal sinus. They divided 90 patients with chronic pilonidal sinus into three groups: those who underwent excision with direct repair of the incision at the midline, those who underwent laser ablation (radial radiation laser probe, 1470 nm, 8 W, continuous mode), and those who underwent excision and healing by second intention (control group). No complications or recurrence were observed in the control group ($P < 0.0001$), and the highest rates of complications (23.4%, $P = 0.004$) and recurrence (16.7%, $P = 0.02$) were observed in the excision group. In the laser ablation group, relatively low rates of complications (6.7%) and recurrence (3.3%) were observed; however, these low rates were not statistically significant.[28] A notable shortcoming of the study was that the groups were small and the patients had relatively mild forms of pilonidal disease; one of the exclusion criteria was the presence of lateral orifices, which represent a large proportion of patients with pilonidal disease. In our study, lateral holes were observed in 31.6% of patients in the LOLE group and in 22.4% of patients in the WE group. Another comparative study of 139 patients was conducted by Abdelnaby et al.,[29] although it was retrospective in nature. The authors used a laser procedure similar to that described by Pappas and Christodoulou[25] and compared the outcome with that of sinusotomy with the incision left open. In the sinusotomy group, successful treatment was achieved in 100% of patients. In the laser group, the rate of unsuccessful treatment was 9.7% and the complication rate was 13.0%. Complications mainly manifested in the form of infected discharge.[29] Here, too, premature closure of the external incisions should have been considered. However, compared with open surgery, the laser procedure was associated with less pain, a shorter rehabilitation period, and a better cosmetic result.[29] Algazar et al.[30] conducted a prospective comparative study in which 25 patients underwent laser surgery similar to the methods described by Dessily et al.[4,5] and Pappas and Christodoulou,[25] and 47 patients underwent Limberg plasty. A significant difference was revealed in the operative duration in favor of the laser group (26.45 ± 5.41 vs. 58.63 ± 7.42 minutes, $P < 0.001$); a significant difference was also observed in the duration of hospitalization (7.5 ± 2.13 vs. 14.74 ± 3.98 hours, $P < 0.05$).[30] In the laser group, the rate of unsuccessful treatment was 4.2%, the recurrence rate was 8.3%, and the complication rate reached 20.8%. A total of 12.5% of complications were seromas. Similar to previous studies, these seromas developed secondary to premature closure of the external

hole. Notably, the complications (12.5%) in the Limberg plasty group were much more serious.[30] Unfortunately, one of the exclusion criteria was complex and complicated forms of disease, which made it difficult to fully assess the effectiveness of laser surgery. Dönmez and Uludag[31] conducted a retrospective cohort study involving 42 patients treated by 2 combined minimally invasive methods: laser-endoscopic vs. cautery-phenol-endoscopic surgery. In the first stage, both groups underwent sinus removal with a fistuloscope. Thereafter, 26 patients in the laser group underwent a procedure with a flexible radially emitting laser probe (1470-nm wavelength, 10 W of energy), and 16 patients in the phenol group underwent endoscope-assisted monopolar cauterization and phenol solution injection. No statistically significant differences were detected. The operative durations were 25 (15–45) and 40 (20–65) minutes. In the laser group, treatment failure occurred in 7.7% of patients, and complications occurred in 3.9%. Recurrence was observed in two (7.7%) patients in the laser group and one (6.3%) in the phenol group.[31] The combination of these minimally invasive procedures did not show a significant impact on treatment outcomes.

The duration of the operation and the frequency of use of regional anesthesia have increased over time. It is also necessary to purchase expensive equipment and learn how to use complex technology. Li et al.[32] conducted a retrospective study of 48 patients with a method similar to that described by Dessily et al.,[4,5] using the same device and fiber. The laser power was 10 W and the wavelength was 1470 nm. The results were quite impressive: the wound healing rate was 100%, the mean wound healing time was 32.4 ± 5.4 days, the recurrence rate was 2.1%, and the complication rate was 0.0%. The absence of complications can probably be explained by the expansion of the external openings in accordance with the size of the sinus and the spread of the infection.[32] However, because of the retrospective design of the study, small sample size, and short observation period, firm conclusions cannot be drawn. In 2022, Romic et al.[33] conducted the largest meta-analysis on pilonidal disease laser treatment (PiLaT) to date. The study included prospective and retrospective studies, case series, and comparative studies of the use of a radial emitting laser in the treatment of pilonidal disease. In total, 971 patients were reviewed. The laser characteristics were as follows: 1470-nm wavelength and power of 12–15 W in nine studies, and 980-nm wavelength in one study. The weighted mean recurrence rate was 3.8% (95% CI, 21%–54%; $I^2 = 39.2$; $P < 0.001$). The weighted mean complication rate was 10% (95% CI, 5.7%–14.3%; $I^2 = 82.28$; $P < 0.001$), and the most common complication was infection ($n = 47$) followed by seroma ($n = 14$), hematoma ($n = 10$), and abscess ($n = 9$). All complications were managed with antibiotics and/or ambulatory treatment. Despite the excellent results, this meta-analysis indicates that well-designed prospective randomized controlled trials comparing PiLaT with other techniques are required to confirm its promising results.[33]

WE with the incision left open has a high probability of cure and a low recurrence rate; however, it requires hospitalization, regional or general anesthesia, and long-term rehabilitation. It also has poorer cosmetic outcomes than LOLE, especially in cases with laterally located distanced secondary holes. When choosing a treatment procedure, preference should be given to an operation that is easy for the surgeon to perform, in which local anesthesia is used, for which rehabilitation can be rapidly completed, and that has low recurrence and complication rates. It is also important

that patients return to their usual lifestyle in a short period of time and that the degree of satisfaction with the cosmetic outcome is high. Among the procedures developed in the last decade, laser operations (including that in the present study) most closely meet these criteria. Nevertheless, they require further study and refinement to achieve better results.[4,5,26–33]

Limitations

This study has several limitations, including the inherent limitations of the study design, the relatively small sample size, and the short follow-up. Moreover, the comorbidities that could have influenced the outcomes were not specified. Future studies on larger numbers of patients with longer follow-up and a comparative double-blind randomized design are required to address these limitations.

Conclusion

Laser obliteration with limited sinus excision is an effective and safe method for the treatment of chronic pilonidal sinus disease of any complexity. This combination of methods demonstrates the best results in complex and relapsing forms of the disease. It is easy to perform, and in most cases, it can be performed under local anesthesia. It also requires a short period of time to complete and has an excellent cosmetic result. Unlike open surgery, it does not require the patient to stay in the hospital, and the rehabilitation process is painless and much shorter in duration. When plastic surgery is not possible for pilonidal disease complicated by multiple distant fistulas, laser obliteration is the procedure of choice. According to the data available in the literature, laser surgery should be included in the guidelines for the treatment and management of pilonidal disease.

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Data availability statement

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Author contributions

EG: Conceptualization, methodology, investigation, formal analysis, and writing–original draft. LA: Conceptualization, investigation, writing–original draft, and writing–review and editing. TI: Conceptualization, formal analysis, writing–original draft, and editing. SK: Investigation, writing–original draft, and editing. NG: Investigation, writing–original draft, and editing. All authors read and approved the submitted version of the manuscript.

Declaration of conflicting interest

The authors declare that there are no conflicts of interest.

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