Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

SiLaC versus PEPSiT for Pediatric Pilonidal Sinus Disease: A Single-Centre Retrospective Cohort Study (PILO-LASER)

Claire Bontems

Claire.bontems@ulb.be

Université Libre de Bruxelles

Filippo Ghidini

Hopitaux Civils de Colmar

Sandy Jochault-Ritz

Hopitaux Civils de Colmar

Ciro Andolfi

Hopitaux Civils de Colmar

Research Article

Keywords: Pilonidal sinus disease, Pediatric surgery, Sinus Laser-Assisted Closure (SiLaC), Pediatric Endoscopic Pilonidal Sinus Treatment (PEPSiT), Minimally invasive surgery

Posted Date: September 8th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10624408/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Purpose

Evidence comparing minimally invasive approaches for pediatric pilonidal sinus disease (PSD) is limited. We aimed to compare the effectiveness of Sinus Laser-Assisted Closure (SiLaC) and Pediatric Endoscopic Pilonidal Sinus Treatment (PEPSiT), with particular emphasis on wound healing and disease recurrence.

Methods

A retrospective single-center cohort study was conducted including patients younger then 18 years of age treated for PSD between January 2022 and December 2025. The primary outcome was wound healing time. Secondary outcomes included recurrence rate and operative time.

Results

Seventy-three patients were included: 21 underwent SiLaC and 52 underwent PEPSiT. Baseline demographic characteristics were comparable between groups. Median wound healing time was significantly shorter following SiLaC than PEPSiT (15 [IQR 15–22] vs. 55.5 [IQR 24.3–113.3] days; $p < 0.001$). Recurrence rates did not differ significantly (14.3% vs. 23.1%; $p = 0.492$), nor did median operative time (18 vs. 22 minutes; $p = 0.089$). Follow-up was shorter in the SiLaC group (2 vs. 5 months; $p = 0.026$).

Conclusions

SiLaC was associated with significantly faster wound healing and similar short-term recurrence rates. Its compatibility with lateral positioning and with local or locoregional anaesthesia may further enhance postoperative recovery. Prospective studies with longer follow-up are warranted to confirm long-term efficacy and cost-effectiveness.

1. Introduction

Pilonidal sinus disease (PSD) is a chronic inflammatory condition of the sacrococcygeal region characterized by the formation of a subcutaneous cavity or sinus tract. It results from the penetration of loose hairs into the dermis, typically through one or more midline pits located within the intergluteal cleft. The sacrococcygeal region is the most frequently affected site. PSD can significantly impair patients' quality of life because of pain, recurrent infections, wound discharge, and limitations in daily activities [1].

Surgical management remains the standard treatment for PSD, and several operative techniques have been described. The conventional approach consists of complete surgical excision of the sinus tract. However, over the past decades, minimally invasive techniques have emerged as promising alternatives. A systematic review demonstrated that, although conventional excision is effective, it is associated with

higher rates of wound-related complications, disease recurrence, unsatisfactory cosmetic outcomes, and prolonged wound healing [1]. In contrast, laser-based techniques have been associated with shorter hospital stays, reduced postoperative pain, and lower recurrence rates. Nevertheless, minimally invasive approaches may be less effective in patients with complex pilonidal disease [1].

Most published studies have focused on adult population [2]. Evidence regarding the management of pediatric pilonidal disease remains limited. However, a study evaluating laser treatment in adolescents reported outcomes comparable to those observed in adults [2]. Another study in the pediatric population identified Pediatric Endoscopic Pilonidal Sinus Treatment (PEPSiT), combined with postoperative laser hair removal of the affected area, as the preferred minimally invasive technique in children [3, 4].

The aim of the present study was to compare these two minimally invasive techniques—PEPSiT and Sinus Laser -Assisted Closure (SiLaC)—in a pediatric population treated at our Institution, with particular emphasis on wound healing time and recurrence rate.

2. Methods

Study design and period

This is an observational, single-centre, retrospective study conducted at the Department of Pediatric Surgery, Colmar Civil Hospitals (Colmar, France).

The study period spanned from January 2022 to December 2025.

Inclusion criteria

Patients younger than 18 years of age who underwent minimally invasive surgical treatment using either PEPSiT or SiLaC were included. All procedures were performed by two senior pediatric surgeons from the same surgical team.

Patients treated using conventional excisional surgery or other surgical techniques were excluded from the study.

Data collection

Clinical data were retrospectively extracted from the electronic medical records and recorded in a pseudonymized Microsoft Excel® database specifically created for the study.

Variables and outcomes

Collected variables included patient demographic characteristics (age, height, weight, body mass index, sex), surgical technique and associated surgical procedure, primary surgery or redo-surgery, patient position on the operating table, local or general anaesthesia.

The primary outcome was wound healing, defined as complete epithelialization of the surgical wound, and expressed as wound healing time.

Secondary outcomes included recurrence rate, and operative time.

Surgical procedures

Preoperative assessment:

Patients attended a preoperative consultation with the operating surgeon approximately one week before surgery. During this visit, the effectiveness of the definitive laser hair removal treatment was assessed by evaluating the reduction of hair density within and around the intergluteal cleft. This assessment ensured that adequate epilation had been achieved before proceeding with surgery, as part of the standardized preoperative protocol.

PEPSiT:

The procedure was performed according to the standardized technique previously described by Esposito et al [3]. After identification of the external pits, the sinus tract was explored using a camera introduced through the main opening. Under continuous irrigation, hair, debris, and granulation tissue were removed using dedicated endoscopic instruments. The sinus cavity was subsequently ablated under direct endoscopic vision using a monopolar electrode until complete destruction of the epithelialized tract was achieved. At the end of the procedure, the cavity was irrigated and left open to allow postoperative drainage.

SiLaC [5]:

Local anaesthesia is first performed using Ropivacaine.

Following identification and enlargement of the external pit(s), the sinus tract was mechanically debrided with curettage to remove hair, debris, and granulation tissue. The cavity was then irrigated with saline solution. A radial-emitting laser fiber was introduced into the sinus tract to its deepest extent and progressively withdrawn while delivering laser energy circumferentially under continuous activation, resulting in photothermal destruction of the epithelialized tract and shrinkage of the surrounding tissue. The external opening was left open to allow postoperative drainage.

The laser used was a NeoV Laser 1470Nm Diode Laser (maximum power 12 W).

Postoperative management:

Postoperative wound care was performed by a community nurse daily for the first 15 days, and subsequently every other day until complete wound healing was achieved. Dressings consisted of hyaluronic acid cream (Ialuset®) covered with a foam dressing (Mepilex®). Gentle massage of the operative site was recommended during dressing changes to facilitate the evacuation of residual debris

from the treated sinus tract. Patients were routinely reviewed by the operating surgeon 3 weeks after surgery to assess wound healing and recovery. A convalescence period of 1 week was prescribed. Physical exercise was restricted for 1 month postoperatively.

Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics software (IBM Corp., Armonk, NY, USA).

Continuous variables are presented as medians with interquartile ranges (IQR) and were compared using the Mann–Whitney U test for independent samples. Categorical variables are presented as frequencies and percentages and were compared using the Pearson chi-square test.

A two-sided p value < 0.05 was considered statistically significant.

Ethical aspects

This retrospective study was conducted in accordance with the principles of the Declaration of Helsinki. The study protocol was reviewed and approved by the appropriate Ethics Committee of the Strasbourg University Hospitals (CE-2026-107).

As this research did not involve human participants as defined by French regulations, and in accordance with the General Data Protection Regulation (GDPR), patients and their legal representatives were informed of the use of their data and were given the opportunity to exercise their right to object. All data were collected in a pseudonymized manner and subsequently anonymized prior to statistical analysis.

3. Results

A total of 73 patients were included in the study. Fifty-two patients (34 males and 18 females) underwent PEPSiT, whereas 21 patients (11 males and 10 females) were treated using SiLaC.

Primary surgical treatment for PSD was performed in 64 patients, while 9 patients underwent surgery for recurrent disease (3 in the PEPSiT group and 6 in the SiLaC group).

Sixty-seven patients were treated exclusively with the planned minimally invasive technique, whereas six patients required an additional surgical procedure.

The median age of the study population was 16.1 years (IQR 15.3–16.7). The median body weight was 72.5 kg (IQR 58–80.3), the median height was 170 cm (IQR 165–178), and the median body mass index (BMI) was 23.5 kg/m² (IQR 20.4–28.1). No statistically significant differences in these anthropometric characteristics were observed between the SiLaC and PEPSiT groups. These results are shown in Table 1.

Table 1
Baseline characteristics of the study population

Variable	SiLaC (n = 21)	PEPSiT (n = 52)	*p*-value
Sex			
Female	10	18	
Male	11	34	
Redo surgery	6	3	
Age, years	16.5 (15.1–17.4)	16.0 (15.3–16.6)	0.268
Height, cm[1]	168 (162–175)	171 (168–179)	0.309
Weight, kg[2]	74 (54–80)	70 (60–81.5)	0.602
BMI, kg/m²[1]	26.2 (19.9–29.1)	23.3 (20.6–27.1)	0.937
Patient position			
Lateral	16	0	
Prone	5	52	
Anaesthesia			
Local	3	0	
General + Local	16	52	
Spinal	2	0	
Associated procedure	0	6	
└ wick placement	–	2	
└ suture	–	2	
└ excision + suture	–	2	
Follow-up, months	2 (1–4)	5 (3–9)	0.026

Quantitative data are presented as medians and interquartile ranges (IQR)

[1] Height and BMI available for **69** patients.

[2] Weight available for **70** patients.

Table 2
Surgical outcomes

Variable	SiLaC (n = 21)	PEPSiT (n = 52)	*p*-value
Wound healing time, days[1]	15 (15–22)	55.5 (24.3–113.3)	< 0.001
Recurrence[2]	3	12	0.492
Operative time, min	18 (14.5–24.5)	22 (16.3–29)	0.089
Time to recurrence, months[3]	2 (1–2)	7 (3–11.8)	0.200

Quantitative data are presented as medians and IQR

[1] Four missing values (2 SiLaC and 2 PEPSiT; *n* = 69).

[2] Four missing values (2 SiLaC and 2 PEPSiT; *n* = 69).

[3] Calculated only among patients who experienced recurrence (*n* = 15).

Patient positioning differed according to the surgical technique. Sixteen of the 21 patients (76.2%) in the SiLaC group were operated on in the lateral decubitus position, whereas the remaining five patients underwent surgery in the prone position. All patients treated with the PEPSiT technique were operated on in the prone position.

All patients in the PEPSiT group underwent combined general and local anaesthesia. In the SiLaC group, 16 of 21 patients (76.2%) received combined general and local anaesthesia, 3 (14.3%) local anaesthesia with light sedation, and 2 (9.5%) spinal anaesthesia. Postoperative recurrence occurred in 3 of 21 patients (14.3%) in the SiLaC group and in 12 of 52 patients (23.1%) in the PEPSiT group. Recurrence data were unavailable for four patients. No statistically significant difference in recurrence rate was observed between the two groups ($p = 0.492$).

Median wound healing time was significantly shorter following SiLaC than PEPSiT: 15 days (IQR 15–22) versus 55.5 days (IQR 24.3-113.3), respectively ($p < 0.001$).

Median operative time did not differ significantly between groups: 18 minutes (IQR 14.5–24.5) in the SiLaC group versus 22 minutes (IQR 16.3–29) in the PEPSiT group (p = 0.089).

The median duration of follow-up also differed significantly between groups: 2 months (IQR 1–4) for the SiLaC group versus 5 months (IQR 3–9) for the PEPSiT group ($p = 0.026$). Among patients who developed recurrent disease, the median time to recurrence did not differ significantly between SiLaC and PEPSiT: 2 months (IQR 1–2) and 7 months (IQR 3-11.8), respectively ($p = 0.200$). These results are shown in Tables 1 and 2.

4. Discussion

In this cohort, for the treatment of pediatric PSD, SiLaC was associated with significantly shorter wound healing time compared to PEPSiT. Recurrence remains one of the main concerns following surgical treatment of PSD, no statistically significant difference in recurrence rates was observed between the two minimally invasive techniques. These findings are consistent with systematic reviews and meta-analyses reporting comparable recurrence rates among currently available minimally invasive procedures [6]. The risk of recurrence is likely influenced by several factors beyond the surgical technique itself, including patient-related characteristics such as obesity, local hygiene, compliance with postoperative wound care, and the presence of comorbidities. In particular, adherence to postoperative recommendations, especially laser hair removal of the intergluteal cleft, is considered a key factor in reducing recurrence and optimizing long-term outcomes.

Patients treated with SiLaC seemed to experience recurrence earlier than those treated with PEPSiT, but the difference was not statistically significant. This finding should be interpreted with caution, as it is likely influenced by the significantly shorter follow-up period in the SiLaC group. Since SiLaC was introduced more recently in our institution, patients treated with this technique have had less postoperative follow-up, limiting the comparison of long-term recurrence between the two groups. Continued follow-up and prospective evaluation will therefore be necessary to determine whether recurrence rates remain comparable over time.

The markedly shorter wound healing time observed after SiLaC represents a clinically meaningful advantage, particularly in children and adolescents. Faster wound healing facilitates an earlier return to school, sports, and normal social activities, thereby reducing the impact of surgery on patients' quality of life. These findings are consistent with recent studies evaluating laser-based techniques. Romanova et al. [2] reported rapid wound healing associated with excellent cosmetic outcomes following adolescent pilonidal laser treatment (a-PiLaT). Likewise, the comparative review by Jazi et al. [1] reported that laser-assisted procedures were associated with faster healing and reduced postoperative pain. The accelerated healing observed after SiLaC is thought to result from reduced tissue trauma and a consequently lower local inflammatory response compared with more invasive procedures [6]. This is primarily attributable to the minimally invasive nature of the technique, limited tissue destruction, preservation of healthy tissue and vascularity, effective hemostasis and the avoidance of large open wounds or high-tension closures. These characteristics enable faster biological healing while maintaining acceptable rates of disease resolution in appropriately selected patients.

Operative time was not significantly shorter with SiLaC. Current evidence regarding operative time remains inconsistent, with some studies reporting shorter procedures using SiLaC and others demonstrating no significant difference compared with other minimally invasive techniques [1, 6].

SiLaC also offers several anaesthetic advantages. The procedure can be performed with the patient in the lateral decubitus position, allowing improved access to and easier management of the airway during general anaesthesia [6]. Furthermore, in selected cooperative patients, SiLaC can be performed under locoregional or even local anaesthesia with light sedation, facilitating faster recovery, earlier oral intake,

shorter post-anaesthesia care unit stay, and earlier discharge following day-case surgery [5, 6]. Reducing exposure to general anaesthesia represents an additional benefit in pediatric and adolescent patients.

Moreover, although the operative time did not differ significantly between groups, patient positioning and induction of anaesthesia appeared to be easier and faster with the SiLaC technique. Consequently, the overall occupancy time of the operating room may be reduced.

Beyond its clinical advantages, SiLaC may also provide relevant medico-economic benefits. The faster wound healing may simplify postoperative management by reducing the number of outpatient visits and dressing changes. Earlier return to school, sports, and normal daily activities may also decrease indirect costs for patients and their families, including parental work absenteeism. Collectively, these advantages could contribute to improved healthcare resource utilization while enhancing patient recovery and overall quality of care.

Despite the novelty of this study and several strengths, including the homogeneous management of patients by the same experienced pediatric surgical team and a relatively uniform study population, several limitations should be acknowledged. First, its retrospective design exposes the study to potential selection and information biases. Second, the relatively small sample size limits the statistical power, particularly for detecting differences in recurrence rates. Finally, the significant discrepancy in follow-up duration between the two groups may have influenced the assessment of long-term recurrence.

Longer follow-up and the implementation of a standardized postoperative surveillance protocol would allow a more accurate evaluation of long-term outcomes and provide a more reliable comparison between the two techniques. Furthermore, future prospective studies incorporating formal health economic analyses, including both direct and indirect healthcare costs, would help to better define the overall value of SiLaC in the management of pediatric pilonidal sinus disease.

5. Conclusion

SiLaC represents an effective minimally invasive treatment option for pediatric PSD. Although early recurrence rates were comparable to those observed with PEPSiT, SiLaC was associated with significantly faster wound healing. Moreover, the possibility of performing the procedure in the lateral decubitus position and under local or locoregional anaesthesia may facilitate patient management and enhance postoperative recovery.

Finally, these findings suggest that SiLaC may improve patients' quality of life while potentially reducing direct and indirect healthcare costs.

Declarations

Conflict of Interest Statement

The authors declare that they have no conflicts of interest related to this work.

Funding Statement

No specific funding was received for this study.

Author Contribution

C.B., S.J.-R. and F.G. made substantial contributions to the design of the study.C.B., S.J.-R., F.G. provided the acquisition, analysis and interpretation of the data.C.A. drafted and revised the work critically for important intellectual content.All authors reviewed and approved the manuscript.

Data Availability

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

References

1. Jazi K, Larijani A, Rahimi M, Rajabi E, Karami Dehkordi P, Yazdian FA et al (2025) Future of pilonidal cyst surgery: a comparative review of traditional and laser techniques. BMC Surg 25(1):486. 10.1186/s12893-025-03222-y
2. Romanova A, Nissen M, Alrefai M, Hubertus J, Deska T, Senkal M (2024) Adolescent pilonidal disease laser treatment (a-PiLaT): a pilot study. Tech Coloproctol 28(1):104. 10.1007/s10151-024-02972-w
3. Esposito C, Turrà F, Cerulo M, Del Conte F, Esposito G, Prato AP et al (2020) Technical standardization of MIS management of children with pilonidal sinus disease using pediatric endoscopic pilonidal sinus treatment (PEPSiT) and laser epilation. J Pediatr Surg 55(4):761–766. 10.1016/j.jpedsurg.2019.04.031
4. Pérez-Bertólez S, Casal-Beloy I, Pasten A, Martín-Solé O, Salcedo P, Tapia L et al (2025) Pediatric endoscopic pilonidal sinus treatment: lessons learned after 100 consecutive cases. Tech Coloproctol 29(1):14. 10.1007/s10151-024-03049-4
5. Dessily M, Charara F, Ralea S, Allé JL (2017) Pilonidal sinus destruction with a radial laser probe: technique and first Belgian experience. Acta Chir Belg 117(3):164–168. 10.1080/00015458.2016.1272285
6. Ouali M, Martin-Martin GP, Avdicausevic S, Alam A, Istok P, Brunenieks I et al (2025) International Society of Laser Proctology Position Paper on SiLaC and EPSiT/SiLaC in the Management of Pilonidal Sinus Disease. Lasers Surg Med 57(10):845–850. 10.1002/lsm.70071