

# Advantages of endoscopic pilonidal sinus treatment

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## ABSTRACT

**Introduction.** Classic treatment of pilonidal sinus is associated with a high rate of complications and a long and painful postoperative period requiring daily wound care, with a decrease in patients' quality of life. The objective of our study was to evaluate the effectiveness and advantages of the endoscopic technique vs. conventional surgery of pilonidal sinus in the pediatric population.

**Methods.** A quasi-experimental study was carried out in pediatric patients undergoing pilonidal sinus surgery at a single institution in 2019. Excision and healing by secondary intention (EHSI), excision and primary closure (EPC), and Pediatric Endoscopic Pilonidal Sinus Treatment (PEPSiT) were compared. The surgical technique chosen was surgeon-dependent.

**Results.** 49 patients were studied – 14 undergoing PEPSiT, 23 undergoing EHSI, and 12 undergoing EPC. Full healing process was faster in PEPSiT than in EHSI (11 weeks earlier; 95% CI: 6.2-15.9;  $p < 0.001$ ). Pain on the Visual Analogue Scale (VAS) and need for analgesics were less in the PEPSiT group ( $p = 0.001$ ). Mean time to return to normal life was shorter with PEPSiT – 78 days earlier than EHSI (95% CI: 42.2-114.9;  $p < 0.001$ ) and 39 days earlier than EPC (95% CI: -2.5-81.4;  $p = 0.06$ ). No complications were recorded with PEPSiT, whereas complication rate with EHSI was 69.6%, and complication rate with EPC was 58.3% ( $p = 0.001$ ).

**Conclusions.** Endoscopic pilonidal sinus treatment is effective, with a short and painless postoperative period, and easy wound care. It allows for an early return to normal life without restrictions.

**KEY WORDS:** Pilonidal sinus disease; Pilonidal sinus; Children; PEPSiT; Primary closure; Wound healing.

## VENTAJAS DE LA CIRUGÍA ENDOSCÓPICA PARA EL TRATAMIENTO QUIRÚRGICO DEL SINUS PILONIDAL

### RESUMEN

**Introducción.** Los procedimientos clásicos quirúrgicos en el tratamiento del sinus pilonidal están relacionados con una alta tasa de complicaciones y conllevan un postoperatorio largo y doloroso, precisando curas tópicas diarias hasta la cicatrización completa, lo que provoca una disminución de la calidad de vida de los pacientes. El objetivo de este trabajo es evaluar la eficacia y las ventajas de la técnica endoscópica frente a la cirugía convencional del sinus pilonidal en población pediátrica.

**Métodos.** Estudio cuasi-experimental en pacientes pediátricos operados de sinus pilonidal durante 2019 en un único centro. Comparamos la exéresis con cicatrización por segunda intención (ESI), exéresis con cierre primario (ECP) y PEPSiT (*Pediatric Endoscopic Pilonidal Sinus Treatment*). La elección de la técnica fue cirujano-dependiente.

**Resultados.** Se estudiaron 49 pacientes: 14 PEPSiT, 23 ESI y 12 ECP. Se consigue la epitelización completa 11 semanas antes con PEPSiT que con ESI (IC95%: 6,3 a 16,3;  $p < 0,001$ ). Encontramos menor dolor en escala analógica visual (EVA) con PEPSiT, y paralelamente también necesitaban menos analgésicos ( $p = 0,001$ ). Con PEPSiT recuperan su vida normal 78 días antes de media que los ESI (IC95%: 42,2 a 114,9;  $p < 0,001$ ) y 39 días antes que ECP (IC95%: -2,5 a 81,4;  $p = 0,06$ ). No se registraron complicaciones con PEPSiT frente a un 69,6% con ESI y 58,3% con ECP ( $p = 0,001$ ).

**Conclusiones.** El tratamiento endoscópico del sinus pilonidal es efectivo, con un postoperatorio corto, indoloro y con fáciles cuidados. Permite la rápida recuperación de la actividad normal sin las restricciones que conlleva la cirugía convencional.

**PALABRAS CLAVE:** Enfermedad pilonidal; Sinus pilonidal; Niños; PEPSiT; Cierre primario; Cicatrización.

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## Ventajas de la cirugía endoscópica para el tratamiento quirúrgico del sinus pilonidal Advantages of endoscopic pilonidal sinus treatment

### MENOS DOLOR

#### LESS PAIN



Dolor medio de 0,5 en escala EVA  
Average 0.5 on VAS scale

### RECUPERACIÓN PRECOZ DEL HÁBITO DE VIDA NORMAL

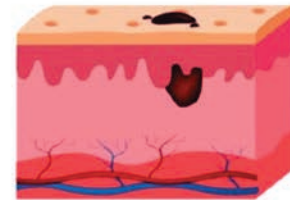
#### EARLY RETURN TO DAILY ACTIVITIES



Desde el 1<sup>er</sup> día postoperatorio  
Since 1<sup>st</sup> postoperative day

### EPITELIZACIÓN COMPLETA MÁS RÁPIDA

#### FASTER HEALING PROCESS



En 3 semanas  
3 weeks

### RESUMEN VISUAL/VISUAL ABSTRACT.

## INTRODUCTION

Pilonidal disease is an acute or chronic inflammatory condition of the subcutaneous fatty tissue located at the sacrococcygeal region. It occurs in adolescents and young adults primarily, and it is more frequent in male patients<sup>(1,2)</sup>. Risk factors include obesity, hirsutism, local trauma, family history, and sedentariness, but the main predisposing factor is the presence of hair at the intergluteal cleft<sup>(3,4)</sup>.

Today, pilonidal disease is considered as an acquired entity. It is caused by an inflammatory reaction as a response to subcutaneous hair follicle and detritus retention at the intergluteal cleft, which sparks off the characteristic foreign body reaction. Pilonidal sinus patients are prone to recurrent infection and local pain<sup>(3,5)</sup>.

Pilonidal sinus treatment is surgical. Various surgical techniques have been described, but there is no consensus as to which of them is the gold standard<sup>(6)</sup>. Generally speaking, in surgery, the choice of the technique depends on the surgeon's experience and perception in terms of healing times and recurrence rates<sup>(7)</sup>.

En-bloc excision and healing by secondary intention (EHSI) and excision and primary closure (EPC) are the surgical procedures most widely used for pilonidal disease treatment<sup>(8)</sup>. EHSI involves a large surgical wound –which requires multiple visits to the primary care center for wound care purposes–, it is painful, and it is a limiting

factor for certain daily activities, thus reducing quality of life<sup>(9)</sup>. EPC may be performed either with a direct midline or lateralized suture, or using flap techniques<sup>(10)</sup>. Classic excision procedures are associated with a high rate of complications such as surgical wound infection, bleeding, and partial or full dehiscence<sup>(1,6,11)</sup>.

Minimally invasive techniques such as hair removal, curettage, phenol or fibrin injection, radiosurgery, laser therapy<sup>(12-18)</sup>, and most recently endoscopic surgery – which was first reported in adults by Meinero in 2014 (Endoscopic Pilonidal Sinus Treatment or EPSiT)<sup>(19)</sup>, and in children by Esposito in 2018 (Pediatric Endoscopic Sinus Treatment or PEPSiT)<sup>(20)</sup> – have also been described.

Based on literature findings, PEPSiT could stand as an effective technique with fewer associated complications for the treatment of pilonidal sinus in pediatric patients from our environment. The objective of this study was to delve into this.

## METHODS

### Study population

A prospective, non-randomized study of all pediatric patients ( $\leq 18$  years old) undergoing pilonidal sinus surgery at a single institution was carried out. Patient recruitment started in January 2019. The study was approved by the

clinical research ethics committee from our healthcare facility (PIC-179-20).

Three groups of patients were compared according to the surgical technique used – EHSl, EPC, or PEPSiT. The choice of the surgical technique was surgeon-dependent. Each type of procedure was conducted by the same group of surgeons during the study period.

Sex, age, weight, previous superinfection episodes, surgical technique used, pain on the Visual Analogue Scale (VAS), hospital stay, analgesic treatment duration, time to full healing, time to return to normal life, and complications –bleeding, infection, dehiscence, granuloma, and recurrence– were recorded in all patients.

The main objective of this study was to assess how long patients had to wait until they could return to normal life according to the surgical technique used.

The secondary objective was to evaluate time to full healing, risk of complications, postoperative pain on the VAS scale, analgesic treatment duration, and hospital stay for each surgical technique.

### Statistical analysis

For sample size calculation purposes, in order to be able to show a difference –according to the technique used– of more than 30 days in time to return to normal life in the patients undergoing surgery, with a 90% power and a 5% alpha error, 44 patients had to be recruited. Considering a potential 10% follow-up loss, sample size was established at 49 patients.

For statistical analysis purposes, Fisher's exact test was used for the analysis of quantitative variables, and Kruskal-Wallis test was used for the analysis of continuous variables. In order to reduce bias, results were age- and weight-adjusted, with multiple linear regression for continuous outcome variables and multivariate logistic regression for binary outcome variables. For all statistical calculations, the Stata 14.2 software was used.

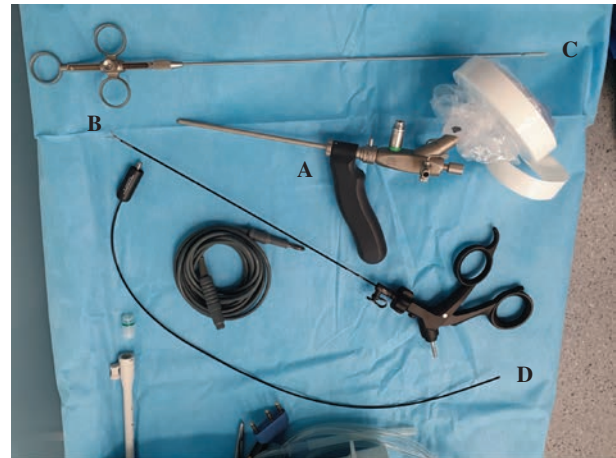
### Surgical procedure

The procedure was carried out under general anesthesia, spinal anesthesia, or local anesthesia and sedation, according to patient characteristics and at the discretion of the anesthesiologist.

Patient position was the same regardless of the surgical technique used – prone position with external traction of both glutei in order to improve surgical field exposure.

### Excision surgery

The procedure was initiated by instilling methylene blue through the fistulous tracts prior to incision. An en-bloc excision was performed by conducting an elliptical incision in the intergluteal midline including the cyst and all its fistulous tracts, with a healthy tissue margin. In some cases, excision had to be extended as a result of the presence of lateral projections of fistulous tracts or sec-



**Figure 1.** Instruments for PEPSiT. A) Fistuloscope; B) Forceps; C) Brush; D) Monopolar electrode.

ondary cavities, which were detected when methylene blue was visualized. The whole tissue involved was resected until the sacrococcygeal fascia was reached, and a careful hemostasis was carried out. In the case of EHSl, surgery ended here. In EPC, the subcutaneous cell tissue was closed in various planes in order to approach the wound surface and reduce both the dead space and the tension of the surgical wound borders. The deepest part was sutured to the sacrococcygeal fascia. The skin was sutured using monofilament interrupted stitches. The surgical specimen was submitted to the pathology department, which subsequently confirmed the lesion had been fully excised.

Patients undergoing excision surgery were advised to sleep in a prone position and avoid sitting on hard surfaces. In the case of EPC, at-home daily wound care was carried out with topical iodinated povidone. Patients undergoing EHSl were referred to their primary care center for topical wound care, which involved a certain variability in this respect.

### Endoscopic surgery (PEPSiT)

We will now describe in detail endoscopic pilonidal sinus surgery, which includes our own changes with respect to the technique described by Meinero and Esposito<sup>(19,20)</sup>.

The instruments used for PEPSiT are featured in figure 1. The fistuloscope (Karl Storz® GmbH - Tuttlingen, Germany) is 18 cm long and has a diameter of 3.3 x 4.7 mm. It consists of an 8° scope and an irrigation and working canal allowing instruments of up to 2.5 mm in diameter to be introduced. A handle may be used for ergonomics purposes, as per the surgeon's preference.

Following adequate asepsis and antisepsis, as well as operating field fitting, the procedure starts by dilating one of the fistulous tracts using a curved mosquito forceps until an adequate diameter is achieved for subsequent fis-



**Figure 2.** PEPSiT. A) Introduction of the fistuloscope through the dilated fistulous tract. B) Hair removal using the forceps under endoscopic vision. C) Electrofulguration using the monopolar electrode.

tuloscope introduction. Using the same mosquito forceps, the hairs inserted within the various fistulous tracts are removed.

The fistuloscope is advanced through the dilated fistula. The main pilonidal cavity, the potential secondary cavities, and the fistulous tracts are identified and examined. A constant flow of glycine or saline solution is applied in order to prevent collapse. The remaining hairs are removed using the fistuloscope's forceps under endoscopic vision. Electrofulguration of the pilonidal sinus and the fistulous tracts is then carried out using the monopolar electrode (Fig. 2). The brush can be used in some cases for mechanical abrasion purposes at fistulas and cyst walls in order to remove dead tissue. Last, the monopolar electrode is directly introduced from the cutaneous surface to complete fistulous tract cauterization.

Wound care involves applying a stream of iodinated povidone on the surgical wound, letting it penetrate through it. This is the same type of care that will be subsequently required at home, once a day, after patients have had their shower.

All patients will require daily wound care until full healing, which is defined as complete coverage of the denudated cutaneous surface.

Follow-up of the three groups of patients is carried out at Pediatric Surgery external consultations. Laser hair removal, both pre-surgery and post-surgery –once full healing has been achieved– is recommended to them all.

Return to normal life is defined as the lack of restrictions for patients to resume daily activity.

## RESULTS

49 patients underwent pilonidal sinus surgery at our institution from January to December 2019. 23 patients underwent EHSI, 12 patients underwent EPC, and 14 patients underwent PEPSiT. Mean age at surgery was 15.7 years (SD = 1.6), with a median weight of 70 kg (range: 44-147). 79.6% of the patients had had an infection episode prior to pilonidal sinus. No statistically significant differences were found among groups in terms of age, weight, or

presence of previous superinfection. Table I features patient characteristics.

51% of the cases in our series were male (n = 25). A tendency towards using EHSI was identified in boys (65.2%), whereas EPC (58.3%) and PEPSiT (64.3%) were more frequently used in girls.

Table II features postoperative variables according to the surgical technique used. Overall, older patients had more pain (p = 0.02), and full healing process (p = 0.004) and time to return to normal life (p = 0.02) were longer in heavier ones. Hospital stay was shorter with PEPSiT than with excision procedures. In the case of EPC, mean hospital stay more than doubled PEPSiT's (15 hours vs. 6 hours), and in the case of EHSI, it more than tripled it (21 hours vs. 6 hours), with significant differences among groups (p = 0.001).

Patients had less pain on the VAS scale with PEPSiT. Value at the first postoperative visit, two weeks following surgery, was analyzed. When age-adjusting it, PEPSiT's pain score on the VAS scale was 6.4 points less than EHSI's (95% CI: 5.1-7.7; p < 0.001) and 6.1 points less than EPC's (95% CI: 4.61-7.61; p < 0.001), which meant analgesic requirement was less with PEPSiT than with EHSI (p = 0.005). The fact 57.1% of PEPSiT group patients did not require any analgesic during the postoperative period was particularly remarkable.

Full healing was achieved 11 weeks earlier with PEPSiT than with EHSI (95% CI: 6.3-16.3; p < 0.001), adjusted by age and weight. Final cosmetic result is featured in figure 3.

On average, PEPSiT patients returned to normal life 77 days earlier than EHSI patients (95% CI: 40-115; p < 0.001) and 38 days earlier than EPC patients (95% CI: -5-81; p = 0.08), adjusted by age and weight. In the PEPSiT group, 64.3% of the patients returned to normal life in the first 24 hours following surgery, and they were even able to do intense sport activities.

No complications were recorded with PEPSiT vs. a 69.6% complication rate with EHSI and a 58.3% complication rate with EPC (p < 0.001). Complications are featured in table III. The most frequent complication in EPC was suture dehiscence (41.7%), and in EHSI, bleeding (26.1%),

**Table I. Patient characteristics.**

	<i>EHSI</i> ( <i>n</i> = 23)	<i>EPC</i> ( <i>n</i> = 12)	<i>PEPSiT</i> ( <i>n</i> = 14)	<i>Total</i> ( <i>n</i> = 49)	<i>p-value</i>
Age, years	15.86	16.17	15.35	15.77	0.402 <sup>1</sup>
Median (IQR)	(15.01-17.23)	(14.57-16.71)	(13.73-16.56)	(14.72-16.73)	
Weight, kg	70	67.5	63.5	70	0.767 <sup>1</sup>
Median (IQR)	(55-86)	(61-81.5)	(56-80)	(58-82)	
Sex					
• Female, <i>n</i> (%)	8 (34.8)	7 (58.3)	9 (64.3)	24 (49)	0.212 <sup>2</sup>
• Male, <i>n</i> (%)	15 (65.2)	5 (41.7)	5 (35.7)	25 (51)	
Previous infection, <i>n</i> (%)	18 (78.3)	10 (83.3)	11 (78.6)	39 (79.6)	1.000 <sup>2</sup>
Follow-up, months	17.3	16	12.4	14.8	0.32 <sup>1</sup>
Median (IQR)	(13.2-19.9)	(13.4-16.9)	(11.4-13.4)	(12.6-17.3)	

*EHSI*: en-bloc excision and healing by secondary intention; *EPC*: excision and primary closure; *PEPSiT*: pediatric endoscopic pilonidal sinus treatment; *IQR*: interquartile range.  
<sup>1</sup>Kruskal-Wallis test.  
<sup>2</sup>Fisher's exact test.

which required revision under general anesthesia in one case. No recurrences were observed in any of the groups in the study period. Median follow-up was 14.8 months, without significant differences among the different groups ( $p = 0.32$ ).

## DISCUSSION

This study demonstrates that PEPSiT is an effective technique in pediatric and adolescent patients. It barely causes pain, recovery times are much shorter than in open techniques, and no recurrences have been noted after a median follow-up of 14.8 months.

Nowadays, EHSI and EPC are the surgical procedures most frequently used for pilonidal disease treatment<sup>(8)</sup>. This was also the case in our 2019 series, since 71% of the patients underwent excision techniques. However, this trend is now inverting, with the endoscopic technique being predominant in light of our preliminary results.

The literature shows that classic excision procedures are associated with a high rate of complications such as surgical wound infection, bleeding, and partial or total dehiscence<sup>(1,6,11)</sup>. In our series, more than half of the patients undergoing classic surgery had complications – although morbidity was grade III or lower according to the Clavien-Dindo classification<sup>(21)</sup>.

Various studies show that time to full healing is longer with EHSI<sup>(8,19)</sup>, but it has a lower recurrence rate than EPC. EPC allows for faster healing and return to normal life than EHSI<sup>(5,22,23)</sup>. However, surgical wound complications, recurrence rates, and costs are higher with EPC<sup>(24)</sup>. Performing an extended excision does not ensure there will be no recurrences. Many studies have demonstrated high recurrence rates. Allen-Merish described a mean recur-

rence rate of 13% with EHSI and 15% with EPC after a one-year follow-up<sup>(7)</sup>. Doll et al. found a 17% recurrence rate with EHSI, and a 30% recurrence rate with EPC<sup>(25)</sup>. Other studies reported similar recurrence rates with both techniques<sup>(26)</sup>. Recurrence leads to re-intervention and patient frustration<sup>(27)</sup>. In our series, no recurrences were observed, but this can be probably explained by the fact follow-up was short.

Based on pilonidal disease etiopathogenesis<sup>(3,5)</sup>, hair follicle eradication using laser hair removal can be a determining factor to prevent recurrences<sup>(9,17,20,28)</sup>. Therefore, laser hair removal is recommended to all our patients, regardless of the surgical technique used.

Nowadays, there is a general trend in surgery towards minimal invasion, and this is also the case with pilonidal sinus. Endoscopic pilonidal sinus surgery (endoscopic pilonidal sinus treatment or EPSiT) was first described by Meinerio in 2014<sup>(19)</sup>, based on video-assisted anal fistula treatment (VAAFT) described by Meinerio and Mori in 2011<sup>(29)</sup>.

In 2018, Esposito described the use of endoscopic pilonidal sinus surgery in the pediatric population. It was called PEPSiT (pediatric endoscopic pilonidal sinus treatment), with excellent results<sup>(20)</sup>. Since then, many studies both in children and adults have demonstrated multiple advantages of the endoscopic technique as compared to open surgery techniques. Direct vision allows the surgeon to visualize all fistulous tracts and secondary cavities, thus allowing all hairs and hair follicles to be seen and removed, the whole tissue to be cauterized, and the dead and necrotic remnants to be taken out. This procedure is associated with very low pain levels, without the need for long and painful wound care, which allows for an early healing process. The cosmetic result is excellent, as well as patient satisfaction, with little impact on quality of life, since patients

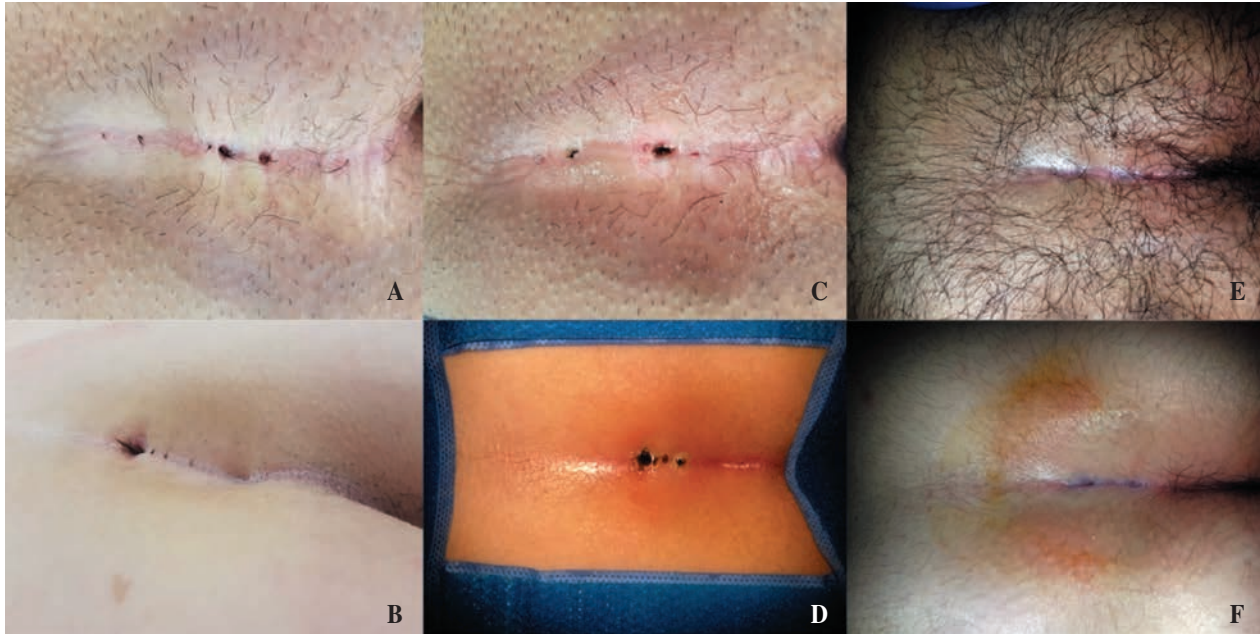
**Table II. Univariate and multivariate analysis of the result variables according to the surgical technique used.**

Variable	Hospital stay (hours)			Pain according to VAS scale (0-10)			Analgesic treatment duration (days)			Time to normal life (days)			Time to full healing (weeks)			Complications			
	Univariate	Multivariate (linear regression)		Univariate	Multivariate (linear regression)		Univariate	Multivariate (linear regression)		Univariate	Multivariate (linear regression)		Univariate	Multivariate (linear regression)		OR (95% CI)	p-value		
Type of analysis	Mean (SD)	Diff means (95% CI)	p-value	Mean (SD)	Diff means (95% CI)	p-value	Mean (SD)	Diff means (95% CI)	p-value	Mean (SD)	Diff means (95% CI)	p-value	Mean (SD)	Diff means (95% CI)	p-value	n (%)	p-value <sup>2</sup>		
Surgical technique																			
• EHSI (n = 23)	21.3 (7.0)	15.5 (10.8-20.3)	<b>0.001*</b>	7.3 (2.4)	6.4 (5.1-7.7)	<b>0.001*</b>	16.8 (22.5)	16.5 (5.3-27.7)	<b>0.001*</b>	85.9 (77.3)	77.3 (39.7-114.8)	<b>0.001*</b>	14.9 (10.5)	11.3 (6.3-16.3)	<b>0.001*</b>	16 (69.6)	<b>0.001*</b>	37.7 (3.5-408.7)	<b>0.003*</b>
• EPC (n = 12)	15.6 (6.9)	10.0 (4.5-15.4)	<b>0.001*</b>	7 (2.0)	6.1 (4.6-7.6)	<b>0.001*</b>	8.6 (5.0)	8.1 (-4.8-21.1)	0.212	43.6 (36.5)	38.0 (-5.3-81.3)	0.008	6.1 (4.6)	3.0 (-2.8-8.7)	0.30	7 (58.3)		23.1 (1.9-275.7)	<b>0.013*</b>
• PEPSIT (n = 14)	6.1 (6.0)	Ref	Ref	0.5 (0.8)	Ref	Ref	1.4 (1.6)	Ref	Ref	1.8 (2.5)	Ref	Ref	3.1 (0.8)	Ref	0 (0)	Ref	Ref	Ref	Ref
Age (years)		-0.61 (-1.9-0.7)	0.36		0.44 (0.07-0.81)	<b>0.02*</b>		-0.89 (-4.0-2.3)	0.57		1.7 (-8.7-12.3)	0.74		-0.4 (-1.8-1.0)	0.59			0.89 (0.54-1.49)	0.67
Weight (kg)		0.04 (-0.1-0.1)	0.44*		-0.004 (-0.03-0.03)	0.80		-0.05 (-0.3-0.2)	0.68		1 (0.2-1.8)	<b>0.02</b>		0.2 (0.1-0.3)	<b>0.004*</b>			1.05 (1.00-1.10)	0.07

EHSI: en-bloc excision and healing by secondary intention; EPC: excision and primary closure; PEPSIT: pediatric endoscopic pilonidal sinus treatment; Diff means: difference of means; OR: odds ratio; VAS: visual analogue scale; Ref: reference group; 95% CI: 95% confidence interval.

<sup>1</sup>Kruskal-Wallis test.

<sup>2</sup>Fisher's exact test.



**Figure 3.** Appearance prior to surgery (A, B), in the immediate postoperative period (C, D), and one month following surgery (E, F) in two different patients – patient 1 (A, C, E) and patient 2 (B, D, F).

**Table III. Complications.**

	<i>EHSI</i> (n = 23)	<i>EPC</i> (n = 12)	<i>PEPSiT</i> (n = 14)	Total (n = 49)	<i>p-value</i>
Infection, n (%)	1 (4,34)	0 (0)	0 (0)	1 (2)	1,00
Dehiscence, n (%)	2 (8,7)	5 (41,7)	0 (0)	7 (14,3)	<b>0,008*</b>
Bleeding, n (%)	6 (26,1)	0 (0)	0 (0)	6 (12,2)	<b>0,028*</b>
Granuloma, n (%)	5 (21,7)	0 (0)	0 (0)	5 (10,2)	0,07
Infection + dehiscence, n (%)	1 (4,3)	2 (16,7)	0 (0)	3 (6,1)	0,224
Bleeding + infection, n (%)	1 (4,3)	0 (0)	0 (0)	1 (2)	1,00

*EHSI*: en-bloc excision and healing by secondary intention; *EPC*: excision and primary closure; *PEPSiT*: Pediatric Endoscopic Pilonidal Sinus Treatment. Variables compared with Fisher's exact test.

\* $p < 0,05$ .

can return to normal activity in a short period of time. In addition, this procedure requires no hospital stay, and it can be performed as a major outpatient surgery. EPSiT or PEPSiT are therefore associated with shorter and less painful postoperative periods, and also with a better prognosis than conventional open surgery<sup>(8,11,20,30-34)</sup>. This is consistent with our study results, where patients undergoing PEPSiT returned to normal life in the first postoperative day vs. day 44 for EPC and day 86 for EHSI.

In our PEPSiT series, no complications were recorded, but long-term follow-up is required. Studies with longer follow-up periods have reported recurrence rates with the endoscopic technique ranging from 1.6% to 8%, with recurrence rates after one year of follow-up of approximately 5%<sup>(6,8,11,20,30,34,35)</sup>. Recurrence rates are lower in

those groups that routinely use laser hair removal pre- and post-surgery<sup>(20)</sup>.

This study has certain limitations. To start with, it is an initial experience at a single institution. The series consists of few patients, with a follow-up time of 1-2 years. The fact each technique was used by different surgeons may be a potential bias, since technique choice was surgeon-dependent. However, the study also has strengths. In spite of having few patients, the results are much better in the PEPSiT group than in the others, which allows differences to be demonstrated. Even though these were our first PEPSiT procedures –the learning curve is to be considered–, the results are very good. Last, even if follow-up time was not very long, the initial benefit of PEPSiT seems obvious.

Therefore, based on these preliminary results and those found in the literature, we believe PEPSiT is a promising technique for pilonidal sinus treatment in pediatric patients.

In conclusion, endoscopic pilonidal sinus treatment is an effective technique in pediatric and adolescent patients, it involves short postoperative periods, it causes no pain, and care is simple. It also allows for a quick return to normal life without the restrictions involved by conventional open surgery. Studies with a larger sample size and a longer follow-up period are required to confirm these results and establish the real risk of recurrence.

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