National Board of Examination - Journal of Medical Sciences
Volume 2, Issue 3, Pages 233–243, March 2024
DOI 10.61770/NBEJMS.2024.v02.i03.006

**ORIGINAL ARTICLE**

# Endoscopic Pilonidal Sinus Treatment {Epsit} vs Limberg Flap for Pilonidal Sinus: A Single Center Experience

Sudarsan Srikanth[1,*], Jameel Akhter[2], Surabhi Sreekumar[3] and Poojitha[3]

[1]*Academic Registrar, Apollo Hospital, Greams Road, Off Greams Lane, Chennai, Tamilnadu*
[2]*Senior Consultant, General and Minimal Access Surgery, Apollo Hospital, Greams Road, Off Greams Lane, Chennai, Tamilnadu*
[3]*Academic Resident, Apollo Hospital, Greams Road, Off Greams Lane, Chennai, Tamilnadu*

Accepted: 06-February-2024 / Published Online 27-February-2024

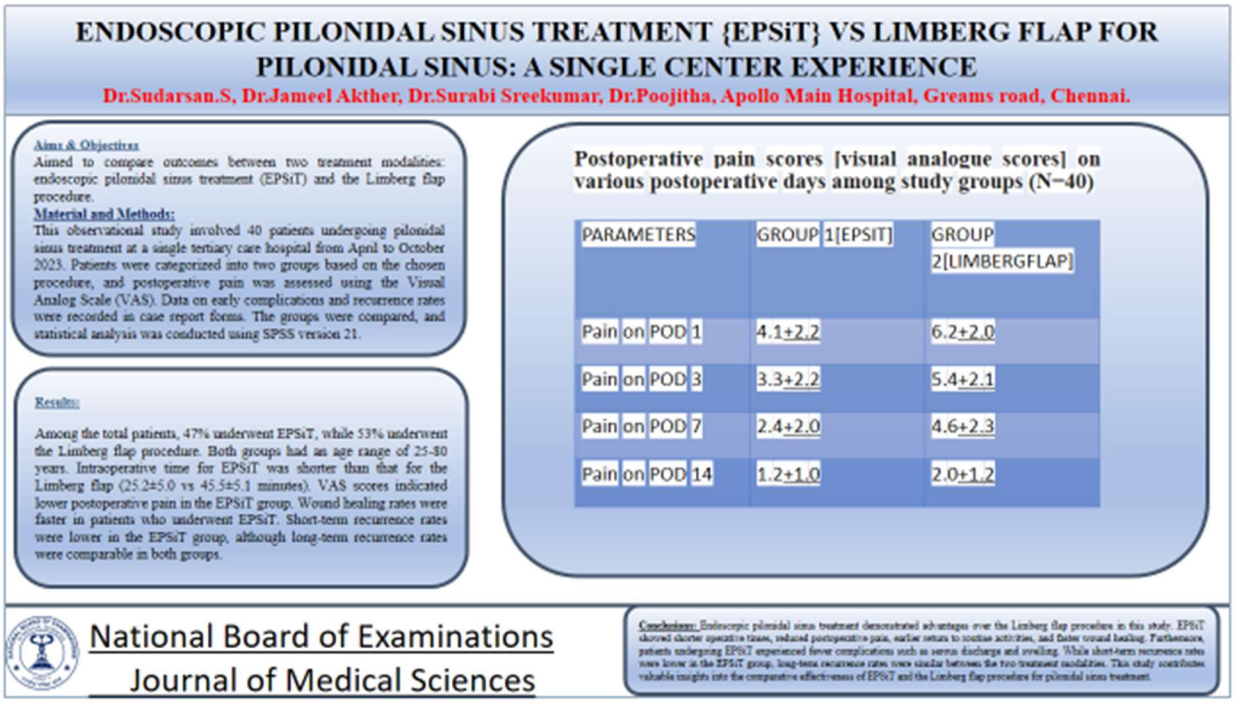
**Abstract**

**Background:** Pilonidal sinus, a condition characterized by chronic irritation in the gluteal cleft, predominantly affects males and is often associated with a higher body mass index and a sedentary lifestyle. Despite its prevalence, a universally accepted gold standard for treatment is yet to be established. This study aimed to compare outcomes between two treatment modalities: endoscopic pilonidal sinus treatment (EPSiT) and the Limberg flap procedure. **Materials and Methods:** This observational study involved 40 patients undergoing pilonidal sinus treatment at a single tertiary care hospital from April to October 2023. Patients were categorized into two groups based on the chosen procedure, and postoperative pain was assessed using the Visual Analog Scale (VAS). Data on early complications and recurrence rates were recorded in case report forms. The groups were compared, and statistical analysis was conducted using SPSS version 21. **Results:** Among the total patients, 47% underwent EPSiT, while 53% underwent the Limberg flap procedure. Both groups had an age range of 25-80 years. Intraoperative time for EPSiT was shorter than that for the Limberg flap (25.2±5.0 vs 45.5±5.1 minutes). VAS scores indicated lower postoperative pain in the EPSiT group. Wound healing rates were faster in patients who underwent EPSiT. Short-term recurrence rates were lower in the EPSiT group, although long-term recurrence rates were comparable in both groups. **Conclusion:** Endoscopic pilonidal sinus treatment demonstrated advantages over the Limberg flap procedure in this study. EPSiT showed shorter operative times, reduced postoperative pain, earlier return to routine activities, and faster wound healing. Furthermore, patients undergoing EPSiT experienced fewer complications such as serous discharge and swelling. While short-term recurrence rates were lower in the EPSiT group, long-term recurrence rates were similar between the two treatment modalities. This study contributes valuable insights into the comparative effectiveness of EPSiT and the Limberg flap procedure for pilonidal sinus treatment.

**Keywords:** Endoscopic Pilonidal Sinus Treatment (EPSiT), Limberg Flap Procedure, treatment Outcomes, pilonidal sinus, surgical modalities

*Corresponding author: Sudarsan S
Email: sudarsansrikanth.1991@gmail.com

**Graphical Abstract**




## Introduction

Pilonidal sinus is characterized as an inflammatory condition affecting the skin and subcutaneous tissue in the region of the gluteal fold [1]. The disease is estimated to have an incidence of 26 per 100,000 individuals, with a male-to-female ratio of 2.2:1 [2]. Various theories exist regarding the etiology of pilonidal sinus, including the foreign body response [3], Bascom's 'midline pits' hypothesis [4,5], and Stelzner's theory of retention dermatopathy [6].

Typically, surgical intervention for pilonidal sinus involves the radical excision of the sinus with primary wound closure or secondary healing through granulation, leading to extended wound healing times [7,8]. Off midline closure, such as with a Karydakis flap, is a preferred surgical technique that appears to reduce recurrence rates in uncomplicated cases [9]. In instances of larger and more complex sinuses, a rhomboid Limberg flap may be necessary due to the extensive wound [10].

A minimally invasive alternative, endoscopic pilonidal sinus treatment (EPSiT), has been developed by Meinero et al. [11]. This technique enables the direct vision debridement of sinus tracts using a specially designed fistuloscope. While studies, including a recent systematic review, have reported positive outcomes for EPSiT, most of these cases involved simple, uncomplicated sinuses [12]. Complex cases with branched, purulent, or recurrent sinuses often necessitate major surgery involving flap rotation.

The focus of this observational study was to compare the treatment outcomes of pilonidal disease using either the endoscopic device (EPSiT) or a Limberg flap, exploring the feasibility of the endoscopic approach in addressing challenging cases.

**Materials and Methods**

Between April 2023 and October 2023, individuals diagnosed with pilonidal sinus were offered a choice between two treatment options: the minimally invasive EPSiT and the traditional Limberg flap. The surgeon thoroughly discussed the pros and cons of each method with every patient, and the decision on the treatment approach was based on the individual patient's preference. Ethical approval for the study protocol was obtained from the ethics committees, and informed consent from each patient was secured before the operation. All patients were admitted to the hospital one day prior to the surgery, receiving a single dose of antibiotics (2 g intravenous cephazolin, administered 30 minutes before surgery) and antithrombotic prophylaxis (following the Caprini Score). The procedures were conducted under epidural analgesia.

For the endoscopic procedures, the technique described by Meinero et al. was followed. A fistuloscope (STORZ GmBH; KARL STORZ SE & Co. KG, Tuttlingen, Germany) was inserted either through the primary opening (enlarged with forceps if necessary) or one of the side openings, as appropriate. Saline was used to flush the tracts, and under direct visual guidance, hair and necrotic debris were removed using forceps. Subsequently, electrocautery probe was employed for thorough ablation of all sinus tracts, and a dedicated brush passed through the fistuloscope cleaned the sinus of necrotic tissues. The sinus orifice was left open for drainage, and patients were discharged the day after the procedure with a prescription for paracetamol (1 g orally four times a day). For patients opting for the flap procedure, the sinus was completely excised, including all side branches, and the wound was closed using a rhomboidal cutaneo-subutaneo-fascial flap rotated from the left or right buttock, depending on the configuration of the sinus and its branches. The flap and the secondary wound were sutured in three layers (fascia, subcutaneous tissue, skin) using absorbable polyglactin 2-0 sutures. No drains were left in the wound, and patients were discharged two days after surgery with the same paracetamol dosage prescription.

Data from all patients operated on using both methods during the specified period were prospectively collected in an anonymized electronic database. The primary outcome was healing, categorized into three groups for patients with a follow-up of 12 months or more: healed (with no recurrence), recurrent (requiring another pilonidal sinus operation after initial healing), or persistent (not healed within 6 months). Secondary outcomes included surgery-related complications (wound infection, wound dehiscence, bleeding). At the time of database closure, complete follow-up data of 12 months or more were available for 40 patients: 21 treated with the Limberg flap technique and 19 with the EPSiT method. The data were analyzed using SPSS version 21.

**EPSiT Technique**

We employed a fistuloscope, a monopolar electrode, and an endoscopic grasping forceps in the procedure. The fistuloscope features an 8-degree angled eyepiece, an optical channel, and a working and irrigation channel. With a diameter of 3.2x4.8 mm and an operative length of 18 cm, it is equipped with a removable handle for enhanced maneuverability and improved ergonomics for the surgeon. Pre-operative antibiotic prophylaxis was given, and patients were positioned in a prone posture with separated buttocks. The EPSiT procedure was conducted under general anesthesia (Figures 1 and 2).

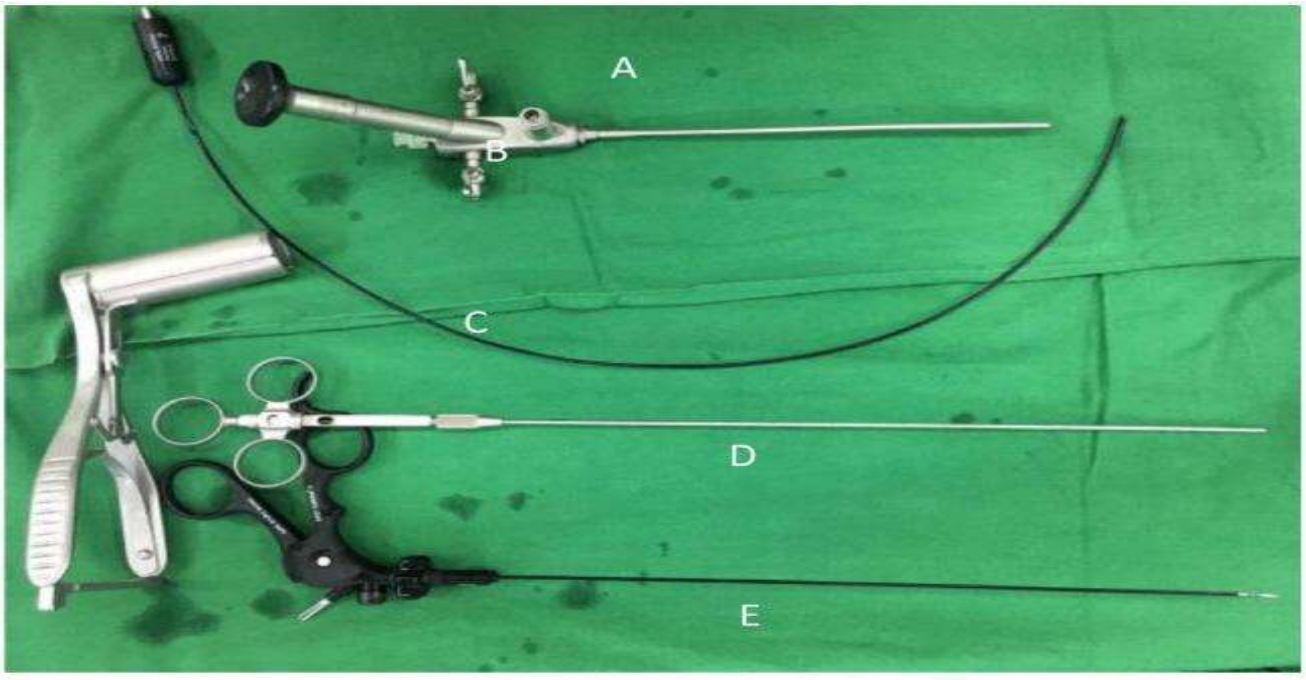



Figure 1. Equipment used for EPSit. **A** Angled fistuloscope -30 degree scope, **B** Speculum, **C,** monopolar electrocautery wire, **D**, aspiration syringe, **E**, atraumatic noon toothed forceps

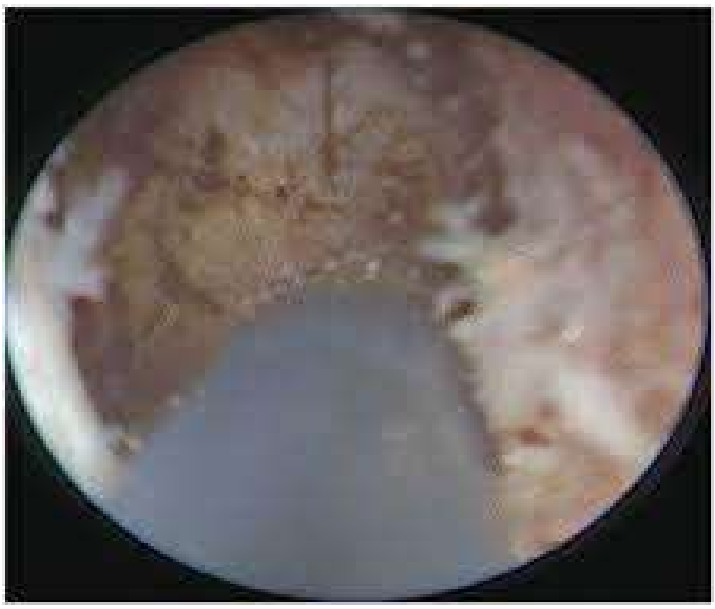


Figure 2. Interior of pilonidal sinus when viewing with fistuloscope - cauterization of tract

**Limberg Flap**

The limberg flap was marked on the skin for a rhomboid-shaped excision, and dissection was carried out until reaching the presacral fascia. The procedure involves incorporating the gluteal fascia, forming an inferior border, and delivering it medially to cover the rhomboid defect. A negative suction drain is inserted, and the wound was closed using nylon sutures. The drain was removed based on decreasing output, and the sutures are taken out on the 16th day after the operation (Figures 3 and 4).

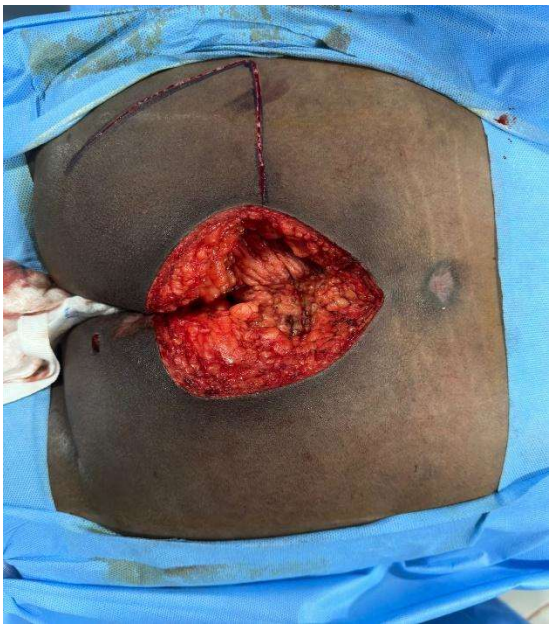


Figure 3. Rhomboid shaped excision area marked and area for skin flap

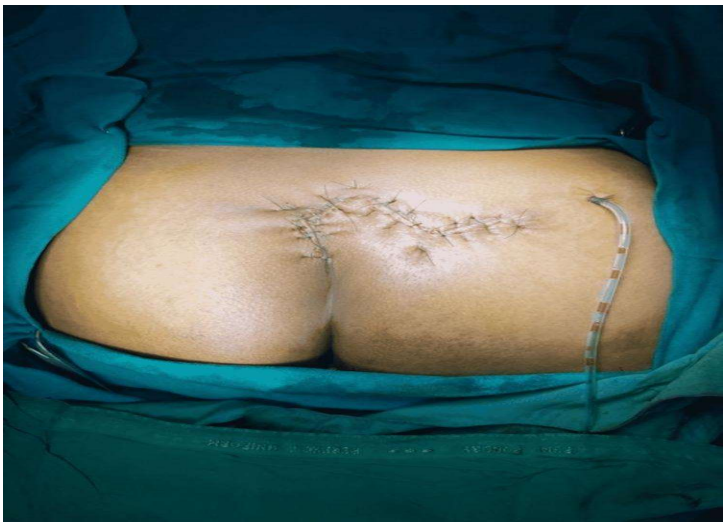


Figure 4. Final outcome of limberg flap

**Results**

Patients who underwent endoscopic pilonidal sinus were grouped as group 1 and patients who underwent limberg flap were grouped as grouped 2.

Table 1. Baseline characteristics of study population (N=40)

| **PARAMETERS** | **GROUP 1[EPSIT]** | **GROUP 2[LIMBERGFLAP]** |
|---|---|---|
| Total number of patients | 19 | 21 |
| Age range (in years) | 25-75 | 25-80 |
| Mean age ± SD (in years) | 50 ± 2.5 | 53 ± 3.2 |
| Male /female | 14/5 | 15/6 |
| Mean Intraoperative time[mins] | 25.2±5.0 | 45.5±5.1 |

The study involved a total of 40 patients, with 19 individuals undergoing Endoscopic Pilonidal Sinus Treatment (EPSiT) in Group 1 and 21 patients opting for the Limberg flap procedure in Group 2. In terms of age distribution, patients in the EPSiT group ranged from 25 to 75 years, with a mean age of 50 years and a standard deviation of ±2.5 years. The Limberg Flap group had patients aged between 25 and 80 years, with a mean age of 53 years and a standard deviation of ±3.2 years. Gender distribution revealed that in the EPSiT group, 14 patients were male and 5 were female, while in the Limberg Flap group, 15 were male and 6 were female (Table 1).

One notable finding is the difference in mean intraoperative time between the two treatment methods. The EPSiT group demonstrated a substantially shorter average intraoperative time of 25.2 minutes, with a standard deviation of ±5.0 minutes, in

contrast to the Limberg Flap group, where the mean intraoperative time was 45.5 minutes, with a standard deviation of ±5.1 minutes. These results suggest that the EPSiT approach may offer a more time-efficient alternative for pilonidal sinus treatment compared to the traditional Limberg flap procedure. (Table 1)

Table 2: Postoperative pain scores [visual analogue scores]on various postoperative days among study groups (N=40)

| PARAMETERS | GROUP 1[EPSIT] | GROUP 2[LIMBERGFLAP] |
|---|---|---|
| Pain on POD 1 | 4.1±2.2 | 6.2±2.0 |
| Pain on POD 3 | 3.3±2.2 | 5.4±2.1 |
| Pain on POD 7 | 2.4±2.0 | 4.6±2.3 |
| Pain on POD 14 | 1.2±1.0 | 2.0±1.2 |

Table 2 displays the postoperative pain scores, measured on a visual analogue scale, for both study groups (N=40). In Group 1, which underwent Endoscopic Pilonidal Sinus Treatment (EPSiT), the pain scores were 4.1±2.2 on postoperative day (POD) 1, 3.3±2.2 on POD 3, 2.4±2.0 on POD 7, and 1.2±1.0 on POD 14. Comparatively, Group 2, which underwent the Limberg flap procedure, exhibited higher pain scores with 6.2±2.0 on POD 1, 5.4±2.1 on POD 3, 4.6±2.3 on POD 7, and 2.0±1.2 on POD 14. These results suggest that patients in the EPSiT group generally experienced lower postoperative pain levels across various postoperative days compared to those in the Limberg Flap group (Table 2).

**Resuming routine activities among groups**

Patients in group1 who underwent EPSit returned to routine activities within 3.4 ± 0.5 days and patients in group 2 who underwent limberg flap returned to routine activities within 5.6 ± 2.2 days.

Table 3: Early complications among study groups (N=40)

| PARAMETERS | GROUP 1 [EPSiT] | GROUP 2: [LIMBERG FLAP] |
|---|---|---|
| **Swelling** | 2 | 4 |
| **Serous discharge** | 2 | 5 |
| **Purulent discharge** | 2 | 2 |

Table 3 outlines the early complications observed among the study groups (N=40) following different treatment modalities for pilonidal sinus. In Group 1, which underwent Endoscopic Pilonidal Sinus Treatment (EPSiT), two cases reported swelling, two cases exhibited serous discharge, and two cases showed purulent discharge. In contrast, Group 2, which underwent the Limberg flap procedure,

experienced a slightly higher incidence of early complications, with four cases of swelling, five cases of serous discharge, and two cases of purulent discharge. These findings indicate that the EPSiT group had a relatively lower occurrence of early complications, specifically in terms of swelling and serous discharge, when compared to the Limberg flap group. (Table 3)

**Complete wound healing**

Patients who underwent EPSit had earlier wound healing rates 20.1±2.3 days .The patients who underwent limberg flap had longer wound healing time 25.8±2.9 days.

Table 4: Recurrence rates among study groups (N=40)

| PARAMETERS | GROUP 1 [EPSiT] | GROUP2 [LIMBERG FLAP] |
|---|---|---|
| Recurrence <45 days | 0 | 0 |
| Recurrence in 3 months | 1 | 2 |
| Recurrence in 6 months | 2 | 2 |

Table 4 outlines the recurrence rates observed among the study groups (N=40) following different treatment modalities for pilonidal sinus. In Group 1, which underwent Endoscopic Pilonidal Sinus Treatment (EPSiT), there were no reported cases of recurrence within the first 45 days postoperatively. However, one case of recurrence was observed within 3 months, and two cases were noted within 6 months. In Group 2, which underwent the Limberg flap procedure, similarly, there were no instances of recurrence within the initial 45 days. However, two cases of recurrence were reported within both 3 and 6 months postoperatively. These results suggest that both treatment groups had no recurrences within the first 45 days, but there were some occurrences within the subsequent 3- to 6-month period (Table 4).

**Discussion**

This study aimed to compare the outcomes of Endoscopic Pilonidal Sinus Treatment (EPSiT) and the Limberg flap procedure in the management of pilonidal sinus. The baseline characteristics of the study population revealed a comparable distribution between the two groups, with Group 1 (EPSiT) consisting of 19 patients and Group 2 (Limberg Flap) comprising 21 patients. The age range and mean age were slightly lower in Group 1, indicating a relatively younger cohort. Additionally, the male predominance was observed in both groups, reflecting the typical demographic profile of pilonidal sinus patients. Nasr et al. [3] noted that the disease was common among both males and females with equal distribution, however in our study we noted that there was more persistence of disease among the males. But the study conducted by Nasr et all was done in a pediatric group of patients. The same male to female equal distribution was noted in a study conducted by Sequeira et al. [13].

A valuable finding in this study was the substantial difference in mean intraoperative time between the two treatment methods. EPSiT demonstrated a

notably shorter average intraoperative time of 25.2 minutes compared to the Limberg flap procedure, which had a mean intraoperative time of 45.5 minutes. This was in accordance with study by Meinero et al [11]. This suggests that EPSiT may offer a more time-efficient alternative for pilonidal sinus treatment, potentially contributing to reduced surgical stress and operative costs.

Postoperative pain scores, measured on various days, revealed a consistent trend favoring the EPSiT group. Patients undergoing EPSiT experienced lower pain levels across different postoperative days compared to those undergoing the Limberg flap procedure. This indicates that the endoscopic approach may lead to a more comfortable postoperative recovery for patients. This was along the lines of study by Esposito et al. [14]

Resumption of routine activities further supported the advantages of EPSiT, with patients in Group 1 returning to routine activities within 3.4 ± 0.5 days, while those in Group 2 took longer, requiring 5.6 ± 2.2 days. This suggests that EPSiT may facilitate a quicker recovery and earlier return to daily life. The return to work was shorter in our study in patients who underwent limberg flap when compared with study by Kuvvetli et al. [15].

Early complications, including swelling and serous discharge, were less frequent in the EPSiT group compared to the Limberg flap group. This highlights the potential benefits of the endoscopic approach in minimizing early postoperative issues. The complcations among patients underwent limberg flap was lesser when compared to study by Ozcan R et al. [16].

Wound healing rates also favored EPSiT, with patients in this group experiencing earlier complete wound healing at 20.1 ± 2.3 days, in contrast to the Limberg flap group, which had a longer healing time of 25.8 ± 2.9 days. This indicates that EPSiT may contribute to a more expedited and efficient wound healing process. The wound healing in patients who underwent limberg flap was in accordance with study done McCallum et al. [17].

The recurrence rates within the first 45 days were zero for both groups, indicating an immediate success in preventing early recurrences. However, within the subsequent 3- to 6-month period, there were some occurrences in both groups, suggesting that ongoing surveillance and follow-up are essential in assessing the long-term efficacy of these treatments.

Minimally invasive treatment offers numerous advantages, with several studies demonstrating a shorter post-treatment recovery period after Endoscopic Pilonidal Sinus Treatment (EPSiT) compared to more extensive surgical procedures [13–18]. Patients undergoing EPSiT often report experiencing less pain and enjoy a better quality of life when compared to those undergoing traditional flap surgery for pilonidal sinus [19]. Despite these benefits, one drawback of EPSiT is the requirement for specific equipment, including a fistuloscope and necessary instruments, incurring higher procedural costs, including the initial equipment purchase, and expenses associated with disposable elements and equipment sterilization. In contrast, the flap procedure can be performed using a standard set of

surgical instruments and several packages of surgical sutures.

The literature consistently reports favorable outcomes for the EPSiT procedure. A significant multicenter study, led by the inventor of EPSiT, involving 250 patients, predominantly with uncomplicated pilonidal sinus, demonstrated a notable 94.8% success rate in terms of healing [11]. Additionally, a study by the same authors focused on evaluating EPSiT in patients with recurrent pilonidal sinuses, revealing a similarly high effectiveness rate of 95% [20].

Acknowledging the limitations of our study, the absence of randomization stands out as a notable drawback. The choice of the surgical procedure was based on patients' decisions, potentially influenced by information provided by the surgeon, introducing a potential source of bias. Furthermore, the relatively small size of the patient groups is another limitation that should be considered when interpreting the results.

## Conclusion

In conclusion, the findings from this study suggest that EPSiT may offer several advantages over the traditional Limberg flap procedure, including shorter intraoperative time, reduced postoperative pain, quicker resumption of routine activities, fewer early complications, and faster wound healing. However, long-term recurrence rates warrant continued monitoring. Overall, these results contribute valuable insights into the comparative effectiveness of these treatment modalities for pilonidal sinus, providing a foundation for informed clinical decision-making.

## Conflicts of Interests

The authors declares that they do not have conflict of interest.

## References

1. McCallum I, King PM, Bruce J. Healing by primary versus secondary intention after surgical treatment for pilonidal sinus. Cochrane Database Syst Rev 2007; 17: CD006213.
2. Søndenaa K, Andersen E, Nesvik I, Søreide JA. Patient characteristics and symptoms in chronic pilonidal sinus disease. Int J Colorectal Dis. 1995; 10: 39–42.
3. Page BH. The entry of hair into a pilonidal sinus. Br J Surg 1969; 56: 32.
4. Bascom J. Pilonidal disease: origin from follicles of hairs and results of follicle removal as treatment. Surgery 1980; 87: 567–72.
5. Bascom J. Pilonidal disease: long-term results of follicle removal. Dis Colon Rectum 1983; 26: 800–7.
6. Stelzner F. Causes of pilonidal sinus and pyoderma fistulans sinifica. Langenbecks Arch Chir 1984; 362: 105–18.
7. Bi S, Sun K, Chen S, Gu J. Surgical procedures in the pilonidal sinus disease: a systematic review and network meta-analysis. Scientific reports. 2020 Aug 13;10(1):13720.
8. Enriquez-Navascues JM, Emparanza JI, Alkorta M, Placer C. Meta-analysis of randomized controlled trials comparing different techniques with primary closure for chronic pilonidal sinus. Tech Coloproctology 2014; 18: 863–72.
9. Lee MJ, Strong EB, Lund J, Hind D, Brown SR, PITSTOP Management Group, Bradburn M, Din F, Lee E, Moffatt C, Morton J. A survey of treatment preferences of UK surgeons in the treatment of pilonidal sinus disease. Colorectal Disease. 2023 Oct;25(10):2010-6.

10. Romaniszyn M, Swirta JS, Walega PJ. Long-term results of endoscopic pilonidal sinus treatment vs Limberg flap for treatment of difficult cases of complicated pilonidal disease: a prospective, nonrandomized study. Colorectal Disease. 2020 Mar;22(3):319-24.
11. Meinero P, Mori L, Gasloli G. Endoscopic pilonidal sinus treatment (E.P.Si.T.). Tech Coloproctology 2014; 18: 389– 92.
12. Emile SH, Elfeki H, Shalaby M, Sakr A. Endoscopic pilonidal sinus treatment: a systematic review and meta-analysis. Surg Endosc 2018; 32: 3754.
13. Sequeira JB, Coelho A, Marinho AS, Bonet B, Carvalho F, Moreira-Pinto J. Endoscopic pilonidal sinus treatment versus total excision with primary closure for sacrococcygeal pilonidal sinus disease in the pediatric population. J Pediatr Surg 2018;53:2003–7.
14. Esposito C, Izzo S, Turrà F, Cerulo M, Severino G, Settimi Aet al. Pediatric endoscopic pilonidal sinus treatment, a revolutionary technique to adopt in children with pilonidal sinus fistulas: our preliminary experience. J Laparoendosc Adv Surg Tech A 2018;28:359–63
15. Kuvvetli A, Cetinkunar S, Parlakgumus A. Evaluation of etiological risk factors in the development of adult chronic pilonidal disease, Turk J Colorectal Dis 2019;29:75–7
16. Ozcan R, Hüseynov M, Bakır AC, Emre S, Tütüncü C, Celayir S, et al. Which treatment modality for pediatric pilonidal sinus: Primary repair or secondary healing? Asian J Surg 2018;41:506–10
17. McCallum IJ, King PM, Bruce J. Healing by primary closure versus open healing after surgery for pilonidal sinus: systematic review and meta-analysis. BMJ 2008;336:868–7
18. Foti N, Passannanti D, Libia A, Campanile FC. A minimally invasive approach to pilonidal disease with endoscopic pilonidal sinus treatment (EPSiT): a single-center case series with long-term results. Techniques in Coloproctology. 2021 Sep;25(9):1045-54.
19. Eastment J, Slater K. Outcomes of minimally invasive endoscopic pilonidal sinus surgery. Asian Journal of Endoscopic Surgery. 2020 Jul;13(3):324-8.
20. Meinero P, La Torre M, Lisi G, Stazi A, Carbone A, Regusci L, Fasolini F. Endoscopic pilonidal sinus treatment (EPSiT) in recurrent pilonidal disease: a prospective international multicenter study. International journal of colorectal disease. 2019 Apr 1;34:741-6.