ORIGINAL ARTICLE

Endoscopic pilonidal sinus treatment (EPSiT) in the pediatric age group: Short-term results

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ABSTRACT

BACKGROUND: This study aims to evaluate the short term outcomes of the Endoscopic pilonidal sinus treatment (EPSiT) in the pediatric age group.

METHODS: In this study, between June 2018 and July 2019, pediatric patients with pilonidal sinus (PS) who were treated with the EPSiT method were reviewed retrospectively.

RESULTS: Of the twenty-nine patients (20 males, nine females), the average age was 15.5±2.8 years, and the average body mass index (BMI) was 25.8±4.2. Eight patients (28%) presented with a history of recurrence following the previous surgery. The average number of fistulas present in cases was 1.17 (1–2). The localization of the fistula was midline in twenty-four and lateral in five of the patients. The average time of the EPSiT procedure was 57±13.9 minutes, and the average time of hospital stay was 11.4±7.2 hours. The pain score average was 0.86 (range of 0–3) and the duration of analgesic use was 37 hr (12–72 hr). The mean post-operative time of total wound healing was 18.71 days (7–60 days) for primary presenting cases. Early wound healing was seen in twenty-five patients (average of 14 days), while late wound healing was observed in four patients (average of 60 days). The mean time of follow-up was 8.3±3.34 months. The average time of return to full daily activity was 2.1 days (0–30 days), while it was the same day for sixteen (53%) patients. In post-operative follow-up, early (bleeding: 1) and late (formation of granulation tissue: 1, recurrence: 8) complications were seen in nine patients. Of the eight patients (27.5%) whose recurrence was detected, seven were primary and one was secondary presenting patients. The average time of presentation for recurrence was 5.8 mo (1–10 mo). Re-EPSiT was applied in two of the eight patients with recurrence and is planned for five, while one of the patients lost to follow-up.

CONCLUSION: EPSiT is an easily applicable, pain-free minimal invasive procedure with a short period of hospital stay and a fast return to routine daily activity. It provides comfortable and repeatable intervention in cases with recurrences after the EPSiT procedure and other methods for PS treatment.

Keywords: Children; EPSiT; fistuloscope; pilonidal sinus.

INTRODUCTION

Pilonidal Sinus (PS) is a pathology that occurs with acute or chronic infection in the gluteal cleft. It affects an estimated 26 per 100,000 people, occurring primarily in young adults with a 3:1 male predominance.[1] The etiology, once considered congenital, is now understood to be acquired.[2,3] Obesity, local irritation, long hours of sitting during work and trauma are known as the underlying risk factors.[4]

The incidence of PS differs according to ethnicity, being low among Africans and Asians and high among white people, particularly those in the Mediterranean region. In a study conducted among 1000 Turkish military soldiers, the incidence of PS was identified as 6.1%.[5–8]

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There is no consensus on a gold standard surgical technique for PS. Enbloc excision and secondary healing are the most common surgical methods utilized for treatment. However, all of the surgical techniques described have long postoperative recovery periods and recurrences.[9] Thus, the best approach is to choose a method that is easy to apply and allows the patient to return to his/her daily activity in a short period. In 2013, Meinero et al.[10] introduced a new video-assisted minimally invasive technique for the PS treatment with favorable results. Following this report, in 2017, Esposito et al.[11] published their preliminary experience with this technique in the pediatric population with better outcomes.

To take advantage of early return to daily activities and lower recurrence rates, we initiated the EPSiT procedure in pediatric cases with PS in our department in 2018. The main purpose of this article is to evaluate the short term outcomes of this new method.

MATERIALS AND METHODS

Between June 2018 and July 2019, pediatric patients with PS who were treated with the EPSiT method were reviewed retrospectively. The Institutional Review Board (IRB) approval was obtained for this study. The cases were evaluated regarding patient characteristics, duration of the procedure, post-operative pain, hospital stay, return to normal daily activity, wound healing, recurrence and short-term outcome results. Body mass index (BMI) was assessed as <18.5 being low weight, 18.5–24.9 normal weight, 25–29.9 overweight and >30 obese.

Patients were evaluated in two main groups: those presenting primarily and those presenting after recurrence. Patients' demographics and results are summarized in Table 1. Visual analogue scale (VAS) was used for the assessment of pain. Active infections or abscesses were treated with antibiotics before proceeding with surgery. The standard EPSiT procedure was performed in both groups.

EPSiT Technique: We used a Meinero fistuloscope, a monopolar electrode and an endoscopic grasping forceps. The fistuloscope has an 8-angled eyepiece and is equipped with an optical channel and a working and irrigation channel. It has a diameter of 3.2x4.8 mm, and an operative length of 18 cm. A removable handle allows easier maneuvering and better ergonomy for the surgeon. Pre-operative antibiotic prophylaxis was administered and patients were placed in a prone position with buttocks were separated. The EPSiT procedure was performed under general anesthesia as described by Meinero et al.[10]

Patients' relatives were educated on how to take care of the surgical wound with daily dressings. Postoperative hair removal was advised with shaving until the external opening healing was complete.

The outcomes of the patients were evaluated according to the following definitions described by Pini Prato et al.:[12]

Recurrence: Persistence of discharge after more than three months with either abscess formation, infection or local pain and discomfort.

Delayed healing: Wound closure occurring after more than six weeks postoperatively: this issue was mostly due to granuloma formation requiring topic silver nitrate administration.

Infection: Persistent smelly discharge with pain and redness possibly associated with systemic signs (i.e., fever) requiring antibiotic administration.

Success: Complete wound closure, no discharge, no pain in the area of surgery both spontaneously or during palpation, no signs of infection/inflammation.

Early complications were defined for those developing within 30 days and late complications after 30 days in the postoperative period.

Table 1. Patients' demographics and results

	Primary (n=21)	Secondary (n=8)
Age (years)	15.6±3.1	16±1.7
Male/female	15/6	5/3
Body Mass Index	26.1±4.4	25±3.6
Duration of the procedure (minute)	58.33±15	53.75±10.6
Visual Analogue Scala	0.95 (0–3)	0.62 (0–1)
Hospital stay length (hour)	9± 5.1	18±8.2
Return to normal daily activity (day)	1.15 (0–14 day)	1 (0–3 day)
Wound healing (day)	18.71(7–60 day)	25.6 (7–60 day)
Recurrence	7	1
Time of recurrence (months)	5.9 (1.5–10 mo)	5

RESULTS

Of the twenty-nine patients (20 male, nine female), the mean age was 15.5±2.8 years. The mean BMI was 25.8±4.2. Eight patients (28%) presented with recurrence following primary surgery at a different institution (Fig. 1) The mean number of fistulas present was 1.17. The localization of the fistula was midline in twenty-four and lateral in five of the patients. The mean duration of the EPSiT procedure was 57±13.9 minutes and the hospital stay was 11.4±7.2 hours. Mean pain score was 0.86±0.65 and the mean duration of analgesic use was 37 hours (range 12–72 hrs). Mean post-operative time for total wound healing was 19 days (range 7–60 days) for primary presenting cases. Early wound healing was observed in 25 patients (average: 14 days), while late wound healing was seen in four (average: 60 days). Figure 2 demonstrates the different stages of wound healing.

The mean duration of follow-up was 8.3±3.34 months. The mean time of return to full daily activity was 2.1 days (range 0–30 days) while it was the same day in 16 (53%) patients. In post-operative follow-up, early (bleeding: 1) and late (formation of granulation tissue:1, recurrence: 8) complications were seen in a total of nine patients. Of the eight patients (28%) with recurrence, seven patients were treated primarily, while one was a recurrent case. The average time to recurrence was 5.8±2.8 months. Re-EPSiT was performed in two of the seven patients with recurrence and was planned for five, while one of the patients was lost to follow-up.

DISCUSSION

PS is a common problem in the sacrococcygeal region, especially in obese, sedentary young men.[1] The male:female ratio was reported to be 1:1 in the study conducted by Nasr et al.,[13] while Sequeira et al.[14] reported a male preponderance of 72.6%. Unlike both these studies, we found a male:female ratio of 2.2:1.

There are different theories on the pathogenesis of PS. In one theory, the remains of the neural canal or ectoderm invaginate due to congenital causes.[11] In the other, currently more widely accepted theory, the disease is thought to be acquired. Karydakis suggested that three factors influence the development of PS: hair loss, external pressure and penetration of shed hairs from the natal cleft into the subcutaneous region.[4,15] Thus, PS usually appears after puberty. In our study, the mean age was 15.5 years which is in concordance with the literature. Some risk factors have been reported for the development of PS and high BMI is one of them. Studies have shown that PS was significantly more common in patients with a BMI of 25.1–30.0 kg/m^2, indicating that overweight patients (BMI >25) were at greater risk of the disease.[16] The mean BMI of 25.8 found in our study is in concordance with the literature. Therefore, we informed our patients to increase their daily activities.

There are different approaches to treat PS, yet there is no consensus on the most effective technique. Non-surgical treatments, minimal tissue excision, lateralized full-thickness flaps, primary midline repair, secondary open healing and local

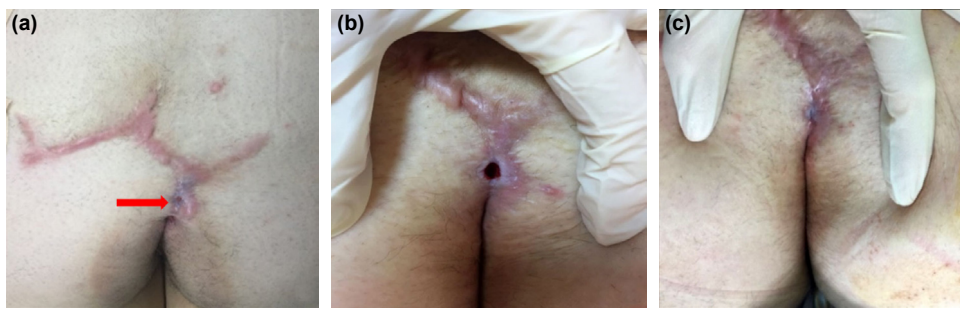

Figure 1. (a) Patient who presented with recurrence of PS after repair with Limberg Flap in a different institution (the area marked by red arrow indicates a recurrent fistula). **(b)** 7th day after EPSiT procedure **(c)** 21st day after EPSiT procedure with complete wound healing.

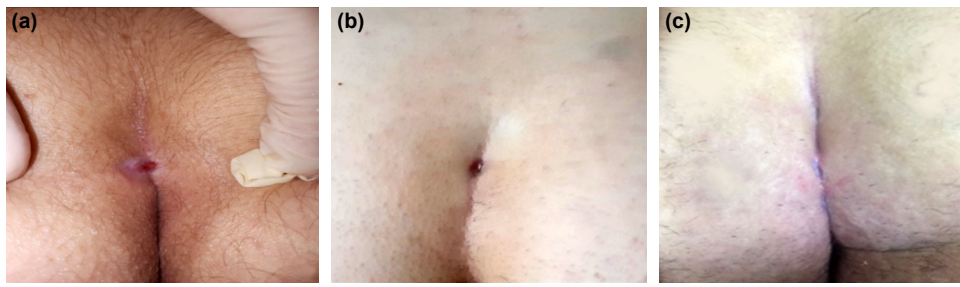

Figure 2. Different stages of wound healing **(a)** 7th day after EPSiT procedure **(b)** 10th day after EPSiT procedure **(c)** 14th day after EPSiT procedure.

Table 2. Comparisons of EPSiT series in the pediatric population

	Patients (male/female)	Age (years)	Hospital stay lenght	VAS	Healing time	Recurrence
Esposito et al. 2017	15 (9/6)	16 (range 13–18)	28h (range 22–48h)	3.2 (range 2–5)	30 days	None
Pini Prato et al. 2018	43 (20/23)	15±1.4	24h (range 12–72h)	2±1.4	3 weeks (range 2–6)	5 (12%)
Esposito et al. 2019	59 (36/23)	16 (range 13–18)	22.4h (range 18–36h)	2.7 (range 2–5)	24 days (range 21–20)	1 (1.6%)

treatment with phenol have all been reported in the literature with various clinical results.[17–19]

After Meinero et al.[10] introduced the EPSiT technique, this treatment became popular because it is easy to apply, pain-free and has a short hospital stay. The advantage of the technique is endoscopic access to the sinus tract allowing removal of debris and hair under direct vision. This is considered to be fundamental for quicker recovery and healing.

Esposito was the first to adopt the endoscopic pilonidal sinus treatment in children with PS fistulas. The their first publication on pediatric endoscopic pilonidal sinus treatment (PEPSiT), Esposito et al.[11] reported their preliminary experience by comparing it with the outcome of the last 15 patients who underwent the classic open excision technique in their institution, confirming that PEPSiT was associated with a significantly shorter, painless and cosmetically better outcome.

The second report was a multi-center series, coordinated by Pini Prato.[12] Then, Esposito et al.[20] presented a larger series consisting of 59 patients at the beginning of 2019. According to the results obtained in these studies, EPSiT showed a relatively low incidence of complications and recurrence (Table 2).

The ideal surgical technique for PS treatment should provide a short hospital stay, faster recovery and return to full daily activities. The average time to return to full daily activities was 3.5 days (range 1–5) in Meinero's study and 2.5 days (range 1–4) in Esposito's study, which is significantly shorter than the other techniques.[10,11] Our study has found that this procedure shortens hospital stay and provides a quick return to daily activity as well. The average time of return to full daily activity was 2.1 days (0–30 days), while it was the same day for sixteen (53%) patients and this result is in concordance with the literature.

In various reports, open surgery and secondary healing were associated with late wound healing, longer hospital stay and increased postoperative pain.[9,21] With PEPSiT, postoperative average pain scores evaluated with VAS were 3.2 (range 2–5) by Esposito et al.,[11] 2±1.4 by Pini Prato.[12] and 0.86 (range of 0–3) in this study, lower than both series. These results ensure the positive effects of this treatment method as a relatively painless technique with a shorter healing time.

EPSiT procedure provides good cosmetic results, which are also important for the pediatric population. In the study conducted by Esposito et al.,[11] the external openings had closed in all patients in one month postoperatively. In the study by Pini Prato et al., complete healing occurred in 38 patients (88%) after a median of three weeks (range 2–6 weeks).[16] In our study, mean postoperative total wound healing was 20,62 days (7–60 days). Early wound healing was seen in twenty-five patients (average of 14 days), while late wound healing was seen in four patients (average of 60 days). Postoperatively, complete healing of external openings was achieved in all patients. The cosmetic results of the patients were satisfactory.

Several studies have demonstrated that recurrences after surgery may occur independently from the surgical technique.[6,9,21] In our study, the 27.5% recurrence rate was higher than the average reported in the literature. This high recurrence rate may be related to various factors. One of them is that the lack of integration of laser epilation as part of the treatment protocol has been stressed, especially in societies where the pilonidal sinus is more common and the possibility of recurrence is high. Esposito reported in 2019 that after standardization of EPSiT with a combination of pre and postoperative laser epilation, the recurrence rate has decreased significantly.[12] In our series, laser epilation was not combined with EPSiT, and this might contribute to the higher recurrence rate.

Although our recurrence rate of 27.5% is high in comparison with other EPSiT reports, it is comparable to other standard surgical and non-surgical treatment methods. Halleran et al.[8] reported an overall recurrence rate of 33.2%; 30.3% with surgical excision and 39.4% with incision-drainage and/or antibiotics. In a recent study by Doll et al.,[22] the recurrence rate in three different surgical treatments was 17% with primary open wound therapy, 30% with primary closure and 18% with marsupialization. Treatment of recurrence following any surgical technique has a painful and long postoperative course with poor cosmetic results. One of the advantages of the EPSiT procedure is its applicability with ease even for recurrent PS following other surgical techniques. In this study, eight of 29 (28%) presenting with recurrent PS following primary surgery and treated with EPSiT procedure had good clinical and cosmetic results. EPSiT procedure was easily applicable for recurrent PS after EPSiT procedure as well. The ease of reapplication of this technique is the most important advantage

of EPSiT, especially in the pediatric age group. Re-EPSiT was applied and successfully treated two of the eight patients with recurrence after the EPSiT procedure. It is safe and effective and has the potential to become the gold standard for a minimally invasive scarless approach in the treatment of recurrent PS following the failure of either open surgery or EPSiT.[23]

Our study has some limitations. One of them is the small group size. The other limitation is that we have not evaluated the efficacy of laser hair removal as part of the EPSiT treatment protocol, which could have reduced the recurrence rate.

In conclusion, EPSiT is a minimally invasive method that is painless, easy to perform and has a short hospital stay with a quick return to normal daily activity. The technique may be employed in both primary and recurrent cases with good cosmetic results. According to our initial experience, we believe that this procedure should be the preferred technique for surgical treatment of PS in the pediatric population.

Ethics Committee Approval: This study was approved by the ethics committee of Cerrahpasa Medical Faculty (approval number: 83045809-604.01.02).

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Conflict of Interest: None declared.

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ORİJİNAL ÇALIŞMA - *ÖZET*

Çocuk yaş grubunda endoskopik pilonidal sinüs tedavisi (EPSiT): Erken sonuçlar

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AMAÇ: Pilonidal sinüs (PS) tedavisinde endoskopik pilonidal sinüs tedavisi (EPSiT) yönteminin erken dönem sonuçlarını değerlendirmektir.
GEREÇ VE YÖNTEM: Haziran 2018–Temmuz 2019'da EPSiT yöntemiyle tedavi edilen olgular geriye dönük olarak incelendi. Olguların demografik verileri, cerrahi işlem süresi, ameliyat sonrası ağrı, hastanede kalış süresi, normal aktiviteye geçiş ve yara iyileşme süresi ve EPSiT işleminin sonuçları değerlendirildi.
BULGULAR: Yirmi dokuz olgunun (20 erkek, 9 kız) yaş ortalaması 15.5±2.8 yaş idi. Vücut kitle indeksi (VKİ) ortalaması 25.8±4.2 idi. Sekiz olgu (%28) dış merkezde girişim sonrası nüksle başvurmuştu. Fistül sayısı ortalama 1.17 (1–2) idi. Fistül lokalizasyonu olguların 24'ünde orta hat, beşinde lateral yerleşimliydi. EPSiT işleminin süresi ortalama 57±13.9 dakika, hastanede kalış süresi ortalama 11.4±7.2 saat idi. Ağrı skoru ortalama 0.86 (0–3 arasında) ve analjezik kullanımı ortalama 37 saat (12–72 saat) olarak bulundu. Tam yara iyileşmesi primer başvuran hastalar için 19 gün (7–60 gün) idi. Olguların 25'inde erken yara iyileşmesi (ortalama 14 gün) ve dördünde geç yara iyileşmesi (ortalama 60 gün) görüldü. İzlem süresi 8.3±3.34 ay idi. Tam günlük aktiviteye geçiş 2.1 gün (0–30 gün) iken 16 olguda (%53) aynı gün idi. Ameliyat sonrası izlemde dokuz olguda erken (kanama: 1) ve geç (granülasyon dokusu: 1, nüks: 7) komplikasyonlar görüldü. Nüks saptanan sekiz olgunun (%27.5) yedisi primer, biri nüks sonrası başvurmuştu. Nüks görülme süresi ortalama 5.8±2.8 ay idi. Bu sekiz olgunun ikisine re-EPSiT yapıldı, biri takipten çıktı, beşine tekrar EPSiT planlanmaktadır.
TARTIŞMA: Endoskopik pilonidal sinüs tedavisi yöntemi kolay uygulanabilir, ağrısız, kısa hastanede kalış süresi olan ve normal günlük aktiviteye hızlı dönüşü sağlayan minimal invaziv bir yöntemdir. EPSiT ve diğer tedavi yöntemleri sonrası görülen nükslerde rahatlıkla ve tekrarlayan uygulamalar yapma olanağı sağlamaktadır.
Anahtar sözcükler: Çocuk; EPSiT; fistüloskop; pilonidal sinüs.

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