



# The EPIC procedure (Endoscopic-assisted Pilonidal Irrigation and Cleaning): a simple and effective treatment for pilonidal disease

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## Abstract

**Background** Pilonidal disease (PD) is a common condition of the sacrococcygeal region leading to inflammation and abscess formation. PD is a topic of renewed interest due to the lack of satisfactory management options. Minimally invasive techniques have recently been investigated, with promising results in adult and pediatric populations. Our technique, the “EPIC procedure,” Endoscopic-assisted Pilonidal Irrigation and Cleaning, involves removal of hair under direct visualization using a small endoscope while flushing saline through the cavity via an angiocatheter. We aim to show that the EPIC procedure is a safe and effective operation for the treatment of pilonidal disease in the pediatric population.

**Materials and methods** We performed a retrospective chart review including 20 consecutive patients. All had a primary sacrococcygeal pilonidal sinus; all underwent the EPIC procedure. Post-operative care instructions included daily bathing and weekly depilatory application. We evaluated gender, age, weight, disease severity, operative duration, recurrence of PD, and other complications.

**Results** In the 20 patients studied, 22 EPIC procedures were performed. The median follow-up duration was 27.95 (range 0.63–45.27) months. The mean operative duration was 28.8 (SD 10.2) min. There was a 15% recurrence rate (95% CI 0.00%, 30.65%).

**Conclusions** The EPIC procedure is an endoscopic-assisted operation that simplifies previously published techniques in pursuit of reduced operative complexity, cost, and time, with comparable recurrence and complication rates. All three recurrences occurred in patients that did not follow instructions for post-operative depilatory care. Two of these patients underwent repeat EPIC procedure and had no further complications. The third was lost to follow-up. The EPIC procedure provides a simple, effective, and minimally invasive approach to the treatment of pilonidal disease.

**Keywords** Pilonidal · Minimally invasive · EPSIT · PEPSIT · EPIC · Pit picking

Pilonidal disease (PD) is a common condition of the sacrococcygeal region caused by invagination of hair follicles leading to inflammation and abscess formation [1, 2]. While there are several theories about the pathogenesis of this condition, there is consensus that it is an acquired condition caused by local inflammation and infection of hair follicles

in the natal cleft, with resultant abscess and fistula tract formation [3]. PD has a reported incidence of 26:100,000 in a 3:1 male to female ratio, with known risk factors of family history, local irritation, obesity, and hirsutism [3, 4]. First described in 1833 by Herbert Mayo, PD is a topic of renewed interest due to what many perceive as a lack of satisfactory management options [3]. The ideal treatment should be easy to perform with short operative and recovery times, minimal pain, and low risk of complications and recurrence. Many surgical options have been employed, such as midline and off-midline resection (with and without closure), cleft lift operation, and the use of rotational flaps [5–8]. Due to the invasive nature of these procedures, wound complications, and relatively high recurrence rates, minimally invasive techniques have more recently been investigated [9]. One such technique involves pilonidal “pit picking” followed by

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electrocautery ablation [10, 11]. This procedure has shown promise with up to a 95% success rate [12]. In 2014, Merino et al. described the use of an endoscope in the treatment of PD, a procedure they called “Endoscopic Pilonidal Sinus Treatment”, or EPSiT [13]. The technique requires a fistuloscope, forceps, electrocautery, endobrush, and continuous infusion of glycine/mannitol 1% solution [13]. Trapped hairs are removed from the cavity under direct visualization, the cavity is ablated, and necrotic material is removed [13]. In 2018, Esposito et al. described the EPSiT technique in the pediatric population, called “Pediatric EPSiT”, or “PEPSiT” [14].

We present the EPIC procedure: Endoscopic-assisted Pilonidal Irrigation and Cleaning, a new minimally invasive technique for the treatment of PD. This technique foregoes the use of potentially painful electrocautery or chemical agents, in pursuit of simplification of PD management and reduced post-operative pain. The aim of our study is to show that the EPIC procedure is a safe and effective operation for the treatment of pilonidal disease in the pediatric population.

## Materials and methods

We performed a retrospective chart review of 20 consecutive patients with pilonidal disease who presented to a single pediatric surgeon at a single institution from December, 2016 to January, 2020. The local institutional review board deemed this study to be exempt. All patients had a primary sacrococcygeal pilonidal sinus and underwent the EPIC procedure in the operating room, intubated, in the prone position. A pre-operative dose of cefazolin was administered. Postoperatively, patients were told to bathe daily and apply depilatory once weekly. We evaluated gender, age, weight, disease severity, operative duration, recurrence, and other complications. A patient was considered to have had a recurrence if they complained of redness, discharge, or pain at any time after the immediate follow-up period. We calculated descriptive statistics; no inferential comparisons were made. 95% confidence intervals were calculated for proportion of reoccurrence within patients and complications within procedures. All analyses were performed using SPSS v9.4 and Microsoft Excel software.

## Operative technique

A 3 mm endoscope is placed into the pilonidal sinus. Saline is flushed through the cavity via an angiocatheter. Small forceps are placed via a second sinus. If there are not two sinuses of adequate size, they are either enlarged bluntly or small incisions are made. Under direct visualization, all hairs are removed from the cavity. When the cavity is free of all

**Table 1** Demographics and results of 20 patients

Gender— <i>n</i> (%)	
Male	15 (75%)
Female	5 (25%)
Mean age, years (SD)	15.6 (1.64)
Mean weight, kg (SD)	95.4 (28.70)
Median follow-up duration, mos (range)	27.95 (0.63–45.27)
Recurrence— <i>n</i> (%)	3 (15.0%)

**Table 2** Findings of 22 operations

Quantity of preoperative gluteal hair— <i>n</i> (%)	
None	0 (0%)
Small	4 (18.18%)
Medium	2 (9.09%)
Large	16 (72.73%)
Quantity of pits— <i>n</i> (%)	
None	1 (4.55%)
Few	9 (40.91%)
Many	12 (54.55%)
Quantity of intraoperative hair removed from pilonidal sinus— <i>n</i> (%)	
None	4 (18.18%)
Small	6 (27.27%)
Medium	3 (13.64%)
Large	9 (40.91%)
Mean operation time, min (SD)	28.8 (10.2)
Mean cavity length, cm (SD)	5.43 (3.19)

hair, the endoscope, angiocatheter, and forceps are removed, and a dressing is applied.

## Results

There were 20 patients studied, 75% male and 25% female (Table 1). The mean age was 15.6 (SD 1.64) years old. The mean weight was 95.4 (SD 28.70) kg. Seventeen patients (85.00%) had a pilonidal abscess prior to the EPIC procedure; 11 (64.71%) of these drained spontaneously, while 6 (35.29%) underwent incision and drainage. The median follow-up duration was 27.95 (range 0.63–45.27) months. There were 22 EPIC operations performed (Table 2). The mean operative duration was 28.8 (SD 10.2) min. Of the 20 patients, 3 (15%) developed recurrent pilonidal disease (95% CI 0.00%, 30.65%). One patient developed a fungal-appearing infection that resolved with topical antifungal cream. One patient experienced “skin separation” one day after laser hair removal, several months after the EPIC procedure. There were no other complications.

## Discussion

Traditional management of PD involves the excision of all pilonidal sinus tissue, with the resultant large wound left open to heal by secondary intention. This technique has the significant drawbacks of a long duration of healing, a requirement for repeated wound packing, and increased pain [15, 16]. A 2005 study found an average healing time of 70 days, consistent with other studies [17, 18]. A modification to this technique, marsupialization, was first described by Buie in 1938 [19]. After unroofing and curettage of the tracts, the skin is sewn to the fibrotic base of the wound to create a smaller wound for faster healing [19]. A 2002 study of this technique found a 10% recurrence rate, with an average healing period of 44.4 days [16]. Techniques without primary closure have long healing times and require repeated wound packing [18–20].

The introduction of flap procedures assisted with closure of the resultant large incisions. The use of flaps allows for immediate or delayed tension-free closure using healthy tissue. Many variations on the technique have been developed, including Z-plasty, V–Y advancement flaps, and Limberg flaps [6, 8, 21, 22]. A 2019 study found a 4.19% recurrence rate using the Limberg flap procedure [23]. Primary closure techniques are associated with significantly faster healing times and fewer days off work, but with increased wound complications and infectious risks [15, 24, 25].

In the 1980s, Bascom postulated that hair and hair follicles were central to the pathogenesis of the condition [26]. In 1983 he proposed a technique, later called “simple Bascom’s procedure” or “Bascom’s simple surgery”, which involved drainage of the sinuses via a lateral incision, followed by excision of midline pits and primary closure [27, 28]. In 1987, he introduced the “cleft lift” procedure, in which diseased midline skin is excised and healthy lateral skin is mobilized and used to close the cleft without mobilizing fat or deeper tissues [7]. The cleft lift technique has been shown to have superior healing time and recurrence outcomes compared to Bascom’s simple surgery [28]. These procedures were among the first to focus primarily on the epidermis, rather than deep tissue, and the removal of hairs and hair follicles from the cleft [7, 26, 27, 29]. Bascom’s theories and techniques are seen as the beginning of the shift towards minimally invasive management of PD [8, 26, 27]. The cleft lift procedure has been shown to have a shorter healing time compared to open techniques, with no difference in recurrence rate [24]. A 2020 study reported a recurrence rate of 4.7% with 235 patients and a follow-up period of 43 weeks [30].

The EPSiT technique, introduced in 2014 by Merino et al. further advanced minimally invasive management of

PD [13]. Unlike Bascom’s technique, which relied on indirect visualization, the EPSiT technique allows for clearing of the sinus and hemostasis to be achieved under direct visualization. While infusing glycine/mannitol 1% solution, a fistuloscope is inserted into the opening of the cavity with the assistance of Kelly forceps [13]. After identifying all areas of infection and any secondary tracts, hair and hair follicles are removed with endoscopic forceps [13]. Granulation tissue is cauterized using a monopolar electrode, and necrotic material is removed using an endobrush or a Volkmann spoon [13]. In the case of multiple incisions due to an extensive infected area, a bristled brush is passed through the incision sites [13]. A 2016 study reported a 5% recurrence rate at a mean follow-up duration of 12 months in an adult population [12]. A follow-up study in 2019 had similar findings [31]. A 2018 meta-analysis found an 8.04% failure rate; 4.02% of patients had persistent (non-healing) PD, and 4.02% had recurrent PD following the EPSiT procedure [32].

Pediatric EPSiT (PEPSiT) has also been shown to be an effective treatment for PD, although the body of research is limited compared to that of the adult population. A 2018 study found a recurrence rate of 10.5% in 21 patients [33]. The complication rate, excluding disease recurrence, was 10.5% [33]. A 2020 study reported a 1.6% recurrence rate in 59 PEPSiT patients who underwent multiple sessions of laser hair removal prior to the procedure and after wound epithelialization, as well as application of silver sulfadiazine spray and 2% eosin solution [34].

The EPIC procedure differs from PEPSiT due to several modifications. We simplified the technique in pursuit of reduced operative complexity, cost, time, and patient discomfort. The EPIC procedure provides a minimally invasive approach to the treatment of pilonidal disease with an 85% success rate. Given that most of our patients were comparable to adults with respect to weight and hirsutism, we feel that this technique would likely be as successful in the adult population. While not formally assessed, our patients described having virtually no pain postoperatively. All patients went home the same day with no further time off required from work, school, or other activities.

It is important to note that all recurrences in our study occurred in patients that did not follow post-operative instructions for daily bathing and weekly hair removal using depilatory on the gluteal region. Of note, one of the patients who recurred had insulin-dependent diabetes. She had a medium amount of preoperative gluteal hair, and a medium amount of hair was removed from her pilonidal sinus intraoperatively. She presented with a new pilonidal abscess, underwent incision and drainage, but was lost to follow-up before undergoing repeat EPIC procedure. The other two patients who recurred had a large amount of preoperative gluteal hair, and a large amount of hair was removed from

the pilonidal sinus intraoperatively. Both patients that underwent repeat EPIC procedure followed post-operative instructions and did well.

In the 17 patients that were compliant, there were no recurrences. We feel that daily bathing and weekly hair removal in the first few months are of utmost importance to the success of the EPIC procedure. It should be noted, however that at later follow-up, many of our patients had abandoned all attempts at hair removal and were doing well.

In conclusion, there is currently no standard procedure for the treatment of PD. The EPIC procedure is a simple technique for the management of PD that has low recurrence and complication rates, and is especially successful in patients compliant with bathing and hair removal postoperatively.

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## Declarations

**Disclosures** Michael Leinwand is on the advisory board of Virtual Ports Laparoscopic Systems. Jacob Baxter and Jairo Espinosa have no conflicts of interest or financial ties to disclose.

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