

Minimally invasive pilonidal sinus disease (PSD) treatment in pediatric patients: A narrative review

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Abstract

Pilonidal sinus is a common disease of the natal cleft, which can lead to complications including infection and abscess formation. Various operative techniques are available options for the treatment of this pathology, but the ideal technique is still debatable. Analyzing the literature we found out that more recently minimally invasive approaches have been described. In particular, the mechanism of an endoscopic approach relies on the use of the endoscope without cutaneous tissue damage. Advantages include shorter operative time and time to discharge, which impact resource management in both primary and secondary care: patients undergoing endoscopic technique have a high satisfaction rate, probably due to the low level of postoperative pain and early return to daily activities. Published results of studies of newer approaches have demonstrated a lower short and long-term complication rate compared to open surgery. However, very poor reports are available in literature about pediatric population.

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Key words: Pilonidal sinus; endoscopic surgery; children; minimally invasive surgery.

Availability of data and materials: All data generated or analyzed during this study are included in this published article.

Ethics approval and consent to participate: Not applicable.

Informed consent: Not applicable.

Received for publication: 27 December 2021.

Revision received: 24 January 2022.

Accepted for publication: 1 February 2022.

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La Pediatria Medica e Chirurgica 2022; 44:281

doi:10.4081/pmc.2022.281

Introduction

Pilonidal Sinus Disease (PSD) is a common inflammatory disease of the sacrococcygeal region.¹ It occurs mainly in young men and teenagers with a reported incidence of 26:100,000 and is associated with obesity, hirsutism, sedentary occupation, and local irritation.² PSD is considered an acquired disorder caused by the obstruction of hair follicles in the natal cleft.³ Herbert Mayo firstly described this disease in 1833. In 1880, Hodges named the disease with the word "pilonidal" by conjoining the word "pilus," hair in Latin, and "nidus," which means nest.^{4,5} The clinical presentation is variable, ranging from asymptomatic pits to acute abscess to chronic cyst, with a considerable negative impact on the quality of life.⁶

The most effective treatment for pilonidal sinus remains debatable despite various surgical techniques being available both in adult and pediatric population. The ideal surgical technique should eradicate the cyst and remove and clean the main and secondary sinus' tracts, leading to complete and durable healing with good cosmetic outcome.^{7,8} The traditional open excision and healing by secondary intention is associated with a long and painful postoperative course and high morbidity rates.¹ Conversely, open excision with primary closure, using different techniques including flap-based procedures, allows shorter wound healing time but higher rates of wound-related complications, such as infection and wound dehiscence, and recurrence.^{8,9} The recurrence of the disease after open surgical treatment remains the most serious problem, ranging from 0% to 40%, for different surgical approaches.^{10,11} PSD is a common entity among children and adolescents, with complication and recurrence rates comparable with the adult population.^{12,13} In 2014, Meinero *et al.* described a novel minimally invasive approach for PSD, the Endoscopic Pilonidal Sinus Treatment (EPSiT), reporting very promising results in adults such as a shorter wound healing and time off work and also improved pain control and cosmesis.^{13,14} Esposito *et al.* in 2018 published their technique of pediatric endoscopic pilonidal sinus treatment (PEPSiT).^{15,16}

Different approaches to PSD: State of art

There is still no consensus about the gold standard surgical management for pilonidal disease in the pediatric population.¹⁷ The treatment is virtually the same as for adult patients and many of these patients are often operated by general surgeons. An extensive review on the treatment of pilonidal sinus by Allen-Mersh was performed in 1990, which concluded that the choice of surgical approach is dependent on the surgeon's experience of the proce-

ture and perceived results in terms of healing speed and recurrence rate.¹⁸ As mentioned before various primary or secondary flap methods, accompanied by one of local curettage, phenol application, electrocauterization, and total sinus excision methods, have been described for the treatment of pilonidal sinus especially in adults.⁸ The traditional Bascom's and Karydakis procedures, in particular, are known for their complications. For the Bascom's procedure, the midline pit is excised with an additional lateral incision, which is undetermined to allow excision of a sinus tract or cyst.¹⁹ The Karydakis procedure excises the entire sinus tract and openings en bloc followed by primary closure off midline achieved by advancement flap.^{19,20} The general trend for surgery to move from open to minimally invasive techniques is mirrored in PS treatment. Sinusectomy, a kind of minimally invasive approach, is a surgical technique in which a circumferential incision of the pilonidal orifices avoiding wide cutaneous margins and a selective subcutaneous extirpation of the sinus without closure of the wound is made. Whereas in the conventional surgical treatment an elliptical wedge of skin and subcutaneous tissue is created to remove the sinus and its lateral tracks, the basis for this treatment is to create a minimal elliptical wedge of the subcutaneous tissue, including all the inflamed tissue and debris, leaving the overlying skin intact. The sinusectomy proposed by Soll *et al.*²¹ was introduced as a novel minimal invasive technique for pilonidal sinus to avoid open wide (*en bloc*) excision in adult population; it has demonstrated a low recurrence rate and a fast return to normal daily activities in adult patients. In 2008, Gips *et al.* proposed a new minimal surgery for pilonidal disease using trephines: in his study on 1358 adult patients, the author found rates of postoperative infection, secondary bleeding, and early failure of only 1.5%, 0.2%, and 4.4%, respectively.²² Furthermore, complete healing was observed with in 3.4 weeks overall; the recurrence rate after 10 years was 16.2%. Elbanna and colleagues also proposed a novel approach: they introduced a sinusectomy accompanied by a thrombin gelatin matrix application as a sealant on 32 patients.²³ Recurrence at 1 year was observed in 2 patients (4%), 96% of patients were satisfied with the procedure, and 92% of patients resumed their daily activities within 3 days.

Despite these minimally invasive approaches in the adult population, excision techniques, both en bloc or not, give numerous problems such as bad and long postoperative period with late return to full daily activities and in a lot of cases, the healing process is very long and painful.

In addition, pilonidal sinus repair is often associated with esthetical problems, infection, hematoma, dehiscence, and recurrence. Despite various surgical techniques being described, reported recurrence rates are as high as 30%, with prolonged recovery times, increased use of resources, repeat surgeries, and patient frustration.

Although PSD is a common disease among children and teenagers, there are very few reports in the literature about PSD in pediatric population. A retrospective review about an over 35-year pediatric surgeon's experience at a Canadian children's hospital concluded that the excision and packing open produced a longer morbidity, but the same results in terms of recurrences, when compared with both marsupialization or excision and primary closure without drainage.¹⁰

Endoscopic approach

Minimally invasive surgical techniques are becoming widespread in recent years due to the increased experience and development of new instruments. New minimally invasive techniques

derive from the concept of operating endoscopically and removing all the infected area by way of small circular incisions. One of these options is Endoscopic Pilonidal Sinus Treatment (EPSiT) that was inspired by Video-Assisted Anal Fistula Treatment (VAAFT) described by Meinero *et al.* in 2011.¹³ VAAFT includes two phases: a diagnostic and an operative one. Key steps are visualization of the fistula tract, correct localization of the internal fistula opening under direct vision, and endoscopic treatment of the fistula. This is followed by an operative phase with fulguration of the fistula tract using glycine solution mixed with mannitol and curetting the tract with curette and fistula brush. Internal opening is closed with a Vicryl suture. VAAFT was associated with a recurrence rate of 30%.²⁴

Similar to the VAAFT procedure, EPSiT was first described by Meinero *et al.* in 2014.¹⁴ In the diagnostic phase, the aim of this technique is to identify the anatomy of the pilonidal sinus, secondary tracts and/or abscess cavities. The spontaneously draining opening, which is normally situated on the midline cleft, must be removed by making a 0.5cm circular incision around the opening. The number and site of incision vary, depending on the presence of secondary fistula tracts or abscesses, as well as on the overall size of the area involved. The operative phase consists in the cauterization of the sinus granulation tissue in the main tract and traversing secondary tracts and abscess cavities. Necrotic material is removed with an endobrush passed through the fistuloscope or with a Volkmann spoon if more superficially located.¹⁹

Esposito *et al.*⁶ have applied this procedure in the pediatric population, calling it Pediatric EPSiT or PEPSiT, with some modifications and excellent long-term results. PEPSiT is performed using a 10 ch fistuloscope with an operative channel and equipped by an endoscopic brush, a monopolar electrode and an endoscopic grasping forceps. In contrast to the technique described by Meinero *et al.*,¹³ PEPSiT adopts a continuous jet of saline or mannitol solution instead of glycine-mannitol to ensure, during the procedure, a clear visual field, but optimizing the economic impact of the procedure. However, we adopt mannitol solution in our institution. In addition, the surgeon stands on a stool to obtain a better ergonomics during the procedure.

Minimally invasive vs conventional treatments

Comparing minimally invasive techniques with conventional treatments, there are only few reports in literature about pediatric patients.

The PEPSiT procedure demonstrated to have many advantages compared with traditional open techniques: the direct vision allows the surgeon to see perfectly not only the pilonidal sinus but also any possible fistula tracts or abscess cavities.⁶ The destruction can be modulated and there is the certainty of complete removal of the infected area. Moreover, the hemostasis is done thoroughly under direct vision. This direct vision also allows the complete removal of hairs and their follicles, often located not only in the pilonidal sinus but also in the surrounding tissue.

The esthetic result is excellent and so is the patient's quality of life and satisfaction. There is no need for painful dressings and healing occurs within 3–4 weeks.¹⁵

Analyzing the literature, is clear that PEPSiT is associated with a significantly shorter, painless, and better outcome compared to the classic open excision technique. With the advent of PEPSiT, the recurrence rate of PSD has dramatically diminished, from 30% as reported with open repair to 1.6% as reported with PEPSiT in Esposito's series.⁶

In addition, the spinal saddle anesthesia with the savings of general anesthesia and its related risks, the low dose of local anesthetic, and the concomitant light sedation provided all components in balance, performing anesthesia with minimum cardiorespiratory disturbances, early ambulation, and high level of satisfaction of patient, of surgical team, and of patient's caregivers.¹⁴

Long-term follow-up

Attention has to be paid to literature data when considering PSD surgery outcomes: few studies have analyzed PSD recurrence rates with a consistent follow-up in pediatric patients. It has commonly been assumed that the majority of recurrences occurred in the first year after surgery.¹⁶ For this reason, study patients were followed up for short periods and only limited data of longer follow-up times exceeding 3 years are available in adult population.²⁵ As for pediatric population very few data are available. Esposito *et al.*⁶ reported a follow up of 30 months with only 1.6% of recurrence recorded in their series.

They also standardized PEPSiT technique with the results of shorter operative time, healing time and laser epilation including a special oxygen-oil-gel-based dressing, and 3 to 4 sessions of laser epilation (1 per week) after the complete healing process occurs.⁶

In an adult series Doll *et al.* found that pilonidal sinus may recur up to 22 years after surgery. Other studies in literature suggest that a long-term follow up of at least 5 years should be considered the gold standard in pilonidal sinus surgery.¹⁵ From this point of view, it is mandatory that further studies analyzing PSD surgical approaches with a consistent and adequate follow up are required.

Conclusions

A multitude of treatment for PSD have been proposed especially in adult population and the management of chronic pilonidal sinus disease remains controversial. In pediatric population the endoscopic treatment seems to become more and more the gold standard technique to adopt thanks to the low recurrence and infection rate, patients' pain and satisfaction, short hospital stay that are the focus points of this new technique. Moreover, it is important to highlight that the general trend of surgery through minimally invasive approaches has involved also PSD treatment; in fact endoscopic approach to PSD was found to be safe and effective compared to conventional techniques. Literature reports demonstrated they have a low short-term complication rate compared to conventional surgery.²⁶

Further randomized, controlled trials with adequate follow-up are required to better confirm PEPSiT as the gold standard technique for the treatment of PSD.

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