

Minimally-Invasive Treatment of Pilonidal Sinus Disease in Children: A Snapshot of the Current Landscape

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Abstract

Purpose: Pilonidal sinus disease is a common pathology in young adolescents, and its management in pediatric patients is changed completely in the last few years, especially when concerning the latest minimally invasive techniques.

Aim: The aim of this study was to identify clinical evidence about the reliability of the different techniques in managing pilonidal sinus disease (PSD) in children.

Methods: We performed a PubMed search for articles published during the last 5 years, using the keywords “pilonidal”, “sinus”, “disease”, “PSD”, “pediatric”, “surgery”, and “children”. The results were investigated in recurrence, length of hospital stay and complete wound healing time.

Results: We pooled 39 studies, but 10 of these were excluded because they were either not relevant or concerned an adult population. Data analysis showed that the totality of the studies published in the last 5 years is focused on minimally invasive techniques had in particular endoscopic techniques that showed advantages in all the endpoints considered.

Conclusions: Literature analysis that we performed showed that minimally invasive techniques, PEPSIT in particular, were superior to open surgery and other surgical techniques in terms of recurrence and complications rate, with a shorter hospital stay and faster return to normal life. As for PEPSIT it seems that the post-operative wound management with oxygen-enriched oily-based gel seems play a fundamental role in the faster healing of the PSD area after surgery.

Keywords: Pilonidal sinus disease; PSD; Fistula; Children; Pediatric patients

Introduction

Pilonidal Sinus Disease (PSD) is a common inflammatory disease, with a reported incidence among teenagers of 26:100.000 [1,2]. Risk factors of PSD include hirsutism, local irritation, sedentary life, and obesity [3,4]. PSD can be considered an acquired disorder, linked to the obstruction of hair follicles in the natal cleft, causing recurrent inflammation with formation of subcutaneous abscesses and usually one or multiple fistula tracts [5]. Clinical presentation of PSD is variable, varying from asymptomatic pits, to acute abscess, to chronic cyst, with a considerable negative impact on the quality of life of the affected patients [1,3]. However, although PSD is enough common pathology, scanty reports have been written about its occurrence in pediatric patients. More recently, there has been an increasing interest in the management of this disease, connected to the use of minimally invasive techniques [6]. However, the gold standard technique for surgical treatment of PSD until now still remains under debate. The ideal technique should remove the cyst clean the sinus tract and secondary tracts, leading to complete and durable healing with good cosmetic outcome [7,8]. While a large literature exists about this disease in the adult population, there are very few studies in pediatric population. The aim of this study was to try to evaluate the results of all the treatment options in pediatric population, focusing on Hospital Stay (HS), Recurrence Rate (RR), Length of Hospital Stay (LOS), complications and Complete Wound Healing Time (CWHT); and to investigate the which is the preferable technique to adopt analyzing the results of all the different techniques employed in children and adolescents with this disease. We decided to include in our review only studies brought on by pediatric surgery departments, with the entirety or majority of the sample composed of pediatric patients.

Materials and Methods

A literature search was performed on the PubMed database, on all articles published during the last 5 years (2016-2021), using the following key words: “pilonidal”, “sinus”, “disease”, “PSD”, “pediatric”, “surgery”, and “children”. Articles with data regarding HS, RR, complications, LOS, and CWHT were analyzed, the primary endpoint being the RR. The research was limited with filters only including the last 5 years. We recorded 39 studies, but 10 of these were excluded from our analysis because of non-relevance and non-conformity of the sample. We separated these 29 studies based on the different technique they used to treat PSD. The results were analyzed trying to identify if exists a technique that gives better results for children affected. For a single technique, not all variables were present in all the studies and in addition in most studies recurrences were not considered among the complication rates. The different techniques used in this study will now be briefly illustrated, for a complete understanding of the operative techniques available in pediatric surgery.

Open surgical techniques

Open surgery has for a long time been the only alternative in treating PSD, with different techniques that evolved through the years. In the last 5 years, 3 main open techniques were analyzed in the international literature: open wound healing, Excision and Primary Closure (EPC), and flap closure. In all these techniques, the first phase of the operation consists in the removal of the affected sinus on the midline and to differentiate

themselves in the reconstructive phase. For open wound healing, the defect is left open, to be healed by second intention with associated mandatory prone position in the first post-operative period. In EPC the defect is closed down the midline, using multiple layers of sutures depending on the depth of the excision. Using the flap technique, the surgeon uses a flap adjacent to the defect created by the excision to perform a closure with less tension.

Conservative approach

One study in our series proposed a non-operative approach in the management of PSD. Patients were initially treated antibiotics, warm baths, hair removal, and abscess drainage; also removing hair from the cavity and injecting it with an antiseptic solution. Finally, a dressing was placed. This treatment lasted for 10 days, and was associated with a topical wax agent for epilation.

Minimally invasive approach

These techniques are the most promising and the most developed in the last years. Many different minimally invasive approaches were studied for the first time in children, mainly to avoid the long CWHT, reduce LOS, and the level of postoperative pain. All these techniques have indeed the main advantage of having low postoperative pain and a shorter LOS. In our research 15 studies were focused on minimally invasive techniques, mainly comparing them to one of the old open techniques. In particular, the analyzed techniques were: GIPS/pit picking, fibrin glue occlusion, phenol injection, and PEPSIT. GIPS and pit picking techniques were associated because of the similarities between the two. In these techniques one or more small incisions are made, then the sinuses are cleaned as profoundly as possible, removing all hair without deroofting the fistula, and cleaning with abundant antiseptic solution. In fibrin glue occlusion and phenol injection, after cleaning the fistula, the respective substance is injected inside through the natural hole. As for PEPSIT, a particular type of endoscope (fistuloscope) with an operative channel is introduced inside the fistula's hole. Under direct vision, firstly all hairs are removed through the operative channel; then all granulation tissue is also removed using the endoscopic grasper and brusher; finally, the inner wall is coagulated all around, using a monopolar electrode. After PEPSIT a fundamental part of the technique it seems the wound management using ozone enriched gel, that accelerates wound healing.

Results

The majority of all the studies analyzed were executed in a retrospective fashion and only 3 prospective studies were found in our research. The total amount of pediatric patients, who underwent PSD treatment with one of the different techniques described above was more than 2200. The most relevant part of the sample underwent EPC, whereas the least represented were the use of phenol or fibrin glue, with only one study each among pediatric patients. All the techniques that employed the use of small incisions without the necessity of a reconstructive phase (GIPS, pit-picking, trephination and PEPSIT) were grouped together because of the similarities to amplify their statistical significance. As it was expected, the second intention healing group showed the worst parameters in all the endpoints, with a 93,95 days of CWHT showed among 4 studies; a 6,43 days LOS; 24,72% of recurrence rate and 48,69% of complications rate showed among 4 studies. The EPC group showed a 41,43 of CWHT among 3 studies, 3,29 days of LOS among five studies, a 13,25% RR, and an

18,37% complications rate among 8 studies. The flap repair group didn't report on CWHT at all, showed a 3,12 days of LOHS among 2 studies, a 5,55% RR, and a 12,96% complication rate. The GIPS group showed a 14,4 days of WHT among 2 studies, LOS wasn't reported, the RR was 15,96% and complication rate wasn't reported clearly. The PEPSIT group showed a 24,33 days of CWHT, 1 day of LOS among 2 studies, a 5,5% RR, and a 6,5% complication rate.

Discussion

Pilonidal Sinus Disease (PSD) is a common inflammatory disease of the sacrococcygeal region [10]. Current management of PSD is strongly based on evidence from studies performed in the adult population [7,11]. Analyzing the international literature, there is no consensus in which surgical technique is preferable to treat this condition [12]. The open surgical treatment consisting in a large wedge of skin and subcutaneous tissue to remove the sinus and its lateral tracks, it is the most performed technique adopted worldwide [13,14]. However large incision means for the patients a long hospital stay, a prolonged wound healing time and a long time limitation of physical and scholar activities of operated children [5,15]. Pediatric patients are indeed much more rarely affected by this pathology [16]. However, especially in recent years, the interest of pediatric surgeons has increased considerably; especially when considering the higher incidence of this pathology in teen agers, the increase of risk factors above all sedentary life during COVID pandemic, or hirsutism as obesity increased in these last year in the pediatric population [4,7,17,18]. In addition, the management of this pathology has greatly evolved in the last 5 years, with an increasing interest of the surgical community for minimally invasive techniques. These techniques have greatly improved, above all, psychological status of the patients, so much so that they have started being employed for pediatric patients as well [20,21]. Among all studies analyzed, conservative approach, phenol injection and fibrin glue injection only had 1 study each on pediatric population; thus, it was impossible to amplify their significance and they weren't compared to other procedures for the low number of patients who underwent said procedures [2,22]. Second intention wound healing was not considered since its inferiority to EPC was already largely proven in international literature [1,6,23]. For these reasons we decide to compare the following 4 techniques: EPC, PEPSIT, flap repair and GIPS. Being the previous gold standard for treatment, EPC was the first one to be compared to other techniques: flap repair didn't reach significance in none of the parameters considered, the same happened when compared to GIPS; however, PEPSIT showed a significantly better RR and complications rate when compared to EPC [7,8,24,25]. PEPSIT also showed a better RR when compared to the GIPS group and, even though data looked promising for flap repair, it didn't show significance when compared to PEPSIT [25,26]. Finally, flap repair wasn't better even in comparison to the GIPS group [2,15]. However, it was also important to underline some important issues we found during the analysis of the studies researched. The main issue was the lack of high quality studies: the majority of studies are retrospective studies and only few studies were conducted in a prospective fashion, parameters for follow-up and for the definition of recurrence and complications weren't standardized among different groups [4,27,28]. In addition, above all for studies focused on EPC and flap repair, there was a lack of information regarding CWHT and LOS in many of the studies analyzed [4,15,29]. It is nowadays clear that minimally invasive techniques in particular PEPSIT is superior to EPC in terms of tolerance from the patients,

RR, LOHT, CWHT and complications [1,18]. PEPSIT in particular, showed to be a very promising technique especially when considered that in this group studies seemed to be more solid [3,5]. However as international studies reported, it is important to follow step by step the technique that now is standardized. First of all, pre-operative epilation using laser, then the operative technique using fistuloscope, then the wound management using oxygen-enriched oily-based enriched gel, twice a day for 4 weeks at the end post-operative laser epilation [1,7,13,14]. Probably the only criticism of minimally invasive techniques compared to the open approach is the cost related to the purchase of the instrumentation (fistuloscope and related surgical accessories) and also the cost for the post-operative management at home using ozonated oil, as our protocol suggests [1,9].

Conclusion

Based upon our experience, we can consider PEPSIT as a standard of care for surgical treatment of PSD in children and adolescents. Our new standardized protocol consisting of pre and post-operative laser session, PEPSIT procedure and post-operative wound dressing allowed to achieve an excellent outcome, with a lot of advantages compared to the open approach as shorter length of surgery, shorter hospital stay, faster healing time, lower rate of recurrence, good aesthetics outcomes and a higher patients' satisfaction score. According to all these parameters evaluated in our study, we believe that the open approach could be definitively abandoned due to the important invasiveness and the worse post-operative course. However, a randomized control trial has to be performed to confirm our hypothesis.

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