



Pilonidal sinus disease surgery in children: the first study to compare crystallized phenol application to primary excision and closure☆☆☆



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ABSTRACT

Introduction: Pilonidal sinus (PS) is an infectious and inflammatory disease of sacrococcygeal region. Current methods include; surgical excision with/without suturing the defect, rhomboid excision and flap and chemical substance application. In this study, crystallized phenol application was compared to excision and primary closure.

Patients and methods: This retrospective study included pediatric patients with PS who were treated with excision and primer closure technique and phenol application. The patients' medical data were analyzed retrospectively.

Results: This study included 117 patients with PS. There were 52 girls (44%) and 65 boys (56%). Mean age of children was 15.6 (12–20) years. Excision and primary closure were applied to 77 patients (66%) and phenol was applied to 40 patients (34%). The children in phenol group were discharged on the operation day; mean hospitalization time in the excision and primary closure group was 2.7 (1–14) days. Mean follow up was 44.6 (8–82) months for primary excision and closure group and 8.1 (1–19) months for phenol group.

Conclusion: Although many surgical and non-surgical treatment modalities have been described for PS, the optimal one remains unknown. Limited with the retrospective nature of the data, crystallized phenol application seems a feasible minimal invasive alternative to primary closure of PS with lower recurrence and complication rates in children.

Treatment study: Level III

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Pilonidal sinus (PS) is an infectious and inflammatory disease of sacrococcygeal region, which is generally observed in young adults; especially in boys [1]. Entrapment of hair follicles and a foreign body type inflammatory process because of failure of dorsal midline fusion was thought to be the reason [2].

The incidence of PS is approximately 0.26% [3,4]. PS occurs predominantly in males, at a ratio of about 3:1 [1]. In childhood, incidence is reported as 1.2–2/10,000, however; there is scarce data in pediatric age group [5]. Obesity, having a large amount of hair, poor hygiene, prolonged sitting times seem to increase the risk of disease or recurrence [6,7].

The treatment of PS involves eradication of the sinus tract by surgical excision, marsupialization. Current methods include; surgical excision with/without suturing the defect, rhomboid excision and flap and

chemical substance application [8–10]. Nowadays, phenol application started to be more popular because it is a minimally invasive treatment, which is easily applied and has good results in adult age group [9,10]. In the literature review, there has not been a study that compares phenol application to primary excision and closure in PS in pediatric/adolescent age group.

In this study, crystallized phenol application as a minimal invasive treatment was compared to excision and primary closure of PS in terms of age, sex, length of stay in hospital, length of postoperative intravenous antibiotic and analgesic usage, complications, recurrence rate, wearing time.

1. Patients and methods

Management of PS at authors' institute was excision and primary closure in the beginning. Complications including recurrence, infection and wound dehiscence were found to be 12% with this technique. While trying to find a better solution in grand rounds, close proximity of general surgery operating theaters and examining their experiences and results with phenol application, the authors decided to change

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self-practice and converted to phenol applications. This retrospective study includes pediatric patients with PS who were treated with excision and primer closure technique and phenol application. The patients' recorded medical data were analyzed retrospectively. The study was performed in adherence to the Declaration of Helsinki. Written informed consent was obtained from legal guardians of each child and Ethical Committee Approval was provided for the study (IRB Approval No: 06-296-17).

1.1. Excision and primer closure technique

Under general anesthesia with endotracheal intubation or epidural anesthesia, patient is placed in prone position. After cleaning the area, an incision was made that includes all of the sinus area, the tissue which includes the sinus is excised totally down to the coccyx and checked with methylene blue to be sure that no sinus is left. Then the defect is closed with interrupted sutures.

1.2. Phenol application

The patient is placed in prone position. After cleaning with an anti-septic solution of the PS area, the sinus orifices are widened with a clamp. If the orifice is still not enough to evaluate and clean the interior of the sinus after opening with clamp, one-centimeter incision could be used. Once all the hair inside is removed, the granulation tissue is removed with curettage. Hemostasis is obtained carefully after the cavity is washed with sterile saline solution. Before introducing phenol, oily pomade is applied surrounding skin of the orifices to avoid skin necrosis and burns. Then crystallized phenol, which turns into the liquid form at body temperature as soon as it contacts with human body, is applied to the cavity through the orifice, just enough to fill the cavity. It is important to avoid overflow. In an average child and defect size, usually 3–5 g of phenol is enough. After the application, sinus orifices are closed with pomade for one day. On postoperative first day, the dressing is removed.

Patients treated with these methods were compared in terms of age, sex, length of hospital stay, length of postoperative intravenous antibiotics and analgesic usage, complications, recurrence rate, wearing time.

1.3. Statistical analysis

The statistical analysis of patients' data was performed via SPSS 15.0 for Microsoft Windows (IBM SPSS Statistics, Chicago/USA). Chi square test was used to evaluate the gender, complication rates and recurrence rates. Ages, hospital stay lengths, postoperative parenteral antibiotics and analgesic usage time were evaluated via independent samples *t* test and a *p* value of less than 0.05 was considered to be statistically significant.

2. Results

This study includes 117 patients with sacrococcygeal PS (Table 1). There were 52 girls (44%) and 65 boys (56%). The difference between the number of boys and girls was not statistically significant

($p > 0.05$). Mean age of children was 15.6 (12–20) years. Excision and primary closure was applied to 77 patients (66%) and phenol application was performed in 40 patients (34%). All of the children were given intravenous antibiotics during their hospitalizations, and all the children in the phenol group were applied single dose intravenous prophylactic antibiotic. All children in the excision and primary closure group were administered intravenous analgesics at least one day after surgery; while nobody in the phenol group needed intravenous analgesics. Mean duration of dressing was 10.6 (± 31.50) days in primary excision and closure group and 1 ($\pm 0,00$) day in phenol group ($p < 0.05$). The children in phenol group were discharged operation day, mean hospitalization time in the excision and primary closure group was 2.7(± 2.17) days ($p < 0.05$).

Complications were observed in nine patients. One of these nine children was in the phenol group who was infected and treated with oral antibiotics (2.5%). Remaining eight children with complications were in the excision and primary closure group; six of them (7.8%) were infected and treated with oral antibiotics, one (1.3%) had wound dehiscence and one (1.3%) had hematoma. Mean follow up was 44.6 (8–82) months for primary excision and closure group and 8.1 (1–19) months for phenol group. Recurrence was noted in 10 children in the group treated with excision and primary closure. One child from phenol group required a second phenol application three weeks after the first intervention. Major contribution of this article is marked lower complication and recurrence rates with phenol application in PS, although it fell just above statically significance ($p = 0.058$).

Preoperative and postoperative images of phenol applied patients were shown in Figs. 1 and 2 respectively.

3. Discussion

Many treatment modalities have been presented in PS surgery. Modalities like primary excision with or without closure, marsupialization or different flap techniques have been told to be advantageous in different studies but those were small, non-randomized and rarely prospective studies [11]. On the other hand, recurrent rates of primary closure were found to be higher than secondary healing group while the primary closure group has a faster healing process [11]. However the best treatment option has not been established yet. In recent years, phenol application has started to be used in PS as a minimal invasive option in children.

In the cases of current study, phenol application seems to be a better option than primary excision and closure in terms of shorter hospital stay, less antibiotic and analgesic needs, faster removal of dressing, faster return to daily routine as discussed in the literature [12,13].

Solid and liquid form of phenol is used in these kinds of patients in the literature. However, the liquid form has some side effects like skin and fat tissue necrosis because of its high concentration [12]. This is why crystallized form of phenol was used in all patients in the present study therefore preventing such complications.

The most common complications of phenol application are; cellulitis, abscess formation, skin and fat tissue necrosis and they can be seen with a ratio of 7%–16% [14]. Covering the surrounding of the sinus with oily pomade may be useful to prevent formation of

Table 1
Patients' data.

Operation types Variables	Excision and primary closure (n = 77)	Phenol Application (n = 40)	<i>p</i>
Sex (n (%))	F:32 (58.4%) M:45 (41.6%)	F: 20 (50%) M:20 (50%)	0.383
Mean age (mean \pm SS/year)	15.4 (± 2.30)	15.7 (± 1.41)	0.198
Iv antibiotic (mean \pm SS/day)	2.7 (± 2.16)	0	0.000
Iv analgesic (mean \pm SS/day)	1 (± 0.11)	0	0.148
Dressing time (mean \pm SS/day)	10.6 (± 31.50)	1 ($\pm 0,00$)	0.011
Complication (n (%))	8 (10.4%)	1 (2.5%)	0.121
Recurrence (n (%))	10 (13%)	1 (2.5%)	0.058

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