Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (4): 516-522
https://doi.org/10.31067/acusaglik.1261052

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Surgery / Cerrahi

Effectiveness of Phenol Application in Pediatric Pilonidal Sinus

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Received: 06 March 2023
Accepted: 20 August 2023

ABSTRACT

Purpose: Phenol application is an increasingly popular method in the treatment of pediatric pilonidal sinus because of its ease of use. However, there has been insufficient research on standards for phenol application in children. This study aimed to determine standards for evaluating phenol applications to identify parameters that can be used in treatment planning.

Methods: Pediatric patients with pilonidal sinus who underwent surgical excision and/or phenol injection between January 2011 and January 2021 were evaluated retrospectively. Data related to the patients' age, sex, treatment method (phenol, surgery), number of phenol applications, preoperative complications and antibiotic use, postoperative complications, and treatment duration were analyzed.

Results: The study included 57 patients, 34 boys (59.6%) and 23 girls (40.3%), with a mean age of 15.15±1.62 years (range: 11-18). Number of phenol applications and postoperative complications were significantly higher in patients with prolonged preoperative antibiotic use (>two weeks) and preoperative complications (p=0.013), (p=0.024). Length of hospital stay, wound dressing duration, and time to return to daily routine were significantly shorter in the phenol application group (p<0.001). Treatment duration and frequency of postoperative complications did not differ among the treatment groups (p=0.523).

Conclusion: This study suggest that phenol application is not superior to surgical treatment in terms of postoperative complications or treatment duration. The potential negative impact of prolonged preoperative antibiotic use and preoperative complications on the treatment process should be considered when deciding to use phenol for the treatment of pilonidal sinus.

Keywords: Children; phenol application; pilonidal sinus; complications.

Pediatrik Pilonidal Sinüste Fenol Uygulamasının Etkinliği

ÖZET

Amaç: Çocuk hastalarda pilonidal sinüsün tedavi yöntemleri arasında uygulama kolaylığı sayesinde fenol uygulaması günümüzde giderek yaygınlaşmaktadır. Ancak, çocuklardaki fenol uygulamasının yönetim standartları konusunda yeterince çalışma bulunmamaktadır. Bu çalışma ile fenol uygulama sayıları ve tedavi yanıtlarının değerlendirilmesinde standartların belirlenmesi, tedavi tercihi aşamasında tedavi sonuçlarını ön görmede kullanılabilecek parameterelerin belirlenmesine katkı sağlanması amaçlandı.

Gereç ve Yöntem: Ocak 2011- Ocak 2021 yılları arasında pilonidal sinüs tanısı alan, cerrahi eksizyon veya fenol uygulaması yapılan çocuk hastalar çalışmaya dahil edildi. Hastaların yaş, cinsiyet, tedavi yöntemi (fenol, cerrahi), fenol uygulanma sayısı, preoperatif komplikasyon, preoperatif antibiyotik kullanımı, postoperatif komplikasyon ve tedavi süresi ile ilgili verileri incelendi.

Bulgular: Çalışmaya 57 hasta dahil edildi. Hastaların 34'ü erkek (%59.6), 23'ü kız (%40.3) idi. Yaşları 15.15±1.62 (min:11, max:18) idi. Preoperatif iki haftadan uzun süreli antibiyotik kullanım öyküsü olan ve preoperatif komplikasyonu olan hastalarda, fenol uygulama sayıları ve postoperatif komplikasyonların anlamlı şekilde daha fazla olduğu tespit edildi (p=0.013), (p=0.024). Yatış süresi, pansuman süresi ve günlük rutine dönme süresi değerlerinin fenol uygulaması grubunda anlamlı şekilde az olduğu tespit edildi (p<0.001). Ancak, tedavi süresi ve postoperatif komplikasyonlar açısından tedavi grupları arasından anlamlı farklılık tespit edilmedi (p=0.523).

Sonuç: Elde edilen bu sonuçlar, fenol uygulamasının postoperatif komplikasyonlar ve tedavi süresi açısından cerrahi tedaviye üstünlüğü olmadığını düşündürmektedir. Ayrıca pilonidal sinüste fenol uygulaması tedavi tercihi sürecinde, preoperatif uzun süreli antibiyotik kullanım öyküsü ve preoperatif komplikasyonların tedavi süreçleri üzerinde oluşturabileceği dezavantajların dikkate alınması gerektiği düşünülmektedir.

Anahtar Kelimler: Çocuklar; pilonidal sinüs; fenol uygulaması; komplikasyon.

Pilonidal sinus is an acquired disease caused by inflammation of hair follicles in the sacrococcygeal region (1). Risk factors include conditions such as hirsutism, obesity, local trauma, and poor hygiene (2). Minimally invasive treatment alternatives such as phenol application are increasingly used for the treatment of pilonidal sinus in the pediatric age group (3). Phenol application controls symptoms by eliminating the inflammatory processes within the pilonidal sinus (2). Open surgical procedures for pilonidal sinus are based on the principle of surgical eradication of the sinus orifice, where the inflammatory process is ongoing (4). The differences between minimally invasive and invasive methods of treating pilonidal sinus are reported to impact the treatment process and outcomes (4).

Phenol injection has become a popular treatment method because of its ease of application and is reported to have benefits such as less need for postoperative care, improved patient comfort, and good cosmetic results when compared to surgical procedures (5). However, repeated applications due to persistent discharge can extend the duration of treatment and reduce patient satisfaction (6). There is still controversy regarding issues such as recurrence rates which are minimal and invasive treatment methods used in pilonidal sinus (7). The existing literature on phenol application for pilonidal sinus offers no standard definition and approach to the management of complications such as infection, abscess, and recurrence (8.9). Moreover, there are insufficient data on the impact of preoperative parameters such as abscess, recurrent infection, antibiotic use, or prior surgical intervention on treatment response (10,11).

This study aimed to share our long-term results of phenol application and surgical treatment in pediatric patients with pilonidal sinus and to help identify parameters that can be used to predict treatment results when making treatment decisions.

MATERIALS AND METHODS

Patient Selection

This retrospective study included pediatric patients with pilonidal sinus who underwent surgical excision or phenol injection between January 2011 and January 2021. Patients with missing data were not included in the study. The study was approved by the local ethics committee of the university where the study was conducted (2023/295).

Study Design

The patients' records were reviewed to collect data regarding their age, sex, preoperative complications, prolonged preoperative antibiotic use (>two weeks before the first phenol application), treatment method, length of hospital stay, time to return to daily routine, duration of intravenous/oral antibiotic/analgesic use, follow-up time, and postoperative complications. Preoperative complication data were based on the period before the first phenol application in the phenol treatment group and the preoperative period in the surgical treatment group. The patients' time to return to daily routine was determined by contacting the patients by phone.

Preoperative complications such as infection of the sinus orifice and abscess were considered contraindications for phenol and surgical treatments. Surgical procedures were performed after controlling preoperative complications.

Duration of treatment was defined as the time to resolution of all complications, including recurrence. During the treatment planning phase, the patients and families were informed about the phenol application procedure and surgical treatment alternatives, and treatment was planned according to their preference. Those who opted for phenol application were informed that surgical treatment may be performed case of recurrence. Patients who did not respond to treatment with phenol application underwent surgical treatment. Patients who underwent surgical treatment after phenol application were not included in the surgical treatment group.

The patients were divided into two groups according to treatment method: phenol application and surgical excision. Phenol application was performed under local anesthesia or sedoanalgesia by curettage, cleaning the pilonidal sinus tract in the intergluteal area, then injecting liquid (80%) phenol (Phenol Liquid, Galenic Pharmaceuticals Inc., İzmir, Turkey) into each orifice to fill the entire cavity for two-three minutes, until a color change to matte white was observed in the orifice. Before the procedure, the skin around the pilonidal sinus was covered with antibiotic ointment (Furacin 0.2% ointment, Sanofi İlaç Sanayi, Istanbul). Patients in the phenol treatment group were scheduled for follow-up a month after phenol application. If complaints of discharge persisted at follow-up, phenol was applied again. Patients without active discharge were followed up. These patients were informed that their complaints could recur within 18 months and that phenol treatment could be continued for six applications.

Persistent discharge after six phenol applications was accepted as recurrence.

The relationship between preoperative and postoperative complications and their frequency in the treatment groups were analyzed. We also evaluated the relationship between the number of phenol applications required and the presence of preoperative complications and prolonged antibiotic use. Length of hospital stay, duration of intravenous/oral antibiotic and analgesic use, duration of wound dressing, time to return to daily routine, follow-up time, and total treatment time were also compared between the treatment groups.

Statistical Analysis

Mean and standard deviation values in each treatment group were determined as descriptive statistics. The relationship of preoperative complications and prolonged preoperative antibiotic use with postoperative complications in the treatment groups was examined by Spearman correlation test. Length of hospital stay, time to return to daily routine, duration of intravenous/oral antibiotic and analgesic use, follow-up time, and total treatment time were compared between the treatment groups using analysis of variance and chi-squared tests.

RESULTS

Seventy-five patients treated for pilonidal sinus between January 2011 and January 2021 were included in the analysis. Eighteen patients who were treated in the same period could not be included in the study because their data could not be reached. Thirty-four patients were male (59,6%) and 23 were female (40.3%). The mean age was 15.15±1.62 years (range: 11-18). Twenty-five patients (43.9%) underwent phenol application and 32 (56.1%) underwent surgical excision treatment. Phenol was applied a mean of 2.36±1.95 times (range: one-six) to the patients in the phenol treatment group. The interval between phenol reapplications in our study ranged from one to three months. Surgical techniques used in surgical treatment included simple excision with primary suturing in 13 patients and rhomboid flap transposition in 19 patients.

All of the patients included in the study had antibiotic use in their medical history when they first applied to the clinic. Twenty patients (35.1%) used antibiotics for more than two weeks preoperatively and 37 patients (64.9%) for less than two weeks due to signs of some clinical conditions. These clinical conditions were discharge from the sinus orifice alone, local infection wherewith skin hyperemia and increased skin temperature accompanying the discharge, abscess, and bleeding. Preoperative complications were seen in 21 patients. Preoperative complications included signs of local infection in 15 patients (26.3%), abscess in five patients (8.8%), and bleeding in one patient (1.8%). The other 36 patients who discharge from the sinus orifice alone (63.2%) had no preoperative complications. Four of the patients with preoperative abscess underwent incision and drainage, while one underwent conservative treatment with oral antibiotic therapy. Postoperative complications were seen in 17 patients. In terms of postoperative complications, eight patients (14%) had recurrence, three (5.3%) had abscess, three (5.3%) had hematoma, and three patients (5.3%) had wound dehiscence. No postoperative complications were observed in 40 patients. None of the phenol-treated patients developed pain or procedure-related dermatitis or cellulitis postoperatively, and none had any systemic complications associated with phenol. Mean follow-up times by treatment group were 42.28±23.44 months in the phenol group and 60.4±20.62 months in the surgery group. Treatment duration (including resolution of all complications and recurrence) in these groups was 15.88±21.7 weeks (range: 1-72) and 14.37±28.93 weeks (range: 2-96), respectively. Surgical treatment was applied to five of the patients who were treated with phenol because there was no response to treatment. These patients were not included in the surgical treatment group.

The number of phenol applications during treatment was significantly higher among patients with prolonged preoperative antibiotic use (p=0.013) and preoperative complications (p=0.023) (Table 1). In addition, prolonged preoperative antibiotic use and the presence of preoperative complications were significantly associated with the presence of postoperative complications (p=0.024 and p=0.047, respectively) (Table 2).

Table 1. Comparison of number of phenol applications according to duration of preoperative antibiotic use and preoperative complications

		n	Number of Phenol Applications		p
			Mean±SD	Range	
Preoperative Antibiotic Use	<2 weeks	37	0.62±0.72	0-4	*0.013
	>2 weeks	20	1.8±2.64	0-6	
Preoperative Complications	None	36	0.63±1.13	0-6	*0.023
	Infection	15	2±2.69	0-6	
	Abscess	5	5±0	0-5	
	Bleeding	1	2±0	2-2	

**Statistically significant (p < 0.05).*

Table 2. Comparison of postoperative complications according to duration of preoperative antibiotic use and preoperative complications

		Postoperative Complications					p
		Recurrence (n)	Abscess (n)	Hematoma (n)	Wound Dehiscence (n)	None (n)	
Preoperative Antibiotic Use	<2 weeks	1	0	0	0	36	*0.024
	>2 weeks	7	3	3	3	4	
Preoperative Complication	Yes	6	3	3	2	6	*0.047
	No	2	0	0	1	34	

Statistically significant (p < 0.05).

There was no significant difference between the treatment groups in terms of preoperative complications and postoperative complications (p=0.354). In addition, there was no significant difference in postoperative complications between patients who underwent phenol application, patients who underwent simple excision, and patients who underwent a rhomboid flap procedure (p=0.241). However, patients in the phenol application group had significantly shorter length of hospital stay, wound dressing duration, and time to return to daily routine when compared with the surgical treatment group (p<0.001 for all). However, treatment duration (including resolution of all complications and recurrence) did not differ significantly between the treatment groups (p=0.523) (Table 3).

Table 3. Comparison of length of hospital stay, wound dressing duration, time to return to daily routine, and treatment duration in the treatment groups

		Treatment		p
		Phenol (n=25)	Surgery (n=32)	
Length of Hospital Stay (days)	Mean±SD	1	2.68±0.85	*<0.001
	(min-max)	(1-1)	(2-5)	
Wound Dressing Duration (days)	Mean±SD	0	8.81±3.39	*<0.001
	(min-max)	(0-0)	(7-20)	
Return to Daily Routine (days)	Mean±SD	1	15.09±6.2	*<0.001
	(min-max)	(1-1)	(7-30)	
Treatment Duration (weeks)	Mean±SD	15.88±21.7	14.37±28.93	p=0.523
	(min-max)	(1-72)	(2-96)	

Statistically significant (p < 0.05).

DISCUSSION

Phenol application is a special issue in pediatric patients because it is a non-invasive treatment alternative. The results obtained in the study support the idea that phenol application is an effective treatment method in the pilonidal sinus in children. However, we think that long antibiotic use and preoperative complications are useful parameters to predict treatment outcomes.

Analysis of the long-term (10-year) outcomes of surgical excision for the treatment of pilonidal sinus indicates that reported recurrence rates vary widely, from 10% to 30% (9,10). In regards to phenol application, Hegge, et al (12) reported recurrence in 17.6% of phenol-treated patients during three-year follow-up. Consistent with the literature, recurrence rates in our study were 9.3% (three patients) in the surgical treatment group and 20% (five patients) in the phenol application group. In the literature, it has been reported that a fibrosis response in the pilonidal sinus tract can be achieved by applying phenol at concentrations varying from 25% to 80% (13). In our study, phenol application was curative in 80% of patients as a result of sclerosis of the fistula tract, while this rate was 90.7% in the surgical treatment group. However, when comparing these results, it is necessary to consider that phenol application is a noninvasive treatment alternative and its aim is to control symptoms.

In the treatment of pilonidal sinus, the crystallized form of phenol is reported to be safer in terms of potential complications related to contact with surrounding tissues. However, it is seen that liquid phenol is considered more effective in treatment (14). While treatment efficacy increases with higher concentrations of phenol (40%-100%), complications caused by contact with surrounding tissues may also increase (14). Local complications such as cellulite or skin and adipose tissue necrosis may occur at rates of 7-16% after phenol application (15). In addition, Bruce, et al (16) reported that phenol may cause systemic complications such as acute toxicity, muscle pain, convulsions, and coma as a result of skin absorption and inhalation. However, these systemic and local complications are associated with high concentration and inadequate skin contact precautions (17). In this study, 80% liquid phenol

was preferred both for treatment efficacy and ease of application. Liquid phenol was applied after protecting the area around the sinus orifice with ointment, and we observed no local (dermatitis, cellulitis) or systemic complications related to phenol. Therefore, we believe that phenol application can be done safely at appropriate concentrations and after taking contact precautions.

Doğru, et al (13) reported that an average of two to three phenol injections may be sufficient for pilonidal sinus, although in some cases a treatment response was obtained after nine applications. There is no consensus among previous studies in terms of numbers of phenol applications and what is considered recurrence, but the general approach seems to be based on whether a treatment response is achieved after six-eight phenol applications (18,19). In this study, we defined recurrence as a lack of treatment response after six phenol applications. Kayaalp, et al (9) also reported that in phenol treatment of pilonidal sinus, 80% of recurrences developed in the first year, and obtaining a complete treatment response may take 18 months. Considering these results, we believe that clinical parameters to predict treatment outcomes are needed because of the disadvantages associated with repeated phenol application for the treatment of pilonidal sinus.

Factors affecting treatment response in pilonidal sinus include sinus number and size, presence of complications, and persistence of symptoms for more than six months (20). In addition, chronic discharge and signs of local infection, which are indicators of chronic inflammatory processes in the pilonidal sinus, have been reported to affect treatment management (21). The intensity of inflammation in the pilonidal sinus also affects the treatment process. Doll, et al (22) reported in their study that pilonidal sinus usually exhibited acute episodes with periods of discharge lasting less than two weeks. The authors noted that chronic inflammation in the pilonidal sinus may be responsible for the formation of complex fistula tracts that impact treatment outcomes (22). This suggests that physical examination findings in the pilonidal sinus are not always directly proportional to the severity of disease. However, there is no information on the effect of prolonged preoperative antibiotic use, which may be another indicator of chronic inflammation in the pilonidal sinus, on the treatment process (18). Therefore, in this study we determined whether patients had local infection requiring follow-up with antibiotherapy for more than two weeks preoperatively and examined its effect on treatment results. We found that in patients with more than two weeks of preoperative antibiotic use, postoperative complications were significantly more frequent and the number of phenol applications needed was significantly higher. This strongly suggests that prolonged preoperative antibiotic use may contribute to longer phenol treatment, which is a factor to consider when selecting a treatment method for pilonidal sinus.

There is also no consensus in the literature on the effects of preoperative complications on treatment management and outcomes in pilonidal sinus (23). In pilonidal sinus, the acute abscess phase is considered a contraindication for noninvasive treatments (24). However, Nasr, et al (25) suggested that the presence of persistent symptoms that guide surgical excision may also be an indicator of multiple abscesses and complex fistula tract, which reduce the effectiveness of surgical treatment.

For all treatment groups in this study, the acute abscess phase was accepted as a contraindication for treatment, which was performed after signs of acute inflammation resolved. In this study, we found that preoperative complications consisting of local infection findings, acute abscess, and bleeding were significantly associated with postoperative complications. In addition, patients with preoperative complications received significantly more phenol applications. Therefore, we concluded that preoperative complications in pilonidal sinus may prolong phenol treatment and negatively affect the outcomes of surgical treatment.

The advantages of noninvasive phenol application for the treatment of pilonidal sinus in terms of patient comfort, labor loss, and cost can become disadvantages when repeated applications are needed (18). Kayaalp, et al (9) reported that it may take 18 months to achieve a complete treatment response with phenol application. Consistent with this, in the present study it was seen that treatment duration can extend up to 72 weeks because of repeated phenol applications. Moreover, there was no significant difference between the groups in terms of treatment duration, which included postoperative complications such as recurrence, abscess, and wound dehiscence. This suggests that although phenol application has the advantage of being a noninvasive method, treatment duration is an issue that should be considered. Ateş, et al (7) recognized phenol injection as a nonsurgical treatment method and reported that its main advantage over surgical treatment alternatives was the absence of surgery-related disadvantages. A quick return to daily routine has also been reported as one of the important advantages of phenol treatment, as phenol application is a simple outpatient procedure (19).Similarly, we observed in this study that mean values for length of hospital stay, wound dressing duration, and time to return to daily routine were significantly lower in the phenol application group compared to the surgical treatment group.

Nasr, et al (25) reported that the recovery period after surgical treatment could last between two weeks and six months and considered this to be one of the disadvantages of surgical treatment. The present study shows that treatment times can be as long as 72 weeks with phenol alone and 96 weeks with surgical treatment. In addition, there was no significant difference in the frequency of postoperative complications between the treatment groups over the mean follow-up period of 15.03±28.8 months. These results suggest that neither treatment option is superior in terms of the recovery process and development of complications in postoperative follow-up. However, when evaluating these results, it should be noted that the treatment goal in phenol application is symptom control, while that of surgical procedures is eradicating the sinus orifice, which is the source of inflammation (26). This difference is believed to influence the treatment process and results. We believe that questioning patients about their preoperative antibiotic use and complications during treatment planning and informing patients of the possible effects of these factors on treatment outcomes will increase their treatment adherence.

Limitations

Regarding the limitations of this study, the lack of standards for the number of phenol applications used in the treatment of pilonidal sinus, the duration of treatment, and the evaluation of treatment responses make it difficult to interpret the results of studies on this subject. Furthermore, differences in implementation and treatment goals between the minimally invasive methods and surgical procedures used in pilonidal sinus make it difficult to compare these treatment alternatives. In addition, due to the retrospective nature of our study, we could not evaluate the effects of variables such as perineal hygiene, hirsutism, and local trauma on treatment outcomes. The limited number of cases should also be considered when evaluating the results of this study. Therefore, prospective, multicenter studies with large patient samples are needed to establish standards for the phenol application treatment of pilonidal sinus in children.

CONCLUSION

In this study, we observed no significant difference in terms of postoperative complications between phenol application and surgery for the treatment of pediatric pilonidal sinus. Preoperative complications and prolonged antibiotic use were associated with the need for more phenol applications and the development of postoperative complications. These factors can lead to repeated phenol applications, which is disadvantageous in terms of treatment duration and subsequent patient satisfaction. These parameters should be taken into consideration during treatment planning for pilonidal sinus.

DECLARATIONS

Ethics Committee Approval

This study was approved by the Mersin University Non-interventional Clinical Research Ethics Committee (Date: 26.04.2023, Decision No: 295).

Conflict of Interest

None declared.

Financial Disclosure

The authors declared that this study has received no financial support

Authorship Contributions

Concept: Cİ, İK; Design: Cİ, HT; Data Collection: Cİ, İK; Analysis: Cİ, İK; Writing: Cİ, HT; Critical revision: AN.

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