Clinical outcomes of crystallized phenol as a first treatment option in patients with recurrent pilonidal sinus

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Aim: *This study aimed to observe the clinical outcomes of phenol treatment in patients with recurrent pilonidal sinus disease.*
Material and Methods: *This study retrospectively collected data from 107 patients with recurrent the pilonidal disease who received phenol treatment in a single institute. Patients were divided into two groups as successful treatment (ST) and unsuccessful treatment (UST) after phenol application. A comparison was held between groups to define factors associated with failure treatment.*
Results: *There were 89 patients in ST and 18 patients in UST group. The treatment success rate after phenol treatment was 83.2%. We observed no difference between ST and UST in terms of age, gender, family history, surgical technique at the first operation, time to recurrence, procedure time, follow-up time, time to return to work, walk without pain or sit on the toilet without pain (p>0.05). However, smoking rate, presence of comorbidity, and mean BMI were statistically significantly higher in the UST group compared to the ST group (p<0.05). In addition, being obese (OR: 2.45, 95% CI: 1.07 - 5.60), having a comorbid disease (OR: 3.11, 95% CI: 1.29 - 7.47), and smoking (OR: 1.97, 95% CI: 0.85 - 4.53) were significantly associated with treatment* failure.
Conclusion: *Phenol treatment is an effective and simple procedure that could be easily applied even in rural hospitals in an outpatient fashion. Therefore, it should be considered for patients suffering from recurrence without the need for an aggressive surgical excision.*

Key words: Crystallized phenol, Pilonidal sinus, Recurrence

Introduction

First described in 1833 by Herbert Mayo, pilonidal sinus is a common disease of the natal cleft, mostly seen among adolescents and young adults [1]. It has a wide spectrum ranging from asymptomatic hairs containing cysts and sinuses to a large abscess. It is almost twelve times more common in men than women, and its overall incidence is 26 per 100000 [2]. Many surgical options exist for treating pilonidal sinus disease, from minimally invasive techniques to gluteus maximus myocutaneous flap [3,4].

Recurrence is a challenging issue in pilonidal sinus treatment, with rates from 1% to 68% reported depending on the type of surgery performed [5]. Repetitive treatments due to recurrence adversely affect the quality of life of patients. Therefore, recent studies have focused on minimally invasive treatment modalities that provide smaller tissue damage and loss with shorter healing times [6].
Phenol is an aromatic compound with strong sclerosing properties which has been used as a simple and effective minimally invasive treatment option for pilonidal sinüs [2]. Although several studies focus on phenol treatment in primary pilonidal disease, only a few studies shared results in recurrent disease [7,8].
In this study, an analysis was carried out to observe the clinical outcomes of phenol treatment in patients with recurrent pilonidal sinus disease. The main outcome measure was the success rate after phenol therapy.
We also wanted to define the factors associated with treatment failure after phenol administration in this particular group.

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Materials and Methods

Patients with recurrent pilonidal sinus disease who received crystallized phenol treatment in the State Hospital of Iğdir between March 2017 and June 2020 were retrospectively evaluated. Patients who have undergone surgery for pilonidal sinus and were subsequently found to have a recurrence, treated with phenol afterward, and followed up were included in the study. Patients with newly diagnosed pilonidal sinus, recurrent pilonidal sinus after a non-surgical treatment (laser, phenol), and multiple surgical interventions because of recurrence were excluded. Participating patients signed an informed consent form for the procedure and subsequent treatment and gave written consent for their data to be used in our analyses. Although there is no consensus on the definition of success or failure of phenol administration in pilonidal disease [9], we defined successful treatment as epitalization of the sinus tract and cessation of discharge.

Demographic data of the patients, body mass index (BMI), presence of comorbid diseases, smoking status, family history, the surgical technique in the first operation, time until recurrence, phenol administration time, and the success of the phenol treatment were recorded. The duration of returning to work, walking without pain, sitting on the toilet without pain, and postoperative follow-up data were obtained in the postoperative period. Patients with recurrent pilonidal sinus were grouped into unsuccessful and successful treatment groups according to the treatment success after phenol treatment and both groups were compared.

Crystallized Phenol Application Method

Phenol is a monosubstituted aromatic hydrocarbon with a crystallized solid form at room temperature. It has antiseptic, anesthetic, and potent sclerosing properties. 80% phenol solution prepared from crystallized phenol was prepared. After entering through the sinus opening located at the sacrococcygeal area, remains and hairs in the cavity were cleaned with a mosquito clamp under local anesthesia. The cavity of the pilonidal cyst was curetted through the use of a biopsy curette. Depending on the size of the cavity, 150 to 250 mg of crystallized phenol was administered without contacting the skin. After waiting for five minutes, phenol and residues were removed by applying pressure with a dry cloth. The wound was washed with saline. The procedure ended with wound dressing.

Statistical analysis

Baseline characteristics were displayed using the number of cases (n) and percentages (%). Normally and non-normally distributed data were described using means with standard deviation (SD). Binary data were analyzed with chi-square analysis or Fishers' exact test, depending on the expected value. Independent samples t-test statistic was used to compare the means of two independent groups. ANOVA test was used to compare mean among more than two groups for continuous data. In the multivariant analysis, independent predictors of phenol treatment failure were examined using logistic regression analysis using possible factors identified in previous analyzes. A p-value of ≤ 0.05 was considered statistically significant. Statistical analyses were performed by using www.e-picos.com New York software and MedCalc statistical package program.

Results

The subjects of this study consisted of 94 (87.9%) males and 13 (12.1%) females. The mean age of the patients was 24.4 ± 5.5. The mean BMI was 25.85 ± 2.93 kg/m^2. The time to recurrence after the first operation was 7.88 ± 3.29 months. The mean procedure time of phenol was 17.76 ± 5.46 minutes. The mean time to return to work was 2.06 ± 0.79 days. After phenol application, the mean pain-free walking time was 1.32 ± 0.49 days, and the time to sit on the toilet without pain was 1.60 ± 0.56 days. The follow-up period after phenol administration was 19.63 ± 6.86 months (Table I).

Forty-five (42.1%) patients had a first-generation relative diagnosed with pilonidal sinus. Thirty-six (33.6%) patients were smokers, while 9 (8.4%) had a comorbid disease. This comorbid disease was diabetes for 4 patients, asthma for 2 patients, Crohn's disease for two patients and juvenile rheumatoid arthritis for one patient. After excision of the pilonidal sinus tract in the first operation, secondary healing was preferred in 7 (6.5%) patients, primary closure was applied in 56 (52.3%), and the flap was applied in 44 (41.2%) patients.

The treatment success rate after administration of phenol was 83.2%. Treatment failure was observed in 18 (16.8%) patients. Subsequently, treatment success was achieved after applying phenol to 4 of these patients for the second time and 3 of these patients for the third time. In the remaining 11 patients, wide surgical excision was performed, considering that the phenol treatment was insufficient.

The patients were divided into two groups as successful treatment group (ST) and the unsuccessful treatment group (UST). The mean age of the patients in ST was 24.2 ± 4.7 years, while it was 25.1 ± 8.6 years in the UST. While 80 (89.9%) of the patients were male in ST, 14 (77.8%) were male in UST. When the groups were evaluated regarding the presence of pilonidal sinus in their families, 38 (42.7%) patients in ST and 7 (38.9%) patients in UST had a family history. In ST, 31 (34.8%) patients were smokers, and 5 (5.6%) had a

TABLE I - *Demographic and clinical data of the patients*

	All patients (n=107) x±SD	Treatment Successful group (n=89) x±SD	Treatment Failed group (n=18) x±SD	p value
Age	24.4 ± 5.5	24.2 ± 4.7	25.1 ± 8.6	0.67*
BMI	25.85 ± 2.93	25.18 ± 2.41	29.12 ± 3.18	<0.001*
Recurrence time after the first operation	7.88 ± 3.29	7.81 ± 3.39	8.22 ± 2.77	0.63*
Procedure time	17.76 ± 5.46	17.58 ± 5.34	18.61 ± 6.14	0.47*
Back to work time	2.06 ± 0.79	2.06 ± 0.77	2.06 ± 0.87	0.99*
Pain-free walking time	1.32 ± 0.49	1.30 ± 0.46	1.39 ± 0.61	0.50*
Pain-free toilet sitting time	1.60 ± 0.56	1.56 ± 0.52	1.78±0.73	0.14*
Follow-up time after phenol	19.63 ± 6.86	19.18 ± 7.08	21.83 ± 5.25	0.14*
	n (%)	n (%)	n (%)	
Gender				
Male	94 (87.9)	80 (89.9)	14 (77.8)	0.15**
Female	13 (12.1)	9 (10.1)	4 (22.2)	
Family history				
Yes	45 (42.1)	38 (42.7)	7 (38.9)	0.77**
No	62 (57.9)	51 (57.3)	11 (61.1)	
Cigarette				
Yes	36 (33.6)	31 (34.8)	11 (61.1)	0.02**
No	71 (66.4)	58 (65.2)	7 (38.9)	
Comorbid disease				
Yes	9 (8.4)	5 (5.6)	4 (22.2)	0.02**
No	98 (91.6)	84 (94.4)	14 (77.8)	
Surgical technique in the first operation				
Secondary healing	7 (6.5)	6 (6.7)	1 (5.6)	0.40***
Primary closure	56 (52.3)	47 (52.8)	9 (50.0)	
Felp	44 (41.2)	36 (40.5)	8 (44.4)	

*Independent t-test, **Chi square, ***One-way ANOV

comorbid disease history. In the UST group, 11 (61.1%) patients were smokers, and 4 (22.2%) had a history of comorbidities.

The groups were evaluated regarding the surgical technique used in the first operation. In ST, secondary healing of the defect after excision of the pilonidal sinus tract was preferred in 6 (6.7%) patients, primary closure in 47 (52.8%) patients, and closure of the defect area with a flap in 36 (40.5%) patients. In UST, secondary healing was preferred in 1 (5.6%) of the patients, primary closure was chosen in 9 (50%), and flap closure of the defect area was preferred in 8 (44.4%) patients. While BMI was 25.18 ± 2.41 in ST, it was 29.12 ± 3.18 in UST. The recurrence time after the first surgery was 7.81 ± 3.39 months in ST, while it was 8.22 ± 2.77 months in UST. The duration of procedure was 17.58 ± 5.34 minutes in ST and 18.61 ± 6.14 minutes in UST. The time to return to work was 2.06 ± 0.77 days in ST and 2.06 ± 0.87 days in UST. Pain-free walking was 1.30 ± 0.46 days, and sitting on the toilet without pain was 1.56 ± 0.52 days in ST. Pain-free walking was 1.39 ± 0.61 days, and sitting on the toilet without pain was 1.78 ± 0.73 days in UST. The follow-up period after phenol treatment was 19.18 ± 7.08 months in ST and 21.83 ± 5.25 months in UST. There was no statistically significant difference between the groups regarding age, gender, family history, surgical technique in the first operation, time to recurrence, procedure time, time to return to work, pain-free walking or toilet sitting, and follow-up period after phenol treatment. (p>0.05). The mean BMI, smoking rate, and having comorbidities were significantly higher in UST than in ST. (p<0.001, p=0.04, p=0.02, respectively)

Higher BMI, being a smoker, and having a comorbid disease, which made a statistical difference between TS

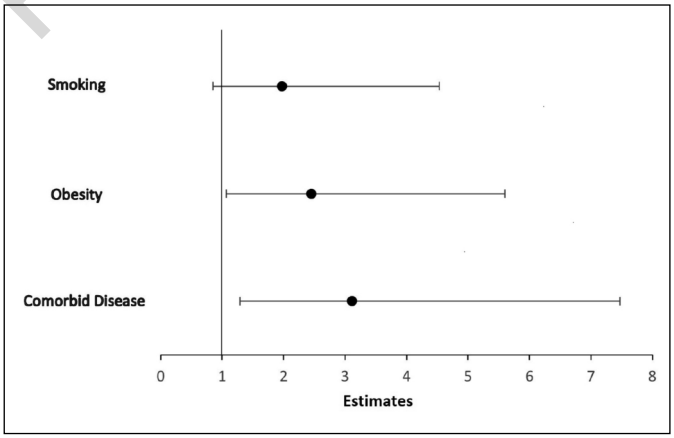

Fig. 1: Forrest plot of multivariate analysis of phenol treatment failure

and UST groups in predicting the outcome of phenol treatment, were evaluated with multivariant analysis. Being obese (BMI ≥ 30 kg/m²) was found to be associated with unsuccessful treatment. (OR: 2.45, 95% CI: 1.07 - 5.6) Having a comorbid disease (OR: 3.11, 95% CI: 1.29 - 7.47), and being a smoker (OR: 1.97, 95% CI: 0.85 - 4.53) were also significantly associated with the treatment failure (Fig. 1).

Discussion

Pilonidal sinus is challenging for surgeons even if numerous treatment options are available. The ideal treatment method for pilonidal sinus should be simple, easy to apply, causing minimal pain, shorter hospital stay, and even appropriate for outpatient treatment [10]. The recovery period should be comfortable for the patient without frequent and complicated wound care. The return to normal life activities should be short, and most importantly, the long-term recurrence rates should be minimal [11].

There is no ideal and unanimous definitive treatment even if many surgical techniques have been described. The curative treatment is wide surgical excision. In the review of Kober et al., it was stated that surgical excision is the standard classical treatment method for pilonidal sinüs [12]. It was determined that secondary healing, primary suturing, and flap shifting in the closure of the skin defect after excision were not statistically different from each other. Considering the recovery period of the disease and the possibility of recurrence is essential before deciding the treatment strategy.

Current treatments protect the skin and interfere locally with the sinus tract. As new treatment methods, sinus tract curettage, fistuloscopy and phenol injection, and laser therapy can be counted [13].

Phenol injection is widely used because it has a shorter learning curve, is faster, simple, and can be applied anywhere [14]. Phenol application shortens the hospital stay after the procedure and provides less loss in the workforce than surgeries in pilonidal sinus treatment. In addition, minimally invasive procedures do not negatively affect the quality of life in the postoperative period as much as wide excision [15].

Wide surgical excision takes a longer time to heal and return to work. In current treatment approaches, wound healing and starting to work are required in a shorter time [16]. For these reasons, minimally invasive surgical and medical treatments are increasingly preferred. However, except for postoperative advantages, they have important complications such as disease recurrence. Therefore, surgeons tend to prefer more aggressive treatment options when recurrence occurs after pilonidal sinus surgery.[17]We herein this study aimed to analyze the clinical outcomes following phenol treatment instead of surgical excision in recurrent pilonidal disease.

Stauffer et al conducted a meta-analysis on the treatment of pilonidal sinus, examining 6143 studies published from 1833 to 2017 [5]. It has been stated that recurrence after pilonidal sinus surgery depends on the surgical procedure and follow-up period. Therefore, both should be considered when concluding the efficacy of a treatment. There are limited data on phenol therapy in the recurrent pilonidal sinus. Most studies regarding phenol therapy are involved with primary pilonidal disease alone and observe the recurrence rate afterward. In the follow-up of the patients, recurrence was observed in 1.9% - 40.4% [5]. Emiroglu et al stated that the recurrence rate of phenol injection after treatment was 5% - 38 [9].

Calikoglu et al reported that phenol injection is as effective as surgical excision in their prospective randomized controlled study. Phenol recurrence rate was found 18.6%, while surgical excision recurrence rate was found 12.8% [18]. In our study, the failure rate was 16.8% after phenol administration in patients with recurrent pilonidal sinus.

The recurrence rate of phenol application is higher than other treatment options. On the other hand, phenol application has the advantage of being fast and easy to apply. In addition, there is a chance to apply phenol several times after surgery or phenol application [15,19].

Aygen et al applied phenol therapy to 36 patients with the recurrent pilonidal disease, and recurrence rate was 13.9% [8]. In our study, we observed recurrence in 18 (16.8%) of 107 patients. Success was achieved with repeated phenol applications in 7 of the recurrent patients.The patients were followed for an average of 20 months, and the duration was similar to the literature.

Different predisposing factors have been defined for recurrence after pilonidal sinus surgery. Factors causing recurrence in adult patients were defined as high BMI, family history, bathroom habits, excessive hair growth, skin color, longer daily sitting time, smoking habit, abscess, and duration of symptoms.[20,21]

Albabtain et al. found the recurrence rate to be 22.8% in their study to predict the recurrence rate after pilonidal sinus surgery and determine the risk factors that cause the disease to recurrence [22]. Advanced age and postoperative seroma were independent risk factors for recurrence. Preoperative antibiotic prophylaxis and postoperative hair removal were effective in reducing recurrence. They stated that the surgical technique did not affect recurrence.

Halleran et al found the recurrence rate after pilonidal sinus surgery to be 33% in pediatric patients and showed that even in pediatric patients, the only risk factor for disease recurrence after pilonidal sinus surgery was high BMI, independent of surgical technique [23]. Al-Khayat et al stated that smoking and obesity increase the complication rate after pilonidal sinus treatment [24]. In our study, risk factors associated with re-recurrence were also examined. Surgical technique at the first ope-

ration, age, and gender were not statistically significant risk factors for recurrence. We observed a statistically significant difference between smoking and recurrence (p=0.03). Multivariate analysis found that smoking (OR: 1.97, 95% CI: 0.85 - 4.53) was also significantly associated with the treatment failure. Patients in UST had a statistically significantly higher BMI than the ST group (p<0.001). Being obese which is shown to have association with many medical conditions also increased the risk of recurrence in our study. (OR: 2.45, 95% CI: 1.07 - 5.6).

In a retrospective study, Doll et al. examined risk factors for recurrence after pilonidal sinus surgery [25]. They stated that while family history and having surgery at a younger age are risks, high BMI is not a risk. Doll et al evaluated the recurrence timeline after primary and recurrent surgery of pilonidal sinus in a multicenter study conducted in 2007. The recurrence rate in long-term follow-up after pilonidal sinus treatment was 22%. Recurrences have been reported up to 20 years postoperatively and recommended completing the postoperative period to five years. Even in a 5-year follow-up, 25% of recurrences can be missed [26]. In our study, there was no association between family history and recurrence (p=0.77). In multivariate analysis, having a comorbid disease prior to phenol administration was a risk factor for recurrence (OR: 3.11, 95% CI: 1.29 - 7.47). We believe that increased risk of recurrence in patients with chronic disease is due to the negative effects of chronic diseases on wound healing.

All our patients were discharged in the day the procedure was performed as phenol treatment is very suitable for outpatient settings. Phenol treatment has also advantage of shorter back to work time and pain-free walking time. In this study, it was found that pain-free walking time was 1.32 ± 0.49 days, and the time to sit on the toilet without pain was 1.60± 0.56 days.

The limitations of our study were its retrospective design and small sample size. However, we were able to apply phenol treatment with favorable clinical outcomes in a small rural hospital.

Conclusion

The ideal treatment for pilonidal sinus is rapid recovery with a low recurrence rate. As a simple outpatient technique, phenol application has many advantages, such as being easy to apply, earlier return to work, and a shorter pain-free walking time. Phenol treatment is convenient for patients suffering from recurrence without the need of an aggressive surgical excision in outpatients settings even in rural hospitals with limited sources as in our study.

Our study suggests that the phenol treatment should be considered in patients with recurrent pilonidal sinus before a surgical approach. Nonetheless, further studies are needed to address the effect of phenol treatment in recurrent pilonidal disease.

Riassunto

Questo studio è finalizzato ad osservare gli esiti clinici del trattamento con fenolo nei pazienti con malattia del seno pilonidale ricorrente.

Nello studio ha sono stati raccolti retrospettivamente i dati di 107 pazienti con recidiva della malattia pilonidale che hanno ricevuto un trattamento con fenolo in un unico istituto. I pazienti sono stati divisi in due gruppi come trattamento riuscito (ST) e trattamento non riuscito (UST) dopo l'applicazione di fenolo. È stato effettuato un confronto tra i gruppi per definire i fattori associati al fallimento del trattamento.

Nel gruppo ST sono rappresentati 89 pazienti, e nel gruppo UST 18 pazienti. Il tasso di successo dopo trattamento con fenolo è del 83,2%. Non abbiamo osservato differenze tra ST e UST in termini di età, sesso, storia familiare, tecnica chirurgica al primo intervento, tempo alla recidiva, tempo della procedura, tempo di follow-up, intervallo di ritorno al lavoro, cammino senza dolore o sedersi sul wc senza dolore (p>0,05). Tuttavia il fattore fumo, la presenza di comorbilità e il BMI medio erano statisticamente significativamente più alti nel gruppo UST rispetto al gruppo ST (p<0,05). Inoltre, essere obesi (OR: 2,45, IC 95%: 1,07 - 5,60), avere una comorbidità (OR: 3,11, IC 95%: 1,29 - 7,47) e fumare (OR: 1,97, IC 95%: 0,85 - 4.53) erano significativamente associati al fallimento del trattamento.

In conclusione il trattamento con fenolo si è dimostrata una procedura efficace e semplice che potrebbe essere facilmente applicata anche negli ospedali rurali in modo ambulatoriale. Pertanto, dovrebbe essere considerato per i pazienti che soffrono di recidiva senza la necessità di un'escissione chirurgica aggressiva.

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