

Staged Crystallized Phenol Treatment in Pilonidal Disease: A Retrospective Cross-Sectional Study.

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Abstract

Background: In recent years, minimally invasive techniques with less tissue excision, rather than surgical treatments including wide tissue excisions, are preferred in the surgical treatment of pilonidal sinus. Crystallized phenol treatment is a widely used minimally invasive method. The aim of this study is to examine the results of applying crystallized phenol in a two-stage manner.

Material and Methods: In this study, demographic information, pilonidal sinus characteristics, and results of crystallized phenol treatment of primary pilonidal sinus patients treated with crystallized phenol at Ankara Yıldırım Beyazıt Education and Research Hospital General Surgery Clinic between January 2016 and July 2021 were retrospectively analyzed.

Results: The average age of 185 patients who underwent phenol treatment for pilonidal sinus was 26.75±6.21 years. 53.2% of the patients were ≤25 years old. 80.5% of the patients were male. 65.0% of all patients had a BMI <30 kg/m². The follow-up period for patients was 31 months (min 6, max 60). The patients had 1-3 pits. In the final evaluation of patients who received crystallized phenol treatment twice, abscesses developed in 3 patients (1.6%) and recurrences occurred in 8 patients (4.3%). A statistically significant relationship was found between age and recurrence (p=0.027) and between BMI and recurrence (p=0.003). The incidence of recurrence increased significantly as the number of pits increased (p<0.001).

Conclusions: In our study, we did not encounter any serious complications with the application of crystallized phenol in two stages. We observed that our patients returned to their routine lives painlessly in the early period and that our recurrence rates were low. Based on our findings, we can say that the application of crystallized phenol as a minimal invasive procedure is still a safe and valid method for the treatment of pilonidal sinus.

Keywords: Pilonidal Sinus, Relapse, Crystallized Phenol Treatment

Introduciton

Pilonidal sinus disease (PSD) is a condition characterized by infection of the skin and subcutaneous tissue in the upper part and surrounding area of the structure known as the “congenital natal cleft” or “congenital intergluteal cleft” located between

the two hips [1-3]. Previously thought to be congenital, with increasing evidence, it is now widely believed that PSD is related to hairs in the gluteal cleft and is acquired [4, 5]. Currently, it is accepted that PSD is a chronic condition that can manifest as intermittent symptoms over several years or as acute symptoms [5]. Due to the varying causes of the disease in different patients, treatment management can range from simple incision and drainage to extensive reconstructive procedures after a wide excision [6, 7].

In recent years, as the trend moves towards less invasive surgical methods, the importance of Video-assisted Pilonidal Sinus Ablation (VAAPS) and Endoscopic Pilonidal Sinus Treatment (EPiST) has increased and they have become more prominent [5]. So far, both surgical and non-surgical techniques have been used in the treatment of pilonidal sinus (PSD), but there is still no standard treatment that is widely accepted.

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Although many surgical methods have been performed, the most commonly used methods include excision, excision-primary closure, excision-marsupialization, and excision-flap techniques. Non-surgical methods include depilation, cavity curettage, phenol crystallization (PC) treatment, and laser treatment [6, 8]. However, PC treatment is a widely used conservative method for PSH treatment due to its ease of use and cost-effectiveness (9). In the study results in the literature, it is emphasized that this minimally invasive method is an alternative to surgery because of the short hospital stay of patients, early return to work and daily life, and high patient satisfaction [10, 11]. In addition, it is reported that the recurrence rates are low in PC applications [10, 12].

The basic approach for treatment of pilonidal sinus (PSD) is surgical intervention. However, regardless of the treatment protocol, there is a risk of recurrence for this condition. Therefore, when determining the ideal procedure for PSD treatment, it is preferred that the procedure is simple and cost-effective. This is because the pain levels of these patients should be reduced to a minimum and their quality of life should be improved in their daily lives. The reason why phenol crystallization (PC) treatment is preferred over surgical procedures in PSD is because it is easy to perform and low-cost. The aim of this study is to examine the results of two-stage PC treatment.

Material and Methods

In this study, the demographic information, pilonidal sinus (PSD) characteristics, informed consents, procedure, and results of the PC treatment of primary PSH patients who underwent PC treatment at the General Surgery Clinic of Ankara Dışkapı Yıldırım Beyazıt Training and Research Hospital between January 2016 and July 2021 were retrospectively analyzed based on patient records. Patients who had undergone surgical treatment, developed recurrence, and received PC treatment were excluded from the study.

Crystallized Phenol;

Phenol can be found in liquid or crystallized forms (Figure 1). It is used in the treatment of PSD [13, 14]. The description of the application of liquid phenol into the sinuses through the sinus opening after cleaning the hairs in the sinuses and curettage was first made by Maurice and Greenwood in 1964 [14]. Phenol is colorless at room temperature and is available in liquid and crystalline forms. Phenol is an acidic substance that is present in the composition of various drugs due to its anesthetic and disinfectant effects, which are obtained by adding a hydroxyl group to an aromatic core. It takes on a yellowish color over time when exposed to air. Its specific gravity is 1.07 g/cm³, melting point is 37-41°C, and boiling point is 178-182°C. It dissolves in water and liquid paraffin, but it easily dissolves in alcohol, ether, chloroform, glycerin, carbon sulfide, and alkalis [13].

Application and Treatment Procedure;

The patient was evaluated on the first visit. It was found

that the patients had sinus openings that varied in size from 0.1-4 mm and in number from 1-3. Criteria such as absence of active infection and abscess and not having undergone surgery were sought for the application of CP. The patients were thoroughly informed about the surgical treatment and CP application, and informed consents were obtained. If these were not present, the first application was made. All patients with purulent discharge from the sinus openings were started on oral antibiotics (Amoxicillin and Clavulanic Acid 1000 mg 2x1), and CP was not applied. If there were no problems in the patients called for control 1 week later, CP was applied to them as well.

Patients were taken to a small surgical room. Local anesthesia was given with 3 ml of prilocaine hydrochloride (20 mg/ml) after cleaning the skin surface in sterile conditions (Figure 1). If a patient had multiple sinus openings, the procedure was performed separately for each opening. Then, all sinus orifices were cannulated (Figure 1). The inside of the sinuses was checked for the presence of hair, and the cyst walls were curetted after removing hairs in the cyst with a forceps (Figure 1). Before the procedure, the surrounding skin tissue was protected from the irritant and corrosive effect of the pure crystallized phenol with a topical antibiotic cream (containing Nitrofurazone) by moistening the skin (Figure 1). Approximately 1-2 pieces of CP were applied to each sinus opening, with a size ranging from 0.1 mm to 0.5 mm that could be inserted into each opening (Figure 1). This was done to ensure that CP would melt at body temperature if it came into contact with tissue. Additionally, applying CP in a solid small piece form was preferred to prevent possible complications and the risk of splashing onto the surrounding skin tissue when applied in liquid form.

After the procedure, patients were told they could remove the dressings 24 hours later and take a shower. They were advised to take daily showers and clean the skin area with hair removal cream, and a follow-up appointment was scheduled one week later. If no pathological findings were observed at the follow-up appointment, a second session of CP application was scheduled 21 days later. Patients received two CP applications with a 3-week interval. The final control was performed 4 weeks after the second CP application. The status of patients whose sinuses were checked for closure and found to have no discharge or infection after undergoing two CP treatments and coming for a check-up one month later was considered "healed."

Ethics Committee Approval conducted with the approval of the Ethics Committee of Dışkapı Yıldırım Beyazıt Training and Research Hospital of the Ministry of Health of the Republic of Turkey with the permit number 117-10.

Statistical Analysis

Data was analyzed using IBM SPSS version 22.0 (IBM Corporation, Armonk, NY, USA). Continuous variables were expressed as mean $\pm$ sd and/or median (min-max), and categorical variables were expressed as numbers and percentages. Non-parametric tests were used because numerical variables did not have a normal distribution

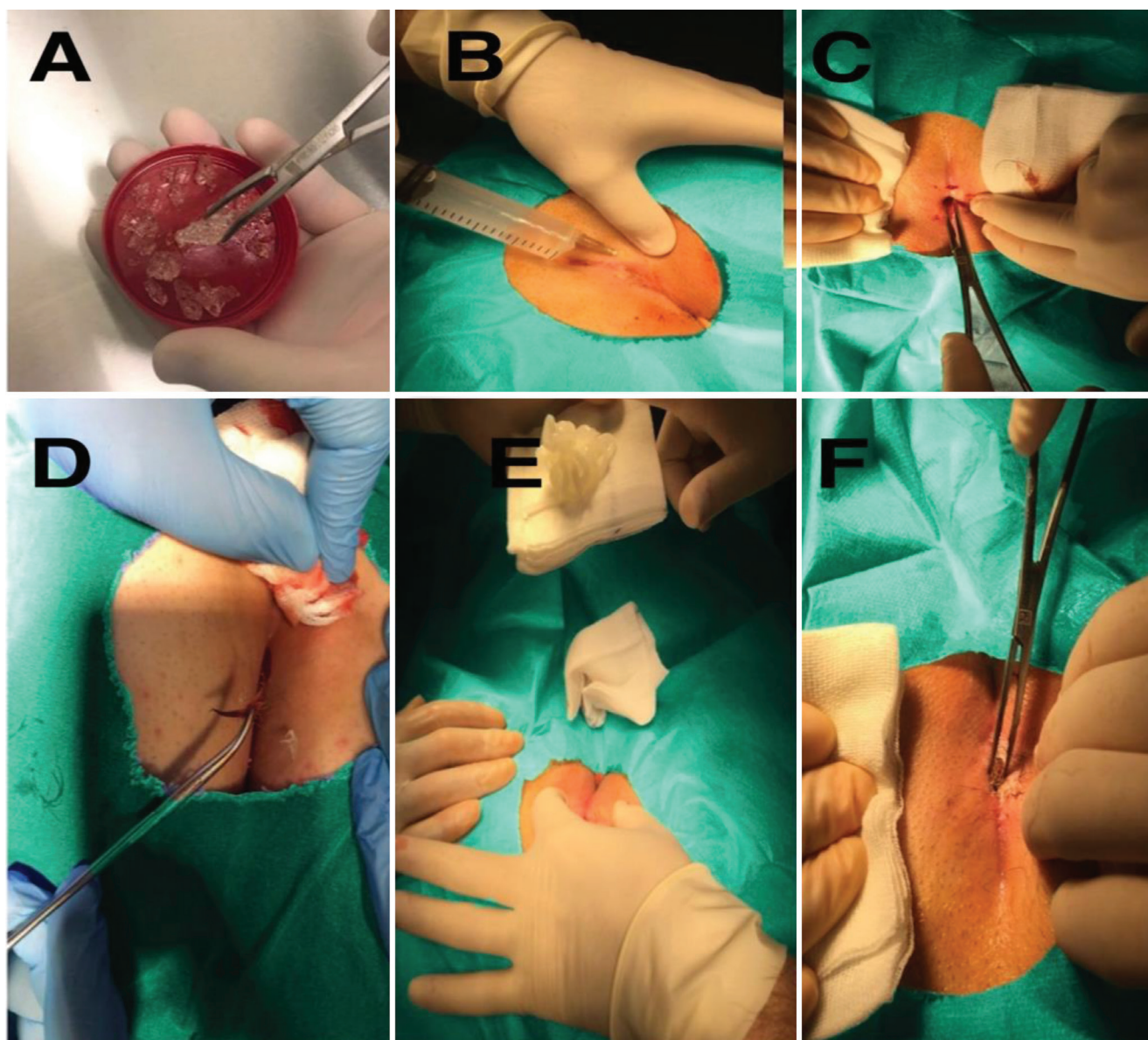


Figure 1. A: phenol in crystalline form, B: application of local anesthesia, C: cannulation and enlargement of the orifice, D: hair removal procedure, E: application of protective cream, F: application of crystalline phenol

according to the Kolmogorov-Smirnov test. The Mann-Whitney U-test was used to examine the differences between numerical variables in two groups and the chi-square test was used to investigate the relationship between two categorical variables.

Results

The average age of 185 patients treated with PSD and phenol application was 26.75 ± 6.21 years. It was seen that 53.2% of the patients were ≤ 25 years old and 47.0% were > 25 years old. 80.5% of the patients were male. 65.0% of all patients had a BMI < 30 kg/m², and the average BMI was 28.72 ± 7.51 kg/m². The median symptom duration was 5 months (min 1, max 15), and the follow-up duration was 31 months (min

6, max 60). 76.8% of the patients described their lifestyle as sedentary due to their professions. 47.6% of the patients were smokers, and 32.4% had a family history of PSD (Table 1).

At the first evaluation during the initial visit, it was found that at least 2 symptoms were present in 34.6% of the patients; 24.3% had abscesses, 22.7% had swelling, 24.9% had pain, and 24.9% had discharge. As a second symptom, swelling was present in 9.4%, pain in 45.3%, and discharge in 45.3% of the patients. 50.8% of the patients had 1 pit count, 44.9% had 2 pits, and 4.3% had 3 pits. In the final evaluation of patients who underwent CP twice, 3 patients (1.6%) developed abscesses and 8 patients (4.3%) had recurrent symptoms. It was determined that 97.8% of the patients had performed local hair cleaning (Table 2).

Descriptive informations		(n)	Percentage (%)
Age (years)	≤ 25	98	%53.0
	> 25	87	%47.0
Gender	Woman	36	%19.5
	Man	149	%80.5
BMI (kg/m ²)	< 30 (Normal)	120	%65.0
	≥ 30 (Obese)	65	%35.0
Lifestyles due to their profession	Ambulatory	43	%23.2
	Sedentary	142	%76.8
Family history	Absent	125	%67.6
	Present	60	%32.4
Smoking	Absent	97	%52.4
	Present	88	%47.6

BMI: Body Mass Index (kg/m²)

Table 1. Descriptive information about patients

When analyzed according to gender, lifestyle due to occupational type, family history, local hair cleaning, and complication status, no significant relationship was found (Table 3). The recurrence rates were 1.0% in patients under 25 years of age and 8.0% in patients over 25 years of age, and a statistically significant relationship was found between age and recurrence status ($p=0.027$).

It was found that the relapse rates were 0.8% in patients with a BMI value <30 kg/m² and 10.8% in those with a

BMI ≥30 kg/m², and there was a statistically significant relationship between BMI and relapse status ($p=0.003$). As the number of pits increased, the relapse rates also increased in a statistically significant manner (1 pit=0.0%; 2 pits=3.6%; 3 pits=62.5%; $p<0.001$). Although the relapse rates in patients who presented with ulcers and discharge (6.7% and 6.5%, respectively) were higher than those who presented with swelling and pain (2.4% and 2.2%, respectively), the difference was not statistically significant ($p=0.680$) (Table 3).

Discussion

Recently, minimally invasive methods that involve the excision of less tissue have been preferred over surgical treatments that include wide tissue excisions in the treatment of PS. CP is widely used in minimally invasive methods today.

The cleaning of hairs within the sinus and subsequent curettage, followed by the application of liquid phenol from the sinus opening, was first described by Maurice and Greenwood in 1964. In the early days of CPT, the procedure was performed under general anesthesia, but it has now become a conservative method performed under local anesthesia on an outpatient basis [14-18].

We also applied the same procedure to our patients.

In order to make the CP procedure easier and more comfortable, it is recommended to enlarge every sinus opening smaller than 3mm.

Enlarging the orifice allows for better observation during all stages of the procedure and prevents early closure of the sinus through granulation and epithelization mechanisms.

Evaluation of the patients	Findings	n	Total(n)	(%)	Total (%)
Symptoms first reported by the patient in the history and detected at the first visit	No symptoms	6	185	3.20%	100.00%
	Abscess	45		24.30%	
	Swelling	42		22.70%	
	Pain	46		24.90%	
	Discharge	46		24.90%	
Symptoms reported secondarily by the patient in the history and detected at the first visit evaluation	Swelling	6	64	9.40%	100.00%
	Pain	29		45.30%	
	Discharge	29		45.30%	
Number of pits determined by the first visit evaluation	1	94	185	50.80%	100.00%
	2	83		44.90%	
	3	8		4.30%	
Detection of the presence of abscess with the last visit evaluation-presence of complications	Absent	182	185	98.40%	100%
	Abscess	3		1.60%	
Detection of recurrence with the last visit evaluation	Absent	177	185	95.70%	100%
	Present	8		4.30%	
Detection of the presence of local individual hygiene (hair cleaning) with the last visit evaluation	Done	181	185	97.80%	100%
	Not done	4		2.20%	

Table 2. Evaluation findings of the patients

Follow-up Criteria	Recurrence (-)		Recurrence (+)		p
	(n = 177)	%	(n = 8)	%	
Age (years)					
≤ 25	97	54.8	1	12.5	0.027*
> 25	80	54.2	7	87.5	
Gender					
Woman	36	20.3	1	12.5	1.000*
Man	142	79.7	7	87.5	
BMI (kg/m ²)					
< 30 (Normal)	119	67.2	1	12.5	0.003*
≥ 30 (Obese)	5	32.8	7	87.5	
Lifestyles due to their profession					
Ambulatory	42	23.7	1	12.5	0.683*
Sedentary	135	76.3	7	87.5	
Family history in terms of PSH					
Absent	120	67.8	5	62.5	0.716*
Present	57	32.2	3	37.5	
Symptom (n, %)					
Absent	6	0.56	0	0	0.680**
Abscess	42	23.7	3	37.5	
Swelling	41	23.1	1	12.5	
Pain	45	25.4	1	12.5	
Discharge	43	24.3	1	12.5	
Number of pit					
1	94	53.1	0	0	<0.001**
2	80	45.1	3	37.5	
3	3	1.8	5	62.5	
Local hair removal					
Done	174	98.2	7	87.5	0.163*
Not done	3	1.8	1	12.5	
Complication					
Absent	174	98.2	8	100	1.000*
Present (Abscess)	3	1.8	0	0	

* Fisher's Exact Test, ** Chi-square Test, BMI: Body Mass Index (kg/m²)

Table 3. Follow-up results of the patients

Sinus curettage is typically performed to remove granulation tissue.

In our study, patients had their sinus orifices, which varied in size from 0.1-4mm and number from 1-3, dilated with a cannula. We agree with the views that cleaning all the sinus content enhances the efficacy of phenol application. However, we would like to emphasize the importance of managing bleeding and serous leakage within the sinus. If there is bleeding and serous leakage in the sinus, it is known that CP's chemical cauterization effectiveness can be significantly reduced [19,20].

Hair is made up of proteins, specifically keratin in the form of polypeptides. Fenol, when used at concentrations above 5%, denatures the cellular proteins found in the cell membrane. As a result, the cell membrane and cellular proteins are broken down. It is clear that fenol's chemical

cauterization function can cause burns on the skin if applied in excessive concentrations [14, 15]. Irritant contact dermatitis and superficial cellulitis are the most common complications that arise from fenol application.

To prevent such complications, the perianal area and other non-surgical areas must also be protected, and the area around the pit should be protected with antibiotic cream or vaseline to prevent skin burns [19, 20]. Due to fenol's anesthetic effect, patients feel minimal pain after the procedure. Analgesics can be administered if needed [10, 16].

We also recommended our patients to use Paracetamol 500mg tablets if necessary. The rate of complications from fenol application is reported in the literature as approximately "0-15.2%," and it has been stated that this rate is "at an acceptable level for the effect on quality of life when compared to surgical procedures."

In our study, prior to phenol application, the surrounding skin tissue was protected with a topical antibiotic cream to counter the irritating and caustic effects of pure CP, and no chemical burn effects were detected on the skin during the controls. We also did not observe contact dermatitis or formation of superficial cellulitis in any of our patients.

After CP application, complications such as abscesses and cellulitis are most commonly seen [10]. A chronic abscess can develop via the sinus known as the drainage pathway [9, 20].

The abscess rate has been reported as 12.5% in the studies of *Schneider and colleagues* and 36.6% in the studies of *Dogru and colleagues* [13]. In our study, we detected abscesses in 3 of our patients, but we did not observe hematoma, cellulitis, or bleeding.

We believe that this result is due to effective hair cleaning before the procedure, expansion of the sinus orifice before the procedure, and thorough cleaning and drainage of the cyst cavity.

In the studies found in the literature, the recurrence rates of PSD during the follow-up period of patients range from 0% to 13.9%. In a study conducted by *Patmano and colleagues*, phenol treatment was applied to 64 patients with a single sinus and followed for 6 months, and a total of 6 (9.3%) patients had a recurrence.

Aygen and colleagues treated 36 patients who underwent surgery due to PSD and had a recurrence after the surgery with CP. They reported that 31 patients did not have a recurrence after a single session of CP, but 5 patients had a recurrence. It was stated that they were successfully treated after the second CP was applied [22].

In our study, recurrence occurred in 4.3% [8] of the patients, which is consistent with the literature findings.

In a study conducted by *Sözüer et al.* with 209 patients, the average age was 25.5 and the number of male patients was 4 times higher than the number of female patients, with an average pit number of 2.13. It was stated that nüks was seen in 17 patients after wound healing.

After 12 months of follow-up, a high success rate of 93.7% was achieved with CP application in the treatment of PSD. Also, low recurrence rate and acceptable complication rate were reported [23]. In our study, the average age of patients diagnosed with PSD was 26.75 ± 6.21 .

The recurrence rates in patients under 25 years of age were at the level of 1.0% while the recurrence rates in patients over 25 years of age were 8.0%. A statistically significant relationship was found between age and recurrence ($p=0.027$).

Two studies have been conducted on the treatment of pilonidal sinus with laser epilation.

In one study by *Girgin et al.*, laser epilation was performed on each patient before the first session of CP treatment. 6 to 8 sessions of laser epilation were performed 6 weeks apart and the patients were followed up on average for 24 months, with three-week intervals.

The study found that no recurrence occurred in any of the 42 patients, but the authors emphasized that the number of patients was small and the follow-up period was short, so they could not reach a definite conclusion [24].

In another study by *Ulusoy et al.*, 92 patients with an average age of 28 and pit counts ranging from 1 to 4 were followed up, and it was found that there was a statistically significant effect of hirsutism degree, presence of abscess at the start, and weekly shower count on recurrence.

Patients with recurrence were evaluated and it was noted that patients with 3 or more pits were predominantly affected. It was emphasized that hirsutism degree and pit count were effective factors for recurrence [25].

In a study by *Kaymakçioğlu et al.*, 143 patients were followed for 24 months. The majority of patients were young individuals (70.7%) in the age range of 20-30 years with an average age of 26.3. In the follow-up, 12 patients (8.3%) experienced recurrence, 10 in the same location and 2 in different locations.

The number of pits varied between 1-8. The results of the study showed that age was not a significant risk factor for PSD, but the volume of the sinus tract and the number of sinus orifices were found to be significant factors affecting recurrence.

The study also found that the recurrence rate increased significantly with an increase in the number of pits (1 pit=0.0%, 2 pit=3.6%, 3 pit=62.5%, $p<0.001$).

Aygen and colleagues reported that after multiple applications of CP, a high success rate (91.7%) was achieved in postoperative recurrent PSD. However, there is no consensus on the ideal number of CP applications [22].

The study by *Akkurt et al.* compared the *Karydakias flap technique* with CP in the treatment of sacro-coccygeal localized PSD. In the study, the median number of sinuses was 3 (2-3) and about 3-5 grams of CP was applied to each sinus opening. In the case of cavities that did not close and/or had persistent discharge, CP was applied every 10 days in 3 sessions for 60% of patients and in 2 sessions for 40% of the patients in the phenol group. *Akkurt et al.* concluded that CP is a less invasive alternative treatment option that can be applied before surgical treatment in selected patients [10]. In our study, we applied CP twice and followed up on the patients for 31 months.

We found that recurrence occurred in 8 patients (4.3%) in the final evaluation. We performed surgical procedures on 3 of these patients. Based on the results of our study, we concluded that age, BMI, and the number of pits are effective factors in the occurrence of recurrence after CP.

In a retrospective study where *Bayhan et al.* compared CP and modified Limberg flap procedures, they found that the recurrence rate was higher in the group of patients who underwent CP once (18.9% recurrence rate and 6.8% recurrence rate), however, the recurrence was not statistically significant between the compared groups.

The study also indicated that CP has a high success rate in treating recurrent pilonidal disease after surgery and can be a preferred option. Additionally, the study found that full healing was achieved in 71.87% of patients after a single CP application and in 92.3% of patients after multiple applications [27].

Our study showed a recurrence rate that was consistent

with the literature, as two CP applications were performed. It was stated that there is a strong correlation between the recurrence and high body mass index (>24.9 kg/m²) and presence of infection in the surgical area.

The success rate after multiple applications of crystallized phenol was found to be 94.5% [27]. Our study found that the recurrence rate was 0.8% in patients with a BMI value of <30 kg/m² and 10.8% in patients with a BMI ≥ 30 kg/m², and a statistically significant relationship was found between BMI and recurrence ($p=0.003$).

According to history, the "sinus containing hair" in the sacrococcygeal region was first described by *Herbert Mayo* in a female patient in 1833 and was defined by *Dr. Andersson* in the Boston Medical-Surgical Journal in 1847 [10,17]. Despite being first described in a female patient, it is now known to mostly affect young adult males [1-3]. It is two times more common in males than in females [28]. In our study, 80.5% of the patients were males, which is in line with the literature findings.

PSD is a condition that can have negative effects on quality of life due to pain, foul-smelling purulent discharge, and even abscess formation.

Predisposing factors for PSD include male gender, young age (often between the ages of 15-24), family history, Mediterranean ethnicity, deep natal cleft, obesity, hairiness, sedentary lifestyle, poor hygiene, excessive sweating, wearing tight undergarments and clothing. In recent years, it is believed that the accumulation of hair falling from the scalp, back and gluteal regions in the intergluteal sulcus causes PSD. These hairs can penetrate the skin when tight clothing is worn and during prolonged sitting, and reach the subcutaneous tissue, leading to chronic anaerobic inflammation and abscess formation. Additionally, the intergluteal area, where PSD is most commonly seen, is anatomically weaker due to the presence of serous glands. The skin in this area becomes more vulnerable and prone to maceration [29] due to the skin being in an intertriginous area and the opening of the serous glands in this region. In our study, no significant relationship was found between lifestyle due to profession, family history, local hair hygiene, and the presence of complications.

The study conducted by *Kargin et al.* is a cohort study with 20-year follow-up results, which found that the success rate of CP in patients who underwent surgery due to refractory chronic pain syndrome was 71.5% with an average of 2.6 infusions. The success was reported in patients who adhered to the treatment and did not discontinue it.

The patients were followed for an average of 45.8 months and 72.4% of the relapses after CP occurred within the first five years and 97.4% within the first 10 years. The longer the disease duration before treatment, the higher the risk of relapse after treatment was also noted [30].

In our study of 185 patients, 3 (1.6%) developed abscesses and 8 (4.3%) had relapses, indicating a high success rate.

Yirgin et al. reported in their studies on PSD that CP resulted in higher patient satisfaction, shorter hospital stays, and earlier return to daily activities [11]. In a study by *Kayaalp et al.*, it was reported that four relapses were seen in patients who received a single session of CP after a 14-month

follow-up. It was emphasized that a single session of CP is an effective treatment for PSD, with acceptable healing rates, less postoperative pain, and shorter absence from work, and could be considered as an alternative treatment method [31].

The results of our study are in line with the literature that states that the relapse rate increases with an increase in the number of pits [21]. We believe that an increase in BMI can lead to a constant moisture in the intergluteal area, excessive hair accumulation, reduced local hair care, and personal hygiene, which can lead to an increase in relapses. We would like to emphasize that our relapse rate is low. We believe that this result is due to the good cleaning of the cavity from hair and debris before the procedure and that the procedure was two-stage.

According to a literature review conducted by *Doll et al.*, the number of patients affected by PSD has exceeded 40,000 since 2010. It was found that Turkish surgeons contributed the most to the literature on this topic, with 39% of studies on Mediterranean patients and 18% of studies on worldwide patients being published by them. They also reported that there has been a significant increase in knowledge and the number of patients studied in recent years on PSD [32].

Our study has two limitations. First, it is a single center, retrospective study. Secondly, the sample size is moderate compared to published studies. In recent years, when looking at studies, there is also a limitation in terms of the procedure as an intervention. Additional interventions are needed before and after the CP application. Laser epilation, for example, is a good practice due to its hair removal and hair reduction effects. The determination of hair growth level, the identification of the duration of symptoms from the onset and a more detailed examination of lifestyle are becoming increasingly important as evidence of their significance in investigating predisposing factors increases.

Another limitation in our study is that it is not a randomized controlled study, so the surgical treatment options for PSD cannot be compared in terms of complications and recurrence. Finally, as we believe that all preventable predisposing factors should be examined together, the follow-up period in our study is relatively short.

Conclusion

In our study, we did not encounter a secondary serious complication by applying the CP in two stages. We observed that our patients returned to their routine lives painlessly in the early stage and that our recurrence rates were also low. With our findings, we can say that the application of CP for PSD treatment is still a safe and valid method as a minimal invasive intervention. We believe that this application can be preferred by managing with a proper indication and some additional lifestyle changes. Further research in the form of multi-center, large-scale randomized controlled studies to explore all the factors affecting the treatment methods, recurrence, and complication rates may contribute to developing a standardized approach for CP application based on the accumulated evidence-based knowledge.

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