

Comparison of crystallized phenol and Karidakis flap treatment in pilonidal sinus disease



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PURPOSE: In this study, we aimed to compare the results of Karidakis flap reconstruction with crystallized phenol in pilonidal sinus treatment.

METHODS: 216 patients treated for pilonidal sinus disease with the researched methods between June 2016 and July 2019 were included in the study.

RESULTS: 142 (65.7%) of the patients were treated with the KFR technique and 74 (34.3%) with the crystallized phenol method. Of the patients included in the study, 157 (72.7%) were male, and 59 (27.3%) were female. The mean age was calculated as 24.89 (\pm 8.4). The mean hospital stay in the KFR group was 1.21 (\pm 0.4) days. The mean time to return to work was 2.79 (\pm 1.03) days in the phenol group and 15.35 (\pm 3.39) days in the KFR group. In 4 (5.4%) patients, the improvement could not be achieved despite multiple sessions of phenol administration, and the procedure was considered unsuccessful. Recurrence occurred in 6 patients (4.22%) in the KFR group. The mean follow-up period was 13.44 (11-16) months in the KFR group and 13.67 (11-16) months in the phenol group.

CONCLUSION: It is thought that phenol administration can be applied in selected single-pit cases with high success, low complications, hospitalization, and early return to work. While the KFR method's lower recurrence rates are advantageous, it was noteworthy that the complication rates were higher.

KEY WORDS: Crystallized phenol, Karydakis flap reconstruction, Pilonidal sinus disease

Introduction

Pilonidal sinus disease (PSD) is a frequently recurring chronic disease in which the sacrococcygeal region is affected¹. The reported incidence in PSD is 25/100,000². It is frequently diagnosed in the 15-30 age group³. It is 3-4 times more common in men^{4,5}. Although it was defined as a congenital disease by Herbert Mayo in 1833, it was widely accepted that it was acquired in the following years because it was not seen in childhood^{6,7}. PSD is thought to develop after the shed hair passes under the skin from the skin's openings caused by friction and pressure in the presacral region. Hair that progresses to the subcutaneous tissue causes the formation

of subcutaneous cysts. Infections that cause serious and purulent discharge to develop in the intergluteal area⁴. Patients often complain of pain, swelling, and inability to sit in the coccygeal area. Hygiene and lifestyle are individual factors affecting the development of the disease, the rate of recovery after treatment, and recurrence⁸. Skin and subcutaneous defects usually require treatment. Surgical and non-surgical treatment approaches are available, but optimal treatment is controversial⁵. Karydakis flap reconstruction (KFR) is one of the most common surgical techniques used in PSD treatment. The procedure is essentially a gluteal advancement flap⁹. The affected area is excised with an asymmetric elliptical incision. The main goal is to close the surgical defect of the midline by flattening the natal cleft. Crystallized phenol application is one of the minimally invasive treatment methods in which sinus ablation is performed. The epithelium in the sinus is sclerosed with phenol¹⁰. Compared to radical surgical excision, PSD has been reported to provide smaller scars, less pain, faster wound healing, and early return to work¹⁰. Although many treatment methods have been compared in the literature,

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there is not much information about the comparison of phenolization with KFR. In this study, we aimed to compare the results of KFR with crystallized phenol therapy used in sinus tract ablation.

Methods

The data of 368 patients who were operated on with PSD diagnosis between June 2016 and July 2019 at Adana Seyhan State Hospital were accessed through the electronic medical record system. Patients with diabetes mellitus, autoimmune disease, steroid, and similar immunosuppressive drug use, history of previous surgery for PSD, and infections in the sacrococcygeal region, who used a surgical technique other than KFR were excluded from the study. Patients over the age of 18 were determined. 142 (65.7%) patients operated with the KFR technique, and 74 (34.3%) patients treated with crystallized phenol were included in the study. All cases were retrospectively gender and age, number of sinus holes (Pit), number of phenol administration, type of anesthesia, duration of operation, use of drains (number of days removed, amount of drainage), postoperative hospital stay, time of return to work, postoperative complications (wound separation), infection, hematoma, seroma) and recurrence.

The relationship between the number of phenol applications and the number of sinuses with recurrence was evaluated. The operation time was determined as the time between the incision with a scalpel and the last stitch. The phenol application time was defined as the period from the start of the procedure to the closure with dressing, following the protection of the surrounding tissue with Nitrofurazan topical antibiotic cream. The duration of hospital stay was started to be evaluated from the day of surgery and was calculated as the day of dis-

charge. The development of pit, serous or purulent discharge and abscess formation within the first 3 months after surgery was defined as failure/recurrence of the procedures. Outpatient clinic control times and results of the patients were recorded.

KFR PROCEDURE

One day before the operation, all patients deemed necessary were shaved to include the entire operating area. Thirty minutes before the operation, all patients received prophylaxis with 1st generation cephalosporin.

Operations were performed in prone position with spinal anesthesia (Bupivacaine hydrochloride 0.5%) or sedation (ketamine hydrochloride + midazolam) and local anesthesia (prilocaine hydrochloride). Including all the pits in the gluteal region, approximately 2 centimeters lateral to the intergluteal sulcus, an asymmetric ellipsoid incision was advanced sacrococcygeal fascia, including all cystic formations in the midline, and excised.

The midline defect was closed with an adipocutaneous flap prepared from the elliptical incision pole's contralateral side. The flap was sutured to the base and lateral tissues. A hemovac drain was placed under the flap in all patients. The drain was removed in patients whose drainage flow rate was less than 20 milliliters/day. 2.0 and 3.0 absorbable polypropylene yarns were preferred for subcutaneous suturing. The skin was closed with a vertical mattress using a 4.0 monofilament nonabsorbable strip (Fig. 1).

CRYSTALLIZED PHENOL PROCEDURE

One day before the procedure, it was shaved to cover the entire area containing the sinuses in all patients deemed necessary. The application was performed in the

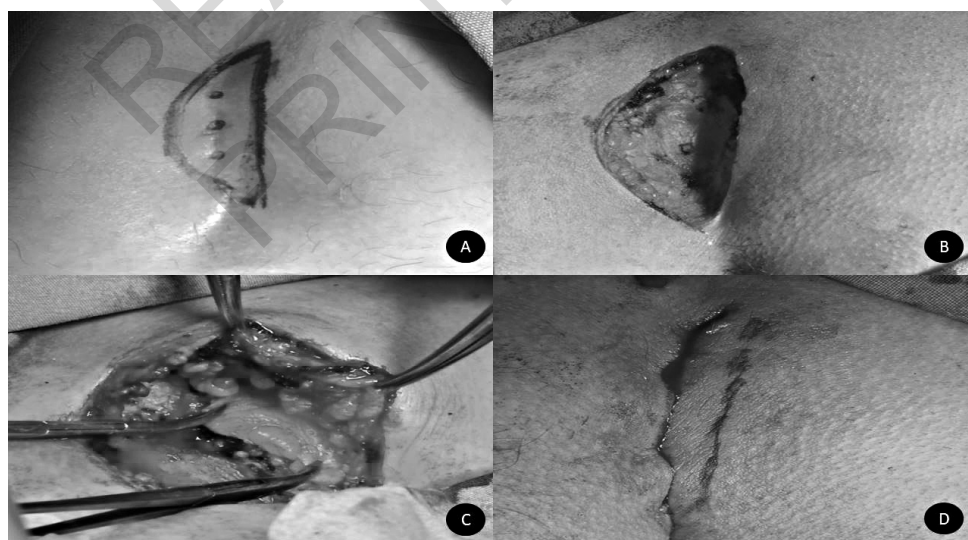


Fig. 1: KFR; Determination of the incision line in the presacral area (A), total excision of the sinuses (B), preparation of the adipofascial flap (C), closure of the fascia and skin after the drain (D).

prone position under local anesthesia in the operating room. The skin was cleansed with povidone-iodine 10%. Pits were determined, and their numbers were noted. Pits blocked due to granulation, fibrin, fallen hair, and other reasons were opened with a fine-tipped cleat and debrided with a curette. The sinus tract was determined with the help of an intracet. Before the crystallized phenol application, Nitrofurazone topical antibiotic cream was applied to the surrounding tissue to protect the skin. 80% crystallized phenol particles were placed in the sinus as described in the original practice of Stewart et al.¹¹. It waited for 2 minutes.

The debris in the sinus was drained. The procedure was applied for the second time, and drainage was performed again. Sinus circumference was neutralized with 70% ethanol. After dressing, the procedure was terminated, and the patient was immediately discharged. The application area was controlled on the 15th day of the process. The second application was not performed in cases where epithelialization was observed in the PSD area. With the same technique, the second and third applications were performed after similar periods of time in patients who could not achieve epithelialization. More than three applications were not made. Failure of the procedure was defined as non-epithelialized cases after three applications and relapse within three months.

The application was performed by the same experienced surgical team (Fig. 2).

DATA ANALYSIS

SPSS 23.0 package program was used for statistical analysis of the data. Categorical measurements were summarized as numbers and percentages, and continuous measurements as mean deviation and minimum-maximum. The suitability of variables to normal distribution was examined using visual (histogram and probability graphs)

and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk Tests). Chi-square test and Fischer's Precision Test were used for comparisons of categorical variables. One way ANOVA was used for parameters conforming to normal distribution, and the Kruskal Wallis test was used in groups that did not comply with normal distribution. Statistical significance level was taken as 0.05 in all tests.

Result

Of the patients included in the study, 157 (72.7%) were male, and 59 (27.3%) were female. The mean age was calculated as 24.89 (\pm 8.4). Patient demographics and clinic property are presented in Table I. Ketamine hydrochloride and midazolam were used in 93.7% of the patients operated with sedation and local anesthesia with the KFR method, and prilocaine hydrochloride was used in 6.3% of the patients operated on with spinal anesthesia. In the phenol group, 90.5% of patients were treated with local anesthesia with prilocaine hydrochloride, and 9.5% of patients were administered prilocaine hydrochloride plus ketamine hydrochloride and midazolam. In patients in the KFR group, the mean withdrawal time of drains placed under the flap was 2.46 days, and the average drainage amount was 29.47 ml.

Complications such as wound infection, seroma, wound dehiscence, and hematoma was evaluated. Complications developed in 12 (8.45%) patients who underwent KFR and 3 (4.1%) patients who were administered phenol. Complications and recurrences are outlined in Table II. Phenol group patients were not hospitalized. The mean hospital stay in the KFR group was 1.21 (\pm 0.4) days. The mean time to return to work was 2.79 (\pm 1.03) days in the phenol group and 15.35 (\pm 3.39) days in the KFR group. After the first session of phenol injection, a second session was required in 15 (20.2%) patients. Complaints continued after the second session

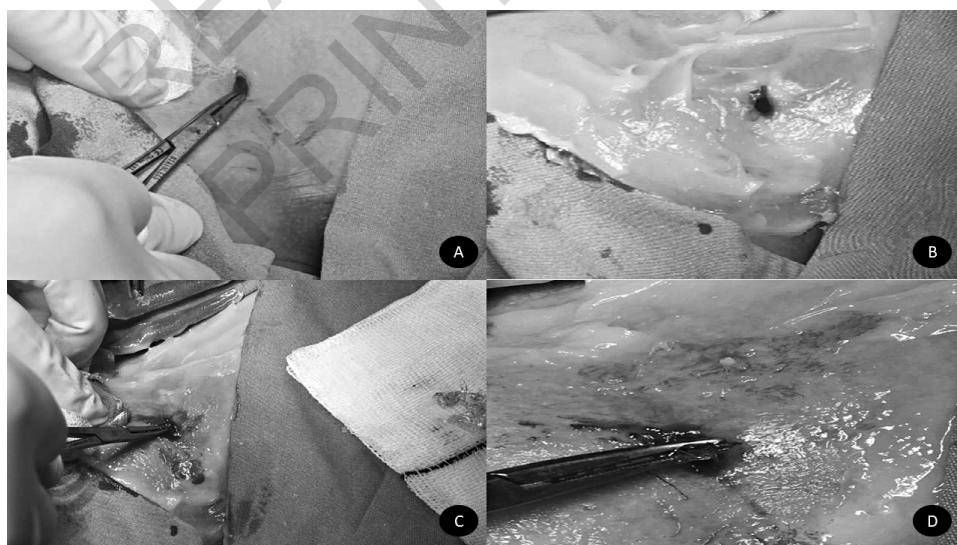


Fig. 2: Pilonidal sinus granulation and debris cleaning (A), applying to the skin to protect surrounding tissue with Nitrofurazone topical antibiotic cream (B), placing crystallized phenol into sinus from the pit (C-D).

TABLE I - Demographic and Clinical information

	Karidakis Group n=142	Phenol Group n=74	Total n=216	P value
Gender				
Female	39(27,5%)	20(27%)	59(27,3%)	P=0,94
Male	103(72,5%)	54(73%)	157(72,7%)	
Age	24,8(18-46)	25,2(18-44)	24,9(18-46)	P=0,77
Number of pits (n)	3(1-6)	2(1-3)	2(1-6)	P<0,05
Average operation/procedure time in minutes	19,3±6,4(10-43)	10,8±2,7(7-17)	16,39±6,7(7-43)	P<0,05
Length of stay in the hospital day	1,21±0,4(1-3)	0	0,79±0,6(0-3)	P<0,05
Return to work time day	15,3±3,3(11-22)	2,8±1,03(1-5)	11,05±6,6(1-22)	P<0,05
Follow up time month	13,44±1,68(11-16)	13,67±1,6(11-16)	13,52±1,68 (11-16)	P=0,36

Values are presented as mean ± standard deviation (range) or number (%)

in 5 (6.7%) patients. As a result of the third session, phenol treatment was applied to 5 patients, one patient fully recovered. In 4 (5.4%) patients, the improvement could not be achieved despite multiple sessions of phenol administration, and the procedure was considered unsuccessful. The success of the treatment with the number of pits and crystallized phenol administration sessions are shown in Table III. Recurrence occurred in 6 patients (4.22%) in the KFR group. The mean follow-up period was 13.44 (11-16) months in the KFR group and 13.67 (11-16) months in the phenol group.

Discussion

The ideal treatment to be preferred in PSD should be simple and effective. Short hospital stay, low complication rate, rapid recovery, shortest return to work, low recurrence rate, and the least scar tissue should be targeted². Current treatment modalities cannot meet all expectations. Different criticisms are made about each method. KFR is one of the most used and successful surgical methods. It draws attention with its low recurrence rates and being an easily applicable technique. It has phenol, antiseptic, anesthetic, and strong sclerosing properties. It is a white crystalline solid at room temperature. It can turn into liquid form at higher temperatures^{10,12}. A liquid or crystalline form of phenol is used in the treatment of pilonidal sinus. Crystallized phenol was used in our procedures because of the high rate of fat necrosis, damage to surrounding tissue, and rapid diffusion of liquid phenol into healthy tissues¹³. PSD affects the young and male population more¹⁴. It is rarely seen under the age of 15 and over the age of 40. The highest incidence is identified in the 15 and 24 age group¹⁵. In our study, 72.7% of the patients were male, and the mean age of these patients was 24.89 (± 8.41), which was consistent with the values reported in the literature. Minimally invasive procedures performed in the treatment of PSD are shorter than surgical methods with flap. Pronk et al. reported the mean procedure time of 18.6 (± 6.8) minutes in patients treated with phenol in their study and 33 (± 3) minutes in the KFR tech-

nique in their research^{16,17}. In our study, each application's average procedure time was found to be 10.81 (+2.71) minutes in the phenol group and 19.30 (± 6.43) minutes in the KFR group. It was observed that the treatment time in the crystallized phenol group was shorter than the KFR group.

Routine cavity drainage is recommended to reduce the risk of seroma, hematoma, abscess, wound dehiscence, and infection in surgical methods with flap applied in PSD¹⁸. Studies reported that 2.4% of the patients developed seroma following drainage¹⁹. Yildiz et al. reported 1.55% seroma in their study²⁰. In our study, a drain was placed under the flap in all patients in the KFR group. In this group, seroma developed in 5 (3.5%) patients, and hematoma developed in 5 (3.5%) patients. When compared with the literature, our seroma and hematoma rates were higher in our study. In this study, drains were removed in drainages less than 20 milliliters/day. It was thought that evaluating

TABLE II - Distribution of complications and recurrence rates by groups.

Complication/Procedure	Karidakis Group n=142	Phenol Group n=74
Seroma	5(3,5%)	0
Hematoma	5(3,5%)	1(1,4%)
Infection	2(1,4%)	2(2,7%)
Wound dehiscence	1(0,7%)	0
All complications	12(8,45%)	3(4,1%)
Relapse	6(4,22%)	4(5,4%)

All complications; Seroma, hematoma, infection, wound dehiscence and others.

TABLE III - Number of pits, number of phenol administrations, complications and recurrence in phenol group

Number of pits	Number of applications			Complications	Recurrence /Failure
	1.	2.	3.		
1(n=24)	24	0	0	0	0(0%)
2(n=33)	33	8	2	1	1(3%)
3(n=17)	17	7	3	2	3(17,6)

the drain termination criteria according to the amount of fluid coming from the drain and the size of the under-flap cavity may minimize the risk of seroma.

The most common PSD complications treated with KFR are seroma, hematoma, abscess, wound dehiscence, and infection. In the application of crystallized phenol from pits, skin necrosis, fat necrosis, infection, and abscess may develop due to sclerosing and lytic properties despite all precautions. In addition to the advantages of the KFR technique, such as easy application, lateralization of the suture line, early recovery, and early return to work, lower complication rates are reported than other surgical techniques²¹. Can et al. In the patient series treated with KFR technique, the complication rate was 8.9%. Sakr et al. similarly, published a complication rate of 9.7%^{22,23}. In studies evaluating Crystallized Phenol therapy, the rate of developing one or more complications is reported as 7% to 16%²⁴. Our complication rate was 8.45% in the KFR group and 4.1% in the crystallized phenol group in our case series. More complications were seen in the KFR group than in the phenol group. It was thought that the incision line being close to the anogenital area during the wound healing process after excision might cause high complication rates.

Surgical excision of all sinuses and closure of the cavity with a flap brings surgical risks together with low recurrence rates. Recurrence rates are reported to be 4.6-2.4% in patient series related to the KFR method^{22,23}. In studies suggesting the use of PSD phenol, treatment success is reported between 59% and 95.1%^{25,26}. In our study, our recurrence rate was 4.22% in the KFR group and 5.4% in the phenol group after all applications.

One of the most important advantages of minimally invasive procedures in treating PSD is the duration of hospital stay. Patients are treated without hospitalization in crystallized phenol application. On patients treated with KFR, Gurer et al. Reported the average length of hospital stay as four days in their study¹⁸. In our study, the mean hospital stay in the KFR group was 1.21(± 0.4) days. It was thought that this duration was shorter than stated in the literature due to the fact that the drain was terminated after discharge in some patients. Patients in the group treated with crystallized phenol were not hospitalized.

Daily life and time to return to work are other parameters that should be considered in PSD treatment. After phenolization therapy, Topuz et al. reported the time to return to work as 0.15 days in their study²⁷. Akinci et al. In their study, it was reported that returning to work after the KFR method was 12.4–20 days²⁸. In this study, the meantime to return to work was found to be 2.79 (± 1.03) days in the phenol group and 15.35 (± 3.39) days in the KFR group. Although there is not much information in the literature comparing the time to return to work after KFR and crystallized phenol treatment, it was observed in our study that the crystallized phenol group provided a faster return to work compared to the KFR surgical technique.

Dogru et al. reported that the treatment's success rates increased with repeated phenol applications and that the number of pits was not related to the success of the procedure²⁹. While success was achieved with one application in all patients with one pit in our patients in the phenol group, it was observed that none of these patients developed recurrence. Multiple sessions of phenol injections were required only in 15 (20.2%) patients with two or more pits. Complete recovery was achieved in 11 (15.6%) patients with multiple phenol administration. Our study determined that unlike the study in the literature, the increase in the number of pits negatively affected the possibility of recovery with phenol treatment. Likewise, an increase in the number of pits and the number of phenol applications was observed. No comment could be made since we did not apply phenol therapy again in patients who developed relapse after phenol treatment, and there was no study on this subject. When evaluating the success of the procedures, the superiority of KFR is remarkable, but 94.6% success rate in phenol application, which provides the opportunity to return to work without surgery, hospitalization, and low complication rate, is undeniable. Our study's limitations are the retrospective nature of our study, postoperative pain, and not evaluating patient satisfaction in cosmetic terms.

Conclusion

According to the searches we have done in the literature, there are not many studies comparing KFR and phenol therapy in PSD. Our study is one of the studies with the largest case series on this subject, and according to our results, it is thought that phenol administration can be applied in selected cases with high success, low complications, hospitalization, and early return to work. While the lower recurrence rates of the KFR method is the advantage of the technique, it was noteworthy that the complication rates were higher. It would be beneficial to conduct prospective randomized studies to re-evaluate phenol treatment after surgery or phenol treatment in cases with recurrence of phenol application in first-line treatment in PSD.

Riassunto

Questo studio è finalizzato al confronto dei risultati della ricostruzione con lembo di Karidakis con fenolo cristallizzato nel trattamento del seno pilonidale. Nello studio sono stati inclusi 216 pazienti trattati per la malattia del seno pilonidale con questi metodi tra giugno 2016 e luglio 2019. RISULTATI: 142 (65,7%) dei pazienti sono stati trattati con la tecnica KFR e 74 (34,3%) con il metodo del fenolo cristallizzato. Dei pazienti inclusi nello studio, 157 (72,7%) erano maschi e 59 (27,3%) erano femmine. L'età media è stata calcolata come 24,89 (± 8,4). La degenza ospedaliera media nel gruppo KFR è stata di 1,21 (± 0,4)

giorni. Il tempo medio per tornare al lavoro è stato di 2,79 (\pm 1,03) giorni nel gruppo fenolo e di 15,35 (\pm 3,39) giorni nel gruppo KFR. In 4 (5,4%) pazienti non è stato possibile ottenere il miglioramento nonostante più sessioni di somministrazione di fenolo e la procedura è stata considerata non riuscita. La recidiva si è verificata in 6 pazienti (4,22%) nel gruppo KFR. Il periodo medio di follow-up è stato di 13,44 (11-16) mesi nel gruppo KFR e 13,67 (11-16) mesi nel gruppo fenolo.

CONCLUSIONE: Si pensa che la somministrazione di fenolo possa essere applicata in casi selezionati con difetto singolo con elevato successo, poche complicanze, minore degenza e anticipato ritorno al lavoro. Sebbene i tassi di recidiva sono inferiori e più vantaggiosi nel metodo KFR, è degno di nota il fatto che i tassi di complicanze sono risultati più elevati.

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