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Original Research Article

Efficacy of Phenol Injection in the Management of Pilonidal Sinus Among Patients Attending Saidu Group of Teaching Hospital

Mehran Shah*, Anwar Ul Haque

Department of General Surgery, Saidu Group of Teaching Hospital, Swat, Pakistan
**Corresponding author`s email address:* drmehranshah8@gmail.com

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Abstract: *Pilonidal sinus disease is an inflammatory condition characterized by a high tendency to recur.* ***Objective:*** *To determine the efficacy of phenol injection in treatment of pilonidal sinus in patients presenting at Saidu group of teaching hospital.* ***Methodology:*** *This study was carried out on 97 patients, aged 18 to 65 years with pilonidal sinus. All patients underwent phenol injection procedure under local anaesthesia, which involved sinus tract dilation of 3mm diameter, debridement, and the application of crystalline phenol. Efficacy of the treatment was assessed after 15 days of the procedure, in terms of e presence of granulation tissues, and collagen deposition. SPSS 27 was used for analyzing the gathered data.* ***Results:*** *The cohort in this study had a mean age 31.81 ± 14.50 years, and 54.6% male majority. The efficacy rate of the treatment was 84.5%. Efficacy demonstrated a positive significant association with younger age ($p < 0.001$) and urban residence ($p = 0.03$). Lower efficacy was observed in patients with diabetes mellitus ($p < 0.001$).* ***Conclusion:*** *Phenol injection is an effective treatment for pilonidal sinus disease, demonstrating a high efficacy rate (84.5%). Older patients, rural residents and patients with higher BMI exhibited lower efficacy rates.*

Keywords: Pilonidal sinus, phenol injection, minimally invasive, efficacy, wound healing, diabetes, sociodemographic factors

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Introduction

Pilonidal sinus disease is an inflammatory condition characterized by a high tendency to recur. The disorder can evidently affect patients' quality of life, causing pain and functional discomfort that, overall, reduces quality of life. Conventional surgeries are most often employed and can offer the symptomatic relief associated with prolonged recovery duration, notable postoperative morbidity, and significant risk for recurrence. Disease most often disturbs the sacrococcygeal region; it is predominantly reported among young adults. Pathogenesis is generally attributed to the penetration of hair shafts and and other foreign constituents into subcutaneous tissue, instigating a chronic inflammatory response (1-4).

Epidemiological data from a study that enlisted 347 patients with pilonidal sinus disease revealed that the majority of affected individuals were male (93.1%). The average age of the patients was reported as 23 ± 8 years. The overall postoperative recurrence rate was seen as 7.2% after surgery, highlighting the persistent challenge of accomplishing durable disease control (5).

Due to the recurrent and chronic nature of pilonidal sinus disease, there is a clear need for effective management strategies. Such approaches should alleviate existing symptoms and reduce the physical, psychological, and economic burden of repeated interventions. Classical surgical techniques often encompass wide excision of required tissues that could result in large wound defects and an increased risk of complications. Such limitations have encouraged professionals and researchers to discover less invasive alternatives that can offer comparable or superior outcomes while improving postoperative recovery. In this context, phenol injection management has emerged as a favorable minimally invasive possibility with potential to alter the conventional management paradigm of pilonidal sinus disease (6-8).

Phenol injection therapy employs phenol to produce a controlled chemical injury within the sinus tract. Through this mechanism, phenol induces localized tissue destruction in a highly targeted manner[7]. This controlled injury initiates an inflammatory cascade that promotes subsequent fibrosis, ultimately resulting in obliteration and closure of the sinus tract (9-11).

There is no such study conducted on this topic on the local level; therefore, the goal of this study is to determine the efficacy of phenol injection in the treatment of pilonidal sinus in patients presenting at Saidu group of teaching hospital. The results of this study will help our health practitioners to explore clinical evidence and its mechanisms of action. Monitoring patients undergoing phenol injection treatment will yield valuable information on the effectiveness of the therapy.

Methodology

This study was conducted in the Department of Surgery at Saidu Group of Teaching Hospital, Swat, from 05-08-2024 to 05-02-2025, using a quasi-experimental design. Ethical approval was obtained from the hospital. The sample size of the present study was 97; it was based on the assumed frequency of efficacy 80%, a confidence interval 95% and a margin of error 8%. This calculation was performed using the WHO sample size calculator, with parameters set at an anticipated efficacy rate of 80%[11] for phenol injection, a margin of error of 8%, and a 95% confidence level.

Eligible patients were aged 18 to 65 years and presented with a pilonidal sinus, defined as pain (VAS > 4), swelling, and abscess formation in the sacrococcygeal area. Diagnosis was performed by visual inspection, noting one or more small openings/pits in the skin in the midline of the sacrococcygeal region, and the development of sinus tracts, narrow channels beneath the skin surface that attach to the pits. Pregnant patients, patients taking immunosuppressive medication, patients with coagulation disorders, and those with recurrent pilonidal sinus were excluded.

All presenting patients were briefed on the study and provided consent. A predesigned proforma was used to record the demographic details such as age, gender, and body mass index, education status, occupation, socioeconomic status, and area of residence, along with the history of hypertension and diabetes.

All patients with a pilonidal sinus received a phenol injection, which was administered under local anesthesia. The sinus was expanded to a diameter of 3mm, and all hair and debris were removed. Following the application of nitrofurazone lotion to the surrounding skin, the expanded sinus was filled with crystalline phenol. The phenol crystals immediately liquefied at standard room temperature. After 2 minutes of leaving the liquid phenol in the sinus, it was withdrawn, and the wound was filled with sterile gauze for 24 hours. The gauze was extracted after 24 hours. Efficacy was determined by wound healing, as assessed by the presence of granulation tissue and collagen deposition after 15 days of the procedure. This entire procedure was carried out under the supervision of a consultant with at least 5 years of post-fellowship experience.

SPSS 27 was used to enter and analyze the acquired data. Mean and SD were calculated for numerical data such as age, weight, height, and BMI. Frequencies and percentages were calculated for gender, efficacy (presence of granulation tissue and collagen deposition), hypertension, diabetes, education status, occupation status, socioeconomic status, and residence area. Effect modifiers such as age, BMI, gender, hypertension, diabetes, education status, occupation status, socioeconomic status, and residence area were controlled for through stratification. A post-stratification chi-square test was used at the 5% significance level. The results were presented in tabular form.

Results

The study included a cohort of 97 patients, with a mean age of 31.81 ± 14.50 years and a BMI of 25.13 ± 1.59 kg/m². Regarding the demographics, there were 53 male patients (54.6%) and 44 female patients (45.4%) (Table 1). Diabetes mellitus was present in 11 cases (11.3%) and hypertension in 14 (14.4%) (Figure 1).

Efficacy was achieved in 82 patients (84.5%). Treatment was not effective for 15 cases (15.5%) (Table 2).

A significant association was found between age > 50 years and poor efficacy ($p < 0.001$). A significant association was also seen for diabetes and poor efficacy ($p < 0.001$). Patients from urban areas had a higher efficacy rate ($P = 0.03$). Patients with BMI > 25 kg/m² had lower efficacy rates, but this difference was not statistically significant ($P = 0.08$) (Table 3).

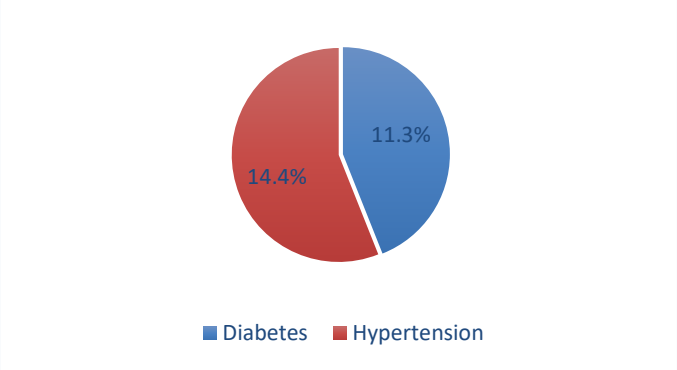

Figure 1: Distribution of comorbidities.

Table 1: Demographic profile

Demographics		n	%
Gender	Male	53	54.6%
	Female	44	45.4%
Occupation status	Employed	40	41.2%
	Unemployed	57	58.8%
Education	Literate	42	43.3%
	Illiterate	55	56.7%
Area of residence	Urban	50	51.5%
	Rural	47	48.5%
Socioeconomic status	Lower class	37	38.1%
	Middle class	47	48.5%
	Upper class	13	13.4%

Table 2: Efficacy of Phenol Injection

Efficacy	n	%
Yes	82	84.5%
No	15	15.5%

Table 3: Association of efficacy with various parameters

Parameters		Efficacy				P value
		Yes		No		
		n	%	n	%	
Age distribution (Years)	18 to 35	63	76.8%	5	33.3%	< 0.001
	36 to 50	12	14.6%	3	20.0%	
	> 50	7	8.5%	7	46.7%	
BMI (Kg/m2)	18 to 25	42	51.2%	4	26.7%	0.08
	> 25	40	48.8%	11	73.3%	
Gender	Male	46	56.1%	7	46.7%	0.50
	Female	36	43.9%	8	53.3%	
Occupation status	Employed	33	40.2%	7	46.7%	0.64
	Unemployed	49	59.8%	8	53.3%	

Education	Literate	34	41.5%	8	53.3%	0.39
	Illiterate	48	58.5%	7	46.7%	
Area of residence	Urban	46	56.1%	4	26.7%	0.03
	Rural	36	43.9%	11	73.3%	
Socioeconomic status	Lower class	30	36.6%	7	46.7%	0.24
	Middle class	39	47.6%	8	53.3%	
	Upper class	13	15.9%	0	0.0%	
Diabetes	Yes	4	4.9%	7	46.7%	< 0.001
	No	78	95.1%	8	53.3%	
Hypertension	Yes	10	12.2%	4	26.7%	0.14
	No	72	87.8%	11	73.3%	

Discussion

In the present study, the analysis of demographic and clinical variables provided a point of comparison with various studies conducted on the efficacy of phenol injection for the treatment of pilonidal sinus.

Starting with the demographic profile, the mean age of the patients in this study was 31.81 ± 14.50 years. This aligns with the findings of Alharbi et al., who reported an average patient age of 30.3 years. Notably, many studies focus specifically on adolescents. Kilç et al. and Gozukucuk et al. reported mean ages of approximately 15 years in paediatric and adolescent populations (13, 14). The broader age range in the current study, extending to 65 years, suggests the study captured a more general adult population. The gender distribution, with 54.6% male and 45.4% female patients, contrasts with several reports of a strong male predominance. The review by Emiroğlu et al. noted that the disease is often seen in males aged 20-30 (15). However, a shift in epidemiology is increasingly recognised. Kilç et al. observed a female majority of 60.7% in their adolescent study, suggesting changing risk factor profiles or improved diagnosis in females (13).

The mean BMI was 25.13 ± 1.59 kg/m² in this study, which situates the cohort in the lower range of the overweight category. This finding is consistent with Kilç et al., who reported a mean BMI of 24.72 ± 5.24 kg/m², with 32.1% of their patients classified as overweight or obese (13). Demir et al. reported similar average values of 25.38 and 25.98 kg/m² in their crystallised and liquid phenol groups, respectively (16). The current analysis found a non-significant trend where participants with a BMI >25 kg/m² had a lower efficacy rate. This observation aligns with the literature suggesting obesity as a risk factor for poorer outcomes. Gozukucuk et al. reported complication rates as high as 50% in patients who were both hairy and had a BMI exceeding 25 kg/m² (14). The identified trend, while not statistically significant, reinforces that higher BMI may negatively influence treatment response.

The overall efficacy rate of 84.5% aligns with Girgin et al., who noted 64.5% success after a single application, and Dogru et al., who reported a 95% success rate with multiple phenol applications (10,17). The current rate is thus competitive, supporting phenol injection as a viable first-line minimally invasive therapy. The significant association between younger age and better outcomes aligns with the general understanding of enhanced healing potential in younger, healthier tissue.

The current findings that efficacy was significantly higher in urban (92.0%) than rural (76.6%) residents are interesting. This disparity may be linked to easier access to postoperative care, better hygiene facilities, or differences in health literacy.

Diabetes mellitus was present in 11.3% patients and showed a statistically significant association with poor efficacy. Efficacy was achieved in only 36.4% of diabetic patients compared to 90.7% of non-diabetic patients. This relationship is rarely quantified in the literature. Emiroğlu et al. mention diabetes as a comorbidity to consider, but did not provide outcome data (15). The clear negative impact observed in the present study underscores the importance of optimising glycaemic control preoperatively and perhaps considering more definitive surgical options initially for diabetic patients. The novelty of this study lies in its holistic analysis of predictors. While previous studies have focused on clinical factors such as sinus number or BMI, this study integrated standard clinical variables with sociodemographic characteristics, including residence, education, and occupation. The significant urban-rural efficacy gap and the negative effect of diabetes are the main important contributions. These findings suggest that treatment planning should extend beyond the physical examination of the sinus to include an assessment of the patient's broader health and social context.

Conclusion

In conclusion, this study demonstrated high efficacy of phenol injection in the treatment of pilonidal sinus, in terms of wound healing (84.5%). The study found that older patients, rural residents, and patients with higher BMI were associated with lower efficacy rates.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (IRB)
Consent for publication
Approved
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Not applicable

Conflict of interest

The authors declared no conflict of interest.

Author Contribution

MS (PGR)
Manuscript drafting, Study Design,
Review of Literature, Data entry, Data analysis, and drafting an article.
AUH (Professor)
Conception of Study, Development of Research Methodology Design
Study Design, manuscript review, and critical input.

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the study's integrity.

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