

Pilonidal Sinusectomy and Primary Closure versus Excision and Primary Closure in Pilonidal Sinus Disease

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Abstract:

Background: Pilonidal sinus disease is a common inflammatory process of the natal cleft. It mainly affects young adults aged 15–25 years. Pilonidal sinus disease can result in no apparent symptoms, specified by one or more non-inflamed pits in the natal cleft incidentally identified an abscess formation, or chronic form. This study aimed to study the efficacy of sinusectomy and primary closure technique and compare it with excision and primary closure technique. **Methods:** This prospective randomized study was conducted on 50 patients diagnosed pilonidal sinus disease divided to Group (A) (N=25): underwent excision primary closure and Group (B) (N=25): underwent sinusectomy and primary closure. Admitted at the General Surgery Department of Benha University Hospital between January 2023 to December 2023. **Results:** The sinusectomy and primary closure group had significantly longer operative time ($P<0.001$) and significantly shorter wound healing time ($P<0.001$) compared to the excision and primary closure group. Time to drain removal and duration of hospital stay were not significantly different between the groups. Patients in the sinusectomy and primary closure group returned to work significantly sooner ($P<0.001$). The prevalence of seroma/hematoma was significantly higher in the sinusectomy and primary closure group ($P=0.041$), while the prevalence of abscess, wound site infection, and recurrence did not differ significantly between the groups. **Conclusion:** Each technique had its own advantage as sinusectomy primary closure short wound healing time and lower work delay days, while excision primary closure showed lower incidence of seroma/hematoma and short operative time.

Keywords: Pilonidal Sinusectomy; Primary Closure; Excision.

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Introduction

Pilonidal sinus disease is a common inflammatory process of the natal cleft with an incidence of 26 per 100,000 population ⁽¹⁾. It mainly affects young adults aged 15–25 years and has a male-to-female ratio between 3:1 and 4:1 ⁽²⁻⁴⁾. Pilonidal sinus disease can result in no apparent symptoms, specified by one or more non-inflamed pits in the natal cleft incidentally identified an abscess formation, or a chronic form ⁽⁵⁾.

Although the exact pathogenesis of Pilonidal sinus disease remains controversial, the most widely accepted view of its pathogenesis is that shed hairs cause a foreign body reaction and inflammation after penetrating subcutaneous cysts in the natal cleft ⁽⁶⁾. Stiffness of body hair, two or fewer numbers of baths in a week, time spent more than 6 h on a seat per day ^(7, 8), deep natal cleft, and family history are the predisposing risk factors of Pilonidal sinus disease ⁽⁹⁾.

Many treatment modalities have been developed since the 1950s ⁽¹⁰⁾. However, the optimal treatment approach of this disease remains controversial to date ⁽¹¹⁾. Surgical treatment of Pilonidal sinus disease varies from simple incision, drainage, curettage, spontaneous secondary healing to excision-flap sliding. Excision and open wound healing are frequently used worldwide, and this method continues to be used because it is simple, easy to learn, and reproducible ⁽¹²⁾. However, its application is limited by its long-wound healing time of 1.5–3 months, thereby delaying the patients' return to school or work. Midline closure considerably shortens the healing time, but it causes a high incidence (between 14 and 74%) of wound dehiscence ⁽¹³⁾. Of the off-midline procedures, the Karydakakis flap ⁽¹⁴⁾, the Limberg flap, and the cleft lift gained popularity and overcame the disadvantages of midline closure about wound dehiscence. Although these flap procedures have been widely desired by

surgeons, off-midline procedures are complex, resulting in long hospital stay and cosmetic concerns ⁽¹⁵⁻¹⁹⁾.

The purpose of this study was to study the efficacy of Sinusectomy and primary closure technique and compare it with excision and primary closure technique. And compare between the results and the incidence of postoperative recurrence and complications.

Patients and methods

This prospective randomized study was conducted on 50 patients diagnosed pilonidal sinus disease Admitted at the General Surgery Department of Benha University Hospital in the duration January 2023 to December 2023.

An informed written consent was obtained from the patients. Every patient received an explanation of the purpose of the study and had a secret code number. The study was done after being approved by the Research Ethics Committee, Faculty of Medicine, Benha University.

Inclusion criteria were patients of both sexes aged above 18 years old, were diagnosed with pilonidal sinus disease, underwent excision primary closure, sinusectomy and primary closure.

Exclusion criteria were patients who refuse to take part in the study, or missing data, have immune system disease, treated by other treatment. Patients whom physical status ≥ 3 , pregnant woman, patients with history of drug abuse, uncontrolled diabetes mellitus, unstable cardiorespiratory disorder and hepatic and renal insufficiency.

Randomization:

Fifty Patients were randomized into two groups at a ratio of 1:1. Opaque sealed envelopes containing sequential numbers were given to the study patients, according to which each patient was enrolled to one of the two groups: Group (A) (N=25): Patients underwent excision primary closure and Group (B) (N=25): Patients underwent sinusectomy and primary closure.

All studied cases were subjected to the following: Full history taking, including [Personal history; age, sex, residence, marital status and occupation, Present history and Past history: (chronic medical disorders or comorbidities like hypertension, DM, cardiovascular diseases, renal diseases and CNS diseases). Full clinical examination: General examination including [vital signs (blood pressure, respiratory rate, temperature, heart rate). Symptoms (pain, discharge, abscess and hair density in the area excessive hair)]. Routine laboratory investigations [complete blood count, random blood glucose, kidney function tests and liver function tests].

Methods:

All the patients were hospitalized 1 day before surgery, and the body hair on the surgical area was removed using an electric clipper in the morning of the operation. An enema was performed approximately 6 h before, and 1 g of cefazolin sodium was administered intravenously 30 min before the surgery in all patients. All the surgeries were performed under spinal anesthesia. The patient was placed in a prone jack-knife position. The intergluteal fold was separated by tape, and the intergluteal cleft was exposed. The operation area was cleansed at least twice using polyvinyl iodine-soaked gauze. Then, polyvinyl iodine-soaked gauze was placed into the anal area to prevent possible contamination. The orifices were probed using a stylet, and diluted methylene blue was injected to assess the resection area.

Sinusectomy and primary closure (An ellipsoid incision was made separately to minimize tissue loss, and all primary and secondary sinus orifices at both sides were enclosed separately using a no. 11 surgical blade. With the help of the stylet, the fistula tract was excised subcutaneously with blunt and sharp dissections. Attention was paid to avoid leaving any diseased tissue at the margins after excision, and bleeding points were cauterized for

hemostasis. The subcutaneous dead space that forms after the excision was closed subcutaneously with absorbable sutures. Subsequently, the wound at both sides of the fistula was dressed in subcutaneous absorbable suture), **Excision and primary closure** (A complete excision of sinus tracts was performed down to the sacral fascia. Following hemostasis, a Penrose drain was placed on the sacral fascia. Subcutaneous and cutaneous layers were closed with absorbable sutures. On the first postoperative day, the Penrose drain was removed, and early mobilization with small steps was initiated), **Postoperative follow-up** (All surgeries were performed by two surgeons who had more than 10 years of experience in PSD surgery, including SPC and EPC. Hair removal did not continue postoperatively for the patients. The postoperative antibiotics were not administered routinely. Patients were discharged with diclofenac sodium 75 mg twice daily on the first postoperative day. All patients were examined on the third and seventh days postoperatively. All short-term complications were treated with appropriate modalities, including wound care and antimicrobial therapy for the wound site infection, drainage and antimicrobial therapy for the abscess, and puncture with an injection syringe for the seroma. The patients were followed up for recurrence by an outpatient visit or by telephone if no available data were provided about the patient's follow-up visit. Both surgeons made phone contacts. The phone contacts followed a protocol asking about the recurrence).

Ethical considerations:

The study was conducted in accordance with the declaration of Helsinki, the protocol was submitted to the Faculty of Medicine, Benha University research ethics committee for revision and approval before conduction, the researcher explained to the participants the aim of the study and the procedure that was done, all participants were assured they have the

right to withdraw from study. All data of the participants were scored in codes to protect their privacy and confidentiality.

Approval Code: MS 21-11-2022

Statistical analysis

Statistical analysis was done by SPSS v26 (IBM Inc., ARMONK, IL, USA). Quantitative variables were presented as mean and standard deviation (SD) and range and compared between the two groups utilizing unpaired Student's T- test. Qualitative variables were presented as frequency and percentage (%) and were analyzed utilizing the Chi-square test or Fisher's exact test when appropriate. A two tailed P value ≤ 0.05 was considered statistically significant.

Results

There was no significant difference between the two groups as regard age, sex, weight, height, and BMI, there was no significant difference between the two groups as regard residence and marital status, there was no significant difference between the two groups as regard comorbidities (hypertension, diabetes mellitus). Table 1

There was no significant difference between the two groups as regard symptoms and hair density in the area. Table 2

Sinusectomy and primary closure group had significantly longer operative time compared to excision primary closure group ($P < 0.001$), Time to drain removal was insignificantly different between both groups. Sinusectomy and primary closure group had significantly shorter wound healing time compared to excision primary closure group ($P < 0.001$), Duration of hospital stay was insignificantly different between both groups, Patients of sinusectomy and primary closure group returned to work after significantly shorter duration compared to excision primary closure group ($P < 0.001$). Table 3

The prevalence of seroma/hematoma was significantly higher in sinusectomy, and primary closure group compared to excision primary closure group ($P = 0.041$). The prevalence of abscess and wound site infection was insignificantly different between both groups, the prevalence of recurrence was insignificantly different between both groups. Table 4

Table 1: Demographics and comorbidities of the studied groups

		Sinusectomy and primary closure group (n=25)	Excision primary closure group (n=25)	P value
Age (years)	Mean \pm SD	32.2 \pm 8.52	31.6 \pm 8.6	0.805
	Range	18 - 45	18 - 45	
Sex	Male	20 (80%)	18 (72%)	0.507
	Female	5 (20%)	7 (28%)	
Weight (kg)	Mean \pm SD	63.8 \pm 8.16	65.1 \pm 9.87	0.609
	Range	51 - 77	50 - 80	
Height (m)	Mean \pm SD	1.7 \pm 0.06	1.7 \pm 0.05	0.501
	Range	1.59 - 1.75	1.59 - 1.74	
BMI (kg/m ²)	Mean \pm SD	22.8 \pm 3.29	23.5 \pm 3.54	0.477
	Range	18.17 - 29.27	17.99 - 30.47	
Residence	Urban	15 (60%)	13 (52%)	0.568
	Rural	10 (40%)	12 (48%)	
Marital status	Single	11 (44%)	10 (40%)	0.397
	Married	8 (32%)	12 (48%)	
	Divorced	6 (24%)	3 (12%)	
Hypertension	Yes	7 (28%)	4 (16%)	0.305
	No	18 (72%)	21 (84%)	
Diabetes mellitus	Yes	5 (20%)	7 (28%)	0.507
	No	20 (80%)	18 (72%)	

BMI: Body mass index

Table 2: Patients' symptoms and hair density in the area of the studied groups

		Sinusectomy and primary closure group (n=25)	Excision primary closure group (n=25)	P value
Symptoms	Pain	23 (92%)	22 (88%)	0.784
	Discharge	16 (64%)	13 (52%)	
	Abscess	3 (12%)	5 (20%)	
Hair density in the area	Excessive hair	9 (36%)	11 (44%)	0.563
	Non-excessive	16 (64%)	14 (56%)	

Table 3: Operative time, post-operative data, hospital stay and return to work of the studied groups

		Sinusectomy and primary closure group (n=25)	Excision primary closure group (n=25)	P value
Operative time (min)	Mean ± SD	44.3 ± 5.62	36.8 ± 4.37	<0.001*
	Range	35 - 55	31 - 45	
Drain removal (Days)	Mean ± SD	2.6 ± 1.22	2.2 ± 0.8	0.107
	Range	1 - 4	1 - 3	
Wound healing time (Days)	Mean ± SD	10.6 ± 1.58	15.4 ± 2.89	<0.001*
	Range	8 - 12	11 - 20	
Hospital stay (Hours)	Mean ± SD	19.9 ± 6.07	22.3 ± 4.55	0.126
	Range	12 - 34	12 - 33	
Return to work (days)	Mean ± SD	17.4 ± 1.5	32.7 ± 4.28	<0.001*
	Range	15 - 20	25 - 40	

*: Significant as P-value ≤ 0.05.

Table 4: Complications and recurrence in the studied groups

		Sinusectomy and primary closure group (n=25)	Excision primary closure group (n=25)	P value
Seroma/hematoma	Yes	6 (24%)	1 (4%)	0.041*
	No	19 (76%)	24 (96%)	
Abscess	Yes	0 (0%)	1 (4%)	0.314
	No	25 (100%)	24 (96%)	
Wound site infection	Yes	2 (8%)	5 (20%)	0.224
	No	23 (92%)	20 (80%)	
Recurrence	Yes	1 (4%)	2 (8%)	0.551
	No	24 (96%)	23 (92%)	

*: significant as P-value ≤ 0.05.

Discussion

This study aimed to investigate the efficacy of sinusectomy and primary closure technique and compare it with excision and primary closure technique and compare between the results and the incidence of postoperative recurrence and complications. We categorized the patients into two groups: Sinusectomy and primary closure group (n=25) and Excision primary closure group (n=25)

Our study design and hypothesis focused on and support the use of Excision primary closure technique due to most commonly used treatment modality in complicated and non-complicated cases for a long time, there was no significant difference between the two groups as regard age, sex, weight, height, and BMI, there was no significant difference between the two groups as regard residence and marital

status as well as comorbidities (hypertension and diabetes mellitus).

We further assessed the patients' symptoms (Pain, discharge, and abscess) and hair density (Excessive hair and non-excessive) in the area of the studied groups and found no significant difference between the two groups, Pain, discharge, and abscess detected in 92%, 64%, 12% of patients in sinusectomy and primary closure group and 88%, 52%, and 20% in patients of excision primary closure group, While 36% and 44% had excessive hair and 64% and 56% had non-excessive hair in sinusectomy and primary closure group and excision primary closure group, respectively.

Sinusectomy and primary closure group had significantly longer operative time compared to excision primary closure group ($P < 0.001$) by mean \pm SD of 44.3 ± 5.62 min and 36.8 ± 4.37 min, respectively, time to drain removal was insignificantly different between both groups; 2.6 ± 1.22 days in sinusectomy and primary closure group and 2.2 ± 0.8 days in excision primary closure group, Sinusectomy and primary closure group had significantly shorter wound healing time (10.6 ± 1.58 days) compared to excision primary closure group (15.4 ± 2.89 days) ($P < 0.001$). The main reason for this delayed healing may be attributed to the high rate of wound dehiscence observed in the excision primary closure group.

A previous randomized controlled trial by Popeskou et al., 2020⁽²⁰⁾ disagree with our results and noted that the total healing time, was faster in the PC group. The median time to complete healing was 54 (23–328) days in the sinusectomy group compared to 34 (13–141) in the excision and paramedian primary closure group In line with our findings, Gul and Destek, 2020⁽⁶⁾ conducted a single-center retrospective cohort study to compare sinusectomy and primary closure with excision and primary closure procedure in patients with pilonidal sinus disease. They

found that the wound healing time was statistically significantly longer in the patients underwent excision primary closure surgery.

The previous results were comparable to the results of a previous study by Oraby and Bahbah 2021⁽²¹⁾, they conducted a retrospective study involved 205 consecutive patients with sacrococcygeal Pilonidal sinus, all patients were treated surgically with minimal excision and primary closure. The mean operative time was 33 min (range, 23–42 min), time to remove the drain 4–7 days, and healing time was 12–22 days.

On the other hand, operative time of Sinusectomy and primary closure surgery was 30.38 ± 6.23 min which was longer than our operative time⁽²²⁾, duration of hospital stay was insignificantly different between both group; 19.9 ± 6.07 hours in sinusectomy and primary closure group and 22.3 ± 4.55 hours in excision primary closure group.

In disagreement with us, Gul and Destek, 2020⁽⁶⁾ conducted a single-center retrospective cohort study to compare sinusectomy and primary closure with excision and primary closure procedure in patients with pilonidal sinus disease. They found that the length of stay was statistically significantly longer in the patients underwent excision primary closure surgery. This difference in significance may be attributed to the larger sample size of their study comparing to our sample size.

On the other hand, Oraby and Bahbah 2021⁽²³⁾ found that the duration of hospital stay ranged from 7 to 12 h in patients were treated surgically with minimal excision and primary closure, which was shorter than our results, patients of sinusectomy and primary closure group returned to work after significantly shorter duration (17.4 ± 1.5 days) compared to excision primary closure group (32.7 ± 4.28 days) ($P < 0.001$).

In alignment with us, Popeskou et al., 2020⁽²⁰⁾ illustrated that the number of lost

work days was similar in both groups (sinusectomy group, 14 (14–19.5) days, vs. excision and paramedian primary closure group 14 [14] days, $p = 0.890$), we recorded the complications in the studied groups and found that the prevalence of seroma/hematoma was significantly higher in sinusectomy, and primary closure group compared to excision primary closure group ($P=0.041$). The prevalence of abscess and wound site infection was insignificantly different between both groups, while in a study by Oraby and Bahbah 2021⁽²³⁾, five (2.4%) cases developed wound seroma after drain removal. Fourteen (6.8%) patients developed simple wound infection. Six (2.9%) patients presented with significant wound infection and wound disruption, after excision primary closure surgery. On the contrary to our results, the occurrence of the wound site infection and the abscess in a previous retrospective cohort study conducted Gul and Destek, 2020⁽⁶⁾ were statistically significantly higher in excision primary closure surgery. This difference may be attributed to the larger sample size of their study comparing to our sample size, the prevalence of recurrence was insignificantly different between both groups; 4% of patients in sinusectomy and primary closure group and 8% of patients in excision primary closure group had recurrence.

Similarly, a previous study by Soll et al., 2011⁽²⁴⁾ included patients underwent sinusectomy for primary pilonidal sinus with a median follow-up of 3.6 years, the overall recurrence rate was 7%. The authors concluded that sinusectomy for pilonidal sinus can be performed with a low recurrence rate. The percentage was slightly higher than our results because of the longer follow up periods in Soll et al.⁽²⁴⁾ study, Gul and Destek, 2020⁽⁶⁾ had comparable results, they noted that recurrence occurred in 25 patients (18.7%) in the patients underwent excision primary closure surgery, in 12 patients (5.5%) in

the patients underwent sinusectomy primary closure surgery.

Our whole hypothesis and some of the previous findings was strengthened by Oraby and Bahbah 2021⁽²³⁾ who concluded that minimal excision of PNS after technique refinement, brings us closer to get a simple procedure with little pain, rapid recovery, and rapid return to work with comparable good results. It helps us to get closer to ideal treatment.

Conclusion

Both sinusectomy primary closure and excision primary closure had comparable time to drain removal, duration of hospital stay, the prevalence of abscess and wound site infection, and recurrence rate. Each technique had its own advantage as sinusectomy primary closure short wound healing time and lower work delay days, while excision primary closure showed lower incidence of seroma/hematoma and short operative time.

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Author contribution

Authors contributed equally to the study.

Conflicts of interest

No conflicts of interest

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