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COMPARISON OF WOUND INFECTION RATES BETWEEN PRIMARY CLOSURE AND OPEN TECHNIQUE IN THE SURGICAL MANAGEMENT OF PILONIDAL SINUS

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Abstract

Background: *Pilonidal sinus is a common chronic inflammatory condition affecting the sacrococcygeal region, frequently seen in young males. Surgical management is the mainstay of treatment, with the open technique and primary closure being the most commonly practiced procedures. Postoperative wound infection is a significant complication influencing the choice of technique.*

Objectives: *To compare the wound infection rates between primary closure and open technique in the surgical management of pilonidal sinus.*

Study Design & Setting: *A comparative cross-sectional study conducted at the Department of General Surgery and Surgical Oncology, Unit – 1, Sheikh Zayed Medical Complex, Lahore*

Methodology: *A total of 120 patients diagnosed with pilonidal sinus were enrolled and divided into two equal groups. Group A (n=60) underwent the open technique, while Group B (n=60) underwent primary closure after excision. Standard preoperative and postoperative protocols were followed. Wound infection was assessed clinically during a 4-week follow-up period. Data were analyzed using SPSS version 25, with the Chi-square test applied and p-value < 0.05 considered significant.*

Results: *The mean age of participants was 27.0 ± 5.8 years, with 78.3% males and 21.7% females. Wound infection was observed in 5 patients (8.3%) in the open technique group and in 15 patients (25.0%) in the primary closure group. The difference was statistically significant (p = 0.014).*

Conclusion: *The open technique was associated with a significantly lower rate of wound infection compared to primary closure. Thus, it may be considered the safer option in terms of minimizing postoperative infection*

INTRODUCTION

Pilonidal sinus disease (PSD) is a chronic inflammatory condition characterized by a subcutaneous tract or cavity, typically located in the sacrococcygeal region near the natal cleft.[1] It predominantly affects young adults, particularly males, and is associated with significant morbidity, recurrent infections, and loss of productivity.[2] The exact etiology remains multifactorial, with contributing factors including hair insertion into the skin, local trauma, deep natal cleft, obesity, prolonged sitting, and poor hygiene.[3] Pilonidal sinus may present with asymptomatic pits, acute abscesses, or chronic discharging sinuses. The recurrent nature and impact on quality of life necessitate effective surgical intervention.[4]

Various surgical techniques have been developed for the treatment of pilonidal sinus, with the primary aim of eradicating the disease, minimizing recurrence, and reducing post-operative complications—particularly wound infection, which remains the most common and challenging complication.[5] The two most commonly employed surgical approaches are the open technique (healing by secondary intention) and primary closure (healing by first intention after excision and suturing). Each technique carries its own advantages and drawbacks in terms of infection risk, healing time, patient satisfaction, and recurrence rates.[6]

In the open technique, the pilonidal sinus is excised, and the wound is left open to heal naturally through granulation. This method is often associated with lower recurrence rates and reduced chances of wound infection due to continuous drainage, but it requires prolonged wound care and healing time, which may inconvenience the patient.[7] On the other hand, primary closure involves excision of the sinus followed by immediate suturing of the wound edges. This technique offers the benefits of shorter healing time, less postoperative discomfort, and earlier return to daily activities, but is often criticized for higher rates of wound infection and recurrence due to potential for fluid collection and inadequate drainage.[8]

Wound infection following pilonidal surgery can significantly affect patient outcomes, prolong hospitalization or wound management, and increase healthcare costs. The incidence of post-operative wound infection varies across studies depending on surgical technique, patient factors, and perioperative care.[9] Reported infection rates range from 2% to 40% in different populations and surgical settings.[10] Given the burden of pilonidal disease and the importance of choosing an appropriate surgical method, there is a need for continued evaluation of outcomes to guide clinical decision-making. Especially in resource-limited settings, balancing infection risk with healing time and patient convenience becomes crucial. While some surgeons prefer the open technique due to its simplicity and low recurrence, others advocate for primary closure for its rapid recovery benefits. This study aims to compare the rates of wound infection between primary closure and open technique in the surgical management of pilonidal sinus. By analyzing and contrasting postoperative infection outcomes in these two groups, our objective is to provide evidence that will help clinicians adopt the most appropriate technique based on patient-centered outcomes. Ultimately, minimizing wound infection not only improves recovery but also enhances patient satisfaction and reduces the overall burden of care.

MATERIALS AND METHODS

This comparative cross-sectional study was conducted at the Department of General Surgery and Surgical Oncology, Unit – 1, Sheikh Zayed Medical Complex, Lahore, after obtaining approval from the Institutional Ethical Review Board. A total of 120 patients diagnosed with pilonidal sinus disease and scheduled for surgical management were included. The sample size of 120 was calculated using the WHO sample size calculator, keeping a 95% confidence level, 80% power of the test, and taking expected wound infection rates from previous literature as 12% in the open technique group and 32% in the primary closure group.[11]

Patients were selected through non-probability consecutive sampling. Inclusion criteria were patients aged between 16 and 45 years of either gender, diagnosed clinically with primary or recurrent pilonidal sinus disease and fit for elective surgery. Exclusion criteria included patients with uncontrolled diabetes mellitus, immunocompromised status, active local infection or

abscess formation at the time of surgery, or previous surgical intervention within the past 6 months.

All patients were admitted one day before surgery and informed consent was obtained. Routine preoperative investigations were performed. Patients were then divided into two equal groups of 60 each. Group A underwent the open technique (excision and healing by secondary intention), while Group B underwent primary closure (excision followed by immediate suturing of wound margins). All procedures were performed under spinal or general anesthesia by experienced surgical teams following aseptic protocols.

In the open technique group, a wide local excision of the sinus tract and all associated tissue was performed, and the wound was left open without closure, packed with sterile dressing. In the primary closure group, a similar wide excision was performed, but the wound edges were approximated using non-absorbable interrupted sutures after achieving hemostasis. A closed suction drain was placed if necessary. Standard postoperative care was provided to both groups, including antibiotic prophylaxis with intravenous ceftriaxone 1g administered preoperatively and continued for 24 hours postoperatively.

Patients were followed regularly for four weeks postoperatively. Wound infection was assessed based on clinical criteria, including redness, swelling, discharge of pus, local warmth, and delayed healing. Any occurrence of infection was documented and treated accordingly. Follow-up was conducted in the outpatient department, and data regarding wound infection were recorded in a structured proforma.

Data were analyzed using SPSS version 25. Quantitative variables like age were presented as mean ± standard deviation, and categorical variables such as gender and infection rate were presented as frequencies and percentages. Chi-square test was applied to compare wound infection rates between the two groups, with a p-value < 0.05 considered statistically significant.

RESULTS

Table 1 shows the demographic characteristics of the study participants. A total of 120 patients were included, with 60 patients in each group. The mean age of patients in Group A (open technique) was 26.8 ± 5.4 years, while in Group B (primary closure), it was 27.3 ± 6.1 years. The overall mean age across both groups was 27.0 ± 5.8 years. Regarding gender distribution, the majority of patients were male in both groups: 46 (76.7%) in Group A and 48 (80.0%) in Group B. Female participants accounted for 14 (23.3%) in Group A and 12 (20.0%) in Group B (Table 1).

Table 2 presents the frequency of wound infection observed postoperatively in both surgical groups. In Group A (open technique), 5 patients (8.3%) developed wound infection, while 55 (91.7%) did not. In contrast, Group B (primary closure) showed a higher rate of infection, with 15 patients (25.0%) experiencing wound infection and 45 (75.0%) remaining infection-free (Table 2).

Table 3 provides a statistical comparison of wound infection rates between the two groups. The wound infection rate in Group A (open technique) was 8.3%, whereas it was significantly higher in Group B (primary closure), at 25.0%. The difference between the two groups was statistically significant, with a p-value of 0.014 (Table 3).

Table 1: Demographic Characteristics of Patients (n = 120)

Variable	Group A (Open Technique) (n = 60)	Group B (Primary Closure) (n = 60)	Total (n = 120)
Mean Age (years)	26.8 ± 5.4	27.3 ± 6.1	27.0 ± 5.8
Gender			
Male	46 (76.7%)	48 (80.0%)	94 (78.3%)
Female	14 (23.3%)	12 (20.0%)	26 (21.7%)

Table 2: Frequency of Wound Infection in Both Groups (n = 120)

Wound Infection	Group A (Open Technique) (n = 60)	Group B (Primary Closure) (n = 60)	Total (n = 120)
Yes	5 (8.3%)	15 (25.0%)	20 (16.7%)
No	55 (91.7%)	45 (75.0%)	100 (83.3%)

Table 3: Comparison of Wound Infection Between Groups

Variable	Group A (Open Technique)	Group B (Primary Closure)	p-value
Wound Infection	5 (8.3%)	15 (25.0%)	0.014

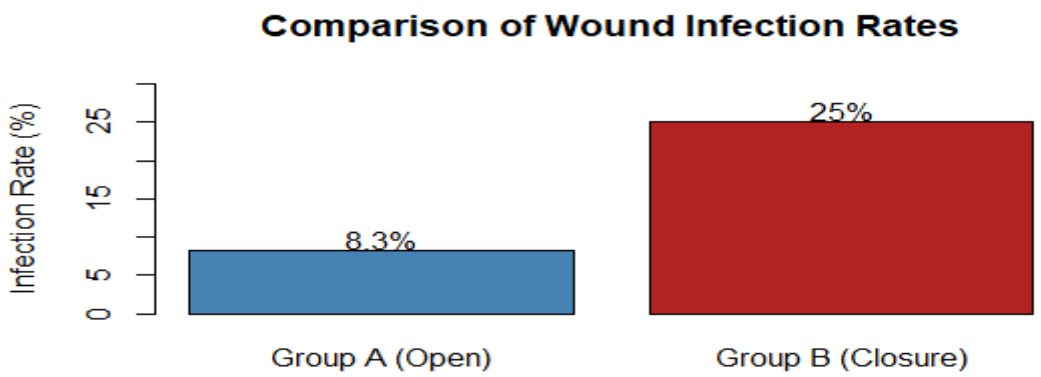

Figure: Comparison of Wound Infection Between Groups

DISCUSSION

Pilonidal sinus is a chronic inflammatory condition commonly affecting the sacrococcygeal region, particularly in young males. It often presents with pain, discharge, and recurrent infection, requiring surgical intervention.[12] The two widely used surgical techniques are the open method and primary closure. While primary closure offers faster recovery, it may have a higher risk of infection.[13] The open technique, although slower to heal, is often associated with fewer postoperative complications.[14] This study compares the wound infection rates between these two surgical approaches to determine the safer and more effective method.

In our study, the incidence of wound infection was significantly lower in the open technique group (8.3%) compared to the primary closure group (25.0%), with a p-value of 0.014, highlighting a notable difference in postoperative outcomes between the two techniques. These results are in close agreement with the findings of Jamil et al. (2021), who reported a wound infection rate of 7.69% in the open group and 35.71% in the primary closure group, supporting the observation that primary closure is more prone to early postoperative infection.[17, 18] Similarly, our mean patient age of 27.0 ± 5.8 years is comparable to their reported mean of 26.7 years, suggesting a similar demographic distribution.

However, the study by Jabbar et al. (2018) reported no statistically significant difference in wound infection rates between primary closure using a Limberg flap and the open technique.[16] This contrasts with our findings, which showed a statistically significant association. The variation may be attributed to differences in surgical expertise, flap design, or follow-up duration. The findings of Jamal et al. (2024), while primarily comparing primary repair and flap techniques, are also relevant. Although their study showed faster wound healing in

the primary repair group (23.66 ± 20.88 days vs. 30.26 ± 14.33 days in the flap group), the SWAA score—a measure of wound aesthetics and healing—was more favorable in the flap group (0.74 ± 1.25 vs. 1.14 ± 1.57, p = 0.03).[15] This suggests that while primary closure may allow earlier healing, it may compromise wound quality, a trend that aligns with the higher infection rates we observed.

Ghaffar et al. (2021) further supported the advantages of flap techniques by reporting high rates of treatment satisfaction (86.6%), early return to routine activity (76.6%), and painless walking (83.3%) in the Limberg flap group.[19] In contrast, patients with primary midline closure had lower satisfaction (73.3%), delayed activity resumption (60%), and less painless mobility (70%). Although our study did not assess functional outcomes, these results reinforce the benefits of approaches with wider excision and tension-free closure, as in the open method or flap-based repairs. In terms of hospital stay, Janjua et al. (2021) reported a significantly shorter stay for the Limberg flap group (2.43 ± 0.56 days) compared to the excision group (5.83 ± 1.05 days, p < 0.00001).[20] Our study did not measure hospital stay directly, but similar studies suggest that shorter stays may not always correlate with fewer complications, particularly regarding infections. Similarly, Abdelraheem et al. (2017) found a statistically significant difference in hospital stay between groups (p = 0.002), further emphasizing the importance of balancing hospital duration with wound-related outcomes.[21]

Collectively, these studies support the notion that while primary closure may offer faster healing and earlier discharge, it may carry a higher risk of wound infection, as confirmed in our study. The open technique, though requiring longer healing time, appears more favorable in reducing infection-related morbidity. Differences in results across studies may be attributed to surgical technique, flap usage, drain placement, and patient comorbidities such as smoking, as noted in Jamal et al. (2024),[15] where smoking prevalence was higher in the primary repair group (20.0%) versus flap group (11.4%). The higher infection rate in the primary closure group may be due to poor drainage and fluid accumulation within the closed wound. This closed environment can trap bacteria and create dead space, leading to infection. Additionally, wound tension and reduced aeration may impair healing and promote microbial growth.

A major strength of the study is its prospective design with equal group distribution and standardized surgical protocols. It provides relevant data for practical surgical decision-making. However, infections were clinically assessed without microbiological confirmation, which may affect diagnostic accuracy. The study was conducted at a single center, limiting generalizability. Short follow-up duration may have missed late recurrences. Confounding factors such as BMI, hygiene, and smoking were not controlled.

CONCLUSION

The study demonstrated a significantly lower wound infection rate with the open technique compared to primary closure. While primary closure offers quicker recovery, infection risk remains a concern. Surgical approach should be selected based on individual patient factors and risk of complications.

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