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| RESEARCH ARTICLE

Outcome of the Treatment of Pilonidal Sinus with Limberg Flap: A Prospective Observational Study

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| ABSTRACT

Pilonidal sinus disease is a chronic and often recurring condition affecting the sacrococcygeal region, prevalent among young adults, particularly males. The Limberg flap, a rhomboid fascio-cutaneous flap, is a reliable surgical method with low complication and recurrence rates. This study assesses outcomes of the Limberg flap procedure in terms of postoperative complications, recurrence, hospital stay, and time to return to work. Conducted at the Department of Colorectal Surgery, Bangabandhu Sheikh Mujib Medical University, this prospective observational study included 18 patients with primary pilonidal sinus treated with the Limberg flap from July 2019 to August 2020. Patients were followed for nine months postoperatively to assess outcomes. Postoperative complications were minimal, with 11.1% developing seroma and 16.7% experiencing tip necrosis. Wound dehiscence was observed in one patient at one month, but no complications were recorded beyond this period, and no recurrence was noted over nine months. The mean hospital stay was 4.17 days, and the mean time to return to work was 12 days. The Limberg flap is an effective, safe option for treating pilonidal sinus, with low complication rates, early return to work, and no recurrence over nine months.

| KEYWORDS

Pilonidal sinus, Limberg Flap

| ARTICLE INFORMATION

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1. Introduction

Pilonidal sinus disease is a chronic condition that primarily affects the sacrococcygeal region, predominantly in young adults aged 15 to 30 years, with a male-to-female incidence ratio of approximately 4:1 [1]. The disease is characterized by midline pits in the natal cleft associated with hair entrapment, leading to infection, pain, and discharge, significantly impacting patients' quality of life [2]. The term "pilonidal" originates from the Latin words "pilus" (hair) and "nidus" (nest). It was colloquially known as "Jeep Disease" due to its prevalence among soldiers who spent extended periods seated in military vehicles [3].

The precise pathogenesis of pilonidal sinus remains uncertain, though factors such as a deep natal cleft, local irritation, sweating, bacterial contamination, and hair entrapment are considered significant contributors [4]. Many surgical techniques have been tried, including simple excision and primary closure, marsupialization, and more complex flap procedures. Among these, the Limberg flap, a rhomboid fascio-cutaneous flap, has gained prominence due to its ability to displace the scar laterally, away from the midline, where recurrence risk is higher [5,6].

Studies have demonstrated that flap techniques, particularly the Limberg flap, provide lower recurrence rates and facilitate faster return to normal activities compared to primary closure methods [7,8]. Despite the advantages of the Limberg flap, comprehensive data on its long-term effectiveness and postoperative outcomes remain limited. This study aims to assess the functional outcomes, postoperative complications, recurrence rates, hospital stay duration, and time to return to work in patients treated with the Limberg flap procedure.

2.Methodology

2.1 Study Design and Population : This prospective observational study was conducted from July 2019 to August 2020 at the Department of Colorectal Surgery, Bangabandhu Sheikh Mujib Medical University. Eighteen patients with primary pilonidal sinus who met the inclusion criteria were recruited. Patients with acute pilonidal abscess or recurrent pilonidal sinus were excluded.

2.2 Surgical Procedure : Under spinal anesthesia, the Limberg flap procedure involved excising the pilonidal sinus using a rhomboid incision and transposing a gluteal fascio-cutaneous flap to cover the defect. A suction drain was placed under the flap to assist healing, and interrupted mattress sutures were used for skin closure.

2.3 Follow-Up and Outcome Measures : Patients were followed at intervals (two weeks, one month, three months, six months, and nine months postoperatively). Outcome measures included hospital stay duration, postoperative complications, recurrence rates, and time to return to work.

3. Results

The consolidated tables present a comprehensive overview of patient demographics, surgical details, clinical characteristics, and postoperative outcomes for pilonidal sinus patients treated with the Limberg flap procedure.

Table 1: Patient Demographics and Baseline Characteristics

Characteristic	**Value**
Age (years)	26.9 ± 5.2 (Range: 16–35)
Gender (Male)	16 (88.9%)
BMI (kg/m^2)	
- 18.5–24.9	13 (72.2%)
- 25.0–29.9	5 (27.8%)
Occupation	
- Service holders	4 (22.2%)
- Students	4 (22.2%)
- Drivers	4 (22.2%)
- Garment workers	3 (16.7%)
- Other (Tailor, Business)	3 (16.7%)

Table 1 summarizes patient baseline characteristics, showing an average age of 26.9 years, with most patients (88.9%) being male. A significant proportion (72.2%) had a BMI between 18.5–24.9 kg/m^2, while the remaining 27.8% were overweight (BMI 25.0–29.9). Occupationally, service holders, students, and drivers each made up 22.2% of the group, highlighting a young, active patient base likely impacted by work-related time away during treatment.

Table 2: Surgery and Hospital Stay Details

Surgical and Hospital Metric	Value
Average Surgery Duration (min)	88.8 ± 12.7 (Range: 70–110)
Duration of Hospital Stay (days)	4.17 ± 0.7 (Range: 3–6)
Drain Tube Removal (days)	3.4 ± 0.7 (Range: 3–5)
Suture Removal (days)	12.9 ± 1.7 (Range: 10–16)
Time to Return to Work (days)	12.7 ± 1.8 (Range: 10–16)

Table 2 details the surgical and hospital metrics, indicating an average surgery duration of 88.8 minutes, with most patients staying in the hospital for around 4.17 days. The drain tube was typically removed within 3.4 days, and sutures were taken out by day 12.9, aligning with early healing goals. Patients generally returned to work around 12.7 days post-surgery, underscoring the Limberg flap's advantage in enabling a prompt return to daily activities.

Table 3: Clinical Characteristics and Surgical Site Details

Characteristic	Number of Patients (%)
Number of External Openings	
- 1 opening	15 (83.3%)
- 2 openings	2 (11.1%)
- 3 openings	1 (5.6%)
Postoperative Complications	
- Seroma (2 weeks)	2 (11.1%)
- Tip Necrosis (2 weeks)	3 (16.7%)
- Wound Dehiscence (1 month)	1 (5.5%)
Patients with No Complications	13 (72.3%)

Table 3 shows clinical characteristics, with most patients (83.3%) having a single external opening in the pilonidal sinus, while others had multiple openings, which can complicate treatment. Postoperative complications were relatively low, with seroma observed in 11.1% of patients, tip necrosis in 16.7%, and wound dehiscence in 5.5% at the one-month mark. Notably, 72.3% of patients experienced no complications, suggesting a generally positive outcome from the Limberg flap approach.

Table 4: Correlation of Complications with BMI and Overweight Status

Variables	Complication (Yes)	No Complication	Correlation (r)	P-Value
Overweight (BMI ≥25)	4	1	0.93	<0.001

Table 4 highlights the correlation between being overweight (BMI ≥25) and postoperative complications, showing a high correlation coefficient ($r=0.93$, $p<0.001$). This suggests that overweight patients were significantly more likely to encounter postoperative issues, indicating the importance of BMI management in surgical planning and patient education.

Overall, these tables illustrate the effectiveness of the Limberg flap in providing a relatively complication-free recovery, early return to work, and low recurrence rate, though with heightened attention needed for overweight patients.

4. Discussion

The Limberg flap procedure demonstrated positive outcomes, with minimal complications and no recurrence across the nine-month follow-up. This low complication rate aligns with findings from other studies, which highlight the Limberg flap as a superior method in managing pilonidal sinus compared to traditional excision techniques [9,10].

A high correlation was observed between increased BMI and postoperative complications, corroborating findings in existing literature, where higher BMI is associated with increased complication risks in pilonidal sinus surgery [11]. This study also found that the Limberg flap facilitated a quicker return to work (mean of 12 days), a considerable advantage over primary closure methods that often require extended recovery time [12].

5. Limitations of the Study

The study's small cohort (18 patients) limits the generalizability of findings. As a single-center study conducted at a tertiary hospital, results may not be fully representative of other populations or healthcare settings. .With only nine months of follow-up, this study may not capture late recurrences. Longer studies are necessary to evaluate the long-term effectiveness of the Limberg flap. Multicenter study with larger sample size may represent the actual scenario.

6. Conclusion

The Limberg flap procedure is effective for treating pilonidal sinus, with low postoperative complication rates, early return to work, and no recurrence over nine months. Based on these findings, the Limberg flap is recommended for managing pilonidal sinus, though further studies with larger, multicentric populations and extended follow-up periods are needed.

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