KJMS / OPEN ACCESS Print ISSN: 2790-0207 Online ISSN: 2790-0215

Original article

Treatment of recurrent pilonidal sinus by flap technique (Limberg flap)

Abdulkarem Omer Mohamed salih[1], Hazem Sadeq Ahmed[2], Nissan Khaleel Abdulla Alazawi[3]

[1] General Surgeon, FICMS, CABS. Department of Surgery, Kirkuk General Hospital. Iraq

[2]General Surgeon, FICMS, CABS. Department of Surgery, Kirkuk General Hospital. Iraq

[3]General Surgeon, FICMS. Department of Surgery, Kirkuk General Hospital. Iraq

Corresponding author Email address: abdulkaremomer1970@gmail.com

DOI: 10.32894/kjms.2022.174184

Abstract:

- ***Background*:** Pilonidal sinus (PNS) is a chronic condition affecting mainly young adults, characterized by a hair-containing cavity in the post-sacral intergluteal (natal cleft) region. It may be asymptomatic or present as a recurrent abscess or a chronically inflamed, discharging sinus with local pain and discomfort.
- ***Methods:*** This retrospective study was conducted from November 2017 to November 2018 at the Department of Surgery, Kirkuk General Hospital. Fifty patients with recurrent PNS were treated using the Limberg flap technique. Excision was performed down to the sacral fascia and laterally to the gluteal fascia, followed by reconstruction using a gluteal-based Limberg flap. Patients were followed up for one year.
- ***Result:*** Of the 50 patients, 45 (90%) were male and 5 (10%) female. A positive family history was found in 60%, and 84% had risk factors for PNS. Thirty patients (60%) had previously undergone excision with primary closure, and 20 (40%) had healing by secondary intention. The recurrence rate following Limberg flap was 2%, which is lower than the 12% rate reported with primary closure. Common complications included fluid accumulation under the flap, managed by placing a drain until drainage fell below 50 mL/day.
- ***Conclusions:*** The Limberg flap technique is an effective treatment for recurrent PNS, offering low recurrence rates, fewer complications, shorter hospital stays, and good patient satisfaction. While technically demanding, it outperforms conventional methods. Personal hygiene remains essential in preventing recurrence.

- **Keywords:** pilonidal sinus, recurrence, Limberg flap

INTRODUCTION

Sacrococcygeal pilonidal sinus (PNS) is a chronic condition that predominantly affects young adults. It is defined as a hair-containing cavity located in the subcutaneous tissue of the post-sacral intergluteal region, also known as the natal cleft. This condition was first described in 1833 and typically occurs in healthy young men, with a reported male-to-female ratio of 4–5:1 (1). The term "pilonidal" originates from the Latin words *pilus* (hair) and *nidus* (nest), reflecting the nature of the pathology (2).

Clinically, PNS may remain asymptomatic or present with symptoms such as a recurrent abscess, a chronically inflamed cavity, discharge from one or more sinus tracts, and localized pain or discomfort (2,3). Although it can be observed across all age groups, its incidence peaks in the second and third decades of life. The estimated incidence in the general population is approximately 26 cases per 100,000 individuals (0.026%) (4).

PNS may manifest as a chronic cutaneous infection or an abscess with or without sinus formation. While generally regarded as an acquired condition, its exact etiopathogenesis remains incompletely understood. Several risk factors have been implicated, including hirsutism, recurrent local trauma, obesity with a deep natal cleft, poor hygiene, smoking, a sedentary lifestyle, and positive family history (5).

Various non-surgical and surgical treatment modalities have been described. Regardless of the method, wound healing is influenced by the stage of disease, patient comorbidities, treatment strategy (medical or surgical), and the surgeon's experience (6). When surgery is indicated, the cornerstone is total excision of the sinus tract. The resulting wound can be managed by primary closure, flap reconstruction, or left open to heal by secondary intention (7,8).

This study presents a retrospective analysis of 50 cases of recurrent pilonidal sinus disease, all managed surgically using the Limberg flap technique.

PATIENT and METHOD

This prospective study was conducted in the Department of Surgery at Kirkuk General Hospital from November 2017 to November 2018. A total of 50 patients with recurrent pilonidal sinus (PNS) were included. All patients were treated surgically using the Limberg flap technique and followed up for one year postoperatively. Prior to surgery, all patients provided informed consent after being fully informed about the surgical procedure, its potential complications, and postoperative care. Preoperative investigations included complete blood tests, electrocardiography (ECG), and echocardiography to assess fitness for surgery. All surgical procedures were performed under either spinal or general anesthesia, with the patient in the prone position. The intergluteal region was adequately exposed, and lateral traction of the gluteal tissue was achieved using adhesive tape. The sinus tracts and their branches were identified by injecting methylene blue dye into the tract.

Complete excision of the pilonidal sinus was carried out using electrocautery, extending deep to the fascia overlying the sacrum and laterally to the gluteal fascia. Reconstruction of the resulting defect was achieved using a rhomboid (Limberg) flap, harvested from either the right or left gluteal region depending on the location of the defect (9). The geometric principles of this flap design and its transposition are illustrated in **Figure 1**.

Preoperative marking of the flap and sinus tract is shown in **Figure 2**, while **Figure 3** demonstrates the postoperative appearance after flap transposition and closure. The flap was secured using skin sutures with Prolene 2-0. A closed-suction vacuum drain was inserted through a separate incision approximately 2 cm from the primary wound and maintained until fluid drainage decreased to below 50 mL/day (10).

The drain was typically removed between the third and fifth postoperative day. All patients were discharged on the day of surgery and instructed to avoid lying on their buttocks for at

least five days. Sutures were removed on day 15, and full recovery was generally achieved by day 21.

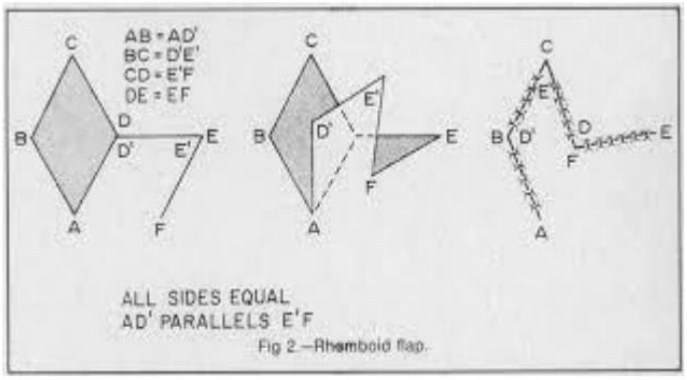

Figure 1: *Diagram of the rhomboid (Limberg) flap design. The figure illustrates the geometric principles used in flap creation, showing how the excised defect is covered by a transposed rhomboid-shaped flap harvested from the adjacent gluteal area.*

Figure 2: *Preoperative planning of the Limberg flap. The pilonidal sinus tract is outlined, and the rhomboid flap is marked on the gluteal region prior to surgical excision and reconstruction.*

Figure 3: *Postoperative appearance after Limberg flap reconstruction. The flap is sutured into place, and a closed suction drain is positioned through a separate incision to prevent fluid accumulation beneath the flap.*

RESULTS

A total of 50 patients with recurrent pilonidal sinus (PNS) were included in the study. Of these, 45 patients (90%) were male and 5 patients (10%) were female. The mean age was 25.3 years, ranging from 18 to 42 years. A positive family history of PNS was observed in 30 patients (60%), while 42 patients (84%) had one or more predisposing risk factors such as deep natal cleft, hirsutism, obesity, local trauma, or a sedentary lifestyle.

Patients were divided into two groups based on the type of their initial surgical intervention: 30 patients (60%) had undergone excision with primary closure, and 20 patients (40%) had been treated with excision followed by healing by secondary intention.

Age distribution across both groups is detailed in **Table 1**. The most commonly affected age group in both cohorts was 20–29 years, representing 46.6% of patients in the primary closure group and 50% in the secondary intention group.

Sex distribution between the groups is presented in **Table 2**. All female patients (n=5) were in the primary closure group, whereas the male population was distributed across both groups, with a majority (77.7%) undergoing healing by secondary intention.

A comparison of clinical features, operative characteristics, and postoperative complications between the two groups is shown in **Table 3**. The majority of recurrences were located at the midline, either as a single or multiple tract. Hirsute body type was noted in 24 patients in the primary closure group and 12 in the secondary intention group.

Postoperative complications were generally low in both groups. Wound infection occurred in one case in the primary closure group and two cases in the secondary intention group. Flap edema (4 vs. 1), hematoma (2 vs. 1), partial wound dehiscence (3 vs. 1), and flap necrosis (1 vs. 0) were observed in the primary closure group more frequently. One case of recurrence was noted in the primary closure group, with no recurrences reported in the secondary intention group (**Table 3**).

Tables from Results Section

Table 1: Age distribution in both groups

Age (yrs.)	Primary closure group	Healing by secondary intension group
10 – 19	8 (26.6%)	4 (20%)
20 – 29	14 (46.6%)	10 (50%)
30 – 39	6 (20%)	4 (20%)
40 – 49	2 (6.6%)	2 (10%)
Total	30 (100%)	20 (100%)

Table 2: Sex distribution in both groups

Sex	Primary closure group	Healing by secondary intension group
Male	10 (22.3%)	35 (77.7%)
Female	5 (100%)	None

Table 3: Clinical Comparison, Operative Characteristics and Complications

Variable	Primary closure group	Healing by secondary intension group
Midline single	20	12
Midline multiple	10	8
Hirsute Nature	24	12
Wound infection	1	2
Flap edema	4	1
Hematoma	2	1
Partial wound dehiscence	3	1
Flap necrosis	1	0
Recurrence	1	0

DISCUSSION

Pilonidal sinus (PNS) is not typically classified as a life-threatening condition, yet it significantly impairs patients' quality of life due to persistent discomfort and potential complications. These include abscess formation, discharging sinuses, and severe localized pain, all of which interfere with daily activities. Recurrence of PNS is frequently attributed to incomplete excision of sinus tracts during the initial surgery, postoperative wound infection, or abscess formation. Additional contributing factors include poor hygiene, persistent moisture, friction, sweating, and the accumulation of hair or debris within the intergluteal cleft (6). While numerous surgical approaches exist for managing PNS, many carry a relatively high risk of recurrence (11). Flap-based techniques, such as the Limberg flap, offer advantages by flattening the natal cleft, minimizing hair accumulation, and allowing tension-free wound closure—all of which contribute to reducing recurrence (9).

The Limberg flap is widely accepted for the treatment of recurrent PNS, as it provides favorable outcomes, including shorter healing times and sustained long-term results (12). However, one limitation of this technique is potential disfigurement in the sacrococcygeal region, particularly in cases requiring a large flap for extensive disease (12).

Comparative studies have shown that the Limberg flap is superior to primary closure techniques. Shabbir et al. reported lower rates of wound infection and recurrence, shorter hospital stays, and greater patient comfort with the Limberg flap compared to excision and primary closure (13). Our findings align with this, as patients treated with Limberg flaps experienced prompt recovery and improved cosmetic outcomes. When compared with the Karydakis flap, some studies—such as Sit M et al.—found similar success rates for both procedures (14). However, Can MF et al. reported a slightly shorter healing time in patients undergoing the Karydakis procedure (15).

Despite its benefits, the Limberg flap is not without complications. As with other surgical techniques, issues such as infection, fluid accumulation, hematoma, and wound dehiscence can occur. One notable complication is the collection of fluid beneath the flap. This is commonly addressed through the use of a closed-suction drain, which remains in place until drainage is reduced to less than 50 mL/day. Gurer et al. confirmed the effectiveness of this practice in reducing postoperative fluid collection (16), while Bessa (17) reported only a 2.4% incidence of fluid retention after drain placement. In contrast, our study observed a 10% rate of fluid collection—higher than previously reported.

Regarding recurrence, the Limberg flap has shown consistently low recurrence rates, ranging between 0.8% and 2.7%. In our study, the recurrence rate was 2%, closely aligning with these published figures. For example, Ertan et al. also reported a 2% recurrence rate with the Limberg flap, which is notably lower than the 12% recurrence associated with primary closure techniques (18).

CONCLUSION

Recurrent pilonidal sinus (PNS) requires a different surgical approach than primary cases, with flap reconstruction—especially the Limberg flap—proving to be highly effective despite its technical complexity. However, the risk factors for recurrence remain the same in both

forms. Therefore, minimizing these factors—such as poor hygiene, hirsutism, and a deep natal cleft is essential. Patient education on personal hygiene and recurrence prevention is crucial to long-term success and reducing the risk of future episodes.

Ethical Clearance:

All ethical aspects of this study were approved. Before enrolling the participants, an informed oral consent was obtained from their families as an ethical agreement. Additionally, approval from the hospital administrator was obtained.

Financial support and sponsorship: Nil.

Conflicts of interest: There are no conflicts of interest**.**

References

1. Srihari RS, Naveen AM, Sreekar H. The Limberg flap reconstruction – the optimal surgery for pilonidal sinus disease. Our Dermatol Online. 2016;7:271–5.
2. Hintapatla S, Safarani N, Kumar S, Haboubi N. Sacrococcygeal pilonidal sinus: historical review, pathological insight and surgical options. Tech Coloproctol. 2003;7(1):3–8.
3. Hull TL, Wu J. Pilonidal disease. Surg Clin North Am. 2002;82(6):1169–85.
4. McCallum IJD, King PM, Bruce J. Healing by primary closure versus open healing after surgery for pilonidal sinus: systematic review and meta-analysis. BMJ. 2008;336(7649):868–71.
5. Segre D, Pozzo M, Perinotti R, Roche B. The treatment of pilonidal disease: Guidelines of the Italian Society of Colorectal Surgery (SICCR). J Visc Surg. 2013;150(4):237–47.
6. Solla JA, Rothenberger DA. Chronic pilonidal disease: an assessment of 150 cases. Dis Colon Rectum. 1990;33(9):758–61.
7. Al-Khamis A, McCallum I, King PM, Bruce J. Healing by primary versus secondary intention after surgical treatment for pilonidal sinus. Cochrane Database Syst Rev. 2010;(1):CD006213.

8. Soreide K. The best surgical technique for chronic pilonidal disease—is this question still open, or closed? Nat Clin Pract Gastroenterol Hepatol. 2009;6(1):2–20.
9. El-Khadrawy O, Hashish M, Ismail K, Shalaby H. Outcome of the rhomboid flap for recurrent pilonidal disease. World J Surg. 2009;33(5):1064–8.
10. Ahdy T. Surgical treatment of the pilonidal disease: primary closure or flap reconstruction after excision. Dis Colon Rectum. 2008;51(12):1816–22.
11. Lorant T, Ribbe I, Mahteme H, Gustafsson UM, Graf W. Sinus excision and primary closure versus laying open in pilonidal disease: a prospective randomized trial. Dis Colon Rectum. 2011;54(3):300–5.
12. Abdelnaby M, Emile SH, El-Said M, AbdelMawla A, Elgendy H, Sakr A, et al. Rotational gluteal flap versus modified Limberg flap in treatment of sacrococcygeal pilonidal disease. J Surg Res. 2018;223:174–82.
13. Habbir F, Ayyaz M, Farooka MW, Toor AA, Sarwar H, Malik AA. Modified Limberg's flap versus primary closure for treatment of pilonidal sinus disease: A comparative study. J Pak Med Assoc. 2014;64:1270–3.
14. Sit M, Aktas G, Yilmaz EE. Comparison of the three surgical flap techniques in pilonidal sinus surgery. Am Surg. 2013;79:1263–8.
15. Can MF, Sevinc MM, Hancerliogullari O, Yilmaz M, Yagci G. Multicenter prospective randomized trial comparing modified Limberg flap transposition and Karydakis flap reconstruction in patients with sacrococcygeal pilonidal disease. Am J Surg. 2010;200:318–27.
16. Gurer A, Gomceli I, Ozdogan M, Ozlem N, Sozen S, Aydin R. Is routine cavity drainage necessary in Karydakis flap operation? A prospective, randomized trial. Dis Colon Rectum. 2005;48(9):1797–9.
17. Bessa SS. Results of the lateral advancing flap operation (modified Karydakis procedure) for the management of pilonidal sinus disease. Dis Colon Rectum. 2007;50(11):1935–40.
18. Ertan T, Koc M, Gocmen E, Aslar AK, Keskek M, Kilic M. Does technique alter quality of life after pilonidal sinus surgery? Am J Surg. 2005;190(3):388–92.