

A comparative study between wide local excision with lay open versus Limberg flap transposition in the management of pilonidal sinus disease – A single center study



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ABSTRACT

Background: Pilonidal sinus disease (PSD) is a tract in the sacrococcygeal region's subcutaneous tissue that presents with recurrent infection and persistent inflammation. The best surgical strategy for treating pilonidal sinus illness is still up for debate, despite the fact that several surgical techniques for treating the sacrococcygeal pilonidal sinus have been identified. **Aims and Objectives:** This study evaluated several intraoperative and post-operative constraints related to the surgical techniques of wide excision with lay open and Limberg flap transposition for treating pilonidal sinus. **Materials and Methods:** The division of 50 symptomatic pilonidal sinus patients into two equal groups was based on simple randomization. Patients in Group-A had wide local excisions with lay open, whereas those in Group-B received wide excisions with Limberg flaps. Operative time along with post-operative issues including pain, seroma, infection, necrosis of the flap's tip, gaping, loss of sensation, and recurrence was compared between the two groups. **Results:** When compared to the wide excision group, the mean operating time was substantially greater in the Limberg flap repair group. There was a significant difference between the groups in terms of the average number of days spent in the hospital (Group-B was 6.8 ± 1.5 days and Group-A was 12.96 ± 1.3 days), the average number of days it took for the wound to heal (Group B was 16.6 ± 8.5 days and Group-A was 49.5 ± 7.8 days), mean work-off periods (Limberg's rhomboid flap - 19.64 ± 5.1 days and laying open technique - 52.6 ± 8 days), and mean number of days pain lasted (Group-B - 14.8 ± 5.7 days and Group-A - 45.6 ± 7.5 days). Wide local excisions are associated with increased wound infection. Recurrence in Limberg's rhomboid flap group was less (4% vs. 16% with laying open approach). **Conclusions:** Low recurrence rates and comparably few complications are associated with rhomboid excision with Limberg flap repair transposition surgery. The primary course of action for pilonidal sinus illness should be Limberg flap repair.

Key words: Infection; Pilonidal sinus; Randomization; Recurrence; Wide local excision

INTRODUCTION

A persistent inflammatory condition that affects the sacrococcygeal area and manifests as a depression or one, two, or more holes in the midline of the intergluteal gap is called a pilonidal sinus. Infection in hair follicles with

buttock friction and shearing forces in that area contributes to shed hair or broken hairs that have accumulated there, drilling through the midline skin, creating a subcutaneous, chronically infected, and midline track.¹ It typically happens during puberty and before the fourth decade of life and is more prevalent in men.

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Patients report sporadic discomfort, swollen areas, and discharge at the intergluteal cleft.

Pilonidal sinus is challenging to treat since treatment options are less efficient. The illness stage affects the therapy option.

A conservative approach may be used for a superficial (depth <2 cm) non-infected lesion with projecting hair.² Because of the high prevalence of complications and discomfort experienced by patients, conservative treatments such as phenol injection, cryosurgery, thermal destruction, and local radiation are no longer advised.

For simple pilonidal cysts or sinuses, a minimally invasive approach such as scarless outpatient ablation of pilonidal cysts or endoscopic pilonidal sinus treatment may be used.

Surgery is required for every pilonidal sinus with an abscess.

One of the surgical techniques is the fusiform excision of diseased tissue up to the sacrum and gluteal fascia. An open wound is allowed to heal. This approach is often effective, although it necessitates a longer period of recuperation while simultaneously reducing the recurrence rate.

Excision of the pilonidal cyst with a healthy tissue margin and primary wound closure is another therapy option. Primary wound closure speeds up healing but is only advised for superficial, subcutaneous lesions with low inflammation since it increases the risk of complications, including infection and dehiscence, as well as disease recurrence.

Excision with marsupialization, in which the wound edges are fastened to the sacral fascia. It results in a considerable shallowing of the intergluteal cleft and a reduction in the granulation surface.

Other procedures with comparable effectiveness but more technical difficulty include V-Y plasty, Z-plasty, plasty employing the Limberg flap, and others.³ Only individuals with severe, persistent lesions should have their flaps relocated. Deep incisions with mobilization of subcutaneous tissue in the treatment of less severe pilonidal cysts allow for quicker healing and are more well liked by patients than flap surgery.⁴

Opening all tracks with or without marsupialization, removing all tracks with or without primary closure, and removing all tracks and then closing with another technique intended to avoid a midline wound (Limberg flap, Z-plasty, Karydakakis procedure) are all considered

as treatment options. However, the choice of method is typically influenced by the surgeon's preference.⁵

The aims of this study are to find the better treatment option (wide local excision with lay open versus wide excision and translocation of the Limberg flap) for symptomatic or recurrent pilonidal sinus in terms of surgical duration, post-operative complications such as pain, discharges, infection, and recurrence.

Aims and objectives

1. To study wide local excision with lay open and Limberg flap transposition as a treatment of symptomatic/ recurrent pilonidal sinus.
2. To study wound healing time, early complications within at 24 hours and recurrence of PSD after wide excision with lay open versus limberg flap transposition surgery in Pilonidal sinus disease.
3. Discharge at surgical site on day 2,3 and 7 after surgery (amount and nature)
4. Wound Infection observed at operation site at post op day 3 and 7.

MATERIALS AND METHODS

Fifty patients with symptomatic or recurring pilonidal sinuses admitted to surgical wards at Dr. S. N. Medical College, Jodhpur, between July 2020 and December 2021 were the subject of this prospective comparative research.

All patients were split into two groups of 25 patients each at random. Both groups received wide excisions, with Group-A using a lying open technique and Group-B using a Limberg rhomboid flap.

All patients had full general physical examinations and were questioned about any relevant medical history of risk factors, including employment, way of life, family history, etc. To determine the location, size, infection, and presence of any discharge, a thorough examination of the sinuses was performed. In challenging and recurrent cases, an magnetic resonance imaging was performed.

Patients were scheduled for elective surgery after an investigative workup and pre-anesthetic assessment. The patient had one intravenous dose of antibiotics before surgery. Every patient received surgery by the groups they were assigned to.

Patients were placed on a liquid diet and given antibiotics intravenously for 5 days following surgery to discourage bowel movements.

Observations were made on days 7, 14, and 21 and then monthly for the next 3 months.

Data on days spent in the hospital, recovery time, time away from work, the number of days that pain remained after surgery, complications, and recurrences were analyzed.

With the use of the SPSS 22.0 software program, statistical analyses were carried out utilizing data from the Tavassoli et al., research (SPSS Inc., Chicago, IL, USA). We compared qualitative data using the Yates continuity correction test (Chi-square test), Fisher's exact test, and Fisher-Freeman-Halton test. For categorical variables, numbers and percentages were employed, while the mean SD was used to summarize all continuous variables. Using the method for hypothesis testing for two populations, the sample size was determined at an alpha error of 0.05 and a research power of 90%. A minimum of 21 people in each group, or 25 subjects total, was required for the sample size calculation.

RESULTS

In this study, males (80%) are more likely than females (20%) to have a pilonidal illness, and the most common age of presentation was in the group of 21–30 years. (Table 1)

86% of patients had a primary illness, with 68% of the patients being men and the remaining 18% being women. Although recurring illness affected 14% of patients, 12% of them were men, and the remaining 2% were women.

In our study, individuals with a deep natal cleft had a higher illness incidence rate (84%) than patients with a shallow natal cleft, who had a disease incidence rate of about 16%.

It affects people who lead sedentary lifestyles (68%) more frequently than those who engage in physical exercise (32% of instances).

Out of 50 patients, 22% had sparse hair coverage, while the rest (78%) had coarse coverage). Among the scanty hair

density patients, only 6% were having shallow natal cleft whereas 16% had a deep natal cleft.

Among the shallow natal cleft patients, 10% were having coarse hair density, while in deep cleft patients, 68% were having coarse hair density.

Hence, people with coarse body hair and deep natal clefts are more likely to develop symptoms of pilonidal sinus disease.

Of patients with sparse hair, 100% had a primary illness. However, 64% of those with coarse hair had a primary illness, and 14% had a recurring illness.

14% of the 16 individuals with shallow clefts had an original illness, while the remaining 2% had a recurring disease. While in the group of people with deep natal clefts, 72% had a main illness and 12% had a recurring illness.

Thus, male patients with coarse body hair and deep natal clefts are more likely to experience recurrent illnesses (Table 2).

In our investigation, the midline swelling with several pus-discharging sinuses was the most frequent clinical presentation (42%), followed by the midline swelling with a single pus-discharging sinus (32%), and the

Table 1: Age-wise distribution of pilonidal disease

Age (years)	No. of patients	Percentage
<10	0	0.00
11–20	8	16.00
21–30	28	56.00
31–40	9	18.00
>40	5	10.00
Total	50	100.00

Table 2: Co-relation between character, sex, body hair density, and natal cleft in patients with pilonidal disease

Character	Primary	Recurrent	Total	P value
Sex				
Male	34 (68%)	6 (12%)	40 (80%)	1.000 (NS)
Female	9 (18%)	1 (2%)	10 (20%)	
Body hair				
Scanty	11 (22%)	0	11 (22%)	0.323 (NS)
Density				
Coarse	32 (64%)	7 (14%)	39 (78%)	
Natal Cleft				
Shallow	7 (14%)	1 (2%)	8 (16%)	1.000 (NS)
Deep	36 (72%)	6 (12%)	42 (84%)	

Table 3: Days of hospitalization in patients with pilonidal disease operated by different procedures

Surgical procedure	Hospitalization stay (days)		
	N	Mean	Standard
Limberg's rhomboid lap	25	6.840	1.518
Excision and laying open	25	12.96	1.337

P<0.0001, highly significant

remaining 26% had a tiny pus-discharging sinus without swelling.

The upper midline (78%) and upper midline with side walls (12%) were the two positions where sinuses were most frequently seen; they were those near the natal cleft (Figure 1).

The average length of stay in hospitals for the lying-open procedure was 12.96 days, compared to 6.8 days for Limberg's rhomboid flap (Table 3).

Limberg's rhomboid flap had a mean wound healing time of 16.685 days, whereas the lying open approach had a mean wound healing time of 49.57.8 days (Table 4).

In Limberg's rhomboid flap, the mean work-off duration was 19.645.1 days; for primary closure, it was 23.669.3 days; and for the lying-open approach, it was 52.68 days (Table 5).

Limberg's rhomboid flap complications most frequently involve loss of local feeling, which occurs in 16% of cases, whereas tip necrosis occurs in 4% of instances. In 8%, 4%, and 4% of cases, an infection, seroma, and wound dehiscence occurred, respectively.

Infection was the most frequent problem with open surgery, followed by loss of feeling in 16% of patients (Figure 2).

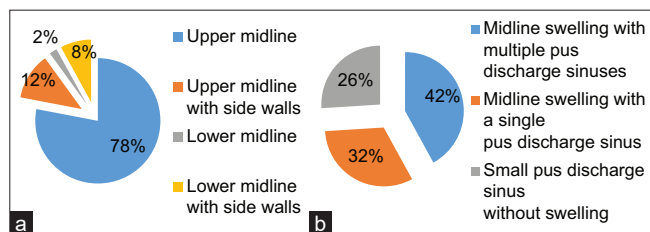


Figure 1: (a) Position of sinus at the natal cleft. (b) Clinical presentation

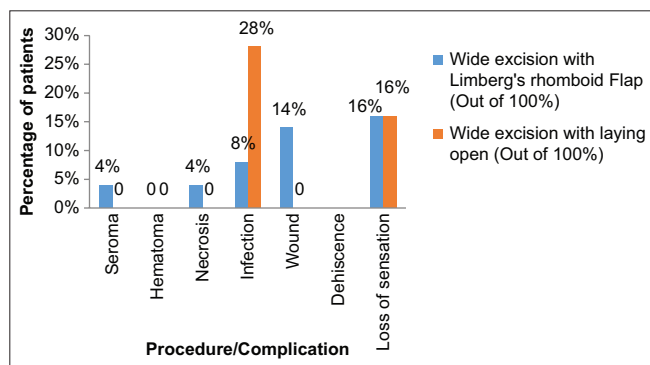


Figure 2: Complication in patients with pilonidal disease operated by different procedures

With Limberg's rhomboid flap, the mean duration of discomfort was 14.85.7 days; in the lying open approach, it was 45.67.5 days. The P-value was 0.001 (highly significant) (Table 6).

Recurrence occurred in 16% of instances using the lying open approach and in 4% of cases using Limberg's rhomboid flap group (Figure 3).

DISCUSSION

In the present study, pilonidal sinus is a disorder that often affects young adult males between the ages of 21 and 30. The same has been noted by M.R.B. Keighley (15–32 years old) and Z.S. Matar (15–24 years).^{6,7} Since PSD begins at puberty's commencement when sex hormones begin acting on pilosebaceous glands in the natal cleft, it is more common in the third decade of life. The creation of an abscess that spreads into the subcutaneous fat results from an infected hair follicle that becomes keratin filled and swollen.

Chintapatla et al. study, which was similar to this study, indicated that this condition was more common in men.⁸

Table 4: Wound healing in patient with pilonidal disease operated by different procedures

Surgical procedure	Wound healing (days)		
	N	Mean	Standard
Limberg's rhomboid lap	25	16.68	5.044
Excision and laying open	25	49.56	7.80

P<0.0001, highly significant

Table 5: Work-off periods in patients with pilonidal disease operated by different procedures

Surgical procedure	Work-off period (days)		
	N	Mean	Standard
Limberg's rhomboid lap	25	19.64	5.139
Excision and laying open	25	52.68	8.00

P<0.0001, Highly significant

Table 6: Number of days pain lasted post-operatively in patients with pilonidal disease operated by different procedures

Surgical procedure	No. of days lasted		
	N	Mean	Standard
Limberg's rhomboid lap	25	14.80	5.721
Excision and laying open	25	45.64	7.593

P<0.0001, Highly significant

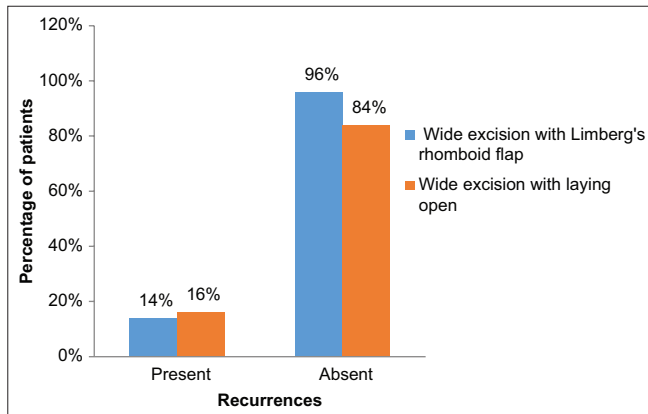


Figure 3: Recurrences in patients with pilonidal disease

According to Awad and Saad study, 56.3% of PSD patients had dense, coarse hair, and deep birth clefts.⁹ The present study completely concurs with this finding since this study discovered that 85.7% of recurring illness patients were male and that the majority of our patients had coarse body hair density (78%), a deep birth cleft (84%), as well as a sedentary lifestyle (68%) in general. The majority of patients had an upper midline natal cleft edema with several pus-discharging sinuses (42% when they first arrived).

According to Awad and Saad, 56.3% of individuals with deep natal clefts had coarse hair density, with nearly three-fourths of them involving the upper midline and side walls of the cleft. The outcomes were formerly more comparable.⁹

In our study, we found that patients who received primary closure with a Limberg rhomboid flap spent less time in the hospital (6.8–1.5 days), whereas patients who underwent broad excision using the lying open approach spent more time in the hospital (12.96–1.3 days).

According to the research by Yildiz et al. (2013) and Jamal et al. (2009), patients treated with flap surgeries spend much less time in the hospital than patients who receive other procedures.^{10,11} Our investigation supports these results as well.

Hospital stays ranged from 8.4 days for the lying open procedure to 5.4 days for the Limberg flap closure technique, according to Rabie et al.¹²

The incision in the present study's excision using the laying open approach healed in 49.5 ± 7.8 days, the post-operative discomfort lasted for 45.6 ± 7.5 days, and the recovery time from work was 52.6 ± 8 .

In our study, the healing period for patients following the Limberg flap technique was 16.685 days, but in the study by Jamal et al., it was found to be 20.13 ± 8.99 days.¹⁰

As a result, it was shown that patients who underwent the Limberg flap technique had considerably shorter overall wound healing times.

In a clinical investigation of 216 patients divided into three groups of 72 cases, Fazeli et al. found that wounds treated with broad excision and the laying open approach healed in 41 days.¹³

In our study, problems affected females 21.42% and males 78.58%. In 7.1% of patients with recurrent illnesses, seroma was the primary consequence. Other problems included wound infection, hematoma, necrosis (only tip necrosis), and wound dehiscence.

Manjunath found that two Limberg procedure patients (6.25%) and two Z-plasty patients (11.11%) both had wound infections and that one Limberg procedure patient (3.13%) had a flap necrosis occurrence.¹⁴ There was no difference in the frequency of complications between the two groups ($P=0.69$ for wound dehiscence, $P=0.526$ for flap necrosis, and $P=0.398$ for seroma formation). Infection and loss of sensation were the most frequent complications in the wide excision with the laying open technique, respectively (28% and 16%).

While using the broad excision with the lying open approach, Ersoy et al. (2007) found that infection (16%) was the only consequence in 44 patients.¹⁵

Because a sizable raw region is left behind for healing by secondary intention in the perineum, which is once again the most polluted area of our bodies, infection was the most frequent consequence in the group that was laying exposed.

In their analysis of 123 patients, Mark et al. found that the broad excision with a lying-open approach had the lowest overall complication rate, with wound infection accounting for 34% of complications.¹⁶

Those who suffered from severe infections experienced wound dehiscence more frequently.

Loss of local feeling and tip necrosis was the most typical problems in the Limberg flap group.

These issues did not affect the patient's overall prognosis because the surgical incision completely healed in 16 days, which did not affect the morbidity when it was calculated.

The two main risk factors were coarse body hair and a deep birth cleft. This is because, as we already know, the perineum is the most polluted part of the human body, with the mid-natal cleft serving as the main site of bacterial colonization. Hence, individuals with deep natal clefts had a significant risk of infection. Dense body hair was another prevalent risk factor for the same condition since these people are more prone to colonization by different microorganisms if they do not keep good hygiene, which raises the infection rate. Nevertheless, there was no statistically significant difference between groups in terms of infection.

Furthermore, based on our experience, it has been shown that body hair density and a deep natal cleft are not only risk factors for the illness but also complicate surgical procedures by raising the incidence of infection, necrosis, and wound dehiscence.

In the present study, Limberg flap recurrence occurred in 4% of patients, lying open method recurrence occurred in 16% of cases, and main midline closure recurrence occurred in 24% of cases. Recurrence rates were reported to be 25% with excision and lying open and 41% with primary closure by Rabie et al.¹² The inadequate excision of the sinus tract and the high incidence of post-operative complications such as infection, flap necrosis, and wound dehiscence may be the causes of the traditional old techniques' high risk of recurrence.

Limitations of the study

Small sample size is a limitation of this study.

CONCLUSION

It is unclear what the best course of action is for treating pilonidal sinus disease, but complete excision of the affected areas, flattening of the natal cleft, avoiding midline scars, and a tension-free repair of the wound with well-vascularized tissue appear to be essential features of any treatment for this disease. It is now abundantly obvious that employing flaps or mainly closing the wound after surgery, as opposed to leaving it open, results in higher patient satisfaction.

In conclusion, rhomboid excision and Limberg flap closure are preferred to simple excision and other treatment methods in the current situation due to their low complication rate and satisfactory long-term outcomes.

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Authors Contribution:

OPP- Definition of intellectual content, Literature survey, Prepared first draft of manuscript, implementation of study protocol, data collection, data analysis, manuscript preparation and submission of article. **RG-** Concept, design, clinical protocol, manuscript preparation, editing, and manuscript revision. **NS-** Design of study, statistical Analysis and Interpretation, Literature survey and preparation of Figures. **GC-** Coordination and Manuscript revision. **SKM-** Reviewed Manuscript.

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