

## COMPARATIVE STUDY OF RHOMBOID (LIMBERG) FLAP CLOSURE WITH WIDE OPEN EXCISION IN MANAGEMENT OF PILONIDAL SINUS

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### ABSTRACT

**Objectives:** There are many options for the treatment of pilonidal sinus with different pros and cons. The current study intends to compare two commonly practiced surgical treatments – Rhomboid excision (Limberg flap repair) against wide-open excision with healing by secondary intention. In this study, we have compared post-operative complications and recurrence rates after Limberg flap and wide excision.

**Methods:** Our study is a prospective study including 56 patients who were admitted for pilonidal sinus and operated by Limberg flap reconstruction surgery and wide local excision at a tertiary center.

**Results:** The patients included males and females in a ratio of 4.6:1. The mean presenting age of the patients was 32.84 years. The most common presenting complaint was discharge from the affected site and local pain. Operating time was observed to be significantly longer for the Limberg flap as compared to for wide local excision. Hospital stay was noted to be longer for wide local excision than Limberg flap with a  $p < 0.0001$ . Post-operative complications such as bleeding, wound dehiscence as well as recurrence were noted more in wide local excision. Pain-free sitting days were less in Limberg flap and return to work was much earlier as compared to wide local excision.

**Conclusion:** Limberg flap reconstruction surgery is the most preferred method of treatment for pilonidal sinus because of its less discomfort, low infection, low recurrence rates, better esthetic results after surgery, and short duration of hospital stay and returns to work.

**Keywords:** Pilonidal sinus, Limberg flap, Wide excision, Pilonidal abscess.

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### INTRODUCTION

Pilonidal sinus disease (PNS) is a relatively common and chronic inflammatory condition. The name pilonidal is taken from Latin meaning "nest of hairs." Karydakos has defined three criteria that set the stage for hair roots to turn in the development of the disease: Hair in area, adequate power for hair roots to turn, and the sensitiveness of the skin. Despite almost two centuries passing since this disease was first noted, no standard management for pilonidal disease exists. A lot of methods have been described for the treatment of the disease such as medical, minimally invasive, and surgical, but there is no determined gold standard treatment method so far. The ideal method should have a high success rate, low pain, less complications, and low recurrence and it should allow a patient to return to normal life as soon as possible [1].

Surgical methods of treating pilonidal disease include incision and drainage, laying open of the sinus tract, excision, and healing by secondary intention, excision and primary closure, and excision with advancement or transposition flap closure.

The main concern for the treatment of the patient is the recurrence; the literature review suggested that it ranged from 20 to 40% regardless of the technique used. Many reasons were attributed to recurrence, such as leaving behind some tracts, and sutures in the midline causing more trauma with repeated infection accumulation of perspiration and friction with a tendency of the hair getting incorporated into the wound [2].

The Limberg flap, initially described by Alexander Limberg in 1948, is a transposition flap for coverage of a rhomboid-shaped defect with opposite sides of equal length and opposite medial and lateral angles of 120° and superior and inferior angles of 60°. The innovative design of the Limberg flap allows for tension-free closure of the rhomboid-shaped

defect and the donor site. Several studies have suggested that rhomboid excision and closure with Limberg transposition flap is the treatment of choice for chronic sacrococcygeal PNS [1].

This study aims to compare the post-operative outcomes of the Limberg flap reconstruction technique with wide-open excision and healing by secondary intention in the surgical management of PNS.

### METHODS

After getting clearance from the ethical committee we did a prospective study including 56 patients who were admitted for pilonidal sinus. Patients with recurrent disease, previously operated patients and immunocompromised patients, or patients with any other significant comorbidities such as diabetes mellitus which may have altered the interpretations were excluded from the study. We randomly divided them into two groups, i.e., Group A and Group B. Group A patients underwent Limberg flap reconstruction surgery and Group B underwent wide local excision. Postoperatively patients were compared in terms of pain-free sitting time, surgical site infection, return to work, and recurrence. The results were calculated by Chi-square test, and Student's t-test (independent sample t-test) as a parametrical test to find significant mean differences between both the study groups. The significance limit of statistics was set at  $p < 0.05$ .

#### Surgical procedure

##### Technique of Limberg flap

After the patient is placed on the table and post the general or spinal anesthesia. Antibiotic prophylaxis is applied. The hips are tied and the patient is given the jackknife position. The hips are shaved and painted with povidone-iodine. The sinuses are found methylene blue is injected and a rhomboid skin incision is made by putting the sinus orifices in

the center and all tissues are removed as a total by descending to the presacral fascia. After the excision, a line which has equal length to the length of the rhombus is drawn that passes through the bisector of the lateral corner of the rhomboid. At the end of this line, the flap is organized by drawing another line that is parallel to the top and lower lateral edges. The bottom of the flap is raised including the fascia on the gluteal muscle, is rotated to fill the excised area, and is sutured to the edges of this area. Wound lips that remain in the gluteal area are closed primarily. Homeostasis is ensured carefully. The vacuumed drain is placed under the flap. The skin is closed with a non-absorbable suture. The oral antibiotics continued for 7 days.

#### Technique of open procedure

The open procedure involved a wide excision of the pilonidal sinus tract and healing by secondary intention. After the operation, the dry dressing was done for 48 h and the wound was examined for any signs of surgical site infection, such as swelling, redness, and discharge.

### RESULTS

In our study, the maximum patients are in the age group 21–40 years with mean age being  $32.83 \pm 8.73$  and male: female=4.6:1. The most common presenting complaint in our study was noted to be discharge (45%) from sinus (local site) followed by pain (41%). Patients also presented with local swelling or even fever. As far as intraoperative factors are concerned, the mean duration of surgery was  $89.75 \pm 6.03$  min in the rhomboid excision with Limberg flap and  $56.75 \pm 3.75$  min in the excision with primary closure technique. The difference was significant ( $p < 0.0001$ ). The mean hospital stay was  $2.82 \pm 0.46$  days in Group A (Limberg flap) and  $6.17 \pm 1.13$  days in Group B (wide excision) which was significant ( $p < 0.0001$ ). In terms of post-operative complications, it is noted that the most common complication is wound infection (25%,  $n=7$ ) Group B (wide local excision with secondary healing). On the other hand bleeding and concealed hematoma (collectively, 21.4%,  $n=6$ ) were more common in Group A (Limberg flap). The most concerned complication, i.e., recurrence was observed more in Group B (wide excision) which was 17.85% ( $n=5$ ) as compared to Group A (Limberg flap) which was 7.1% ( $n=2$ ). Rest all complications are mentioned in Table 1 if combined then the overall complication rate is significantly higher in Group B. Comparison of Visual Analog Scale (VAS) scores for pain among study participants of both the groups showed that on post-operative days 1 and 7 mean VAS score was higher for Group B as compared to Group A. Although, during follow-up visits at 1 and 3 months study participants in both groups did not complain of any pain. The mean duration in which the patient could sit comfortably without any pain was significantly low, i.e.,  $9.37 \pm 1.85$  days in Group A versus  $20.42 \pm 3.04$  days in Group B ( $p < 0.001$ ). The mean duration for return to work postoperatively in Group A is  $11.5 \pm 1.91$  days and in Group B is  $23.0 \pm 3.8$  days with  $< 0.001$  p-value which is significant. Patients undergoing secondary healing after excision take longer time to return to work thus suffering financial loss.

### DISCUSSION

A lot of literature has been published supporting that sacrococcygeal sinus disease is an acquired condition, predominantly present in young males of the working class. This has been observed in our study as well [1-3]. The most common presenting complaint of patients was discharge from the local site (44.5%) followed by pain (41.02%).

There is a long list of procedures that are advocated for the treatment of chronic PNS from total conservative treatment and non-surgical approach, to extensive surgical procedures. Despite this broad range, the ideal treatment of PNS remains a topic of debate and controversy. We have compared arguably the two most common techniques of surgery for pilonidal sinus, i.e., Limberg flap versus wide excision. Both of the techniques have their own pros and cons.

Many studies have mentioned a known disadvantage of the Limberg flap technique i.e., the duration of operation, which is significantly longer

**Table 1: Comparison of post-operative complications in Limberg surgery versus wide excision**

Post-operative complication	Group A	Percentage	Group B	Percentage
Bleeding	3	10.71	5	17.85
Discharge	2	7.14	2	7.14
Hematoma	3	10.71	0	0
Wound dehiscence	1	3.57	4	14.28
Wound infection	1	3.57	7	25
Recurrence	2	7.1	5	17.85
Total	12	42.8	23	82
p-value	0.0002			

in the group of patients with the Limberg flap procedure compared to the group of patients with excision only which is similar to our current study [4,5].

Patients with wide excision required dressing for longer duration and many patients were not confident to get discharged which in turn increased overall hospital stay in Group B. Frequent dressing is another factor which is responsible for increased pain (VAS score) and anxiety observed in our as well as other similar studies [1,2,6]. This fact also added up in the duration required to go back to work in Group B and hence Group A (Limberg flap) patients could return to work sooner. The patients who received Limberg flap repair could return to their work after suture removal; however, patients with wide local excision resisted resuming their work due to significant anxiety about the wound and the requirement of daily dressing. Other studies such as Chopade and Adhikari, Kumar *et al.* also observed similar differences between the respective groups.

On comparing post-operative complications Group B (wide excision) patients experienced more wound infection as compared to Group A (Limberg flap) patients which is commonly observed in other studies as well [1-4]. Recurrence rate is something which many studies have variable outcomes. Alam *et al.* in their study reported 33% recurrence in the wide excision group as compared to one case of recurrence in the Limberg flap. A similar outcome is also observed in our study. On the other hand, there are few studies which suggest minimal recurrence in both procedures [1,2,4,6].

### CONCLUSION

Our study included 56 patients with PNS particularly those aged 21–40, revealing that it predominantly affects young individuals. The prevalence is significantly higher in men compared to women, likely due to factors such as being overweight, occupational habits such as prolonged sitting, excessive sweating, and deep natal cleft hirsute individuals, as well as those with a positive family history, are more likely to acquire this benign condition. Among surgical options, the rhomboid excision with the Limberg flap operation appears to be the most effective, as it completely removes the midline natal cleft, offering a superior outcome.

The Limberg flap method outperforms the wide excision approach in terms of wound healing duration, work loss days, post-operative pain, the possibility of wound infection, and low rates of recurrence. These findings are most likely due to the advantage of the Limberg flap procedure which removes not only the primary sinus but also flattens the natal cleft thereby lowering the possibilities of hair build-up, mechanical discomfort, and recurrence. To conclude, despite requiring difficult surgical skills and longer operation time, rhomboid excision with Limberg flap is a preferred treatment for PNS illness due to its low recurrence rates and few complications. Other benefits include speedy recovery, a short hospital stay, and an early return to daily life.

### AUTHORS CONTRIBUTION

Dr. Vishal Solanki – Formal analysis, investigation, writing – Original draft, data curation, resources. Dr. Suman Parihar – Conceptualization,

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