

## Outcome of Wide Excision versus Limberg Flap Repair in Pilonidal Sinus: A Comparative Study

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### Abstract

**Background:** The purpose of this study was to compare various operative and postoperative complication in pilonidal sinus managed with wide excision and Limberg flap repair methods.

**Methods:** Fifty patients with diagnosis of pilonidal sinus were taken up for surgery. All the patients were divided into two groups of 25 patients each, based on simple randomization. Group A consisted of patients with Limberg flap repair and group B consisted of patients with wide excision. A comparative study was performed between both the procedures. In both groups, postoperative complications such as seroma, infection, necrosis of tip of flap, gaping, recurrence, and hospital stay were compared.

**Results:** The mean operative time was significantly longer in the Limberg flap repair group compared to the wide excision group. There was no significant difference between the groups in terms of seroma formation and wound infection. The rate of wound gaping and recurrence was significantly lower in the Limberg flap repair group than the wide excision group.

**Conclusions:** Rhomboid excision with Limberg flap repair has low recurrence rate and comparatively few complication rates. Limberg flap repair should be the preferred treatment for pilonidal sinus disease.

**Keywords:** Limberg flap; Rhomboid incision; Natal cleft.

## Introduction

Pilonidal means nest of hair and the term is derived from the Latin words for hair (*pilus*) and nest (*nidus*). This condition was first described by Herbert Mayo in 1833. Pilonidal sinus is a common condition usually observed in young adults. The estimated incidence rate is 26 per 100,000 people, affecting men twice as often as women [1]. There are several theories regarding its etiology and pathogenesis, and it is considered as an acquired lesion. Main predisposing factors are poor hygiene, excessive hairiness, and local trauma in the sacrococcygeal area, as well as the presence of a deep natal cleft. During walking, the shed of hair shafts are pushed into the skin abrasions in the gluteal sulcus. These hair shafts act as a foreign body and lead to the development of an acute or chronically infected site [2]. In obese patients intergluteal sulcus is wet and fragile, and this process is more pronounced [3].

An ideal operation should be simple, should not need prolonged hospital stay, should have low recurrence rate, and should be associated with minimal pain and wound care, and should decrease patient's time off work [4]. Various surgical techniques are:

- Excision with primary closure
- Wide excision with open packing
- Excision with marsupialization
- Excision with skin grafting
- Limberg flap method (excision with flap reconstruction)

Although these methods have been described for the treatment of pilonidal sinus, there is an ongoing debate regarding the best treatment method. The ideal treatment for pilonidal sinus should ensure low pain, short hospitalization period, low risk of complication, and rapid return to normal activities, and should have a low recurrence rate. Although wide excision and primary closure techniques have certain advantages, including shorter surgery time and shorter hospitalization time, flap methods are expected to have lower recurrence rates. The main problems associated with the conventional techniques are high infection and recurrence rates. However, procedures that flatten the intergluteal sulcus and bring the suture line aside the midline seem to be superior in terms of postoperative morbidity and recurrence rate [5].

The proposed study was conducted to compare the outcome and various operative and postoperative complications associated with pilonidal sinus managed with wide excision and Limberg flap repair.

## Methods

This study was conducted on 50 patients at Department of General Surgery, Government Medical College, Patiala, Punjab, India, during January 2014 to May 2015. The patients diagnosed with pilonidal sinus disease were divided into two groups of 25 patients each, based on simple randomization method. A comparative study was conducted to compare the outcomes of both the procedures. All procedures were performed by experienced surgeons. In both groups, postoperative complications such as seroma, infection, necrosis of tip of flap, gaping, recurrence, and hospital stay were compared. Informed consent, which was approved by the local ethics committee, was obtained from all patients included in the study. All patients were subjected to thorough history taking, clinical examination, and laboratory tests. ECG and chest radiography were advised when indicated. The patients were then randomized into two groups: group A consisting of patients managed with Limberg flap technique and group B consisting of those managed with wide excision. Inclusion and exclusion criteria were as follows:

### Inclusion Criteria:

1. All patients diagnosed with pilonidal sinus disease which were fit to undergo surgery.

### Exclusion Criteria:

1. Patients having severe comorbidities such as malignancy and diabetes mellitus
2. Patients having spinal deformities
3. Patients falling in the pediatric age group
4. Patients with recurrent and purulent discharging sinuses

### Preoperative Procedure

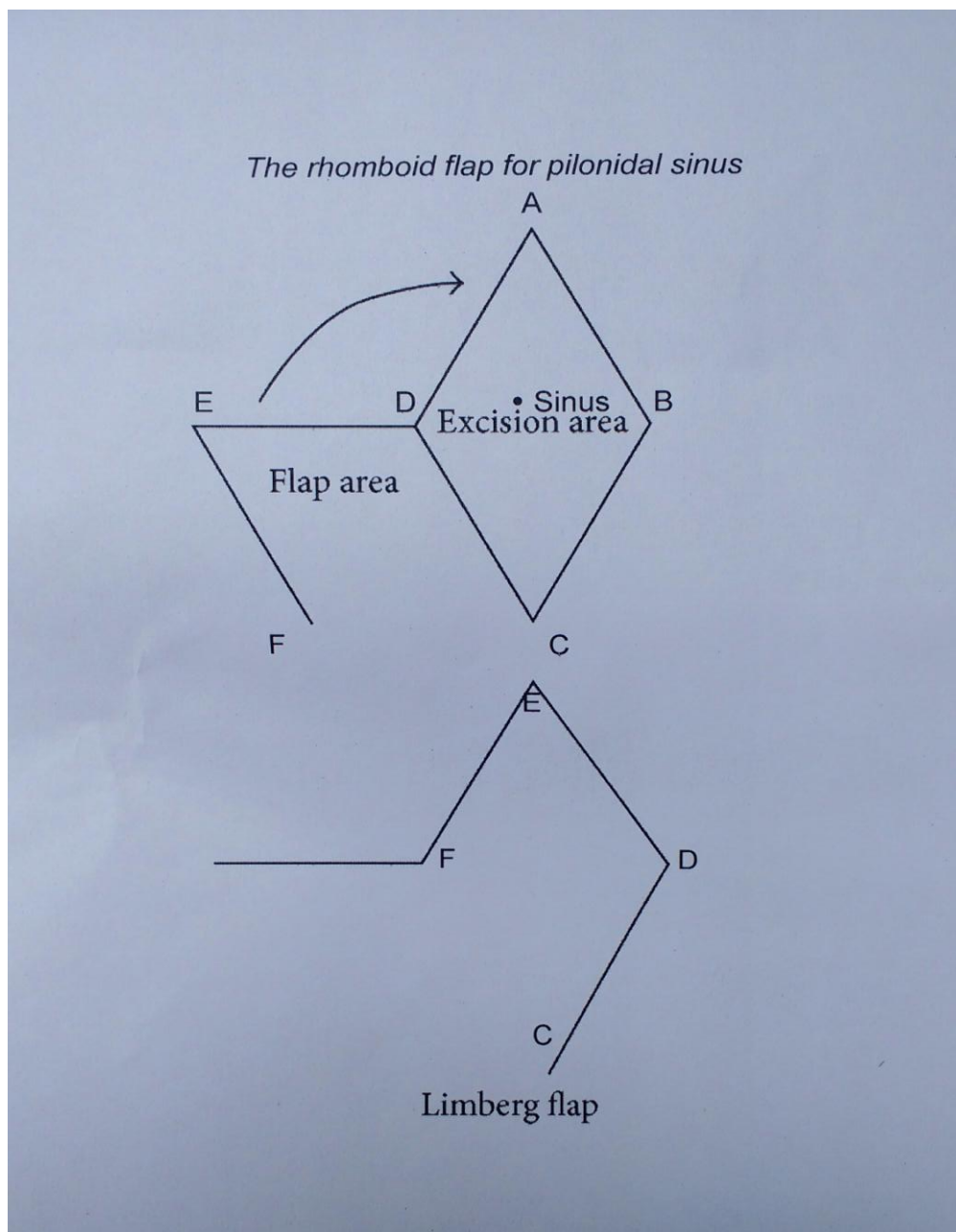
The patients were kept nil per orally and started on IV fluid. Preanesthetic medication was administered. The patients were admitted to the hospital on the day of operation. All patients were operated on under spinal anesthesia in prone Jack-knife position with two adhesive straps in each gluteal region to pull them laterally and the area was cleaned with povidone iodine. A prophylactic antibiotic in the form of a third-generation cephalosporin (ceftriaxone) was administered 30 min before the operation. The patients were shaved from gluteal skin areas to the lumbar region extending laterally to midaxillary line. Methylene blue was injected through the sinus into the cyst and thoroughly massaged to ensure the even distribution of the dye.

In group A, rhomboid areas to be excised and flap lines were marked. A rhomboid incision (with each side equal in length), including the sinus, was made down to the presacral fascia around the mouth of the sinus (Figure 1). A rhombic area of skin and subcutaneous fat was excised, which included both the midline pits and any lateral sinus extensions. First the line A–C was drawn and its length was measured. Point C would be adjacent to the perianal skin and point A was placed so that all diseased tissue was included in the extension. The line B–D transected the midpoint of A–C at right angle and 60% of its length. In this rhomboid-shaped incision angle at A and C was 60° and incisions at B and D were 120°. The flap was planned so that D–E was direct continuation of the line B–D and was of equal length to the incision B–A to which it would be sutured after rotation. E–F was parallel to D–C and was of

equal length. After rotation it was sutured to A–D. The incision was deepened and excised. The rhomboid flap was rotated from the gluteal fascia to the excised area and transposed without tension. Hemostasis was achieved by the use of electro cautery. The superior and inferior gluteal arteries are the main arteries nourishing the gluteus maximus muscle and the subcutaneous tissue of the transposed flap. The fourth lumbar artery and lateral sacral arteries subsidiarily nourish the region.

A suction drain was placed in the wound cavity through a separate stab incision. Subcutaneous tissue was approximated with interrupted polyglactin 2-0 suture. Skin was closed with interrupted nylon 2-0 suture. The patients were kept in prone position for 48 h. The antibiotic was IV administered for 48 h and then the patients were shifted to oral medication.

**Figure 1:** The rhomboid flap for pilonidal sinus



In group B, an elliptical incision was made on the skin using a scalpel and the cyst with overlying subcutaneous layer along with sinus tissues was excised down to the presacral fascia by an electro cautery. Complete hemostasis was achieved and the wound was closed with nylon 2-0 suture.

Postoperatively, the patients were advised to avoid prolonged sitting or exercise for 2 weeks. Hair removal by either shaving or hair removal cream was advised for at least 1 month. The patients were followed up in OPD monthly for 6 months followed by 3 monthly follow-ups for 1 year. Postoperatively, regular diet was allowed and the patients were encouraged to walk after 8 h but not to exercise until removal of stitches. Closed suction drains were removed when 24-h suction output was less than 30 ml. The patients were advised to shave the hair 3–4 cm from the surrounding edges of the wound and to keep the natal cleft free of hair for 3–6 months after healing.

## Results

Our study was carried out on 50 cases with natal cleft pilonidal sinus, who were admitted to our hospital.

The comparison was made between two groups in terms of operative time, drain duration, and incidence of postoperative complication such as seroma formation, infection, wound gapping, flap necrosis, hospital stay, and recurrence.

## Age Distribution

In this study, most of the patients were in the age group of 21–30 years in both groups. The mean age in the Limberg flap group was 28.24 years and that in the wide excision group was 28.12 years. The difference was not statistically significant.

**Table 1:** Distribution of Cases According to Age Group (Years) in Both Groups

Age group (years)	Groups		<i>t</i>	<i>p</i>
	Limberg flap	Wide excision		
Mean	28.24	28.12	0.051	0.960
SD	8.39	8.30		

**Table 2:** Comparison Table

Observation	Group A (LF)	Group B (WE)	<i>p</i> -Value
Operating time	60.80±9.41	49.20±10.37	<0.001
Drain duration	2.68±0.423	2.24±0.523	0.085
Seroma	10/25 (40%)	6/25 (24%)	0.225
Infection	6/25 (24%)	11/25 (44%)	0.136
Wound gapping	1/25 (4%)	6/25 (24%)	0.042
Hospital stay	3.52±0.91	3.28±0.79	0.34
Recurrence	0/25 (0%)	4/25 (16%)	0.037

Duration of surgery was defined as time interval between the first incision made and the last stitch. The mean duration of surgery in the Limberg flap group was 60.80±9.41 min and in the wide excision group it was 49.20±10.37 min, and the difference was statistically significant.

In our study, drain removal was performed when there was less than 30 ml serous collection in the vacuum suction drain in 24 h. In most of the patients drain was

removed on the second postoperative day. The mean duration in the Limberg flap group was 2.68 days whereas that in the wide excision group was 2.24 days. The difference was statistically insignificant.

Of the 25 patients in the Limberg flap group, 10 had seroma formation whereas in the wide excision group 6 patients had seroma formation. The difference was statistically insignificant. Higher tissue manipulation led to greater seroma formation in the Limberg flap group.

Infection at stitches site was present in only six patients belonging to the Limberg flap group. In the wide excision group, 11 patients had infection at stitches site. The difference was statistically insignificant. Wound gapping was present in only one patient in the Limberg flap group whereas it was present in six patients in the wide excision group. The difference was statistically significant ( $p < 0.05$ ). Mean hospital stay in the Limberg flap group was  $3.52 \pm .91$  days and that in the wide excision group was  $3.28 \pm .79$  days. The difference was statistically insignificant.

After a monthly follow up of 6 months and then 3 months follow up for 1 year no recurrence was reported in patients in the Limberg flap group whereas in the wide excision group four patients had recurrence. The difference was statistically significant ( $p < 0.05$ ).

## Discussion

A full basket of techniques ranging from simple curette to extensive flap techniques have been published so far. Conceptually, an ideal procedure, in addition to eradicating the disease, should also eliminate the natal cleft so as to take off the anatomical predisposition for the recurrence of the sinus. However, none of the techniques have been established to be superior over others in all aspects.

Pilonidal sinus occurs most commonly after puberty mostly in the second and third decade of life. In our study, majority of patients were in 20- to 30-year age group. The mean age in the Limberg flap group was 28.24 years and that in the wide excision group was 28.12 years. The mean age was found to be 28.18, which was in concordance with that reported in some earlier studies. Akca et al. and also reported the disease to be common in the third decade of life [6].

Pilonidal sinus is 10 times more common in men than women due to their more hirsute nature. In our study, most of the patients were male. In the wide excision group 24 patients were male and 1 patient was female.

Similar results were obtained by Sondenaa et al. [1], who studied 322 patients with pilonidal disease prospectively and calculated that incidence is 10 times more common in men than in women.

In our study, 40 of 50 patients had a sedentary occupation. Operative time is a major parameter in deciding the superiority of a procedure over the other. The operative time was taken as time interval between the first incision and placement of the last suture. In case of Limberg flap, it includes both excision and flap reconstruction whereas in case of wide excision there is excision only, so the expected time interval is always more in Limberg flap than wide excision method. In our study, the mean duration of surgery in the Limberg flap group was 60.80 min and that in the wide excision group was 49.20 min. Our study documented

a statistically significant difference between operative time periods for the two procedures.

In our study, we observed that the drain duration was longer in the Limberg flap group than in the wide excision group. Most probably it was a result of more tissue handling in Limberg flap method than in wide excision method. In few patients, there was accidental drain removal on the first postoperative day that resulted in seroma formation.

A seroma is a collection of fluid that builds up under the surface of skin. The cause of seroma formation is tissue disruption or tissue removal. To prevent seroma formation, we placed a vacuum suction tube drain in all patients. A clear discharge from wound indicates seroma. Such differential tendencies for the two procedures are accounted by more tissue handling in the Limberg flap procedure, which leads to more seroma formation. Seroma was drained externally to prevent infection, abscess formation, delayed wound healing, wound dehiscence, and flap necrosis, which may lead to prolonged hospitalization. Of the 25 patients, 10 had seroma formation in Limberg flap whereas in case of wide excision only 6 patients had seroma formation at the wound site. In spite of regular antiseptic dressing, of these 10 patients in the Limberg flap group 5 patients had wound infection that increased the hospitalization stay of these patients. One patient had wound gapping, which was managed by secondary suturing. In the wide excision group six patients had seroma formation, which led to wound infection and later four patients had wound gapping, which was managed by secondary suturing.

Accidental drain removal on the first postoperative day was noticed in one patient in the wide excision group, which also contributed to seroma formation. Similar results were obtained by Akin et al. [7] in 411 patients with pilonidal sinus managed with Limberg flap method and they reported seroma formation in 2.1% patients. Thus it is concluded that seroma formation is more common in Limberg flap method due to more tissue handling than in wide excision, but its incidence can be decreased by keeping the tube drain patent till drain volume reaches less than 30 ml.

All patients included in this study got similar antibiotic coverage. IV antibiotic was administered during the first 48 h then switched off to oral antibiotic coverage. Some patients had seroma collection that becomes infected whereas a few got infection due to poor local hygiene. Most of the patients had wound infection on the fourth or fifth postoperative day.

A thorough look at the immediate postoperative complication profile of the two procedures lead to the conclusion that wound collections (seroma) tend to occur with Limberg flaps whereas suppurative wound infections tend to occur more with wide excision procedure. Such differential tendencies for the two procedures are accounted by the extensive dissection for the flap procedure and strained wound at the basin of natal cleft for the wide excision

In keeping with the published literature, our study observed wound infections rate of 26.7% and 10% in the wide excision and Limberg flap groups, respectively. Local hygiene is very important to prevent wound infection. Most of the infections were reported after 2–3 days of discharge from the hospital. Patients having daily antiseptic dressing presented with less wound infection. Those patients who were not having daily antiseptic dressing presented with local wound infection. Two factors were responsible for wound gapping: suppurative wound infection and tension at the suture line.

Tension at the suture line was observed in case of the wide excision group whereas in case of the Limberg flap group, suppurative wound infection was the major cause of wound gapping. In case of Limberg flap method suture line is not under tension due to transposition of flap.

Our study reported wound gapping in 24% and 4% patients in the wide excision and Limberg flap group, respectively. This difference was statistically significant ( $p < 0.05$ ).

Flap necrosis was not reported in any case of Limberg flap method. Flap necrosis can occur due to either ischemia/pressure necrosis or tension at the suture line. All patients were advised to lie in prone position for 48 h after surgery to prevent ischemia and pressure necrosis.

Our study reported longer hospital stay with Limberg flap method. Drain duration directly coincided with hospital stay as all patients in our study were discharged after the drain removal. Drain duration was reported longer for Limberg flap method, which contributed to longer hospital stay. In contrary, most of the study had documented a shorter hospital stay for Limberg flap method

than for wide excision. In this study, we observed a total hospital stay of  $3.52 \pm 0.91$  and  $3.58 \pm 0.79$  days for the Limberg flap and wide excision groups, respectively

Mahdy [8] reported a mean hospital stay of 2.9 days in Limberg flap group and 4.8 days in wide excision group. Similar results were reported by Mentés et al. [9], who reported a mean hospital stay of  $4.51 \pm 2.85$  days in patients managed by Limberg flap method. In both the groups all patients were followed up for 12 months.

No recurrence was reported in the Limberg flap group whereas 16% recurrence rate was reported in the wide excision group, and the difference was found to be statistically significant ( $p < 0.05$ ).

Literature has shown a recurrence rate of 0%–3% [10] for Limberg flap against a significantly high recurrence of 7%–42% [11] for wide excision group. These results are probably because Limberg flap removes not only primary sinus but also the predisposing factor for recurrent pilonidal sinus formation. Flattening of natal cleft is achieved after Limberg flap method that reduces the chances of hair accumulation, mechanical irritation, and risk of recurrence.

In conclusion, as per the results of this study, Limberg flap method has better outcomes compared with wide excision method. Therefore, we recommend Limberg flap for treatment of pilonidal sinus disease.

Despite of longer operative time and demanding surgical skills, rhomboid excision with Limberg flap is a preferred treatment for pilonidal sinus disease due to its low rates of recurrence and comparatively few complications. Limberg flap method provides an effective procedure for the treatment of pilonidal sinus disease.

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