

# Limberg Flap Reconstruction: An Effective Technique for Sacrococcygeal Pilonidal Sinus

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**Abstract:** ***Background:** Sacrococcygeal pilonidal sinus has prolonged morbidity and recurrence following surgery. For management of pilonidal sinus many conventional surgical procedures have been described and all have their merits and demerits. The present study aims to evaluate the efficacy and complications of Limberg flap reconstruction. **Methods:** 30 patients underwent Limberg flap reconstruction between January 2019 to september 2019 were evaluated for various parameters. **Results:** All patients successfully underwent surgery, with minimal postoperative pain, mean hospital stay for  $2.73 \pm 0.86$  days with early return to work. 2 patients developed seroma, 1 developed wound infection, no flap necrosis and recurrences was noted. All complications were managed conservatively. **Conclusions:** Limberg flap for reconstruction of the defect after excision of sacrococcygeal pilonidal sinus is an effective and reliable technique, easily performed with subjectively high patient satisfaction. It was associated with complete cure and low incidence of post-operative complications.*

**Keywords:** Limberg flap, Pilonidal sinus, rhombic shape excision

## 1. Introduction

Pilonidal disease was first described by Mayo in 1833 as a hair-containing cyst located just below the coccyx for which Hodge later coined the term "pilonidal" in 1880. Now pilonidal disease describes clinical presentations ranging from asymptomatic hair-containing cysts and sinuses to large symptomatic abscesses of the sacrococcygeal region that tend to recur [1-3].

Pilonidal sinus is common disease of skin and subcutaneous tissue most commonly found at or near the upper part of natal cleft of buttocks in young hirsute men and can also affect other areas of the body such as umbilicus and inter digital spaces.

It is an acquired condition with high morbidity and patient discomfort. The estimated incidence is 26 per 1, 00,000 population with mean age at presentation 19 and 21 years for males and females respectively. [4,5] Men are affected two to four times more often than women, rare both before puberty and after the age of 40 years.[6] It generally presents as a cyst, abscess or sinus tracts with or without discharge.[7]

Initially it was thought to be congenital in origin and was suggested that it was secondary to a remnant of an epithelial lined tract from post coccygeal epidermal cell rests or vestigial scent cells. Now it is considered to be acquired [8] supported by the fact that they recur even after extensive surgical resection.

The typical risk factors include obesity, local trauma, prolonged sitting, deep natal cleft with increased hair density in the cleft region, family history and characteristics of the hair.[9]

The presence of hair in the gluteal cleft with inflammation contribute to the pathogenesis of this disease.[10-12] A deep

natal cleft is a favourable environment for sweating, maceration, bacterial contamination and penetration of hairs. The natal cleft stretches on sitting or bending, damaging or breaking hair follicles and opening a pore which collect debris and serve as a fertile environment for hairs shed from the head, back, or buttocks to lodge and become embedded. As the skin is drawn taut over the natal cleft, negative pressure is created drawing hairs deeper into the pore. The friction causes the hairs to form a sinus, which when infected presents as an acute subcutaneous abscess and may rupture spontaneously, discharging its contents through the skin. A retained hair or infected residue may cause a recurring or chronic infection.

The diagnosis is mainly clinical as a tender mass or sinus draining mucoid, purulent, and/or bloody fluid. Patients who have never experienced an acute flare do not require surgery. An acute pilonidal abscess is managed with incision and drainage at the time of presentation following healing of which, patients should begin regular gluteal cleft shaving or another method of epilation.[13,14]

Chronic pilonidal disease requires surgical excision with the mainstay of management being destruction of all sinus tracts and skin pores. Some surgeons prefer to excise pilonidal sinus tracts down to the level of the sacrococcygeal fascia, while others only unroof and debride.

A primary closure is associated with faster wound healing and an early return to work, but a delayed closure is associated with a lower likelihood of disease recurrence. The choice should be individualised based on the extensiveness of the resection, presence/absence of infection, and surgeon experience/preference. Among the techniques of primary wound closure, Off-midline closures reduce complication rate, healing time, and recurrence rate compared with midline closure. The other option is flap based reconstruction which allows for excision of greater amounts of involved tissue, are associated with a decrease in tension in the healing wound and facilitate wound closure lateral to

the natal cleft. These techniques also eradicate the aetiology of the disease by flattening the inter gluteal sulcus with much less hairy fasciocutaneous flaps and less perspiration. [15]

Among them, the most commonly used is the rhomboid excision with the Limberg flap. With this technique of flattening the natal cleft, a tension-free repair is made using a wide, well-vascularized flap. It is reported as one of the best treatment methods, with a 0-16 % of surgical area-related complication and a recurrence rate of 0-5 % . [16]

This article evaluates the use of Limberg flap, which is based on the superior gluteal and sacral perforators for reconstruction of the sacrococcygeal region after excision of pilonidal sinus.

## 2. Methods

A prospective observational study was conducted on 30 patients with chronic pilonidal sinus admitted between January 2019 to September 2019 at SMS hospital Jaipur. All patients were subjected to complete history taking and routine clinical, local examination and laboratory investigations. Written consent was obtained from all patients after explaining the procedure and its complications. The patients having other local pathologies like eczema and fungal infections were excluded from the study. All the patients underwent Rhomboid excision with Limberg flap reconstruction as the surgical procedure. Data of the patients was collected via a performa and follow up was done at 2 week interval, then at 1 month and again at six months. All the patients were evaluated for flap healing, seroma formation, oedema, flap necrosis, surgical site infection, pain and length of hospital stay. The main outcome of this study was to evaluate the surgical procedure with respect to the surgical area related complications and recurrence rates.

## 3. Surgical Procedure

The natal cleft was shaved preoperatively using clippers. Ceftriaxone 1 gram administered intravenously prophylactically before placing incision. All surgeries were performed under spinal anaesthesia. Patients were placed in prone position and the buttocks strapped apart by adhesive tapes.

Using a sterile skin-marking pen a rhomboid area of skin was marked over pilonidal sinus involving all midline pits and lateral extension if any. The flap design was mapped on the skin and placed such that all diseased tissues can be included in the excision. The long axis of the rhomboid in midline was marked as A-C, C being adjacent to perianal skin line, B-D transected the midpoint of A-C at right angles and is 60 % of its length. D-E was a direct continuation of the line B-D and was of equal length to the incision B-A, to which it was sutured after rotation. E-F was parallel to D- C and of equal length. After rotation, it was sutured to A-D.[17]



Figure 1: Marking with letters

A rhombic-shaped excision of the sinus-bearing skin and subcutaneous tissue up to the pre-sacral fascia was done by electrocautery followed by elevation of the Limberg flap, the level of dissection of which was pre muscular fascia, which was fully mobilized on its inferior edge and transposed medially to fill the defect.



Figure 2: Excision of pilonidal sinus complex till deep fascia

Haemostasis was achieved and the adhesive tapes which retracted the buttocks were released before suturing of the flap to prevent any tension. The defect created at the flap site was closed in linear fashion. Interrupted Vicryl 2-0 sutures were placed to include fascia and fat after placing a vacuum suction drain above the pre-sacral fascia followed by skin closure with ethilon 2-0 sutures.



Figure 3: Raising of inferior Limberg flap

Antibiotics were given for 3 days initially intravenously, then orally, suction drain was removed after 7 days and sutures removed around 14th day. The patient was advised not to put pressure on the flap for 2 weeks.



Figure 4: Rotation flap over defect



Figure 5: After fascia and fat suturing



Figure 6: Final outcome after suturing

#### 4. Results

A total of 30 patients came with pilonidal sinus, from January 2019 to september 2019, underwent Limberg flap

surgery under spinal anaesthesia. The mean operative time was  $48.80 \pm 8.10$  mins.

All the patients were male. The mean age of patients in the study was  $23.96 \pm 3.06$  years. 5 patients [16.67%] had previous history of abscess drainage due to infected pilonidal sinus.

All patients were followed up initially at 2 weeks interval, then at 1 month and again at six months.

Complication	Number	Percentage
Seroma	2	6.67%
Wound infection	1	3.33%
Flap necrosis	0	0

Three patients [12.5%] developed complications out of which two [6.67%] had seroma formation, 1 [3.33%] had superficial surgical site infection and none of them presented with flap necrosis.

It took nearly 1 week for seroma to resolve and two weeks for the surgical site infection to subside. The pain score range was in the range of 2-7 with a mean score of  $4.06 \pm 1.17$ . The average length of stay in hospital was  $2.73 \pm 0.86$  days. All other patients wound healed primarily with minimal scarring and less postoperative pain, with no recurrence till now. None of the patients needed readmission due to any cause pertaining to the pilonidal sinus. The mean time to return to work was  $20.16 \pm 3.18$  days.

#### 5. Discussion

Sacroccygeal pilonidal sinus diseases have prolonged morbidity and recurrence. The treatment of pilonidal sinus directed towards low pain, short hospitalization period, low risk of complications, rapid return to normal activities, better cosmesis, and a low recurrence rate.

To avoid recurrence the midline natal cleft should be avoided for suture placement. as it is To minimise the recurrence and wound related complications natal cleft should be flattened and closure should be off midline. As suture line on intergluteal sulcus and flap with midline lower edge increases recurrence rates, wound dehiscence and wound infection rates. [18-20]

Advantages with limberg flap reconstruction are as it is easy to perform, flattens natal cleft and sutured without tension. So this in turn maintains good hygiene, reducing the friction, preventing maceration, and avoiding scar in the midline. This flap procedure is found better than simple excision and closure, marsupialization, other flap procedures such as Bescom and Karydakis.[21-24]

Katsoulis had a study on 25 patients, with 16 of them having complications with no any recurrences. Aslam studied on 110 patients, out of which 5 having complications with 1 recurrence [18, 25, 26]

Several series with the rhomboid or rhombic flap technique, including more than 50 cases, have reported recurrence rates of 1% to 7%. [27]

In our series total of 30 patients studied among which 3 patients had complications like seroma formation [2], wound infection [1] with none of them had a flap necrosis. Complications were managed subsequently. The mean pain score was  $4.06 \pm 1.17$  with fewer needs of additional analgesics apart from the standard protocol. None of the patients reported recurrence.

Iesalnieks compared long term results after excision of pilonidal sinus and primary midline closure with the open surgical procedure in 73 patients.[28] Study show high recurrence rate [42%] after excision of pilonidal sinus and primary midline closure. Compared to our study with no recurrence.

El-Khatiband Al-Basti reported a series of 8 cases of pilonidal sinus reconstructed by bilobed perforator-based flap, the mean operative time was 90 minutes so it is time consuming with a long scar [29] We performed inferiorly based flap, the mean operative time was  $48.80 \pm 8.10$  min with complete cure of the disease and very low incidence of post-operative complications when compared with the previous studies.

## 6. Conclusion

Limberg flap for reconstruction of the defect after excision of recurrent sacrococcygeal pilonidal sinus is an effective and reliable technique, easily performed, subjectively high patient satisfaction, associated with complete cure and low incidence of post-operative complications.

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