Limberg's (Rhomboid) Flap: Design, Efficacy and Complication for Treating Sacrococcygeal Pilonidal Sinus

Chinky Garg[1*], Gv Sathya Narayanan[2]
[1]Senior Resident, Department of General Surgery, Gajra Raja Medical College, Gwalior, M.P, India.
[2]Senior Resident, Department of General Surgery, Gajra Raja Medical College, Gwalior, M.P, India.

ABSTRACT

Introduction: Pilonidal sinus disease is a common condition usually seen in young adults. Aetiology is uncertain but relates to the implantation of loose hair into the depth of the natal crease. This study was carried out to evaluate the advantages of primary excision and Limberg flap reconstruction in the management of pilonidal sinus disease.

Material and Methods: This prospective study was conducted in a surgical unit from 2021 December- 2023 May. 15 patients were selected after applying inclusion and exclusion criteria and operated by Limberg's flap technique.

Results: In this study total of 15 patients were taken. Only one patient developed an infection and two patients developed seroma which was managed conservatively and did not require operative intervention. Other patient's wounds healed with no minimal scarring and recurrence till now

Conclusion: Limberg's flap is very effective for pilonidal disease with low complication rates, short hospital stay, low recurrence rates, and earlier healing.

Keywords: Limberg's Flap, Natal Cleft, Reconstruction, Sacrococcygeal Pilonidal Sinus Disease.

Address of Corresponding Author
Chinky Garg; Department of General Surgery, Gajra Raja Medical College, Gwalior, M.P, India.
E-mail: garg.chinky222@gmail.com
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Introduction

Sacrococcygeal pilonidal sinus is a common disease of hirsute men usually found in the midline of the sacrococcygeal region results in high morbidity and patient discomfort.

The term pilonidal sinus is taken from Latin meaning "nest of hairs." The estimated incidence is 26 per 1,00,000 people.[1,2] It generally presents as a cyst, abscess, or sinus tract with or without discharge.[3] Men are affected more often than women[1], rare both before puberty and after the age of 40 years.[4] Rarely may it present in the fourth decade.[4]

The commonest form is an acute abscess characterized by the presence of a midline pit in the natal cleft typically identified 4 to 8 cm away from the anus with the smooth overlying skin giving the opening a smooth edge.[4] This primary tract leads into a subcutaneous cavity, which contains granulation tissue and usually a nest of hair that is present in two-thirds of cases in men and in one-third of those in women and may be found projecting from the skin opening.[5]

Initially, the congenital origin was suggested that it was secondary to a remnant of an epithelial lined tract from post coccygeal cell rests or vestigial scent cells. Now the view is widely shifted toward acquired theory.[3] and is based on the observations that congenital tracts do not contain hair and are lined by cuboidal epithelium. Deep natal cleft also provides a favourable environment for sweating and bacterial contamination. Other factors are obesity, family history, irritation or local trauma, a sedentary lifestyle, and excessive hairiness. This is due to the

penetration of shed hair shafts through the skin and leads to an acute or chronically infected site.

This is not a serious condition, but if not treated, it can become a chronic disease which is more complex and characterized by chronic or recurrent abscesses with extensive, branching sinus tracts.[6]

Clipping of hairs with good hygiene of the area, and wide excision of the area as management are not widely accepted.[5] Excision and primary closure, excision and packing, flap techniques, and marsupialization are the procedures that have been suggested for the treatment.[6] After using various defined conservative and surgical techniques, recurrence rates remain high.[7] Reason for recurrence such as leaving behind some tract, midline suture causing minor trauma with repeated infection accumulation of perspiration and friction with the tendency of the hair getting incorporated into the wound.[8]

Limberg rhomboid flap for sacrococcygeal pilonidal sinus was designed by Limberg in 1946[10], who described a technique for closing a 60° rhombus-shaped defect with a transposition flap. This flap was easy to perform, with sutures away from the midline giving rise to a tensionless flap of unscarred skin in the midline, which helps in good hygiene maintenance, reducing sweating maceration, erosions, and scar formation.

Among different procedures, flap reconstruction techniques eradicate the aetiology of the disease as it flattens the intergluteal sulcus with much less hairy fasciocutaneous flaps and less perspiration.[9] Rhomboid excision with Limberg flap is most commonly used and is reported as one of the best treatment methods, with 0-16% of surgical area-related complications and a recurrence rate of 0-5%.[10]

The purpose of this study was to describe our results using Limberg transposition flap reconstruction for sacrococcygeal pilonidal sinus disease.

Material and Methods

This study involves 15 patients, from December 2021 to May 2023. 13 were male patients, and the remaining were females with an average age of 24 years and a mean duration of symptoms was 1.6 years.

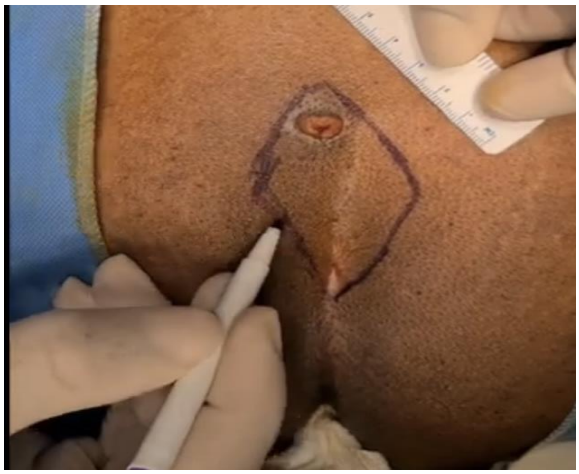
Preoperative Criteria

Informed consent was obtained from all patients to participate in this study and for the educational and academic use of any photographic images taken in the pre-, peri- or postoperative period. Patients who underwent Limberg transposition flap reconstruction for sacrococcygeal pilonidal sinus disease were included. Patients who underwent other surgical procedures for the treatment of sacrococcygeal pilonidal sinus disease were excluded. History of presenting complaints including the onset of symptoms, course of disease, and duration of symptoms. Routine clinical, local examination, and laboratory investigations.

Procedure of Surgery

The natal cleft was shaved the day before surgery. All the patients had been preoperatively assessed with Magnetic Resonance Imaging (MRI) for any foci of abscess. The standard protocol for surgery has been adhered and preoperative i.v. ceftriaxone 1 gm was administered. The patient was placed in a jack-knife position following spinal anaesthesia. The buttocks were retracted by adhesive tapes for exposure to the operative site. The surgical site was sterilised with 10% povidone-iodine.

By a marking pen, A rhombic area of skin is marked over the pilonidal sinus involving all midline pits and lateral extension if any. The long axis of the rhomboid in the midline is marked as A–C, C being adjacent to perianal skin, and A placed so that all diseased tissues can be included in the excision. The line B–D transects the midpoint of A–C at right angles and is 60 % of its length. D–E is a direct continuation of the line B–D and is of equal length to the incision B –A, to which it will be sutured after rotation. E–F is parallel to D–C and of equal length. After rotation, it will be sutured to A–D (Figure. 1 and 2].[11]



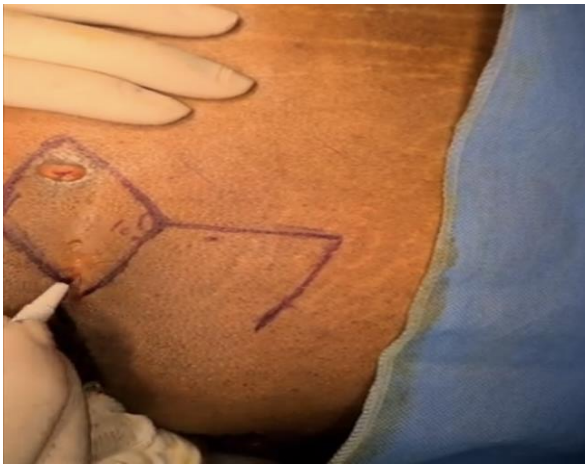
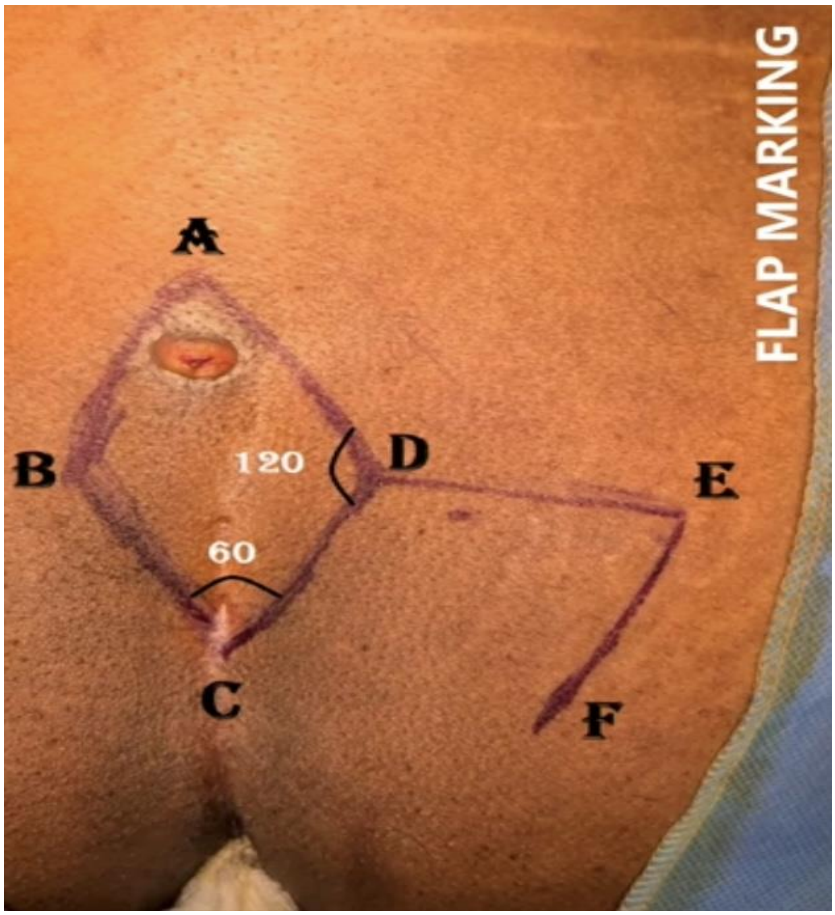


Figure 1 and 2: Preoperative images.

The skin and Subcutaneous fat to be removed is excised down to the deep fascia and a rhomboid area of a specimen including the pilonidal sinus and its all extension is removed (figure.3). Then the flap is raised so that it includes skin, Subcutaneous fat, and fascia overlying gluteal maximus, rotated to cover midline rhomboid defect. The defect thus then created can be closed in a linear fashion. A suction drain was placed in the wound cavity through a separate stab incision. Subcutaneous tissue was approximated with interrupted vicryl 2-0 suture. The flap of unscarred skin in the midline. The skin was closed with an interrupted suture. The drain was removed after 48–72 hours. Alternate sutures were removed around the 12th postoperative day (POD) during a follow-up visit. The patient was advised not to put pressure on the flap for 3 weeks.



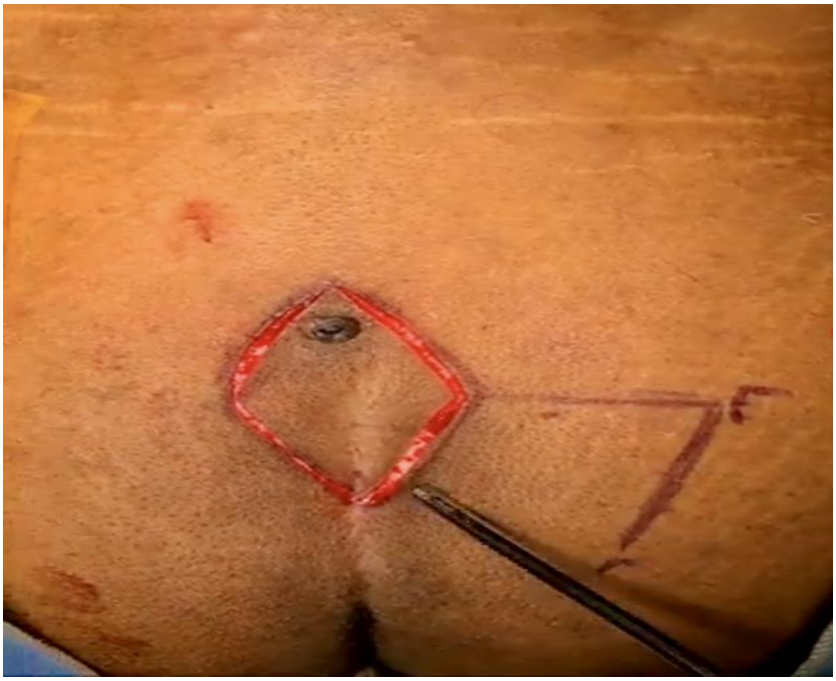
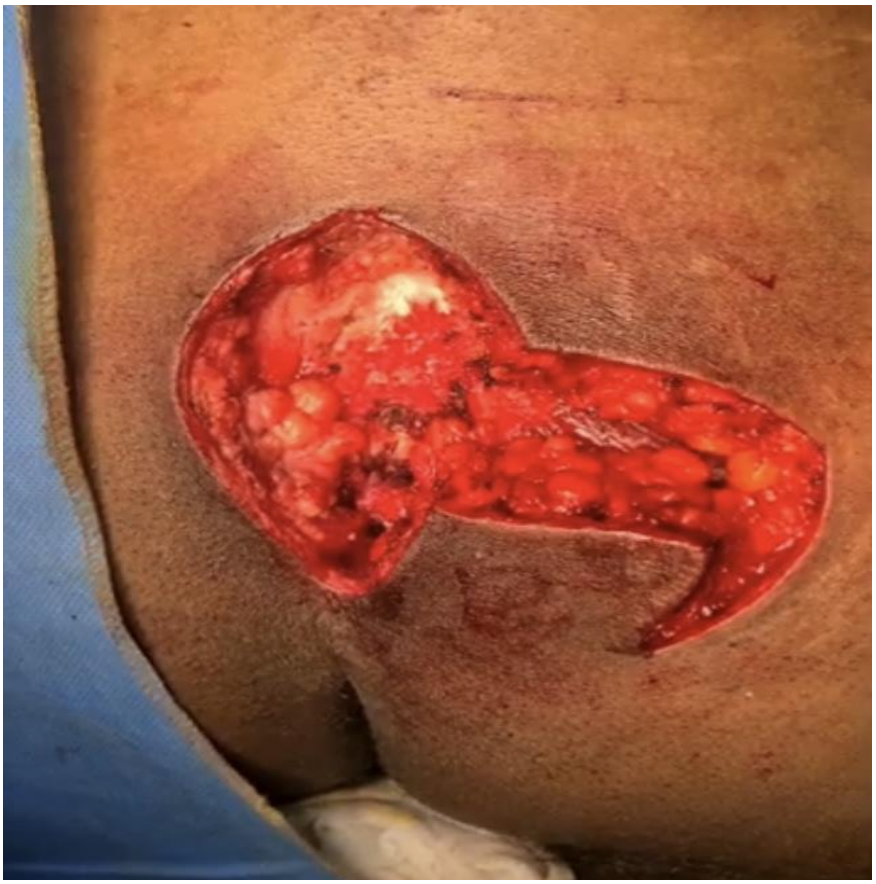
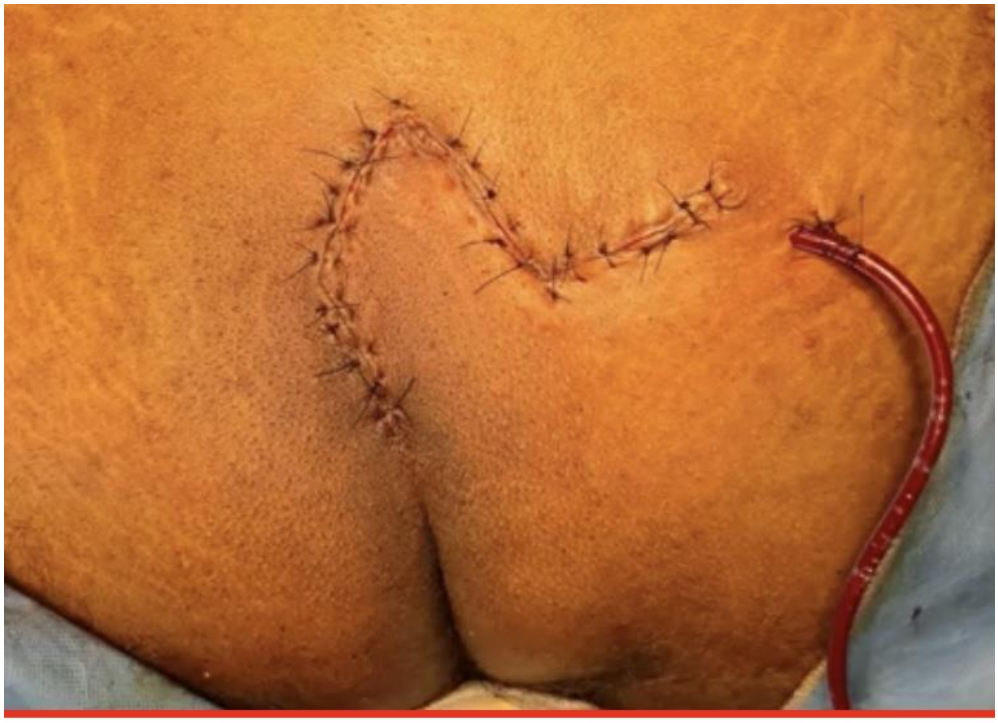


Figure 3 and 4: Design or Marking of limberg flap.





Appearance after reconstruction.

Results

In this study, a total of 15 patients were followed at 2 weeks, 1 month and 6 Follow up months. All the patients were evaluated for healing, seroma formation, pain, oedema, flap necrosis, surgical site infection, pain, and length of hospital stay. Only one patient developed an infection and two patients developed seroma which was managed conservatively by iv antibiotics and with local wound care and did not require operative intervention. The other patient's wound healed with no minimal scarring and recurrence till now.

Complication	Total
No. of patients	15
Seroma	2
Dehiscence	0
Necrosis	0
Persisting pain	1
Infection	1
Recurrence	0
Hematoma	0

Table 1: Complications and outcomes after Limberg flap reconstruction.

Characteristic	Total
No. of patients	15
Age (yr)	24.6
Male sex	80 (12)
BMI (kg/m^2)	27.6 ± 4.2
Drain time (day)	5.6 ± 3.2
Pain score	4.03
Duration of Hospital stay	7 days

Table 2: Demographic and clinical characteristics of patients having Limberg flap reconstruction.

According to demographic characteristics the mean age of presentation was 24 years and 80% were male with BMI 27 (kg/m2). The average duration of drain use before the removal was 5.2±3.1 days and the Pain score range was 2-8 with a mean score of 4.03. The average length of stay in the hospital was 7 days (range 2-14).

Discussion

The term pilonidal sinus was first given by Hodges. it is an epithelium-lined tract, situated a short distance behind the anus, and contains hairs and unhealthy granulation tissue Surgical treatment for pilonidal sinus is a matter of debate for years. Among the techniques for reconstruction after wide excision are the Karydakis flaps, the Limberg flap, the Bascom flap, and the V-Y advancement flap. Bascom cleft lip procedure is a simpler technique which includes only the excision of midline pits and avoiding removal of deep tissues.[10] A number of methods have been developed over the years, but none is proven satisfactorily optimum. Surgical management includes complete excision of all the tracts which is of utmost importance as far as the recurrence is concerned. Patient compliance,

duration of stay, recurrence rate, and early return to work makes the procedure ideal for the situation.

Recurrence is the main problem associated with all surgeries described which ranged from 21.4% to 100% for incision and drainage, 5.5%–33% for excision and open packing, 8% for marsupialization, and 3.3%–11% for Z plasty.[15] The early recurrence is thought to be due to failure to excise all sinuses and the late recurrence is considered to be due to secondary infection caused by incomplete excision and the residual hair in the natal cleft or failure to maintain the area hair free after surgery.[12] Among all the suggested procedures, the Flap techniques carry lower complication and recurrence rates.[13] With the Limberg flap technique, the internal flap cleft can be flattened and tissue can be approximated without tension. In a study done to observe outcomes of primary closure by Hussain MA and Malik NA, the seroma formation was observed to be 3.39% and hematoma formation was 1.69% where as it was 13.3 % and 0% respectively in our study. The recurrence rate observed after the follow-up of 6 months was 0 % in our study, as compared to 3.39% in the above-mentioned study.[13]

In a similar study by Jawade KK et al., the results are comparable in terms of minor wound infection, only one patient had reported out of 10 patients.[14] The healing period was 15 days which was also similar to the results achieved by Eryilmaz et al.[16] Sutures were removed on the 14th postoperative day and can resume work after 3 weeks.

Conclusion

Reconstruction of the defect with Limberg flap has proved to have many advantages as it is easy to perform and design, and it flattens the natal cleft with a large vascularized pedicle, sutured without tension. This flap procedure is found better than simple excision and closure, marsupialization, and other flap procedures. Other advantages are early return to daily life, quick healing, and short hospital stay.

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