

ORIGINAL ARTICLE

LIMBERG FLAP TECHNIQUE FOR PILONIDAL SINUS DISEASE TREATMENT: AN EXPERIENCE OF HAMDARD UNIVERSITY HOSPITAL

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Background: Pilonidal sinus disease (PNSD) is considered as the challenging disease for surgeons since decades. The term *pilo-nidal* is derived from Latin meaning “nest of hair”. It is a commonly occurring disease usually involved young male adults. It is considered as an acquired condition with unidentified aetiology and pathogenesis. The objective was to observe the results of Limberg’s flap operation in patients with Pilonidal sinus disease. **Methods:** We performed an observational study at Hamdard University Hospital from 1st January 2016 to 31st December 2019 on patients who came to the outpatient department for the treatment of pilonidal sinus diseases and underwent surgery (Limberg’s flap) after consent. The patient’s presentation varied from single sinus and dry, multiple sinuses and dry, single sinus with serous discharge, single sinus with pus discharge, and pilonidal abscess. Forty-six patients were selected after applying inclusion and exclusion criteria and operated by Limberg’s flap technique. **Result:** Results were observed for postoperative seroma, hematoma, wound infection, persistent pain, and recurrence. Out of 46 patients, 30 (65.21%) were male and 16 (34.7%) were female. 28 patients (60.8%) were between 31–40 years of age and 12 patients (26.08%) were between 41–50 years of age. After performing Limberg’s flap procedure, 35 patients (76%) had no complications at all. 2 patients (4.3%) had seroma formation. 4 patients had Hematoma formation (8.6%). Two patients (4.3%) patients developed superficial wound infection. 2 patients (4.3%) had persistent pain after 3 months of the procedure. One patient (2.1%) had recurrence during the follow-up period of 12 months. **Conclusion:** Limberg’s flap operation is associated with low recurrence as well as a low rate of other complications such as seroma or hematoma formation, wound infection, and persistent pain irrespective of the presentation of the pilonidal sinus.

Keywords: Pilonidal sinus disease; Limberg’s flap; Natal cleft; Recurrence

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INTRODUCTION

Pilonidal sinus disease (PNSD) is considered as the challenging disease for surgeons since decades.¹ The term *pilo-nidal* is derived from Latin meaning “nest of hair”.¹ It is a commonly occurring disease usually involved young male adults.² It is considered as an acquired condition with unidentified aetiology and pathogenesis.³ The sinus is formed mostly in a cleavage between the buttocks (natal cleft). The presentation varies from a cyst or an abscess, to sinus tracts with or without discharge (serous/purulent/pus). It tends to show either an acute, chronic, symptomatic or asymptomatic course. The most common presentation is an acute abscess which is few centimetres away from the anal verge, in the midline pit of a natal cleft with normal surrounding skin.⁴ The main or primary tract leads into a subcutaneous cavity containing nest of hair, surrounded by granulation tissue in two third of patients.⁵ If remains untreated or under treated, this condition may take the more complex chronic course with recurrent abscess and multiple extensive branching tracts.⁶ Secondary lateral openings are also common in midline pit.⁷ Squamous epithelium forms

the lining of outer skin opening and superficial part of the tract.⁷

The Pilonidal sinus disease causes hinders with normal daily activities of people due to its location and morbidity associated with it. The estimated incidence of PNSD is 26 per 100,000 populations.⁸ It is rarely found before puberty and after the age of 40 years.⁹ The common associations are obesity (37%), sedentary occupation (44%) and local irritation or trauma (34%).¹⁰

There is no consensus on the optimal management of the PNSD. Various management options are described but there is no agreement on the gold standard method as the recurrence rate remains high, which ranges from 20–40% as suggested by different studies regardless of the technique.¹¹ The management starts from clipping of body hair with maintenance of good hygiene. Surgical options include simple incision and drainage to a limited or wide local excision with packing and dressings and marsupialization for infected sinuses. In non-infected sinuses, simple primary closure or extensive reconstructive procedures that includes flap reconstruction to cover the defect and obliterate the

midline of natal cleft.¹² Variety of reconstructive procedures are practiced including midline, Z plasty, Karyadakis, Limberg flap, V-Y flap and Bascom's procedure etc. Each of these procedures have their own pros and cons, varying from length of the procedure, hospital stay, infection and recurrence.¹³ Multiple factors attributed to recurrence, such as leaving behind some tracts, sutures in midline, accumulation of sweat, and friction with potential of the hair being trapped into the wound.¹⁴

Limberg flap for Sacrococcygeal Pilonidal sinus was designed by Limberg in 1946, who described a technique for closing a 60° rhombus-shaped defect with a transposition flap.¹⁵ This procedure is easy to perform and gives a tensionless flap of unscarred skin in the midline that helps in maintenance of good hygiene, reducing maceration by sweat, superficial erosions, and extensive scar formation. Studies show that this type of reconstruction is a reliable method of closing the pilonidal sinus as compare to primary midline closure as it flattens the natal cleft and reduces the risk of recurrence.^{16,17}

Hence, we performed this study in our setup to observe the usefulness of Limberg flap procedure in patients with Sacrococcygeal pilonidal sinus. Patient compliance, complications, and long-term recurrence rate following the procedure were also recorded. The data was managed by prospectively managed database.

MATERIAL AND METHODS

This is a retrospective case series and has been carried out at Hamdard University Hospital Karachi from 1st January 2016 to 31st December 2019. Patients were selected by fulfilling the inclusion and exclusion criteria.

All those patients with primary Sacrococcygeal PNSD of either gender, general working age group of 18–60 years (PNSD is uncommon outside this range), controlled systemic disease and gave consent for the procedure.

Patients with recurrent PNSD, advanced systemic disease, malignancy, severely immunocompromised and those not willing for the Limberg flap procedure.

The patient's details entered and collected in the *proforma*. The results were analyzed at the completion of the study and compared with the literature.

Surgery was performed under spinal anaesthesia. Any discharge from the sinus or pus sent for culture and sensitivity. Patients were placed in a prone position with buttocks strapped for proper exposure [Figure-1]. After painting and draping, the area to be excised and flap lines were marked with permanent marker. The rhomboid incision (with each side equal in length) includes the sinus (all openings), was made down to the pre-sacral fascia. The flap was

constructed by extending the incision laterally on right side down to the fascia of the gluteus maximus muscle [Figure-2]. Haemostasis was secured. The flap was transposed to the rhomboid defect created by excision of the sinus. A suction drain was placed in the wound cavity through a separate stab incision. Subcutaneous tissue was approximated in layers with interrupted Vicryl 2-0 suture. The skin was closed with interrupted Prolene 2-0 suture [Figure-3]. Drain was removed after 72 hours. All sutures were removed on 20–25th postoperative day (POD). Postoperatively patients were advised to avoid prolonged sitting or exercise for two weeks. Hair removal was advised by using either hair removal cream or shaving the area for at least 1 month. All patients were followed up in outpatient department monthly for 12 months. Post operatively, the records were taken for the seroma, hematoma, infection, persistent pain, and recurrence.



Figure-1: Pre-sacral pilonidal sinus



Figure-2: Area marked for Rhomboid excision and Limberg flap



Figure-3: Reconstruction with Limberg Flap

RESULTS

Out of 46 patients, 30 (65.21%) were male and 16 (34.7%) were female. Twenty-eight patients (60.8%) were between 31–40 years of age and 12 patients (26.08%) were between 41–50 years of age [Table-3]. After performing Limberg flap procedure, 35 patients (76%) had no complications at all. Two patients (4.3%) had seroma formation. Four patients

had Hematoma formation (8.6%). Two patients (4.3%) patients developed superficial wound infection. Two patients (4.3%) had persistent pain after 3 months of procedure. One patient (2.1%) had recurrence during the follow-up period of 12 months.

Table-1: Complications

Complications	Frequency	Percent
Nil	35	76.08
Seroma	2	4.3
Hematoma	4	8.6
Wound infection	2	4.3
Persistent pain	2	4.3
Recurrence	1	2.1
TOTAL	46	100.0

Table-2: Clinical presentation

Sinus	Frequency	Percent
Single sinus and dry	18	39.1
Multiple sinuses and dry	8	17.3
Single sinus + Serous discharge	10	21.7
Single sinus + Pus discharge	6	13.04
Pilonidal abscess	4	8.6
Total	46	100.0

Table-3: Age range of the patients

Age range	Frequency	Percent
18–30	4	8.6
31–40	28	60.8
41–50	12	26.08
51–60	2	4.3
Total	46	100.0

Table-4: Complications in various patients according to preoperative status of pilonidal sinus

Complications	Sinus					Total
	Single and dry	Multiple and dry	Single + serous discharge	Single sinus + Pus discharge	Sinus + Abscess	
Nil	17	6	7	3	2	35 (76%)
Seroma	0	0	1	1	0	2 (4.3%)
Haematoma	0	1	1	1	1	4 (8.6%)
Wound infection	0	0	0	1	1	2 (4.3%)
Persistent pain	1	1	0	0	0	2 (4.3%)
Recurrence	0	0	1	0	0	1 (2.1%)
Total						46 (100.0%)

DISCUSSION

The selection of best surgical procedure for pilonidal sinus disease is still debatable. In all the procedures, the general principles and aim is to require total excision of the sinus along with all the tracts and early satisfactory healing with avoidance of recurrence⁸, which is the main problem associated with all surgeries ranging from 21.4–100% for incision and drainage, 5.5–33% for excision and opens packing, 8% for marsupialization, 3.3–11% for Z plasty.¹⁸ The early recurrence is mainly because of wound infection or dehiscence 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.¹⁹ Among all the suggested procedures,

the Flap techniques carry lower complication and recurrence rates.²⁰ Among all the flap procedures, the natal cleft can be flattened and tissues can be approximated without tension in the Limberg flap technique.

In a study by Hussain MA *et al*, to observe outcomes of primary closure, the seroma formation was observed as 3.39% and hematoma formation was 1.69% where as it was 4.3% and 8.6% respectively in our study [Table-1]. They quoted wound infection rate of 6.78% as compared to ours, which was 4.3% [Table-1, 4]. We used the method of simple dressing with Pyodene and oral antibiotics to treat wound infection without any adverse outcomes. The recurrence rate observed after the follow-up of 12 months was 2.1% in our study [Table-4], as compare

to 3.39% in above mentioned study.²⁰ Yoldas T *et al.* reported recurrence rate of 40% after lay open procedure.²¹ Afridi Z. *et al* observed the results after Bascom's repair for PNSD. They stated the seroma formation in 1.9% of cases and hematoma in 3.8%. They observed wound infection in 5.7%, persistent pain in 3.8% and recurrence in 1.9%.²²

There are studies that show the favourable results of Limberg flap in paediatric population also. A study published in Journal of Paediatric Surgery by Yildiz T *et al.*, on comparison of two procedures. Eight (20%) of the patients had undergone through Pilonidal sinus excision with primary repair and Thirty-two (80%) patients were operated by the Limberg flap technique. Complications observed in both of these procedures and noted as 87.5% of patients who underwent excision and primary repair and 15.6% in those with Limberg flap technique. Recurrence was observed with only the primary repair technique (37.5%).²³ Another study done by Aithal SK *et al.*, published in Indian Journal of surgery. Limberg flap procedure was performed on 30 patients under spinal anaesthesia. One patient had flap necrosis and the other had persistent serous discharge from the wound. The wound infection took around 3 weeks to heal completely with antibiotics and daily dressing. Flap oedema was observed in three patients, which took 10 days to get resolved. One had persistent discharge at the tip. All other patients wound healed satisfactorily with minimal scarring, with very less postoperative pain, with no recurrence so far. None required readmission and most patients returned to work after 3 weeks.⁹

A study done at Bangalore Medical College and Research Institute, India by CN Yogish *et al* also showed promising results. They performed Limberg flap procedure on 52 patients. Among them, 38 (73%) were males and 14 (27%) were female. The mean age in their study was 31.14 (26.9%) presented with recurrent sinus and 5 of them had previous surgery on more than one occasions. Fifty patients (96%) had complete healing without any complications. Two (4%) patients presented with minimal evulsion of flap corners. However, both healed completely with conservative treatment. The mean length of hospital stay was 2.45 days and most patients were back to work within 3 weeks.²⁴ Another study by Cagatay M.D. *et al*, was based on 147 male patients with PNSD. All patients were treated by Limberg flap under regional anaesthesia. Three patients (2%) had a seroma and six patients (4.1%) had partial wound detachment. Seven patients (4.8%) had a recurrence.¹⁶

The strength of our study was a variety of clinical presentation of PNSD [Table-2]. It helped us correlating the results with the initial presentation.

The weakness of our study was the limited number of patients and most of the patients were lost to follow-up after 12 months, so we couldn't record the long-term recurrence.

CONCLUSION

Thus, on the basis of our experience we concluded that reconstruction of the defect created by the excision of the Pilonidal sinus with Limberg flap has many benefits as it is comparatively simple design and easy procedure. It also flattens out the midline deep cleft with a vascularized flap, sutured without tension. Hence, it reduces friction which in turns prevents skin maceration and establishes proper hygiene. The overall outcome in terms of cosmetics is far better than the healing by secondary intention. Also, the complications such as seroma, hematoma, wound infection, persistent pain and most importantly recurrence is low as compare to other methods.

AUTHORS' CONTRIBUTION

RZ: Literature search, conceptualization of the study, study design, data collection, data analysis. MAC: Data interpretation, proof reading and final changes.

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