

Outcome of Limberg Flap Reconstruction in the Management of Pilonidal Sinus Disease: A Retrospective Study

S PRADEEP¹, V KALAIVANI², K ANUPAMA PUJAR³, BHAVYADEEP KORRAPATI⁴

ABSTRACT

Introduction: Pilonidal Sinus Disease (PSD) is a tract or cavity commonly seen in the sacrococcygeal region, usually containing a tuft of hair. It is mostly observed in drivers who have excessive hair in the natal cleft region. Although several surgical procedures have been described for the management of PSD, none have been universally accepted as the gold standard. Limberg flap reconstruction, following wide excision, offers a tension-free repair using a well-vascularised flap. This technique flattens the natal cleft, avoiding a midline scar and reducing the chance of recurrence.

Aim: The aim of this study was to determine the outcomes of Limberg flap reconstruction in sacrococcygeal PSD.

Materials and Methods: A retrospective descriptive study was conducted in the Department of General Surgery at M S Ramaiah Medical College, Bangalore, Karnataka, India. The study duration was six years, from January 2011 to January 2017. The study included a total of 40 patients aged

between 15-70 years, with Tezel type III sacrococcygeal Pilonidal Disease (PND), who underwent the Limberg flap procedure. Data was collected and analysed from January to June 2021. Outcome measures such as duration of hospital stay, time required to return to work, and procedure-related complications associated with procedure were analysed and entered into an Excel sheet.

Results: The mean age of the study participants was 18.02±6.87 years. Out of the 40 patients, 4 (10%) developed complications. Superficial wound infection was observed in 1 (2.5%) patient, which healed within two weeks. Minimal flap necrosis was observed in 2 (5%) patients, who underwent debridement and dressings on an outpatient basis. The wounds healed within three to four weeks. Recurrence was reported in 1 (2.5%) patient. The mean time to return to work was 18.7±4.88 days.

Conclusion: Limberg flap reconstruction for sacrococcygeal PSD is a simple technique with a lower complication rate, faster return to normal activity, and a low recurrence rate.

Keywords: Limberg flap, Pilonidal sinus disease, Rhomboid flap, Rotational flap

INTRODUCTION

Pilonidal Sinus Disease (PSD) is a tract commonly observed in the sacrococcygeal region, typically containing a tuft of hair, and it is frequently seen in drivers. It is characterised by recurrent infection and chronic inflammation [1]. The term "Pilonidal sinus" originates from Latin, meaning a nest of hair [2,3], and the male-to-female ratio is 2:1 [4]. The incidence of PSD is reported to be 26 per 100,000 population [5]. Risk factors include poor hygiene, obesity, and unhealthy behaviours such as prolonged sitting, particularly in drivers who have hair in the natal cleft [1]. Mayo first described PSD as a congenital condition in 1833, but later Karydakos postulated that the etiology is attributed to a high quantity of hair, local trauma, and susceptibility to infection [2]. Pilonidal sinuses can also occur in other areas such as the axilla, suprapubic region, periumbilical zone, and interdigital cleft in the hands of barbers [4]. PSD can significantly impact daily activities and work ability due to recurrent infections and high recurrence rates, affecting the individual's Quality of Life (QoL). Treatment options range from wide excision or tract opening (20%-40%) to more complex procedures such as Z-plasty, Bascom, Karydakos, and Limberg Flap [2].

In 1946, Limberg introduced the Limberg flap procedure, which involves making a rhomboid-shaped incision encompassing all sinuses followed by excision. The defect is then reconstructed using a wide, well-vascularized rotational flap [6,7]. This technique helps flatten the natal cleft, preventing hair accumulation and avoiding a midline scar. The aim of the present study was to evaluate the outcomes of Limberg flap reconstruction in sacrococcygeal PSD.

MATERIALS AND METHODS

A retrospective descriptive study was conducted in the Department of General Surgery at M S Ramaiah Medical College, Bangalore, Karnataka, India. The study duration was six years, from January 2011 to January 2017. The study analysed the records of all patients with sacrococcygeal PND who underwent Limberg flap reconstruction. Approval for the study was obtained from the Institutional Ethics Committee (IEC) under the letter number (MSRMC/EC/AP-02/05-2020). Data were collected and analysed from January 2021 to June 2021.

Inclusion criteria: The study included patients with Tezel type III [8] sacrococcygeal pilonidal sinus who were treated with Limberg flap reconstruction and were between the ages of 15 and 70 years.

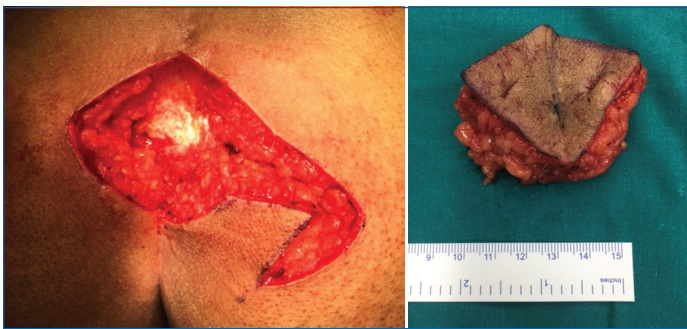
Exclusion criteria: Patients with sacrococcygeal pilonidal sinus presenting with abscess (Tezel type IV, V) were excluded from the study.

Study Procedure

Patients were identified using a computer-generated search through the medical records department. The medical records were reviewed for age, gender, presenting complaints, site of occurrence, single/multiple sinuses, and outcome measures such as duration of hospital stay, time required to return to work, and procedure-related complications, including recurrence. Patients underwent a wide rhomboid-shaped excision involving all sinuses [Table/Fig-1-4]. A rhomboid-shaped rotational flap was then created and sutured into the defect with a suction drain in-situ [Table/Fig-5]. The drain was removed between the 3rd and 7th postoperative day when the drain fluid was less than 10 mL. Sutures were removed between 10 and 15 days.



[Table/Fig-1]: Pilonidal sinus at intergluteal cleft. **[Table/Fig-2]:** Rhomboid incision with incision for flap. (Images from left to right)



[Table/Fig-3]: Excision of sinus track and creating rotational flap. **[Table/Fig-4]:** Excised specimen of pilonidal sinus. (Images from left to right)



[Table/Fig-5]: Reconstruction of defect with rotational flap.

STATISTICAL ANALYSIS

All variables relevant to the study were entered into an Excel spreadsheet. Descriptive statistics, including Mean±Standard Deviation (SD) for continuous variables and percentages/proportions for categorical variables, were calculated.

RESULTS

Data from a total of 62 patients were collected, but complete data was available for 40 patients who were included in the study. Among them, 31 (77.5%) were males and the remaining were females. The

age of the patients ranged from 19 to 55 years, with a mean age of 18.02 ± 6.87 years. All patients presented with single or multiple discharging sinuses in the sacrococcygeal region, and they were classified as type III PND according to the Tezel E classification [8]. Multiple sinuses were observed in six patients. The average length of hospital stay was 5.16 days.

Out of the 40 patients, 4 (10%) developed complications. Superficial wound infection was observed in 1 (2.5%) patient, which healed within two weeks. Minimal flap necrosis was seen in 2 (5%) patients, who required debridement and dressings on an outpatient basis. The wounds healed within three to four weeks. Recurrence was reported in 1 (2.5%) patient after one year. The mean time to return to work was 18.7 ± 4.88 days, ranging from 15 to 30 days.

DISCUSSION

Sacrococcygeal pilonidal sinus is an acquired condition typically observed in the midline of young hirsute men. The estimated incidence is 26 per 100,000 population [9,10]. Although sacrococcygeal pilonidal sinus is considered a benign disease, it is associated with morbidity and recurrence, significantly affecting the QoL. The most commonly affected age group is 16 to 26 years, with infection typically starting in early adulthood (18-40 years) [11]. Alvandipour M et al. and Bali I et al. reported a mean age of patients as 29 and 24 years, respectively [12,13]. In a study by Gurer A et al., 95% of patients were males [14]. In the present study, the mean age was 18.02 ± 6.87 years, and 31 (77.5%) patients were males.

In a study by Kumar S et al., the average hospital stay was five days [15], while in the study by Boshnaq S et al., it ranged from four to seven days [16]. In the present study, the average hospital stay was five days, which is consistent with the above studies. Ates et al. found that the Limberg flap was superior to the Karydakias flap in terms of hospital stay [17], but they did not find a statistically significant difference in return to normal activity time. However, in a study by Tokac M et al., there was no significant difference in hospital stay, but patients who underwent the Limberg flap procedure had a shorter return to work time compared to those who underwent the Karydakias flap [18]. In the present study, the mean time to return to work was 18.7 ± 4.88 days (range 15 to 30 days).

Complications following Limberg flap reconstruction were reported as 12.5% in a study by Singh PK et al., and 14.8% in a study by Alvandipour M et al., [3,12]. In the present study, complications occurred in 10% of patients. The distribution of complications and a comparison with other related studies are shown in [Table/Fig-6] [19-22].

Arslan K et al., found that patients undergoing Karydakias flap had significantly higher rates of seroma formation (19.8% vs 5.2%), wound dehiscence (15.4% vs 2.1%), and flap maceration (11.0% vs 1.0%) compared to patients undergoing Limberg flap reconstruction [23]. The author also noted that the appearance of seroma, hematoma, or wound infection in the early postoperative period increases the risk of recurrence. Aithal SK et al., reported that out of 30 patients, three developed complex wound infections,

Studies	Place and year of study	No. of patients	Complication rate (%)	Seroma (%)	Infection (%)	Flap necrosis (%)	Recurrence rate (%)
Majeed S [19]	SKIMS, Kashmir. November 2013-February 2015	25	16	4	4	4	4
Mentes BB et al., [20]	Gazi University Medical School, Ankara, Turkey	238	2	0	0.8	0	1.26
Urhan MK et al., [21]	Ankara Training and Research Hospital, Ankara, Turkey January 1992 to December 1998	102	7	3.06	1.02	2.06	4.9
Aslam MN et al., [22]	King Edward Medical University, Lahore, Pakistan	110	5	0	1.81	0.9	0.9
Current study	MS Ramaiah Medical College, Bangalore, Karnataka, India.	40	10	0	2.5	5	2.5

[Table/Fig-6]: Table comparing complication rate in different studies [19-22].

three experienced minor flap edema, and one had flap tip discharge. All of these complications healed over time [6].

One of the main challenges in treating sacrococcygeal pilonidal sinus is its tendency to recur, with recurrences often occurring within the first three years [18]. In the present study, recurrence was observed in one patient, one year after surgery, accounting for 2.5% of the patients, which is comparable to findings from other studies. Ertan T et al., reported a recurrence rate of 2% in the Limberg flap group compared to a recurrence rate of 12% in the primary closure group [24]. Studies have shown that the recurrence rate is low (0.5%-7%) with rhomboid excision and Limberg flap reconstruction [19,21,25,26]. Due to the low recurrence rate, Limberg flap reconstruction is widely accepted for recurrent and complicated pilonidal sinus [25]. Unalp et al. reported a statistically significantly higher rate of recurrence in the V-Y flap group [27]. Alvandipour M et al., reported a recurrence rate of zero in the Limberg flap group and 2.7% in the Karydakias flap group [12].

Limitation(s)

It was a retrospective study with a small sample size.

CONCLUSION(S)

Though there are various reconstruction techniques available for sacrococcygeal pilonidal sinus disease (PND) after wide excision, Limberg flap reconstruction is a simple technique that has a lower complication rate, faster return to normal activity, and a low recurrence rate. This makes it a better surgical option, as per the study.

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PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of General Surgery, M S Ramaiah Medical College, Bangalore, Karnataka, India.
2. Professor, Department of General Surgery, Sathagiri Institute of Medical Sciences, Bangalore, Karnataka, India.
3. Professor, Department of General Surgery, Sathagiri Institute of Medical Sciences, Bangalore, Karnataka, India.
4. Senior Resident, Department of General Surgery, SDUMC, Kolar, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

K Anupama Pujar,
No 1165, 4th Main, 5th Block, HBR Layout, Bangalore, Karnataka-560043, India.
E-mail: anupamapujar@rediffmail.com

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