

# Comparison of Primary Closure + Limberg Flap Combination with Primary Closure and Limberg Flap Alone in the Treatment of Pilonidal Sinus Disease: A Retrospective Study

Mümin Demir<sup>1</sup>(ID), Çağrı Akalın<sup>1</sup>(ID)

<sup>1</sup>Department of General Surgery, Ordu Training and Research Hospital, Ordu, Turkey

Received: 26 June 2022, Accepted: 11 September 2022, Published online: 30 November 2022  
© Ordu University Institute of Health Sciences, Turkey, 2022

## Abstract

**Objective:** There are no definite rules for the treatment of pilonidal sinus disease (PSD). The aim of this study was to compare the primary closure (PC)+ Limberg flap (LF) combination with PC and LF alone in the treatment of PSD.

**Methods:** Patients with PSD who underwent PC, LF and PC+ LF between 2013–2020 in Tokat State Hospital were included in the study. Age, gender, sinus classification, and recurrence were evaluated. PSD staging was performed according to the Tezel classification. Patients were divided into three groups as PC, LF and PC+LF according to type of operation.

**Results:** Ninety-four patients (mean age of  $26.5 \pm 6.9$  years) were included in the study. Group PC consisted of 17 male and 7 female patients with a mean age of 27.04 (18–44) years; group LF comprised 24 male and 12 female patients with a mean age of 27.39 (18–46) years and group PC+LF comprised 22 male and 12 female patients with a mean age of 25.26 (18–47) years. There were no significant differences between groups in terms of age and gender ( $p=0.36$ ,  $p=0.87$ , respectively). The mean operative time was significantly longer for the LF group than the PC+LF group ( $p<0.001$ ). Recurrence rate was 41.7% in the PC group, compared to 17.6% for the PC+LF group ( $p=0.04$ ). There were no significant differences between LF and PC+LF group regarding recurrence ( $p=0.43$ ).

**Conclusion:** The PC+LF combination provided less recurrence compared to PC and shorter operation duration compared to LF.

**Keywords:** Pilonidal sinus, primary closure, Limberg technique, recurrence, operation time

**Suggested Citation:** Demir M, Akalın C. Comparison of primary closure + Limberg flap combination with primary closure and Limberg flap alone in the treatment of pilonidal sinus disease: a retrospective study. Mid Blac Sea J Health Sci, 2022;8(4):563-569.

Copyright@Author(s) - Available online at <https://dergipark.org.tr/en/pub/mbsjohs>

The content of this journal is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.



## Address for correspondence/reprints:

**Name and Surname:** Mümin Demir  
**Telephone number:** + 90 (541) 948 79 33  
**E-mail:** Demir55aze@outlook.com

## INTRODUCTION

Pilonidal sinus disease (PSD) is a condition limiting daily activity, disrupting life comfort, and causing loss of labor. The disease is now believed to be multifactorial and related to the depth of the natal cleft, degree of hirsutism, family history, and obesity (1-3).

Though there are many conservative and surgical treatment methods defined for PSD treatment, the search for the ideal treatment continues in the present day with primary closure (PC) and Limberg flap (LF) performed for a long time. In addition to the advantage of short operative duration in PC, the excess recurrence probability compared to other surgical procedures is noteworthy. For LF operations, the opposite situation is present in terms of operative duration and recurrence (4). The short operative duration and low recurrence rate are desired for PSD surgery, while it is probable that the combination of these operations will provide the advantages of each operation type. In the literature, there are limited numbers of studies about the combination of these surgical procedures.

Considering the operation techniques of PC and LF, the combined form of these operations was performed. The aim of this study was to compare the PC + LF combination with PC and LF alone.

## METHODS

We retrospectively analyzed patients diagnosed with PSD who were operated on in

Tokat State Hospital between January 2013 and January 2020. Of these patients, the study included patients with PC, LF, and PC+LF operations. Patients with information that could not be reached and undergoing different surgical interventions were not included in the study. Patient information was obtained from hospital information systems and patient files. Patients were reached by telephone and patients with pain, swelling, or pilus in the operation field were called to the hospital.

The age, sex, sinus stage, and recurrence status of patients were recorded. PSD staging was performed according to the Tezel classification (5). Patients with PSD pilus in the operation field was accepted as recurrence. Patients were divided into three groups PC, LF, and PC+LF according to the operation type.

All operations were performed under anesthesia in the jack-knife position by a single surgeon. Patients had prophylactic antibiotic treatment (cefazolin 1 g) administered 30 minutes preoperatively. Patients were given analgesic treatment for pain control during the postoperative period (diclofenac sodium or paracetamol) and monitored in the general surgery clinic.

In the PC group, an elliptical incision was made around the sinuses/pits and further dissection is done by using cauterization till the whole tract was excised. Full through and through sutures were applied by using 1/0 monofilament polypropylene sutures. The

wound was closed in layers. The skin was closed in 2/0 monofilament polypropylene sutures.

In LF group, the tissue was totally excised down to presacral fascia with a rhomboid incision including all sinuses and pits. Following hemostasis, the flap from the right gluteal area was raised so that it included skin, subcutaneous tissue, and the fascia overlying the gluteus maximus, and rotated to cover the defect. Rhomboid was inserted into the defect so that the lower end did not remain in the intergluteal space. The flap was sutured to presacral fascia and subcutaneous skin with 1/0 polyglactin sutures. The skin was closed in 2/0 monofilament polypropylene sutures.

In the PC+LF group, elliptical incisions in the caudal region were made 2 cm lateral to include sinuses and pits in the intergluteal sulcus (including lateral tracts), while oblique incisions were used for primary excision in the cranial region. The subcutaneous tissue was closed with an interrupted layer of 3/0 polyglactin suture, and the skin was closed with 2/0 monofilament polypropylene sutures (Figure 1).

### *Statistical Analysis*

Data were analyzed using Statistical Package for Social Sciences (SPSS) Version 26 for Windows® (Chicago, IL, USA). Descriptive statistics for continuous variables are expressed as mean, median, standard deviation, minimum, and maximum values;

they are expressed as numbers and percentages for categoric variables. The data distribution was evaluated using the Kolmogorov-Smirnov test. Mann-Whitney U and Kruskal-Wallis tests were performed for continuous variables. The chi-square test was used to determine the relationship between categoric variables. P-value <0.05 was considered statistically significant.



**Figure 1.** Postoperative view of PC+LF operation

### **RESULTS**

Between 2013-2020, a total of 149 patients underwent PC, LF, and PC+LF. The information for 55 (36.9%) of these patients was not reached. Thus, a total of 94 patients (mean age  $26.5 \pm 6.9$  years) were included in the study. Group PC consisted of 17 male and 7 female patients with a mean age of 27.04 (18–44) years; group LF comprised 24 male and 12 female patients with a mean age of 27.39 (18–

46) years and group PC+LF comprised 22 male and 12 female patients with a mean age of 25.26 (18-47) years. There were no significant differences between groups in terms of age and gender ( $p>0.05$ ). The mean operative time was significantly longer for the LF group than the PC+LF group ( $p<0.001$ ). The recurrence rate was 41.7% in the PC group, compared to 17.6% for the PC+LF group ( $p=0.04$ ). There were no

significant differences between LF and PC+LF groups regarding recurrence ( $p=0.43$ ). Overall, the mean follow-up time was  $29.53 \pm 10.83$  months. In the PC group, the mean follow-up time was statistically longer than in the other groups ( $p < 0.001$ ). Demographic data and postoperative outcomes are summarized in Table 1.

**Table 1.** Demographic data and postoperative outcomes

	PC (n=24)	LF (n=36)	PC+LF (n=34)	p-value
<b>Age (year)</b>	27.04 ± 6.65	27.39 ± 7.27	25.26 ± 6.72	0.36
<b>Gender</b>				0.87
Male	17	24	22	
Female	7	12	12	
<b>Sinus classification</b>				0.003
Tezel I	-	-	-	
Tezel II	15	14	14	
Tezel III	8	8	16	
Tezel IV	-	11	2	
Tezel V	1	3	2	
<b>Operation time (min)</b>	28.63 ± 5.42	40.47 ± 6.34	36.24 ± 4.61	0.001
<b>Recurrence</b>	10	4	6	0.015
<b>Follow-up time (month)</b>	38.21 ± 12.44	28.72 ± 8.99	24.26 ± 7.28	<0.001

Values are presented as mean ± standard deviation. PC: Primary closure, LF: Limberg flap

## DISCUSSION

Recurrence in PSD is mostly due to skipping of any sinus tract during operation, or the formation of infection or abscess of the wound; this may cause the formation of a new sinus tract within the scar tissue (6). Moreover, this involves many complications such as chronic wounds and even squamous cell carcinoma within sinus tracts (7). Therefore, the recurrence rate has become an advanced parameter for evaluating the effect of surgery. For this reason, recurrence after PSD surgery is an unwanted situation. After PSD treatment, those with the lowest recurrence rate of less

than 6% had LF, Bascom Cleft Lift, and Karydakis flap surgery (8). The common feature of these surgical interventions is stated to be the removal of the natal cleft midline. Based on this thought, in our study we applied the combination of LF, removing the natal cleft midline, with PC surgery providing easy closure. This surgical procedure excised PSD with a primary incision performed to include fistulas progressing from the most distant pilus in the natal cleft or from the midline to lateral in addition to a rhomboid incision performed to include pilus or pits close to the anal region in the natal cleft. In this procedure, the LF in the

natal cleft is minimized as much as possible with minimal incision applied to perform primary excision of the remaining PSD tissue.

In the literature, there are many studies comparing PC and LF for PSD treatment. The study by Elshalzy et al. (9) identified mean operative durations were 40.6 and 55.2 minutes for PC and LF, respectively, with a statistical difference in terms of operative durations. Similarly, a study in 2018 by Kartal et al. found operative durations were 26.9 min for PC and 54.3 min for LF and there were statistical differences in terms of these durations (10). In these studies, LF had longer surgical duration compared to PC and the reason was stated to be due to differences in the surgical technique. In our study, the operative duration was 28.63 min for PC and 40.47 min for LF and there was a statistically significant difference between the two groups, similar to the earlier studies.

However, the operative duration for PC+LF was similar to PC and statistically shorter than LF. Unfortunately, we could not compare our results objectively as there was no study found with a similar method in the literature. In spite of this, in terms of both surgical technique and incision, PC+LF was more advantageous compared to LF and we think the operative duration was shortened due to this.

In our study, according to the Tezel classification, the rates in the PC, LF, and PC+LF groups were no Tezel I patients, 62.5%, 38.9% and 41.2% in Tezel II, 33.3%, 22.2%,

and 47.1% in Tezel III, 0%, 30.6%, and 5.9% in Tezel IV and 4.2%, 8.3% and 5.9% in Tezel V, respectively. There were significant differences in terms of distribution between the groups ( $p=0.003$ ). In the 2009 review by Tezel et al., they stated that no surgical procedure was required for patients in Tezel I (5). In our study, in accordance with the authors' recommendation, Tezel I cases were not operated.

Additionally, Lee et al. recommended PC for Tezel I-IV and flap reconstruction for Tezel V cases (11). In our study, in the name of preventing possible recurrence, PC was performed for only one patient in Tezel V, with flap reconstruction performed for the other 5 patients. Moreover, considering that sinus tracts extending laterally may be missed in PC, LF or PC+LF was performed instead of PC for sinus orifices extending toward the lateral (Tezel IV). For recurrence of PSD, clinical recurrence was not identified to be different between LF and PC+LF, though not statistically due to the low number of patients (11.1% and 17.6%, respectively). Moreover, the PC+LF recurrence rate was identified to be significantly low compared to PC, but similar to LF ( $p=0.04$ ,  $p=0.43$ , respectively).

A meta-analysis by Horwood et al. comparing PC and LF identified recurrence rates as 8.4% for PC and 0.79% for LF, with the clinical recurrence rate identified to be lower for LF (12). However, a study in 2013 by

Karaca et al. comparing PC and LF identified the recurrence rate as 9.2% for PC and 7.1% for LF, with no statistical difference identified between the two groups (13). In our study, the recurrence rates were 41.7% for PC, 11.1% for LF, and 17.6% for PC+LF. PC had a higher recurrence rate and longer follow-up duration compared to the other groups. A systematic review and meta-analysis by Stauffer et al. including more than 80,000 PSD cases concluded that the recurrence rate in PSD was largely linked to the follow-up duration and that PC was associated with the highest recurrence rate (14). For this reason, we think the longer follow-up duration for PC patients may have increased the recurrence rate. Unfortunately, if we consider the new operation technique we performed in recent years, the difference in terms of follow-up duration with other operations is unavoidable.

Our study has some disadvantages. The first is that the majority of patients could not be reached due to the retrospective design of our study and for this reason the population in the study groups is limited. Second, for the same reason, some parameters like postoperative pain, comfort, and duration to return to work could not be evaluated for patients. We could not measure the incision length due to the retrospective design of the study; in spite of this, theoretically, we think it was longer compared to PC and shorter compared to LF. For this reason, the shorter incision length may

have positively affected the postoperative pain, comfort, and return to work duration. We believe prospective-randomized studies including these parameters will contribute to the literature in a similar way to our study. Third, as patients were communicated with by telephone, only patients with a probability of recurrence were examined. For this reason, patients with recurrence but without complaints may have been missed. Additionally, as this surgical procedure we performed is a new procedure, standardization in terms of procedure was deficient. If we accept that surgical procedures develop as the years pass, we believe our procedures will develop in future years.

## CONCLUSION

According to the results of this study, the PC+LF surgical combination ensured less recurrence compared to PC and shorter operation time compared to LF.

---

**Ethics Committee Approval:** Ethical approval for this study was obtained from the Clinical Research Ethics Committee of Ordu University, Faculty of Medicine (Approval number: 12/150, Date: 17.06.2021).

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept and Design: MD, ÇA; Data Collection: MD, ÇA; Literature search: MD, ÇA; Analysis or Interpretation, Writing: MD, ÇA.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The author declared that this study hasn't received any financial support.

---

## REFERENCES

1. Khanna A, Rombeau JL. Pilonidal disease. Clin Colon Rectal Surg. 2011;24:46–53.

2. Akinci OF, Bozer M, Uzunköy A, Düzgün SA, Coskun A. Incidence and aetiological factors in pilonidal sinus among Turkish soldiers. *Eur J Surg.* 1999;165:339–42.
3. Ahmed, AK, McCallum I, King PM, Bruce J. Healing by Primary versus secondary intention after surgical treatment for Pilonidal sinus. *Cochrane Database Syst Rev.* 2010:CD006213.
4. Mahdy T. Surgical treatment of the pilonidal disease: primary closure or flap reconstruction after excision. *Dis Colon Rectum.* 2008;51(12):1816-22.
5. Tezel E, Bostancı H, Azılı C, Kurukahvecioglu O, Anadol Z. A New Perspective on Pilonidal Sinus Disease and Its Treatment. *Marmara Medical Journal.* 2015;22(1):85-89.
6. el-Khadrawy O, Hashish M, Ismail K, Shalaby H. Rhomboid flap outcome for recurrent pilonidal disease. *World J Surg.* 2009;33(5):1064–68.
7. Bi S, Sun K, Chen S, Gu J. Surgical procedures in the pilonidal sinus disease: a systematic review and network meta-analysis. *Sci Rep.* 2020;10(1):13720.
8. Vartanian E, Gould DJ, Lee SW, Patel KM. Pilonidal Disease: Classic and Contemporary Concepts for Surgical Management. *Ann Plast Surg.* 2018;81(6):e12-e19. doi:10.1097/SAP.0000000000001585.
9. Elshazly WG, Said K. Clinical trial comparing excision and primary closure with modified Limberg flap in the treatment of uncomplicated sacrococcygeal pilonidal disease. *Alexandria Journal of Medicine.* 2012;48(1):13-18.
10. Kartal A, Aydın HO, Oduncu M, Ferhatoglu MF, Kıvılcım T, Filiz AI. Comparison of Three Surgical Techniques in Pilonidal Sinus Surgery. *Prague Med Rep.* 2018;119(4):148-155. doi: 10.14712/23362936.2019.2.
11. Lee PJ, Raniga S, Biyani DK, Watson AJ, Faragher IG, Frizelle FA. Sacrococcygeal pilonidal disease. *Colorectal Dis.* 2008;10(7):639–650.
12. Horwood J, Hanratty D, Chandran P, Billings P. Primary closure or rhomboid excision and Limberg flap for the management of primary sacrococcygeal pilonidal disease? A meta-analysis of randomized controlled trials. *Colorectal Dis.* 2012;14(2):143-51. doi: 10.1111/j.1463-1318.2010.02473.x.
13. Karaca AS, Ali R, Capar M, Karaca S. Comparison of Limberg flap and excision and primary closure of pilonidal sinus disease, in terms of quality of life and complications. *J Korean Surg Soc.* 2013;85(5):236-9. doi: 10.4174/jkss.2013.85.5.236
14. Stauffer VK, Luedi MM, Kauf P, Schmid M, Diekmann M, Wieferrich K, Schnüriger B, Doll D. Common surgical procedures in pilonidal sinus disease: A meta-analysis, merged data analysis, and comprehensive study on recurrence. *Sci Rep.* 2018;8(1):3058. doi: 10.1038/s41598-018-20143-4.