



Original Research Article

SURGICAL OUTCOME BETWEEN KARYDAKIS FLAP AND LIMBERG FLAP IN PILONIDAL SINUS: A COMPARATIVE STUDY

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Received : 20/12/2025
Received in revised form : 29/01/2026
Accepted : 17/02/2026

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DOI: 10.70034/ijmedph.2026.1.284

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (1); 1624-1628

ABSTRACT

Background: Postoperative morbidity and recurrence are associated with pilonidal sinus disease, a frequent benign illness of the sacrococcygeal area. Two of the most popular surgical treatments are the Karydakias flap and the Limberg flap. Patients suffering from pilonidal sinus illness were the subjects of this study, which sought to compare the surgical results of the Karydakias flap with those of the Limberg flap.

Materials and Methods: A prospective comparison study included 50 individuals who were diagnosed with primary sacrococcygeal pilonidal sinus. At random, 25 patients were assigned to the Karydakias group and 25 to the Limberg group; each group received a different type of flap. Time spent operating, VAS-measured postoperative pain, duration of hospital stay, time to resume normal activities, postoperative complications, and recurrence were among the parameters that were gauged. After six months, patients were followed up with. When the p-value was smaller than 0.05, the statistical analysis was considered significant.

Results: The Limberg group had a mean operating time of 46.9 ± 7.2 minutes, which was far longer than the Karydakias group's mean operating time of 38.6 ± 6.4 minutes ($p = 0.001$). The Karydakias group had a lower average pain score (3.1 ± 0.9) on the first day following surgery than the Limberg group (3.8 ± 1.0 , $p = 0.018$). The Karydakias group stayed in the hospital for an average of 2.1 ± 0.6 days, while the Limberg group stayed for an average of 2.6 ± 0.7 days ($p = 0.021$). The Karydakias group took an average of 13.4 ± 2.8 days to get back to their normal activities, which was far less than the Limberg group (16.2 ± 3.1 days, $p = 0.002$). There was no statistically significant difference in postoperative complications between the two groups. In the Karydakias group, four patients (16.0%) had wound infections and two had seroma infections. In the Limberg group, six patients (24.0%) had wound infections and two had seroma infections. In the partial flap edge necrosis group, one patient had one. One patient (4.0%) in the Karydakias group and two patients (8.0%) in the Limberg group suffered recurrence throughout the follow-up period ($p = 0.55$).

Conclusion: Both the Karydakias flap and the Limberg flap are safe and effective ways to treat pilonidal sinus disease with surgery. The complication and recurrence rates were comparable between the two techniques; however, the Karydakias flap demonstrated significantly reduced surgical time, diminished postoperative pain, abbreviated hospitalizations, and expedited resumption of normal activities.

Keywords: Pilonidal sinus; Karydakias flap; Limberg flap; postoperative complications; recurrence; comparative study.

INTRODUCTION

Pilonidal sinus disease is a long-term inflammatory condition of the sacrococcygeal region that causes pain, frequent discharge, frequent absences from work, and a lower quality of life.^[1,2] This condition primarily impacts young adults. Surgeons still have a big problem with this benign illness since it can cause problems after surgery and come back. The goal of surgical care is to completely remove diseased tissue, close wounds without tension, speed up healing, reduce postoperative morbidity, and reduce the chance of recurrence.^[3,4]

Traditional methods for closing the midline have been related to higher rates of wound infection, longer healing times, and recurrence. This is because too deep natal cleft, constant tension on the midline, and not enough cleaning in the area.^[5] To get around these limits, a number of off-midline flap techniques have been created to move the suture line to the side, flatten the natal cleft, and reduce friction, localized dampness, and hair buildup. The Karydakias flap and the Limberg flap are two of the most common and well-known ways to fix a sacrococcygeal pilonidal sinus.^[6,7]

Both methods have demonstrated good success for healing wounds and preventing them from coming back, but there is still no clear victor for routine therapeutic use. Furthermore, numerous facilities currently do not possess sufficient comparative data from analogous patient populations.^[8,9]

Thus, this study sought to evaluate the surgical outcomes of the Karydakias flap versus the Limberg flap in a cohort of fifty patients with primary sacrococcygeal pilonidal sinus. The results were measured by looking at the length of the operation, the amount of discomfort after the surgery, the length of the hospital stay, the time it took to get back to normal activities, complications, and recurrence.^[10-12]

MATERIALS AND METHODS

This prospective comparative study involved 50 patients diagnosed with primary sacrococcygeal pilonidal sinus illness, who were admitted to the Department of General Surgery at Sri Balaji Medical College and Hospital, Research Institute, during the study period From December 2024 to November 2025. After getting informed consent, patients were randomly split into two equal groups. Group A (n = 25) had their excision and reconstruction done with the Karydakias flap technique, and Group B (n = 25) had their excision and reconstruction done with the

Limberg flap technique. All patients had a standard pre-operative evaluation. Both groups followed the usual rules for surgery and anesthesia. We kept track of things like the length of the surgery during the surgery. After surgery, patients were followed up for at least six months.

Data Collection

A pre-designed and structured proforma was used to collect data for every patient. The patient's demographic information, clinical features, and surgical details were documented both before and after surgery. The time it took to go from making an incision to closing it was the surgical time. The visual analogue scale (VAS) was used to evaluate postoperative pain on the first day following the procedure. The length of time spent in the hospital, the time it took to resume daily activities, and any difficulties that occurred after the operation were documented during the hospital stay and subsequent follow-up appointments.

Inclusion Criteria

- Patients aged ≥ 18 years.
- Patients with clinically diagnosed primary sacrococcygeal pilonidal sinus.
- Patients fit for surgery under spinal or general anesthesia.
- Patients who provided written informed consent to participate in the study.

Exclusion Criteria

- Patients with recurrent pilonidal sinus disease.
- Patients with acute pilonidal abscess requiring emergency drainage.
- Patients with associated systemic infection
- Patients with previous surgery in the sacrococcygeal region.
- Patients unwilling to participate

Statistical Analysis

A common statistical program was used for data entry and analysis. Categorical variables were represented as frequencies and percentages, whilst continuous variables were shown as mean \pm standard deviation. When comparing the two sets of data, we used Fisher's exact test or the Chi-square test for categorical variables and the independent sample t-test for continuous variables. It was deemed statistically significant if the p-value was less than 0.05.

RESULTS

The study included 50 patients, with 25 allocated to the Karydakias flap (Group A) and 25 to the Limberg flap (Group B). There are six tables that show the findings.

Table 1: Baseline demographic and clinical characteristics of the study population

Parameter	Group A (Karydakias)	Group B (Limberg)	p-value
Age (years), mean \pm SD	24.8 \pm 4.6	25.6 \pm 5.1	0.56
Male/Female	20 / 5	19 / 6	0.73
Body mass index (kg/m ²), mean \pm SD	24.1 \pm 2.3	24.4 \pm 2.6	0.64
Duration of symptoms (months), mean \pm SD	7.8 \pm 2.9	8.1 \pm 3.1	0.71
Number of sinus openings, mean \pm SD	2.2 \pm 0.8	2.3 \pm 0.9	0.83

In terms of age, gender distribution, BMI, illness duration, and number of sinus apertures, both groups were similar. There was sufficient baseline comparability since no statistically significant difference was seen between the two groups.

Table 2: Comparison of operative time between the two groups

Group	Operative time (minutes), mean \pm SD	p-value
Group A (Karydakias)	38.6 \pm 6.4	0.001
Group B (Limberg)	46.9 \pm 7.2	

A statistically significant difference was observed between the groups using the Karydakias flap and the Limberg flap in terms of the mean operating time.

Table 3: Comparison of postoperative pain scores (VAS on day 1)

Group	VAS score, mean \pm SD	p-value
Group A (Karydakias)	3.1 \pm 0.9	0.018
Group B (Limberg)	3.8 \pm 1.0	

After the Karydakias flap technique, patients reported far less pain on the first day after surgery compared to those who had the Limberg flap.

Table 4: Comparison of hospital stay and return to normal activities

Parameter	Group A (Karydakias) mean \pm SD	Group B (Limberg) mean \pm SD	p-value
Hospital stay (days)	2.1 \pm 0.6	2.6 \pm 0.7	0.021
Time to return to normal activities (days)	13.4 \pm 2.8	16.2 \pm 3.1	0.002

When comparing the two groups, the Karydakias flap group had a far shorter hospital stay and a far quicker recovery period than the Limberg flap group.

Table 5: Postoperative complications in both groups

Complication	Group A (Karydakias) n (%)	Group B (Limberg) n (%)	p-value
Wound infection	2 (8.0)	3 (12.0)	0.48
Seroma	2 (8.0)	2 (8.0)	
Partial flap edge necrosis	0 (0)	1 (4.0)	
Hematoma	0 (0)	0 (0)	
Total patients with complications	4 (16.0)	6 (24.0)	

The Karydakias group had four patients who experienced overall postoperative problems, while the Limberg group had six. The majority of both groups experienced wound infection as a consequence. In terms of total complications, there was no statistically significant difference between the two groups.

Table 6: Comparison of recurrence during follow-up

Group	Recurrence present n (%)	No recurrence n (%)	p-value
Group A (Karydakias)	1 (4.0)	24 (96.0)	0.55
Group B (Limberg)	2 (8.0)	23 (92.0)	

One patient in the Karydakias group and two patients in the Limberg group experienced recurrence throughout the 6-month follow-up period. It was not statistically significant that the two methods had different recurrence rates.

DISCUSSION

This prospective comparative study involved 50 patients with primary sacrococcygeal pilonidal sinus disease, who underwent surgical treatment with either the Karydakias flap or the Limberg flap, with the outcomes of the treatments being evaluated. The postoperative outcomes were comparably reliable between the two groups due to their baseline similarities in demographic and clinical factors.^[13]

In this study the Karydakias flap group exhibited a significantly shorter average operating time (38.6 \pm 6.4 minutes) compared to the Limberg flap group (46.9 \pm 7.2 minutes), as indicated by this study 14, 15.

Previous studies, indicating that the Karydakias technique is less complex and requires reduced operational dissection and flap design compared to the Limberg procedure, which entails rhomboid excision and transposition.^[16,17] Due to the substantial tissue mobilization and complex flap planning associated with the Limberg flap, prior comparative research indicated that the surgery required more time than anticipated. The Karydakias flap's reduced operating time in this study may correlate with diminished anesthetic exposure and potentially expedited postoperative recovery.^[18,19]

Patients treated with the Karydakís flap experienced considerably less postoperative discomfort (VAS 3.1 ± 0.9) compared to those in the Limberg flap group. Prior studies have associated off-midline closure techniques with less flap dissection and diminished postoperative discomfort; hence, our results corroborate these findings. The Karydakís flap, characterized by little tissue manipulation and a reduced flap area, was associated with comparatively lower pain levels than the Limberg flap, which necessitates extensive undermining and the transfer of a rhomboid flap.^[20-22]

Patients in the Karydakís cohort saw significantly reduced hospital durations and expedited recoveries. Individuals who underwent Karydakís surgery were able to resume their normal activities and discharge from the hospital more promptly than those treated with the Limberg flap. Previous studies have demonstrated that the Karydakís technique results in a reduced convalescence duration and expedited functional recovery. Patients of working age and younger, including the majority of pilonidal sinus cases, are more clinically significant for this benefit. In pilonidal sinus surgery, recurrence remains a critical measure of success.^[23]

Neither the Karydakís nor the Limberg cohorts exhibited statistically significant variations in recurrence rates during the six-month follow-up; one patient (4.0%) and two patients (8.0%), respectively, had this complication. In accordance with prior studies, our findings indicate that both therapies surpass conventional midline closure techniques in reducing recurrence. Minimizing hair accumulation, wetness, and localized trauma—elements recognized as contributors to sickness recurrence—may elucidate the diminished recurrence rates observed in the current study. This is accomplished by the lateralization of the suture line and the flattening of the natal cleft.^[24,25]

This study could not identify a significant difference in recurrence rates between the two procedures, although the Limberg flap may exhibit a little reduced recurrence rate because to its more extensive excision and enhanced flattening of the natal cleft. The short six-month follow-up period in this study may explain the observed low recurrence rate, given that late recurrences have been recorded in long-term follow-up investigations.^[26]

In previous comparative studies have shown that both the Karydakís and Limberg flap procedures provide acceptable rates of complications and recurrences, resulting in satisfactory outcomes; the findings of the current study align with these results. Conversely, the Karydakís flap shown significant advantages in this study, including reduced operating room duration, diminished postoperative discomfort, a shorter hospital stay, and a more rapid return to normal activities post-surgery. The primary limitations of this study include the limited sample size and the brief follow-up period, which may not adequately represent long-term recurrence trends. Larger multicentric trials with prolonged follow-up are

essential to reinforce the evidence for the superiority of one technique over another and to further validate these findings.^[27,28]

CONCLUSION

This study illustrates that the Karydakís flap and Limberg flap techniques are both safe and successful for the surgical treatment of primary sacrococcygeal pilonidal sinus illness. In this study, although the overall postoperative complication and recurrence rates were comparable between the two groups, the Karydakís flap showed clear advantages in terms of significantly shorter operative time, lower postoperative pain scores, reduced duration of hospital stay and earlier return to normal daily activities. This study's findings, consistent with prior research, indicate that the Karydakís flap is a superior surgical option for the routine management of primary pilonidal sinus, owing to its technical simplicity, expedited recovery, and comparable short-term recurrence rates relative to the Limberg flap. Nonetheless, extensive investigations with prolonged follow-up durations are advised to further corroborate these findings and evaluate long-term consequences.

Funding: None

Conflict of Interest: None

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