

Comparative Study between Limberg Technique and Karydakis Procedure in Surgical Treatment of Sacrococcygeal Pilonidal Sinus

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ABSTRACT

Background: Pilonidal disease is persistent sacrococcygeal inflammation and infection. Theories include congenital and acquired causes. Karydakis and Limberg flaps can treat pilonidal sinus. The conventional method replaces the vulnerable raphe with healthy tissue. The Karydakis flap was modified by suturing its base to the wound's lateral border. Limberg flap involves excision of rhomboid area down to presacral fascia and transposition of fasciocutaneous flap medially to cover defect without strain. The flap matched the rhomboid area. **Aim:** to compare the Karydakis technique and the Limberg flap approach for surgically treating pilonidal sinus disease in terms of wound healing, wound complications, recurrence rate, satisfaction and time to return to work. **Subject and Methods:** 50 patients with sacrococcygeal pilonidal sinus illness participated in this prospective study, which was divided randomly into two groups. **Results:** In the Limberg Flap group, After surgery, there was a highly significant reduction in pain and healing in the Limberg

Flap group. Between the two groups, there was no discernible difference in the time it took for complete healing. In the Limberg Flap group, satisfaction was noticeably higher. Regarding affected location, there was no discernible difference between the two groups among the included individuals. **Conclusion:** Pilonidal disease patients typically receive therapy with Limberg flap surgery. In comparison to Karydakis flap surgery, it is less problematic, quicker to return to work, more patient-satisfied overall, and heals wounds more quickly.

Key Words: Limberg Technique, Karydakis Procedure, Sacrococcygeal Pilonidal Sinus.

Introduction:

A chronic infection and inflammation of the sacrococcygeal area is known as pilonidal disease. After puberty, it generally affects young people and typically manifests as an abscess or a painful sinus tract on the natal cleft with persistent seropurulent discharge (1). There are conflicting views of the aetiology, including congenital versus acquired illness processes. It primarily affects young guys and has an incidence rate of 26 per 100,000 persons (2). Risk factors include unhealthy behaviours such prolonged sitting, poor hygiene, and obesity (3).

There is a great deal of disagreement on the best course of treatment, despite the fact that several operative and conservative treatments for pilonidal sinus have been reported in published studies. Numerous surgical options, such as the Karydakias flap and the Limberg flap, are suggested for the treatment of the pilonidal sinus (4). The traditional Karydakias flap involved the removal of the diseased raphe in an asymmetrical elliptical shape, mobilization of a flap from the wound's median side, fixation of the flap's base to the sacral fascia, and suturing of the flap's edge to the lateral ones (5). The susceptible raphe is to be removed and replaced with healthy tissue using the traditional procedure. The Karydakias flap was modified so that the

base of the flap was directly sutured to the lateral edge of the wound (6).

The Limberg flap entails rhomboid-shaped tissue being excised all the way to the presacral fascia, and the fasciocutaneous flap is then transposed medially to cover the defect tension-free. The prepared flap had the same size as the rhomboid area (7).

Patients and Methods

This is a prospective study was conducted at general surgery department at Benha University Hospital for 12 months from December 2021 to December 2022

This study was conducted on 50 patients with sacrococcygeal pilonidal sinus disease and were divided randomly into two groups; group (1) included 25 patients who were treated surgically with the Limberg flap technique and group (2) included 25 patients who were treated surgically with the Karydakias technique.

Inclusion criteria: patients with sacrococcygeal pilonidal sinus disease from 18 years to 50 years old were included.

Exclusion criteria: Patients with an acute infection or abscess in the pilonidal sinus Patients who are not fit for surgery.

Ethical Approval: The participants who agree to share in this clinical study gave informed consent after being fully informed about the technique and its circumstances. The study was

conducted after approval of the Committee of Ethics in Faculty of Medicine, Benha University.

Preoperative preparation: detailed history, general examination and local examination.

Operative details:

Limberg Flap Technique (Group I)

The sinus tract was determined by injecting methylene blue into the sinus with the aid of a syringe. A rhomboidal skin incision was made with a sinus opening in the center. Guided by this incision, all tissues were removed by descending into the presacral fascia. Bleeding was cauterized. The horizontal bisector of the ABCD parallelogram shown in Figure [1A](#) was extended by an incision made on the right gluteus to the length of the AB side to reach point E, as shown in Figure [1A](#). This point is parallel

to the CD edge and has the same length. The incisions were deepened to include the gluteal muscle fascia and the fascia was released. Thus, the rhomboid flap was prepared. The wound was irrigated with copious amounts of saline. Patches holding the gluteus in traction were opened to facilitate closure. Flap transposition was done so that the FD points came together. After placing a vacuum Redon drain under the flap, a separate hole was opened and taken out. It was closed by suturing with 2/0 vicryle to bring the fascia and subcutaneous tissues together. 3/0 polypropylene material was used in skin suturing. The skin was washed with saline and dried, and after wiping it with povidone-iodide again, it was covered with sterile gauze (Figure 1).

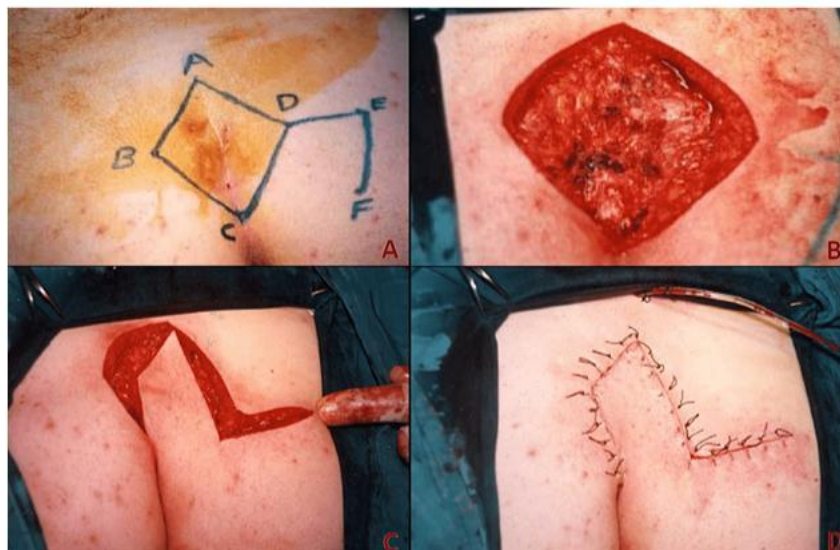


Figure 1: Limberg flap technique. A: Marking equilateral triangles before the excision. B: Excision of the sinus along with the rhomboid. C: Creating a rotational flap. D: Appearance of the wound at the end of the operation.

Karydakis Flap Technique (Group 2)

Methylene blue was injected into the fistula before the skin incision. An asymmetric and biconcave incision was made, as described by Karydakis. If there was a secondary opening or induration on one side of the ellipse, the incision was shifted in that direction. The excised lateral edge of the ellipse was tried to be symmetrical with the medial edge, and, for this, more skin and adipose tissue were excised around the sinus when necessary. Thus, it was ensured that the suture line was vertical. The lateral margin was excised symmetrically with the medial margin. Next, a 1 cm deep and a 2 cm inward flap of the medial edge of the wound were prepared using cautery to extend across the entire incision. Absorbable sutures (2/0 polyglycolic acid) were used to cover both surfaces from the adipose tissue in the prepared flap. Subsequently, a series of sutures were

placed along the entire flap and tied, passing through the midline of the presacral fascia. An assistant pushed the flap from its base to the presacral fascia, allowing the sutures to be easily tied. A vacuum Redon drain was placed on this suture line and removed from the lower end of the wound. The second row of sutures (2/0 polyglycolic acid) was placed between these two layers to approximate the lower surface of the flap and the lateral adipose tissue. A useful modification here is to pass the sutures through the deep fascia when placing the second row of sutures. Thus, the flap was flattened and the dead space was eliminated. When this second suture line was tied, the drain was completely covered. Vertical U-shaped sutures were placed on the skin with intermittent 3/0 proline (Figure 2 D). The skin was washed and dried with saline, and after wiping it with povidone-iodide again, it was covered with sterile gauze.



Figure 2: Karidakis flap technique. A: Simple elliptical excision. B: Flap elevation. C: Approximation and closure of the wound. D: Final view of the surgical area.

Statistical analysis:

A personal computer from IBM, NY, USA, and SPSS were used to compile the results, tabulate them, and perform statistical analysis (version 25).

Statistics of two different types were computed.

1. Descriptive data, such percentage, mean, and standard deviation

Analytical 2.

A nonparametric test of the Student's t test is the Mann-Whitney test (a).

It is used to highlight all significant differences between two groups for a quantitative variable with a non-normal distribution.

Fisher's precise test (b)

In a 2 2 contingency table, this is used to compare between two groups or more for one qualitative variable operation and gained their signed consent.

Results

Table (1): Patients basal characteristics

	Limberg Flap (N = 25)	Karydakis Techniqu (N = 25)	
Age (Years)	30.36±5.54	28.64±6.4	0.3147 ^[1]
Sex			
Male	20 (80%)	21 (84%)	0.71 ^[2]
Female	5 (20%)	4 (16%)	
BMI (Kg/m²)	26.6±1.78	25.6±2.78	0.1368 ^[1]
Duration of Symptoms (Months)	11.56±3.83	10.44±3.38	0.2785 ^[1]
Recurrent diseases	5 (20%)	6 (24%)	0.7328 ^[2]

P>0.05: No significant difference | P<0.05: Significant difference | P<0.001L High significant difference
^[1]: T.Test | ^[2]: Chi square test

There was no significant difference between both groups regarding basal characteristics.

Table (2): Complication rate and recurrence in both groups

	Limberg Flap (N = 25)	Karydakis Technique(N = 25)	
Seroma	1 (4%)	3 (12%)	0.2971 ^[2]
Hematoma	0	0	-
Dehiscence	0	2 (8%)	0.4898 ^[2]
Wound infection	0	1 (4%)	0.97 ^[2]
Recurrence	1 (4%)	2 (8%)	0.5515 ^[2]

P>0.05: No significant difference | P<0.05: Significant difference | P<0.001L High significant difference
^[1]: t. test | ^[2]: Chi square test

There was no significant difference between both groups regarding Complication rate and recurrence.

Table (3): Pain and healing after operation

	Limberg (N = 25)	Flap Karydakias (N = 25)	Technique
1 st day pain score	5.84±1.6	7±1.61	0.0137 ^[1]
3 rd day pain score	4.04±1.54	5.44±0.77	0.0002 ^[1]
5 th day pain score	2.2±0.82	3.64±1.29	<0.0001 ^[1]
Sit without pain (days)	9.64±5.54	17.28±6.85	0.0001 ^[1]
Painless toilet seating (days)	4.16±0.85	5.12±0.78	0.0001 ^[1]
Time to first mobilization (days)	1.44±0.51	2.28±0.79	<0.0001 ^[1]
Duration of incapacity for work (days)	8.04±2.03	17.08±2.04	<0.0001 ^[1]
Completely healed (days)	23.44±6.15	23.16±7.25	0.8836 ^[1]

P>0.05: No significant difference | P<0.05: Significant difference | P<0.001L High significant difference

^[1]: t- Test | ^[2]: Chi square test

There was high significant decrease regarding Pain and healing after operation in Limberg Flap group. There was no significant difference between both groups regarding complete healing duration.

Table (4): Satisfaction among included subjects

	Limberg (N = 25)	Flap Karydakias (N = 25)	Technique
Poor	1 (4%)	3 (12%)	
Fair	2 (8%)	9 (36%)	0.044 ^[2]
Good	17 (68%)	11 (44%)	
Excellent	5 (20%)	2 (8%)	

P>0.05: No significant difference | P<0.05: Significant difference | P<0.001L High significant difference

^[1]: t- Test | ^[2]: Chi square test

There was significant better satisfaction in Limberg Flap group.

Discussion

This 12-month prospective study was carried out at the general surgery department of the hospital affiliated with Benha University. 50 patients with sacrococcygeal pilonidal sinus disease participated in this study, and they were randomly divided into two groups: the first group contained 25 patients who underwent surgical treatment using the Limberg flap technique, and the second group contained 25 patients who

underwent surgical treatment using the Karydakias technique (8).

Similar to our findings, a prospective randomized study was carried out with 79 (86.8%) male and 12 (13.2%) female patients to compare the short- and long-term outcomes of Karydakias flap and Modified Limberg flap operations, both of which have gained in popularity recently for the surgical treatment of PSD. 28 was the typical age (18–25 years) (9).

Regarding age, sex, or BMI, there was no statistically significant difference between the groups ($P > 0.05$). There was no noticeable difference between the groups in the patients' average preoperative complaint time, which was 36 months ($P > 0.05$) as was shown in a previous study (10). Additionally, it was found that the KF group had more postoperative issues than the LF group ($P = 0.05$). Fluid collection was the most typical postoperative consequence in both groups. Further, the KF group produced fluid thirteen times more frequently than the LF group, compared to three times more frequently (3 vs. 13; $P = 0.028$). In neither group were there any hematomas, haemorrhages, or necrosis of the flaps. There was a wound infection in one patient from the LF group and three patients from the KF group, respectively. In one patient from the KF group, wound dehiscence and recurrence were also discovered. No patients in the karydakis flap group reported postoperative wound dehiscence or infection, and only two patients in that group developed seroma, according to a 2020 study by (11) On days three and four following surgery, the suction drain unintentionally came loose. For one patient, two to three aspirations were sufficient. In the alternative, we had to take out two sutures in order to drain the seroma. One patient developed wound

dehiscence, however none of the patients in the Limberg flap group had postoperative collection (even though he had no infection prior to the disruption of the wound). Initially given conservative care, this patient needed sutures to seal the wound on the 17th postoperative day. None of the patients in either group developed hematomas, flap necrosis, or ischemia; however, one patient had a wound infection that required antibiotic treatment in addition to daily dressings and led to wound disruption. Overall, there was no statistically significant difference in the prevalence of postoperative wound problems between the two groups. A former study (11) analyzed 134 patients who had received Limberg flap surgery and 135 individuals who had undergone Karydakis flap surgery in a 2011 research. In comparison to Limberg flap patients, it was discovered that wound dehiscence was more challenging in (8) Karydakis flap patients (8 & 14). In addition, four Karydakis flap patients reported postoperative wound infections compared to eight in the Limberg group. This confirms our findings by showing that wound dehiscence and infection were more common in the Limberg group. But just three of the study's Karydakis flap patients experienced postoperative collections, compared to the Limberg flap group as a whole.

In our review, we found that the Limberg Fold bunch saw an exceptionally significant decrease in torment and mending following surgery. Between the two gatherings, there was no way to see a distinction in the time it took for complete recuperating. In concurrence with our discoveries, it was expressed that the Karydakis bunch got back to work sooner than the Limberg bunch (11). While patients in bunch (1) took an average of 14.6 2.46 days off, the Limberg group returned to work after 16.8 2.39 days. However, there was no statistically significant difference between the two groups. Twenty two vacation days instead of the previous 12 days. This also aligns with the investigation that a study (12) registered companions conducted in 2019, using 150 patients (75 patients each group) for their consecutive non-likelihood testing evaluation, bunch A (Karydakis) and bunch B (rhomboid) found that the mean work misfortune was (13.13 1.15) days in bunch (A) and (15.53 1.22) days in bunch (B). This difference was significant. It's interesting that, in the current evaluation, the Limberg Fold group reported much more joy. It was claimed that 2019, the median fulfillment scores in the LF and KF groups, respectively, were 9 (37%) and 8 (28.1%) (P = 0.046), which is consistent with our findings (10). The median VAS ratings in the LF and KF groups were 12

(44%) and 14, respectively (P = 0.934); the highest VAS rating in the two groups was 6. (11) 2020 stated that, in contrast to what we discovered, bunch 1 of the Karydakis fold had a larger mean SD (7.8 1.03) and range (6-9) than bunch 2 of the Karydakis fold, which had a smaller mean SD (4.2 0.92) and range (3-6). With respect to fulfillment, there was a measurably tremendous distinction between Karydakis fold (bunch 1) and Limberg fold (bunch 2). The patient in bunch (1) with the most reduced score was the person who had a repeat in spite of having high stylish fulfillment preceding the event of the recurrence. While most of Limberg fold bunch patients, especially females, gave really bad grades to mirror their discontent with the scar appearance.

Conclusion

Pilonidal disease patients typically receive therapy with Limberg flap surgery. In comparison to Karydakis flap surgery, it is less problematic, quicker to return to work, more patient-satisfied overall, and heals wounds more quickly.

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