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Surgical outcome between Karydakias flap and Limberg flap in pilonidal sinus: A comparative study

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Abstract

Introduction: Pilonidal sinus disease (PSD) is a chronic inflammation and infection of the sacrococcygeal area with swelling, discomfort and seropurulent discharge among the ain symptoms. Studies show the disease to be an acquired condition. Among the treatments offered are excision and secondary intention healing, marsupialization, excision and primary closure, and different kinds of excision followed by flap repair, commonly being Karydakias flap and Limberg flap. The surgical outcomes of both the types of flaps is compared in this study.

Aim and Objectives: To assess the surgical outcome between Karydakias flap and Limberg flap in pilonidal sinus.

Materials and Methods: It was an observational study conducted at department of surgery, in patients with pilonidal sinus between the age of 15 to 65 yrs. A total of 30 patients were included after obtaining the informed consent, with group A as 15 patients undergoing Karydakias flap procedure and group B as 15 patients undergoing Limberg flap procedure.

Results: The mean age of patients was found to be 33.10 ± 11.57 yrs of age, male preponderance (80.0%) was seen. Male to female ratio was 4:1. Mean operative time was 45.1 ± 3.0 and 57.7 ± 3.7 mins for Karydakias flap and Limberg flap method respectively. Significant lower blood loss was seen among the Karydakias flap method. Lower duration of hospital stay was seen among the Karydakias flap group (4.9 ± 1.2 days), Limberg flap group (5.2 ± 0.7 days). Overall, 6 patients presented with recurrence who underwent the Karydakias flap method.

Conclusion: Comparative results seen between both Karydakias flap and Limberg flap however, Karydakias flap procedure showed shorter operative time, lower blood loss. Patient's with Limberg's flap had lesser early post operative complications, early pain-free toileting and nil recurrence and was recommended to other patients. Hence, Limberg flap is still a better option to the patients as compared to Karydakias flap procedure.

Keywords: Pilonidal sinus, Karydakias, Limberg flap

Introduction

Pilonidal sinus disease (PSD) is a chronic inflammation and infection of the sacrococcygeal area, characterised by weak hair buildup in the hair follicles. Pilonidal sinus disease (PSD) is a chronic inflammation and infection of the sacrococcygeal area, characterised by weak hair buildup in the hair follicles ^[1].

Localized discomfort, swelling, and seropurulent discharge are the most common symptoms. Because of the disease's recurrence, it has a significant morbidity due to protracted periods of disruption in education or job.

PSD was debated as a congenital condition until a few decades ago, and many authors are now convinced that it is an acquired disease. The hypothesis explained by Bascom, "Only the bones move up when people stand up," To move the buttocks, the sacrum must grip and pull up on skin, fat and muscles. This tugging creates a vacuum effect across the gluteal area. Hair enters the pit as a result of the vacuum created by gluteal movement in cases of mild folliculitis ^[2, 3-5].

Karydakias proposed the most rational explanation concerning the aetiology and etiopathogenesis of the condition after publishing the biggest pilonidal sinus case series in 1992. He indicated that the aetiology is acquired, as a result of his 35 years of study on pilonidal sinus. The most major risk factor for the condition is modest local trauma ^[6]. Hair penetration process is the basis of pilonidal sinus according to Karydakias ^[7].

Three major aspects contribute to hair embedding invaders produced by free hair, the force that causes hair embedding, and the susceptibility of the skin that allows hair embedding deeper in the gluteal area. Pilonidal sinus disease arises when all three of these conditions are present [7, 6]. As a result, recently most of surgeons are in the opinion that the disease is acquired.

Among the treatments offered are excision and secondary intention healing, marsupialization, excision and primary closure, and different kinds of excision followed by flap repair. Because of the increased chance of poor wound healing, post-operative infection, and recurrence, pilonidal disease care is complex.

The present study aimed to compare surgical outcome between Karydakias flap and Limberg flap in pilonidal sinus.

Materials and Methods: It was an observational study conducted in a tertiary care centre after approval from the Institutional Ethics Committee. A total of 30 patients were included in the study. Group A included 15 patients undergoing karydakias flap procedure and Group B included 15 patients undergoing limberg flap procedure.

All Patients with diagnosis of pilonidal sinus, between age group 15-65 yrs and giving consent for the procedure were included in the study. Patients with co-morbid conditions like diabetes mellitus, immunodeficiency, abscess, recurrence, secondary infections and those not willing for procedure were excluded from the study.

All patients with inclusion criteria and giving consent for the procedure, with base line investigation and anesthetic fitness were taken up for operation under spinal anesthesia. All of them were administered intravenous antibiotics on the day of surgery. The patients were placed in the position allowing better sight of the operation area and both buttocks was retracted to the lateral using sticky tapes. The operating site was cleaned with 10% povidone-iodine solution and draped.

Operation performed in the Limbergflap group: Rhomboid excision was performed, the lower end being 2 cm lateral to the midline and covering the whole area where the sinus spread. Using electrocautery, hemostasis was checked. In order to ensure tension-free repair, the flap was released at the bottom including gluteal fascia, and then slid to medial in order to cover the defect. A suction drain was applied to the region in all patients. The subcutaneous tissue were closed with 2/0 vicryl suture and the skin was closed with 3/0 ethilon mattress suture. When the drain amount was below 20 mL/d, it was removed.

Operations performed in the Karydakias flap (KF) group: defined by Karydakias. In this technique, an asymmetrical elliptic excision was done, lower and upper ends being located at approximately 2 cm lateral to the natal cleft and all defective tissues were removed until reaching to healthy borders. After that, the medical wound edge was mobilized and the flap was

slid by suturing to the fascia and skin suitable wound layers on the lateral wound edge corresponding to one another. The subcutaneous tissue was closed with 2/0 vicrylsuture and the skin was closed with 3/0 ethilon mattress suture. In all patients, a suction drain was applied to the region. When the drain amount was below 20 mL/d, it was removed.

Variables and their measurement methods with standardization techniques, Independent variables included Age, Sex, Age wise sex determination. Outcome variables included, procedure time, recurrence, hospital stay, time to resume work, early post-operative complications, post-op pain, patient satisfaction and pain free toileting.

Data regarding patient age, sex, BMI, preoperative complaint, preoperative discharge history, preoperative antibiotics use, operation duration, hospital stay time, drain removal time, painless sitting time, return-to-work or school time, cosmetic dissatisfaction, recurrence, and whether operation was recommended to others was recorded in this study. Data was collected by examining the patients during postoperative dressing. To access patients' wounds daily as they needed dressing. Patient was assessed weekly for the first month and subsequently every 1 month for the first 6 months. After that, patients were asked to contact if they had any problems.

Statistical Analysis: All the data was noted in proforma and entered in excel sheet. Continuous variables represented in mean, standard deviation and categorical variables were represented in frequencies and percentage using the tables, figures, bar char and pie diagram. The mean difference between continuous variables was analysed using t-test and for the categorical variables used chi-square test. All the statistical analysis was performed using SPSS v21 operating on windows 10. P-value of <0.05 was considered statistically significant.

Observation and Results: Total of 30 patients included in the present study after obtaining the informed consent, with group A as 15 patients undergoing Karydakias flap procedure and group B as 15 patients undergoing Limberg flap procedure. In present study, the mean age of patients was found to be 33.10±11.57 yrs of age and the mean age between patients who underwent Limberg flap was 33.8 yrs whereas that of Karydakias flap was 32.4 yrs of the total patients, 24 (80%) were male and 6 (20%) were females, 4 females and 11 males underwent Limberg flap procedure whereas 2 females and 13 males underwent Karydakias flap procedure. The mean operative time was 45.1±3.0 and 57.7±3.7mins for Karydakias flap and Limberg flap method respectively. Significant lower blood loss was seen among the Karydakias flap method (70-90 ml) as compared to Limberg flap method (80-100 ml).

Comparison of duration of drain removal among the patients between the groups is shown in following table 1.

Table 1: Comparison of the duration of drain removal, among the patient between the groups

| | | Limberg Flap | Karydakias Flap | Chi-square (p-value) |
|-------------------|-----|---------------------|------------------------|-----------------------------|
| | | Count (%) | Count (%) | |
| Drain Removal POD | 3.0 | 8 (53.3%) | 6 (40%) | 3.36 (0.186) |
| | 4.0 | 7 (46.7%) | 6 (40%) | |
| | 5.0 | 0 (13.3%) | 3 (20%) | |

*p<0.05 is statistically significant; **p<0.001 is statistically highly significant.

Early post-op complications, comparison between the groups is shown in the following figure 1.

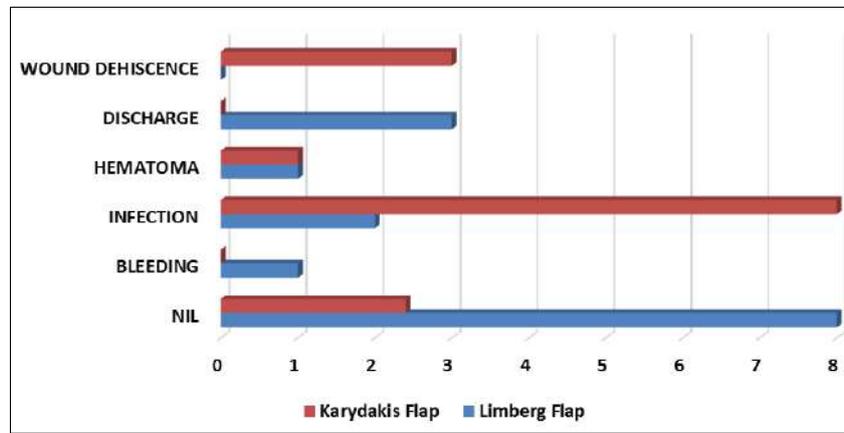


Fig 1: Comparison of the Early Post OP Complication among the patients between the groups.

The mean duration post drain removal was 3.8 days and 3.5 days in Karydakis flap and Limberg flap respectively. The mean pain score on day 1 (3.87 and 6.2) and day 4 (2 and 4.13) for Limberg

flap and Karydakis flap respectively. Lower duration of hospital stay was seen among the Karydakis flap group (4.9 ± 1.2 days) as compared to Limberg flap group (5.2 ± 0.7 days).

Table 2: Comparison of distribution of finding of follow-up and scar satisfaction between the groups

| | | Limberg Flap | | Karydakis Flap | | Chi-square (p-value) |
|-------------------|-------------------|--------------|------------|----------------|------------|----------------------|
| | | Count | Column N % | Count | Column N % | |
| Follow-up 1 month | Healthy scar | 13 | 86.7% | 9 | 60.0% | 2.861 (0.239) |
| | Hypertrophic scar | 1 | 6.7% | 2 | 13.3% | |
| | Wound gaping | 1 | 6.7% | 4 | 26.7% | |
| Follow-up 6 month | Nil | 14 | 93.3% | 9 | 60.0% | 4.65 (0.03)* |
| | Recurrence | 1 | 6.7% | 6 | 40.0% | |
| Scar satisfaction | No satisfaction | 0 | 0.0% | 8 | 53.3% | 6.21 (0.02)* |
| | Moderate | 5 | 33.3% | 6 | 40.0% | |
| | Complete | 10 | 66.7% | 1 | 6.7% | |

Six patients presented with recurrence who underwent the Karydakis flap method as compared to the Limberg flap method.

Patients recommendation about the procedure to others about both the methods is depicted in the following table 3.

Table 3: Comparison of patient’s recommendation about the procedure to others between the groups

| | | Limberg Flap | | Karydakis Flap | | Chi-square (p-value) |
|--------------------------|-----|--------------|------------|----------------|------------|----------------------|
| | | Count | Column N % | Count | Column N % | |
| Recommendation to others | No | 5 | 33.3 | 15 | 100 | 15.45 (0.001)** |
| | Yes | 10 | 66.7% | 0 | 0.0 | |

Comparison of painless sitting and return to work between the groups is shown in the following figure 2.

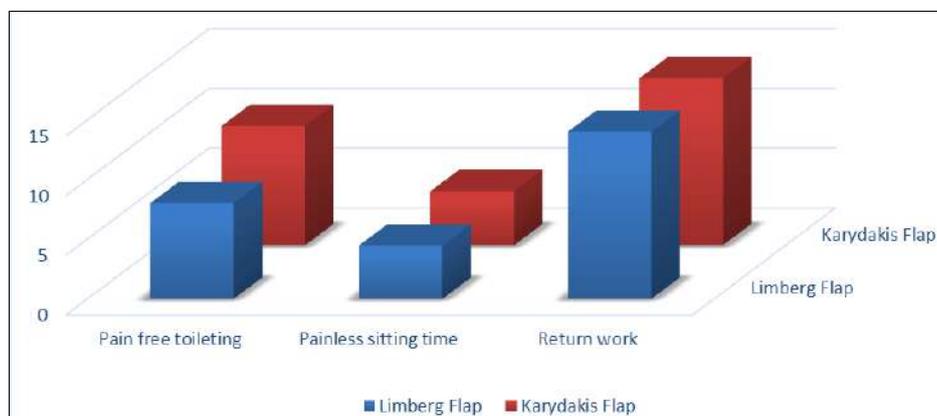


Fig 2: Comparison of painless sitting and return to work between the groups

Discussion

The management of pilonidal disease is complicated due to increased likelihood of poor wound healing, post-operative infection, and recurrence. Despite the fact that there were numerous non-surgical and operational therapy options, no

single approach was commonly acknowledged as the gold standard. Excision and secondary intention healing, marsupialization, excision and primary closure and various forms of excision followed by flap repair are among the techniques available.

The present observational study was conducted at department of surgery, which included patients diagnosed with pilonidal sinus between the age of 15 to 65yrs. Study aimed to assess the surgical outcome between Karydakias flap and Limberg flap in pilonidal sinus. Total of 30 patients included in the present study after obtaining the informed consent, with group A as 15 patients undergoing Karydakias flap procedure and group B as 15 patients undergoing Limberg flap procedure.

In present study, the mean age of patients was found to be 33.10 ± 11.57 yrs of age, with no significant difference in the mean age between the two groups. The mean age among the patients in study by Alvandipour *et al.*, was found to be 34.19 ± 10.47 yrs of age^[8].

On assessment of gender, male preponderance with 80.0% and 20.0% females were seen. Male to female ratio was found to be 4:1. There was no significant difference in distribution of patients between the groups. Similar to present study, male preponderance was observed in other studies as well^[9, 10, 8, 11, 12, 13]. In present study, the operative time was found to be significantly lower in the Karydakias flap method as compared to the Limberg Flap method. The mean operative time was found to be 45.1 ± 3.0 and 57.7 ± 3.7 mins for Karydakias flap and Limberg flap method respectively. Similar to present study, in a study by Alvandipour *et al.*, the difference in surgery durations (minutes) between the groups was significant; specifically lower in the KF group (29.15 ± 7.69 minutes vs. 23.03 ± 6.06 minutes)^[8]. The results suggest that Karydakias flap surgery is shorter than the duration of Limberg flap surgery. In concordance to present study, Ates M *et al.*, documented the mean operative time for the Karydakias group (42.32 ± 8.64 minutes) being shorter than that for the Limberg group (50.14 ± 6.96 minutes)^[14].

On assessment of blood loss during the surgery, there was significant lower blood loss among the Karydakias flap method compared to the Limber flap method. On assessment of the surgical site infection, present study documented no patients in both the groups with any surgical site infection among them. The mean duration of the drain removal was no significant difference, in Karydakias flap group (3.8 ± 0.8 days) as compared to the Limberg flap group (3.5 ± 0.5 days). In study by Alvandipour *et al.* Most common postoperative complication in both groups was fluid collection. Also, fluid formation was more common in the KF group than in the LF group. No hematoma, bleeding, or flap necrosis occurred in either group. Wound infection was detected in 1 patient and 3 patients from the LF and the KF groups, respectively. Also, wound dehiscence and recurrence were found in one patient from the KF group^[8].

Bostanoglu S *et al.*, found that operation period, hospitalization period, and work loss period were all shorter for patients who had the Karydakias procedure.^[15] Arslan *et al.*, in their study of 295 patients, found that patients undergoing Karydakias flap surgery had a significantly higher rate of seroma formation as compared with patients undergoing Limberg flap or modified Limberg flap surgery. In addition, patients undergoing Karydakias flap surgery had a higher rate of wound dehiscence and flap maceration^[16].

The hospital stay among the patients was compared between the group, there was no significant difference, however lower duration of hospital stay among the Karydakias flap group (4.9 ± 1.2 days) as compared to the Limberg flap group (5.2 ± 0.7 days) was seen. Similar to present study, Alvandipour *et al.*, compared to the KF group, the length of hospital stay (days) in the LF group was longer (1.48 ± 0.50 days vs. 1.41 ± 0.49 days), but this difference was not significant.^[8] Ahmed Z *et al.*, found mean hospital stay 2.93 ± 0.66 days in group-A and 3.97

± 0.71 days in group-B^[17].

In present study, 6 patients presented with recurrence who underwent the Karydakias flap method as compared to the Limberg flap method. In study by Ates M *et al.*, documented 4 patients in the Karydakias group, who developed recurrence (3%) whereas 9 patients (6.9%) did so in the Limberg group^[14]. Bostanoglu S *et al.*, documented no statistically significant difference in recurrence rate between the two groups^[15]. However, Bostanoglu S *et al.*, reported higher wound dehiscence, wound infection, and hematoma/seroma rate in the Limberg flap group. In terms of shorter operation time, inpatient stay, less work loss, and lower complication, the Karydakias approach, which is one of the most commonly used surgical techniques in the treatment of Pilonidal sinus illness, should be a preferred way^[15].

Besa *et al.*, documented recurrent illness in one patient (2%) in the modified Karydakias group and two patients (3%) in the modified Limberg group. 58 patients (97 percent) in the modified Karydakias group were happy with the cosmetic outcome and would recommend the surgery to others, as compared to 43 patients (72 percent) in the modified Limberg group. Both methods are successful for treating pilonidal sinus illness and can be performed as day-case surgery. The modified Karydakias flap has a much reduced operational time, a lower rate of full-thickness wound disruption, and a greater percentage of patient satisfaction^[12].

Similar to present study, Bali *et al.*, documented that use of the Limberg flap was associated with lower complication rates, shorter length of hospital stay, early return to work, low pain score, high patient satisfaction and better complete healing duration^[18].

Limitation of the study: This study was conducted at a single centric hospital based study, with small sample size. The study has the potential to be conducted among larger population and at multiple setting of hospitals to assess the utility of the method and benefit to the patients.

Conclusion

Comparative results seen between both Karydakias flap and Limberg flap however, Karydakias flap procedure showed shorter operative time, lower blood loss. Patient's with Limberg's flap had lesser early post operative complications, early pain-free toileting and nil recurrence and was recommended to other patients. Hence, Limberg flap is still a better option to the patients as compared to Karydakias flap procedure.

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