

Modified Limberg flap Versus Karydakis Flap Operations in Pilonidal Sinus Surgery.

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Abstract:

Background- The surgical approach to pilonidal sinus disease (PSD) is always debatable. Though many procedures as Modified Limberg Flap (MLF), Karydakis Flap (KF), Bascom cleft lip technique, Marsupialization are being practiced, the best method is still controversial. In this study we compare the outcome of the MLF and KF operations for pilonidal surgery.

Materials and Methods- All healthy patients with chronic pilonidal sinus willing to undergo surgery and willing to be a part of this study were included. The period of study was from February 2017 to January 2020. A total of 80 patients were enrolled in this study. 40 patients underwent MLF operation and another 40 patients underwent KF operation. Five patients were lost in follow up three in KF group and two in MLF group. Preoperative findings of the patients, their surgical findings were recorded and statistically compared.

Results- Duration of pre operative complaints, mean operating time, post operative wound infection, time (days) taken to sit without pain after surgery, time (days) taken to walk without pain after surgery, time taken to return to work/ school, recurrence of the disease within 12 months, cosmetic acceptance of the scar were compared between the two groups. The mean operation time, return to work/ school after surgery and cosmetic acceptance of the scar had statistically significant differences. The other factors were statistically insignificant. Time taken to return to work/ school was found to be shorter in MLF group compared with KF group (20.51 ± 7.91 days, 23.19 ± 6.52 days respectively $P < 0.05$). Cosmetically the Visual Analog Scale (VAS) of the KF group was significantly higher than that of the MLF group (VAS score 7.12 ± 1.28 , 5.45 ± 1.67 respectively $P < 0.05$). Mean operational time was 54 (44-75) minutes in MLF group and 45 (35 – 60) minutes in KF group and it was statistically significant ($P = 0.001$).

Conclusion – In our study, the short and long term results of the MLF and KF procedures are similar. In MLF procedure the time to return to work is shorter while KF procedure provides better cosmetic results. We believe both methods can be safely used in pilonidal sinus disease.

Key words – Pilonidal sinus disease (PSD), Modified Limberg Flap (MLF), Karydakis Flap(KF),

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I. Introduction:

Pilonidal sinus, a condition found in the natal cleft overlying the coccyx, consisting of one or more midline openings, which communicate with fibrous track lined by granulation tissue and containing hair lying loosely within the lumen. It is thought that the combination of buttock friction and shearing forces in that area allows shed hairs or broken hairs which have collected there to drive through the midline skin or that infection in relation to a hair follicle allows hair to enter the skin by the suction created by movement of the buttocks, so creating a subcutaneous chronically infected midline track. From the primary sinus, secondary tracks may spread laterally, which may emerge at the skin as granulation tissue lined discharging openings (1).

Pilonidal sinus is a very common inflammatory disease of the sacrococcygeal region that usually affects young and middle age males with an incidence of 26/ 1000000 (2). Although the most common site for pilonidal sinus disease is the inter gluteal region, it may occur in other sites as the umbilicus, the finger web, in hair dressers (3), Rarely cases had been reported in neck (4) and penis (5).

Discussion as to whether Pilonidal sinus disease is a congenital disease, continued until a few decades ago. Many authors are now convinced that it is an acquired disease. Although theories of Karydakis and Bascom provide the best explanation about the pathogenesis of the disease, there is no definite etiology and Pathogenesis (6, 7). Male sex, obesity, sedentary life style, jobs that require sitting for long hours, family history, hirsute body habitus, trauma or irritation of the natal cleft and poor hygienic conditions are among the listed risk factors (8, 9). Although numerous surgical treatment methods have been identified, there is no consensus for optimal treatment in the literature. There is no a high level evidence data for ideal treatment selection. A recent Cochrane study by Mc Callum et. al. suggested that "... off midline closure should be the standard treatment" is

the clear cut message (2). Various methods have been described for off midline treatment. Among them the most commonly used is rhomboid excision with the Limberg flap. With this technique of 'flattening the natal cleft', a tension free repair is made using a wide, well vascularized flap. This method claims 0- 16% rate of surgical area related complications and recurrence rate of 0-5% (4). The other off midline technique is the cleft lift procedure described by Bascom. This technique was originally developed to deal with operations that had failed to heal or where symptoms continue to recur. Now this technique is being performed as a short healing period and a low recurrence rate have been reported regarding this technique in cohort studies (10, 11).

The following variables as duration of pre operative complaints, mean operating time, post operative wound infection, time (days) taken to sit without pain after surgery, time (days) taken to walk without pain after surgery, time taken to return to work/ school, recurrence of the disease within 12 months, cosmetic acceptance of the scar were compared between the two groups.

II. Materials and Methods:

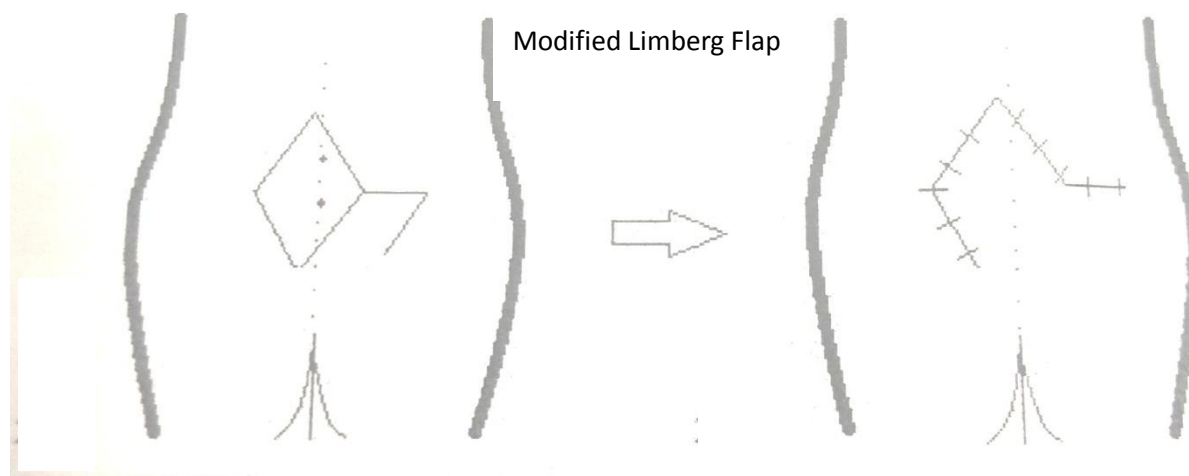
This prospective randomized study was carried out in the department of General Surgery, Sri Manakula Vinayagar Medical College Hospital, Pondicherry. A total of 80 patients with the presence of pilonidal sinus disease of age 18 and above operated between February 2017 to January 2020 were included in this study. Patients with minor inflammation findings were included in the study after antibiotic treatment and the subsidence of inflammation. The patients were included in the study after detailed verbal explanation and informed written consent. Patients were divided into two groups based on the computer assisted random number table. Patients in the first group n=40 underwent the MLF operation and the second group n=40 underwent the KF technique. Both surgical procedures were performed by the same surgeons.

Exclusion criteria – Patients with diabetes mellitus, immunodeficiency, neurological disorders, age below 17 and above 60 (9 patients) , patients who refused to be a part of this study (3 Patients).

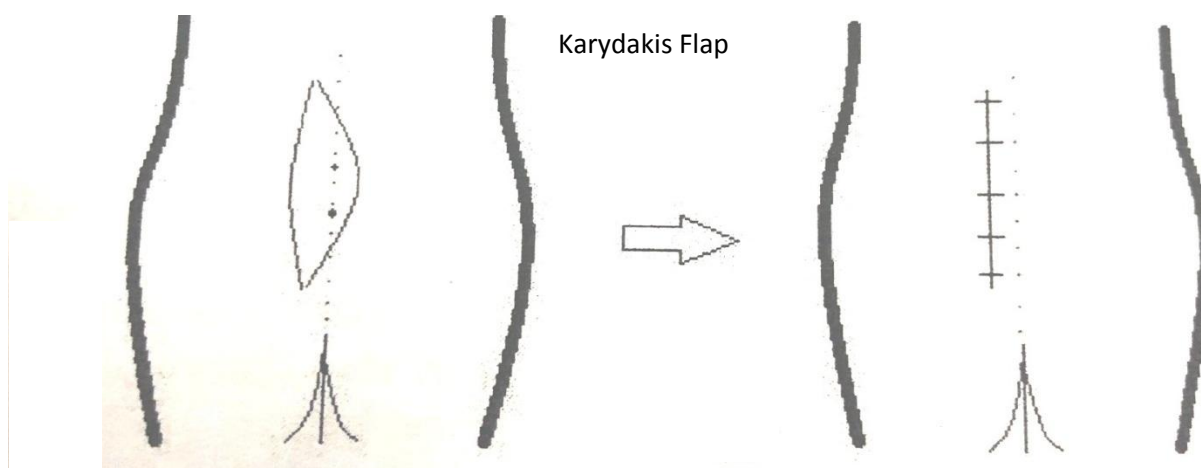
Surgical Procedure:

All patients underwent operation under spinal anaesthesia in prone jack knife position. All of them were administered antibiotics prophylaxis with 1 gram of Cefazolin intravenously at the operation table. The patients were placed in jack knife position allowing better sight of the operation area and both buttocks were retracted to the lateral using sticky tapes. The operating site was cleaned with 10% povidone iodine solution.

Operations were performed in the MLF group as defined by Mentis et.al (12). Rhomboid excision was performed, the lower end being 2 cm lateral to the midline and covering the whole area where the sinus spread. Using electro cautery, haemostasis was obtained. In order to ensure tension free repair, the flap was released at the bottom including gluteal fascia, and then slide to medial in order to cover the defect. A suction drain was applied to the region in all patients. The sub cutaneous tissue was closed with 2-0 polyglactin suture and the skin was closed with mattress sutures using 3-0 polypropylene. When the drain was below 20 ml in 24 hours it was removed.



For the patients in KF group, operations were performed as defined by Karydakis (6). In this technique an asymmetrical elliptical excision was done. Lower and upper ends being located at approximately 2cm lateral to the natal cleft, and all defective tissues were removed until reaching to healthy borders. After that, the medial wound edge was mobilized and the flap was slide by suturing to the fascia and skin on the lateral wound edge. The subcutaneous tissue was closed with 2-0 polyglactin suture and the skin was closed with mattress sutures using 3-0 polypropylene.



Data regarding patient age, sex, Body mass index (BMI), preoperative complaint time, preoperative disease history, preoperative abscess drainage, preoperative antibiotics usage, lateral orifice existence, operation type, operation duration, hospital stay time, drain stay time, preoperative infection, post operative analgesic need, pain free sitting time, pain free walking time, return to work or school time, cosmetic dissatisfaction, recurrence and whether operation was recommended to others were recorded in the study. Data were collected while examining the patients during post operative dressing in the hospital. Patients were assessed weekly for the first month and subsequently every three months in the first year. After the first year the patients were instructed to contact us if they had any problems. We called all the patients for final examination in February 2021.

III. Results:

Three patients from KF group (40- 3 =37) and 2 from the MLF group (40-2=38) could not be contacted during follow up. Eventually results were statistically analyzed for MLF (38 patients) and KF (37 Patients). 71 (94.6%) and 4 (5.3%) of the patients included in the study were males and females respectively. Average age was 28 (20 - 38 yrs). No statistically difference was found between the groups in terms of age, sex and BMI (P>0.05 – Table 1.)

Table 1.

Factors compared	MLF Group Patients	KF Group Patients	P value
Age in years	29.31±8.47	28.41 ± 8.37	>0.05
Sex M/ F	(36/ 2) 94.7% / 5.2%	(35/ 2) 94.5% / 5.4%	>0.05
BMI (Kg/ M ²)	25.10 ± 2.32	24.87± 2.27	>0.05

Average pre operative complaint period such as abscess / discharge of the patients was 36 weeks, 30± 18 weeks in MLF, and 28 ± 20 weeks in KF and there was no significant difference between the groups (p >0.05 Table 2) 12 patients in MLF group (31.5%) and 12 patients in KF group (32.4%) described having sacro coccygeal discharge at some pre operative time and no significant difference was found between the group (P >0.05). There was no significant difference between the groups in terms of number of patients who had gone through pilonidal abscess drainage. Of the patients in both groups, 13 patients (17.3%) had lateral orifice apart from natal cleft, and there was no significant difference between the groups (P>0.05). There was no significant difference between the groups regarding average hospital stay period and post operative analgesic need. Three patients in MLF group (7.8%) and three patients in KF group (8.1%) had post operative wound infection. There was no significant difference between the group (P>0.05). No significant difference was found between the groups with respect to start time of painless sitting and painless walking time (P>0.05%).

The MLF group had shorter return to work/ school time compared with the KF group (20.61± 7.89 days, and 23.29± 6.42 days) respectively (P> 0.05% Table 2). Considering cosmetic results, patients in the KF group had a higher Visual analog scale (VAS) score compared with those in MLF (VAS score – MLF – 5.45 ± 1.77, KF 7.12 ± 1.28 P < 0.05%). Regarding recurrence, within 12 months of surgery we had recurrence of two cases in each category, hence no significant difference was found between the groups (Table 2).

Table 2.

Factor studied	MLF Group	KF Group	P Value
Mean operation time in minutes	54	45	0.001
Preoperative complaint (Abscess, discharge etc) in weeks	30±18	28±20	>0.05
Post operative wound infection	3/ 38	3/ 37	>0.05
Time taken to sit without pain in days	16.54±9.54	15.5±10.35	>0.05
Time taken to walk without pain in days	11.45±7.31	10.52±8.24	>0.05
Return to work/ school after surgery in days	20.51±7.91	23.19±6.52	>0.05
Cosmetic result VAS	5.45±1.77	7.12±1.28	<0.05
Recurrence within 12 months Y/N %	2/38 (5.26%)	2/37 (5.40%)	>0.05

IV. Discussion:

Pilonidal sinus disease is a very common disease seen in young population especially in males. Although several surgical methods have been recommended for pilonidal sinus disease treatment, no gold standard treatment is available till date. Complications that may occur as a result of surgical treatment may sometimes appear with more morbidity than the disease itself. There is still a search for optimal treatment method due to labor loss and high recurrence rate. Marsupialization has been used as a treatment for many years. Marsupializing the edges of the wound is done to ensure reduction in wound size and shorten healing time. It is also worth mentioning that the healing time after marsupialization was about 4 to 5 weeks and required regular periodic dressing during this healing time. This disadvantage led the surgeons to think an alternative method than leaving the wound open and hence some practiced ‘excision and primary closure’ method. Though this method ensure shorter ‘return to work’ time and quick healing than marsupialization, the complications such as wound disintegration, infection were discouraging to adopt this method.

Karydakis stated that three factors are associated with pilonidal sinus development (13). In contrast to his theory, Bascom maintained that pilonidal sinus is formed because of stretched follicles and hair insertion is a secondary development (14, 15). The common point shared by both theories is that deep natal cleft creates a moist, hypoxic, anaerobic environment that bears a risk of developing surgical area complications. Hence, the vulnerability of the skin can be reduced by an off-midline closure. ‘Flattening of the natal cleft’ is the most significant point for the surgical technique of choice because it decreases both early post operative period complications and recurrent rates (16 – 18).

Following PSD surgical treatment, early post operative morbidity and comfort is an important concern. The most notable early postoperative problem is wound infection. Samer et al carried out a study on 120 patients where they found that the KF group (n = 60) had 2% wound infection, while the MLF group (n= 60) had 3% wound infection, no significant difference was found between the groups (19). The study carried out by Can et al on 145 patients did not discover significant differences between the two groups (MLF n = 72, KF n =73) in terms of wound infection, collection, wound disintegration and total surgical area complications considering early postop findings (20). Many studies in the literature analyzed early postoperative results of surgical PSD treatment. Ertan et al in their prospective randomized study found that Limberg flap is advantageous compared with primary repair in terms of painless walking and return to work time, whereas they did not find any significant difference between the groups in terms of painless toilet sitting time and hospital stay (21)

Our study found that return to work/ school time was shorter among the MLF group, while it showed no significant difference between the groups in terms of patient comfort in the early post operative period. The fact that in Limberg flap operations, extensive tissue excision and suture lines extending to the lateral from medial are involved may be regarded disadvantageous in terms of cosmetic appearance. Our study found the KF flap surgery is cosmetically superior to MLF (VAS score – MLF – 5.45 ± 1.77, KF 7.12 ± 1.28 P> 0.05%). Our study did not find any significant difference between the groups with respect to recurrence.

V. Conclusion:

In this prospective randomized study, we have compared the most widely used two methods of surgery in treating pilonidal sinus disease and found there is no significant difference in terms of early patient comfort and risk of recurrence. Our study revealed that there is slight advantage in MLF patients regarding early return to work/school, but the cosmetic acceptance is slightly more in KF group of patients. We believe that both MLF and KF methods of surgery can be safely done for PSD treatment.

Declaration by authors:

This study has not been funded and there is no conflict of interests.>`

References:

- [1]. Norman S. Williams et.al, *Bailey & Love’s Short practice of surgery*, 27th edition;2018:1347-1349
- [2]. Mc Callum IJD, King PM Bruce J, Healing by primary closure versus open healing after surgery for pilonidal sinus: system @ review and meta analysis. *BMJ* 2008; 336 (7649): 868 – 871

- [3]. K. Ballas, K. Psarras, S. Rafailidis et.al Interdigital Pilonidal Sinus In a Hairdresser, *Journal of Hand Surgery (British and European Volume*, 2006) 31B: 3: 290–291
- [4]. Pilonidal sinus of neck: A case report. *Int J Case Rep Images* 2018;9:100882Z01AS2018.
- [5]. O’Kane, H.F., Duggan, B., Mulholland, C., and Crosbie, J. (2004) Pilonidal sinus of the penis. *The Scientific World JOURNAL* 4 (S1), 258–259.
- [6]. Karydakias GE. Easy and successful treatment of pilonidal sinus after explanation of its causative process. *ANZ J Surg* 1992;62(5): 385 - 389
- [7]. Bascom J. Pilonidal disease: origin from follicles of hairs and results of follicle removal as treatment. *Surgery* 1980; 87((5):567-572
- [8]. Humphries AE, Duncan JE. Evaluation and management of pilonidal disease. *Surg clin North Am* 2010;90(1): 113-124
- [9]. Harlak A, Menten O, Kilic S, Coskun K, Duman K, Yilmaz F. Sacrococcygeal pilonidal disease: analysis of previously proposed risk factors. *Clinics* 2010;65(2):125-131
- [10]. Bascom J, Bascom T (2007) Utility of the cleft lip procedure in refractory pilonidal disease. *Am J Surg*; 193: 606-609
- [11]. Abdelrazeq AS, Rahman M, Botterill ID et al (2008). Short term and long term outcomes of the cleft lip procedure in the management of non acute pilonidal disorders. *Dis Colon Rectum* 51:1100-1106
- [12]. Menten BB, Leventoglu S, Cihan A, Tatlicoglu E, Akin M, Oguz M. Modified Limberg transposition flap for sacrococcygeal pilonidal sinus. *Surg Today* 2004;34(5):419-423
- [13]. Karydakias GE (1992) Easy and successful treatment of pilonidal sinus after explanation of its causative process. *Aust N Z Surg* 62:385-389
- [14]. Kitchen PR (1996) Pilonidal sinus: experience with the Karydakias flap. *Br J Surg* 83:1452-1455
- [15]. Bascom J (1980) Pilonidal disease: Origin from follicles of hairs and results of follicle removal as treatment. *Surgery* 87:567-572
- [16]. Nursal TZ, Ezer A, Caliskan K et al (2010). Prospective randaomized controlled trial comparing V-Y advancement flap with primary suture methods in pilonidal disease. *Am J Surg* 199:170-177
- [17]. Theodoropoulos GE, Vlahos K, Lazaris AC et al (2003) Modified Bascom’s asymmetric mid gluteal cleft closure technique for recurrent pilonidal disease: early experience in a military hospital. *Dis Colon Rectum* 46: 1286-1291
- [18]. Nordon IM, Senapati A, Cripps NP (2009) A prospective randamomized controlled trial of simple Bascom’s technique versus Bascom’s cleft closure for the treatment of chronic pilonidal disease. *Am J Surg* 197:189-192
- [19]. Bessa SS. Comparison of short term results between the modified Karydakias flap and the modified Limberg flap in the management of pilonidal sinus disease: a randamoized controlled study. *Dis Colon Rectum* 2013;56(4):491-498
- [20]. Can MF Sevinc MM, Hancerliogullari O, Yilmaz M, Yagci G. Multicenter prospective randomized trial comparing modified Limberg flap transposition and Karydakias flap reconstruction in patients with sacrococcygeal pilonidal disease. *Am J Surg* 2010;200(3):318-327
- [21]. Ertan T, Koc M, Gocmen E, Aslar K, Keksek M, Kilic M. Does technique alter quality of life after pilonidal surgery? *Am J Surg* 2005;190(3):388-392

Anto M, et. al. “Modified Limberg flap Versus Karydakias Flap Operations in Pilonidal Sinus Surgery.” *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 20(04), 2021, pp. 43-47.