International Journal of Research in Medical Sciences
Kanthan A et al. Int J Res Med Sci. 2023 Apr;11(4):1153-1159
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20230853

Original Research Article

A comparative study on short term outcome of Karydakis versus Limberg procedure for pilonidal sinus

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Received: 03 March 2023
Revised: 17 March 2023
Accepted: 18 March 2023

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ABSTRACT

Background: Pilonidal sinus disease is a common chronic disease occurring in the natal cleft of the sacrococcygeal region and is common among young adults. It is characterized by inflammation, abscess and sinus formation. It is accepted that pilonidal sinus results from the penetration of shed hair shafts through the skin. there is no consensus about treatment of pilonidal sinus disease. Some procedures include shaving, phenol application, treatment with crystallised phenol, incision and curettage, unroofing and curettage, excision with primary closure, excision with marsupialization, vey flap reconstruction, Bascom procedure, Limberg flap reconstruction, modified Limberg flap reconstruction, Karydakis flap reconstruction, modified Karydakis flap reconstruction and musculocutaneous flap reconstruction are some of the treatments for pilonidal disease. We compared the short-term outcome of Karydakis procedure and Limberg flap surgery at MMC, Chennai
Methods: Prospective study-> period of 12 months from April 2020 to March 2021 was done in our hospital. 110 patients undergoing surgery for pilonidal sinus at MMC Chennai who fulfilled the criteria were included in the study. Patients were divided in two groups of 55 each into KP and LFS.
Results: MLF has shorter duration of hospital stay and lesser workdays loss as compared to KP. No significant difference in two procedures in view of wound infection and post op pain.
Conclusions: In this study, no significant difference was found between the surgical techniques in terms of post-operative pain and wound infection. MLF procedure achieves shorter return-to-work time when compared to KP.

Keywords: Pilonidal sinus, Karydakis, Limberg flap, Sacrococcygeal infection

INTRODUCTION

Pilonidal sinus is sinus tract which commonly contains hairs under the skin between the buttocks (natal cleft) a short distance above the anus. sinus track goes in vertical direction usually between the buttocks, but can occur elsewhere in the body, which is very rare.

Pilonidal disease was first described by Hodges in 1880 and is diagnosed by the Hodges in 1880 and is diagnosed by the finding of a characteristic epithelial track (the sinus) situated in the skin of the natural cleft, a short distance behind the anus and generally containing hair, hence the name pilonidal taken from the Latin, meaning literally 'nest of hairs'.[1]

The exact aetiology of pilonidal sinus is not clear. There are various theories, however the acquired one is accepted by most of surgeons instead of congenital one. Whatever the cause, once hair fragments become stuck in the skin they irritate the skin and cause inflammation. Inflamed skin quickly becomes infected and a recurring or persistent infection tends to develop in the affected

area. The infection causes the sinus to develop, which often contains broken pieces of hair.

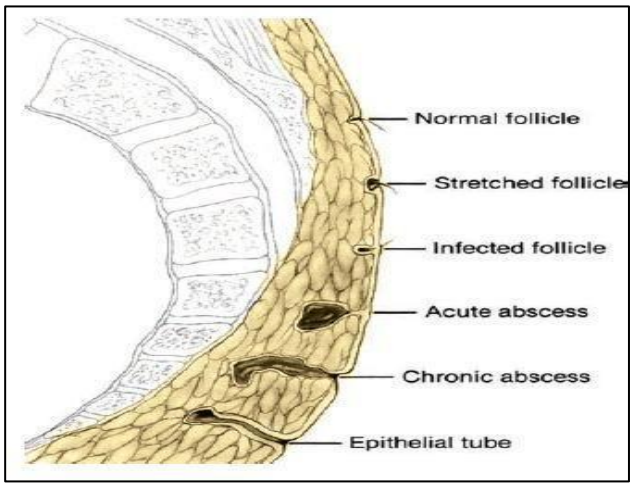

Figure 1: Pathology.[2]

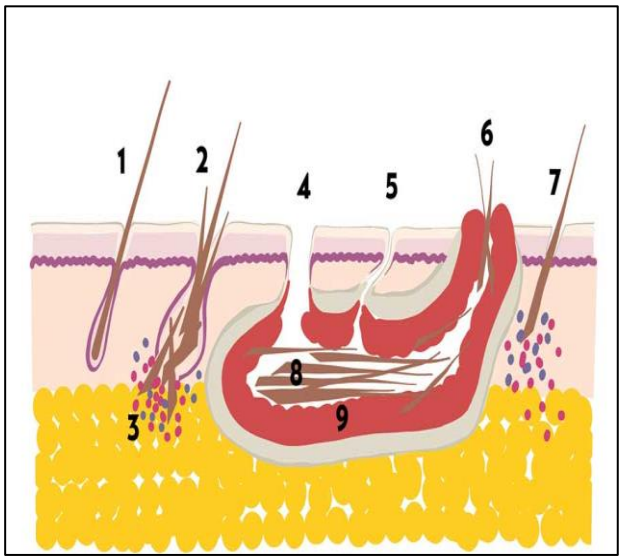

Figure 2: Schematic drawing of a pilonidal Sinus (1 normal hair root, 2 dilated hair root with broken hairs, 3 inflammation due to impaled hairs, 4 large pit, 5 small pit, 6 secondary fistula opening, 7 impaled loose hair, 8 fistula cavity with embedded hairs, 9 granulation tissue). Sites 1 and 7 correspond to the initial stage of the fistula.[3]

This occur most commonly in young adult with dark and strong hair after puberty aged 15-30 years when sex hormones are known to affect pilosebaceous glands and is rare in children and after the age of 40 years.

Pilonidal sinus is asymptomatic disease until it becomes infected, most patients only present with the onset of symptoms and signs which can vary from small painless pit or dimple at the base of spine to the large painful abscess.

Various procedures have been attempted and some of them have been mentioned here which includes shaving, phenol application, treatment with crystallised phenol, incision and curettage, unroofing and curettage, excision with primary closure, excision with marsupialization, vey flap reconstruction, Bascom procedure, Limberg flap reconstruction, modified Limberg flap reconstruction, Karydakis flap reconstruction, modified Karydakis flap reconstruction and musculo-cutaneous flap reconstruction are some of the treatment for pilonidal disease.[4-8]

Limberg rhomboid flap

The patient is placed prone, and the buttocks are strapped apart.

A rhombic area of skin and subcutaneous fat is excised, which includes both the midline pits and any lateral sinus extensions.

Figure 3: Limberg flap technique.[3]

The long axis of the rhomboid is in the midline and its shape determined by angles of 60 degrees at A and C and 120 degrees at B and D. Accuracy is essential and the tissue to be excised and the flap must be measured and marked at the start of surgery.

Planning using precise angles is difficult and the following linear measurements are an alternative. The line A-C is drawn and its length measured. C should be adjacent to the perianal skin and A is placed so that all diseased tissue can be included in the excision.

The line B-D transects the midpoint of A-C at right-angles and is 60 per cent of its length. It is this ratio that determines the correct shape of the rhomboid.

The flap is planned so that D-E is a direct continuation of the line B-D and is of equal length to the incision B-A, to

which it will be sutured after rotation. E-F is parallel to D-C, and of equal length.

After rotation, it will be sutured to A-D.

The skin and subcutaneous fat to be removed are excised down to, but not including, the deep fascia.

The flap is raised so that it includes skin, subcutaneous fat and the fascia overlying gluteus maximus.

It is then rotated to cover the midline rhomboid defect and the defect this creates can be closed in a linear fashion. Deep absorbable sutures, to include fascia and fat, are placed over a vacuum drain and then finally the skin is closed with interrupted sutures. This operation produces a tension-free flap of unscarred skin in thr midline.

Karydakis procedure

In this procedure, an ellipse of skin and underlying fat down to the deep fascia is excised. The ellipse is parallel to, but 2 cm from, the midline. It must be at least 5 cm in length as there is increased tension on closure of a short ellipse.

The medial side of the incision should just cross the midline and should encompass all the diseased midline tissue.

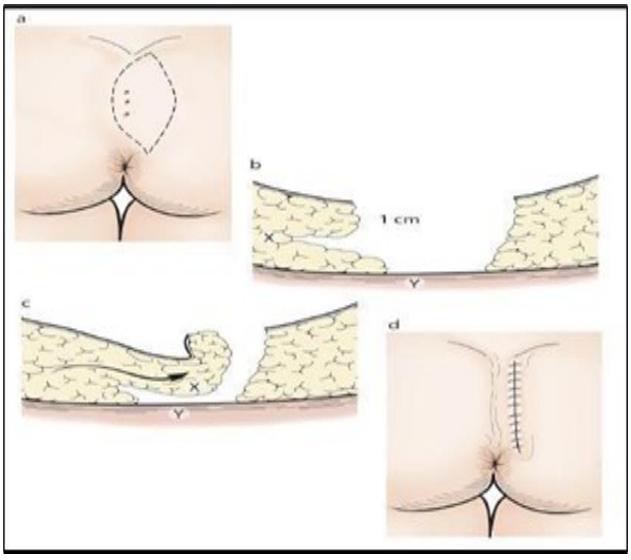

Figure 4: Karydakis procedure.

In extensive natal cleft disease, a long ellipse may be required, but this does not create any problem. However, when there are bilateral sinus extensions it may not be possible to excise all diseased tissue with this technique. The ellipse must be symmetrical, and the surgeon must resist the temptation to cut the lateral part of the ellipse less generously in an attempt to remove less tissue, as this only results in the scar failing to lie away from the midline.

The whole length of the medial side of the incision is then mobilised by undercutting a distance of 2 cm at a depth of 1 cm. In thin patients, the undercutting incision may be on the deep fascia. Any strapping to distract the buttocks is now removed. The first sutures are placed between the limit of the undercutting incision and the deep fascia in the midline.

These draw the flap over and create a new shallow midline sulcus. Pressure applied by an assistant to unroll the flap as the sutures are tied will reduce tension.

A vacuum drain and a second layer of more superficial fat sutures are then inserted, and finally, the skin is apposed with interrupted non-absorbable sutures. The wound lies a few centimetres from the midline and the patient has a new shallow natal cleft with healthy unscarred skin.

METHODS

A prospective study for a period of 12 months from April 2020 to March 2021 was done in our hospital. 110 patients undergoing surgery for pilonidal sinus at MMC Chennai who fulfilled the criteria were included in the study. Patients were divided in two groups of fifty five each into KP and LFS.

The present study was conducted in the institute of general surgery, MMC Chennai. Over a duration of eighteen months. The study was a prospective study comparing Karydakis procedure and Limberg flap surgery for pilonidal sinus disease.

The study was approved by the institutional ethics committee and in line with the declaration of Helsinki and followed the guidelines laid out by Indian council of medical research (ICMR). Written informed consent was taken from the patients participating in the study.

One hundred and ten patients undergoing surgery for pilonidal sinus at MMC, CHENNAI who fulfilled the criteria were included in the study. Patients were divided in two groups of fifty five each using nonprobability purposive sampling, a computer-generated number was given for randomization. Patients who received odd numbers were selected for KP and all the patients on even numbers were selected LFS. Fifty five underwent Karydakis procedure and thirty underwent Limberg flap surgery.

Patients were subjected to clinical examination and routine laboratory investigations preoperatively. All patients were operated on an inpatient basis. Patient's hospital stay for analysis was calculated starting from the day of surgery. Preoperatively patients were kept nil per oral overnight.

Patient were started on a soft oral diet within 4 hours postoperatively. Dressing is removed on the morning after surgery and a local external visual examination is done. Post-operative pain was managed according to the guidelines of French anaesthesia society. Pain was assessed using a visual analogue scale (VAS) where 0 represented no pain and 10 represented the worst pain ever.

Visual analog scale

The aim was to keep the VAS score below 5 with adequate analgesia. Prescribed analgesics were classified using the world health organization (WHO). Analgesics were administered on the basis of the VAS score in <3, class I analgesic (paracetamol); between 3 and 5, class II analgesic (codeine, dextropropoxyphene-paracetamol) or VAS>5, class III analgesic (with paracetamol). If a given analgesic was having a partial effect, an analgesic of the next class was prescribed.

In addition to analgesics, patients are advised antibiotics (in tablet form) ciprofloxacin 500 mg twice daily was given. In the present study suction drains left when the effluent was less than 20 ml per 24 hours. Patient were discharged after removing the drain. Patients were advised to report immediately in the cases of the emergency.

Patients were reviewed between 4-6 weeks postoperatively. On follow up patients were asked about duration to return to normal activities and any other problems they had.

Statistical methods

Descriptive statistical analysis has been carried out in the present study. Significance is assessed at 5% level of significance, Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale in parametric condition between two groups (Inter group analysis) and Mann Whitney U test (two tailed, dependent) has been used to find the significance of study parameters on continuous scale in non-parametric condition within each group.

Chi-square/ Fisher exact test has been used to find the significance of study parameters on categorical scale between two groups.

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min- Max) and results on categorical measurements are presented in number (%). Significance is assessed at 5% level of significance, Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale in parametric condition between two groups inter group analysis) and Mann Whitney U test (two tailed, dependent) has been used to find the significance of study parameters on continuous scale in non-parametric condition within each group.

RESULTS

Age distribution were 36.4% is 16-25 years, 38.2% is 26-35 years, 25.5% is 36-45 years.

Gender distributions were 30.9% are female, 69.1% are male.

Age with procedure by Pearson's chi-squared test were χ^2=7.029, p=0.030<0.05 which shows statistical significant association between age and procedure.

Gender with procedure by Pearson's chi-squared test were χ^2=0.170, p=0.680>0.05 which shows no statistical significant association between gender and procedure.

Wound infection with procedure by Pearson's chi-squared test were χ^2=0.909, p=0.340>0.05 which shows no statistically significant association between wound infection and procedure.

Post op. pain (VAS) with procedure by unpaired t-test were t=2.151, p=0.034<0.05 which shows statistical significant difference at p<0.05 level.

Hospital stay in days with procedure by unpaired t-test were t=10.322, p=0.0005<0.01 which shows highly statistical significant difference at p<0.01 level. Days to return to work with procedure by unpaired t test were t=10.014, p=0.0005<0.01 which shows highly statistical significant difference at p<0.01 level.

One hundred and ten patients undergoing surgery for pilonidal sinus in MMC, Chennai fulfilled the criteria and were included in our study. The 55 underwent KP and 55 underwent LFS. Outcome of both procedure is compared in view of post op pain, wound infection, hospital stay, time needed to return to routine activity.

Table 1: Age distribution.

Age (Years)	N	Percentages (%)
16-25	40	36.4
26-35	42	38.2
36-45	28	25.5
Total	110	100.0

Table 2: Gender distribution.

Gender	N	Percentages (%)
Female	34	30.9
Male	76	69.1
Total	110	100.0

Table 3: Comparison between age with procedure.

Age (Years)		Procedure		Total	χ^2 value	P value
		Karydakis	Limberg			
16-25	Count	26	14	40	7.029	0.030 *
	%	47.3	25.5	36.4		
26-35	Count	15	27	42		
	%	27.3	49.1	38.2		
36-45	Count	14	14	28		
	%	25.5	25.5	25.5		
Total	Count	55	55	110		
	%	100	100	100		

*Statistical significance at p<0.05 level.

Table 4: Comparison between gender with procedure.

Gender		Procedure		Total	χ^2 value	P value
		Karydakis	Limberg			
Female	Count	16	18	34	0.170	0.680 #
	%	29.1	32.7	30.9		
Male	Count	39	37	76		
	%	70.9	67.3	69.1		
Total	Count	55	55	110		
	%	100	100	100		

#No Statistical significance at p>0.05 level

Table 5: Comparison between wound infection with procedure.

Wound infection		Procedure		Total	χ^2 value	P value
		Karydakis	Limberg			
Present	Count	13	9	22	0.909	0.340 #
	%	23.6	16.4	20		
Absent	Count	42	46	88		
	%	76.4	83.6	80		
Total	Count	55	55	110		
	%	100	100	100		

#No statistical significance at p>0.05 level.

Table 6: Comparison of post op. pain (VAS) with procedure by unpaired t test.

Variable	Procedure	N	Mean	SD	T value	P value
Post op. pain (VAS)	Karydakis	55	4.11	1.07	2.151	0.034*
	Limberg	55	3.71	0.88		

*Statistical significance at p<0.05 level.

Table 7: Comparison of hospital stay in days with procedure by unpaired t-test.

Variable	Procedure	N	Mean	SD	T value	P value
Hospital stay in days	Karydakis	55	15.69	2.21	10.322	0.0005**
	Limberg	55	11.65	1.88		

**Highly statistical significance at p<0.01 level.

Table 8: Comparison of days to return to work with procedure by unpaired t-test.

Variable	Procedure	N	Mean	SD	T value	P value
Days to return to work	Karydakis	55	24.40	3.57	10.014	0.0005 **
	Limberg	55	18.45	2.57		

** Highly statistical significance at p<0.01 level.

DISCUSSION

Pilonidal sinus is sinus tract which commonly contains hairs under the skin between the buttocks (natal cleft) a short distance above the anus. The sinus track goes in vertical direction usually between the buttocks, but can occur elsewhere in the body, which is very rare. The name pilonidal taken from the Latin, meaning literally 'nest of hairs'. The exact aetiology of pilonidal sinus is not clear. There are various theories, however the acquired one is accepted by most of surgeons instead of congenital one. With the uncertainty, as to the etiology and the complexities often encountered in its treatment, a pilonidal sinus has been considered as a difficult disease. Wide variety of approaches are employed in dealing with ailment ranging from a conservative treatment to an extensive surgical excision or repair. We have compared Karydakis and Limberg flap repair in our study.

Age and gender distribution

Disease most commonly affect 3rd and 4th decade of life[11].from the cited study it is comparable to our study, 38.2% falls between 26-35 years and most commonly affect males (69.1%).but as per study conducted in Germany in adolescent age group (11-16 years of age) female are affected more, thus suggesting sex hormones might have a role in pilonidal sinus disease.[12] Overall this disease is more common in the sacrococcygeal region among white adult men. The highest age range is 16-26 years, and cyst infection usually starts in early adulthood (18-40 years).[16-19] Gurer et al and Bali et al reported mean ages of 25.5 and 24 years, respectively; in those studies, 95% of the patients were male.[14,15]

Surgical technique

In terms of surgical technique, younger age group (16-25 years) most likely underwent more Karydakis than other set of population, while slightly older age group (26-35 years) underwent Limberg flap procedure. This data is comparable to one another study which is cited below probable reason could be the return time to work, surgical skill of the doctor involved and ease with which each surgery is done.[13]

QoL in terms of surgical site infection (SSI), post operative pain, hospital stay, return to work

Today, considering the importance of time and rapid return to work and life activities, the off-midline approach is recognized as the best surgical technique, which can lead to full recovery within 1-12 days. The ultimate goal of treatment is improved wound healing, low relapse rate, short length of hospitalization, fewer complications, and high patient satisfaction.in our study total 22 patients (20%) had wound infection (SSI) slightly higher preponderance with patients who underwent Karydakis procedure (23.6% vs 16.4% of Limberg flap procedure), 88 patients (80%) didn't have any SSI and recovered normal, it was statistically not significant.

The mean score of postoperative pain was approximately similar in patients undergoing Limberg and Karydakis flap surgeries.in our study those who underwent Karydakis had more pain when compared to Limberg procedure and was statistically significant ($p<0.05$). The pain scores with KP having mean VAS 4.1 and LFS having 3.7. ($p=0.034$) one another similar study showed comparable values.[20]

Post op hospital stay from our study was significantly higher in group which underwent Karydakis procedure 15.6 days vs 11.6 days in limberg flap group this is comparable to study.[13,15]

When comparing time taken for return to work in days in tw groups of patients, a mean of 24 days in KP and 18 days in LFS group was noted.[13,15,20]

This study has its own limitations to begin with it is a single centre study with relatively short study period of 1 year and short follow-up 4-6 weeks, there were several other studies [13-20] which had significantly longer followup and large patient population even though results were comparable to that of cited journal, further studies similar to this should been undertaken in future with larger population and also multimodality comparison with other procedures like Boscom, laser therapy advancement plasty is required to find out the best possible management for pilonidal sinus

CONCLUSION

Pilonidal sinus has always troubled men and women from time to time, in particular those who are involved in high degree of manual labour and extensive physical activity. Though innumerable theoretical postulates have been put forth to identify the cause, the treatment has always been perplexing to every surgeon in order to achieve least post- operative complications, early wound healing and sustainable patient compliance. In this prospective randomized study which involved mostly patients engaged in high degree of manual labour. Limberg flap surgery when compared to Karydakis was more compliant with respect to shorter hospital stay and early return to work though Karydakis procedure faired marginally better with lesser post op pain and incidence of infection.

To conclude, both procedures have overall helped patient with pilonidal sinus when one looks at previously practiced surgical approaches but our patients with poor socioeconomic background showed greater acceptance and compliance with Limberg procedure as they were able to return to work early.

Funding: No funding sources
Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Kanthan A, Hariprasad, Bhaskaran SV. A comparative study on short term outcome of Karydakis versus Limberg procedure for pilonidal sinus. Int J Res Med Sci 2023;11:1153-9.