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Pilonidal Sinus Disease: A General Surgeons Approach

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ABSTRACT:
AIM: Pilonidal Sinus Disease (PSD) is a common Anorectal problem affecting young population; The mainstay of management of PSD is surgical excision of sinus tract and wound closure of midline. The aim is to compare Keystone Perforator Island Flap (KIPF), Limberg Flap (LF) & Karydakis Flap (KF) [widely used in clinical practice to treat pilonidal sinus disease], in terms of early post-op complications. METHODS: This is a prospective, multi-centric study conducted between August 2020 and August 2021. A series of 60 patients were consecutively & randomly divided into 3 groups. 20 patients (Group I) underwent Karydakis Flap, 20 (Group II) underwent Elliptical Excision and Keystone Perforator Island Flap & 20 patients (Group III) underwent Rhomboid Excision and Limberg Flap, to cover the post-surgical raw area and the post op outcome compared in terms of Seroma, Hematoma, Flap Necrosis, Hospital Stay, Wound Dehiscence, Recurrence and Scar Characteristics. RESULTS:This study revealed that operative time was significantly less in KF group (47.5±5.50 Mins) compared to KIPF & LF group which were (82.00±15.68) & (92±22.79) minutes respectively whereas pain-free ambulation and hospital stay was lower in KIPF group which was statistically significant. CONCLUSION:The study revealed that KIPF has low hospital stay and early pain-free ambulation with good scar characteristic.
KEYWORDS: PILONIDAL SINUS, KEYSTONE ISLAND PERFORATOR FLAP, KARYDAKIS FLAP, LIMBERG FLAP

I. INTRODUCTION AND BACKGROUND

Pilonidal Sinus Disease (PSD) is a common Anorectal problem affecting young population; typically in their middle to late twenty's with a reported incidence of 26 cases per 100,000 people. Historically, PSD is associated with obesity, sedentary lifestyle and local trauma / irritation. Presence of sinus opening along the midline of the natal cleft is the hallmark finding [(1)].

The mainstay of management of PSD is surgical excision of sinus tract and wound closure of midline [(2)]. There are many surgical techniques which are being used with varying results without any clear consensus on gold standard techniques for excision of PSD. It's a challenge for General Surgeons to choose among the best available technique for excision of the sinus tract and lower the post-op complications and recurrence. Studies have been conducted in the past comparing efficacy of Limberg Flap (LF) & Karydakis Flap (KF) or Limberg Flap (LF) & Keystone PerforatorIsland Flap (KIPF). However, in the present study, the aim is to compare Keystone Perforator Island Flap (KIPF), Limberg Flap (LF) & Karydakis Flap (KF) [widely used in clinical practice to treat pilonidal sinus disease], in terms of early post-op complications like Seroma, Hematoma, Flap Necrosis, Hospital Stay, Wound Dehiscence, Recurrence and Scar Characteristics after 3 months follow-up.

METHODOLOGY

This is a prospective, multi-centric study conducted between August 2020 and August 2021 in high altitude area. A series of 60 patients were consecutively & randomly divided into 3 groups. 20 patients (Group I) underwent Karydakis Flap, 20 (Group II) underwent Elliptical Excision and Keystone Perforator Island Flap & 20 patients (Group III) underwent Rhomboid Excision and Limberg Flap, to cover the post-surgical raw area. The nature of surgical procedures was explained to the patients and their consent was obtained. The surgeries were performed under spinal anesthesia in the prone jack-knife position. Surgical time was noted using stop-watch, from skin incision to closure of wound. Dissection and Homeostasis were performed using electrocautery. Drain was placed as per requirement (depending on tissue handling and dissection). Wound closure was done with Prolene 2-0. Post-op pain was assessed using VAS & non opioid analgesia was used for pain control. Scar characteristics and recurrence was noted after 03 months follow-up. None of the patients lost follow-up.

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Study population was selected as per the Inclusion criteria: Age above 18 yrs, 03 months follow-up. Exclusion criteria: Chronic ill patients, bed-ridden patients, patients on steroids or immunomodulator, diabetic patients.

SURGICAL TECHNIQUE

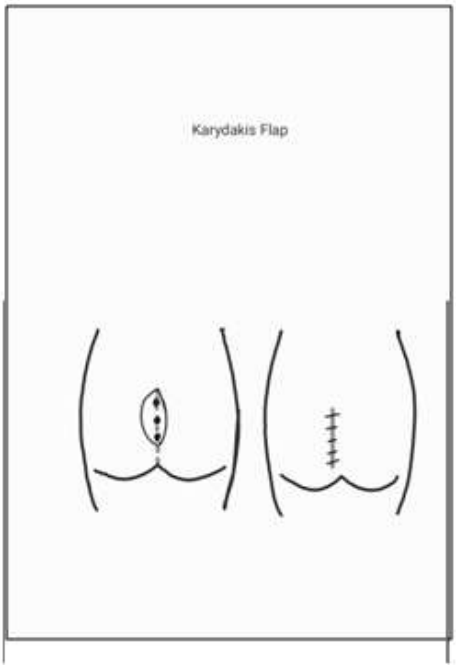

Figure 1:

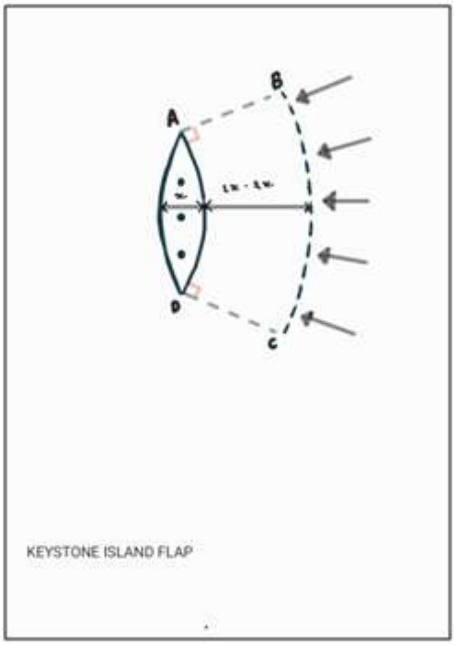

Figure 2:

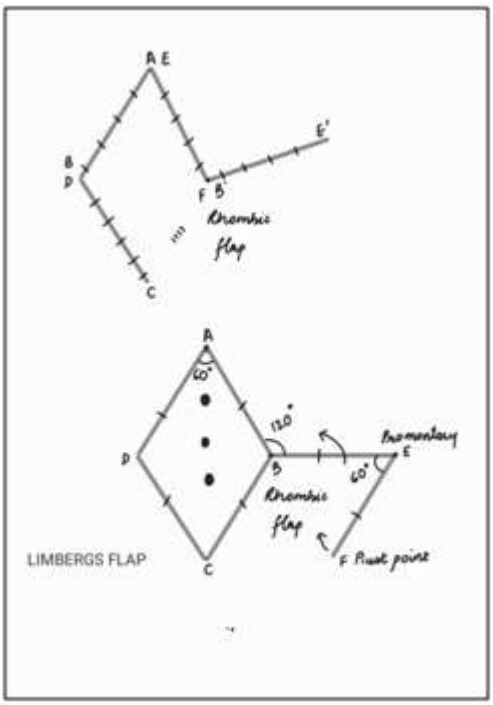

Figure 3:

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II. RESULTS

The present study was performed on 60 patients with age above 18 years, between August 2020 and August 2021. 60 patients were randomly divided into 3 groups. 20 patients (Group I) underwent Karydakis Flap, 20 (Group II) underwent Elliptical Excision and Keystone Perforator Island Flap & 20 patients (Group III) underwent Rhomboid Excision and Limberg Flap to cover the post-surgical raw area.

TABLE - 1:

GROUP		AGE	BMI	OPERATIVE TIME	HOSPITAL STAY	PAIN-FREE AMBULATION
KARYDAKIS FLAP	Mean	30.95	22.35	47.50	5.85	4.35
	Median	31.50	22.22	45.00	5.50	4.00
	Std. Deviation	6.68	2.42	5.50	1.46	0.67
KEYSTONE FLAP	Mean	31.65	22.93	82.00	3.45	2.15
	Median	34.50	23.12	90.00	3.00	2.00
	Std. Deviation	6.95	2.81	15.68	1.32	0.59
LIMBERG FLAP	Mean	31.05	22.92	92.00	5.55	3.55
	Median	32.50	23.41	90.00	4.00	3.00
	Std. Deviation	6.60	2.36	22.79	2.74	1.32
	p Value	0.897	0.586	<0.001	<0.001	<0.001
	Significance	Not Significant	Not Significant	Significant	Significant	Significant

The demographic profile (TABLE-1) is comparable in all three groups with no statistical significance seen. However, the mean operative time in KF was 47.50±5.50 minutes which was significantly less compared to KIPF: 82±15.68 minutes and LF: 92±22 minutes respectively. Similarly, the hospital stay in KIPF was 3.45±1.32 days compared to 5.85±1.46 daysin KF & 5.55±2.74 days in LF respectively and statistically significant. Pain-free ambulation calculated in days using VAS was significantly less in KIPF: 2.15±0.59 days compared to KF: 4.35±0.67 days & LF: 3.55±1.32 days respectively.

Early post-op complications (TABLE-2) seen in all 3 groups were statistically non-significant. However, wound dehiscence was observed in 4(20%) patients in KF, 1(5%) each in KIPF & LF group. Seroma formation was seen in 5(25%) patients in KF, 1(5%) in KIPF and 2(10%) patients in LF group. Flap necrosis was observed in 1(5%) patient in KF & 3(12%) in LF. 1(5%) patient developed hematoma in LF group.

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TABLE - 2:

		GROUP			TOTAL	P VALUE	SIGNIFICANCE
		KARYDAKIS FLAP	KEYSTONE FLAP	LIMBERG FLAP			
WOUND DEHISCENCE	NO	16 (80%)	19 (95%)	19 (95%)	54 (90%)	0.344	Not Significant
	YES	4 (20%)	1 (5%)	1 (5%)	6 (10%)		
SEROMA	NO	15 (75%)	19 (95%)	18 (90%)	52 (86.67%)	0.246	Not Significant
	YES	5 (25%)	1 (5%)	2 (10%)	8 (13.33%)		
FLAP NECROSIS	NO	19 (95%)	20 (100%)	18 (90%)	57 (95%)	0.310	Not Significant
	YES	1 (5%)	0 (0%)	2 (10%)	3 (5%)		
HEMATOMA	NO	20 (100%)	20 (100%)	19 (95%)	59 (98.33%)	0.362	Not Significant
	YES	0 (0%)	0 (0%)	1 (5%)	1 (1.67%)		
ADDITIONAL MANAGEMENT	NO	14 (70%)	19 (95%)	14 (70%)	47 (78.33%)	0.107	Not Significant
	YES	6 (30%)	1 (5%)	6 (30%)	13 (21.67%)		

During follow-up after 03 months, none of the groups presented with recurrence but 04 patients (20%) in KF group had scar tenderness with hypertrophic scar.

TABLE - 3:

		GROUP			TOTAL	P VALUE	SIGNIFICANCE
		KARYDAKIS FLAP	KEYSTONE FLAP	LIMBERG FLAP			
ADDITIONAL MANAGEMENT	DELAYED PRIMARY SUTURING	5 (25%)	0 (0%)	2 (10%)	7 (11.67%)	0.070	Not Significant
	SECONDARY INTENTION HEALING	1 (5%)	1 (5%)	2 (10%)	4 (6.67%)		
	SSG	0 (0%)	0 (0%)	2 (10%)	2 (3.33%)		
	NO	14 (70%)	19 (95%)	14 (70%)	47 (78.33%)		

SCAR CHARACTE-RISTIC	HYPERTROPH-IC SCAR	5 (25%)	1 (5%)	2 (10%)	8 (13.33%)	0.066	Not Sig-nificant
	SUPPLE	15 (75%)	19 (95%)	15 (75%)	49 (81.67%)		
	NO	0 (0%)	0 (0%)	3 (15%)	3 (5%)		
SCAR TENDER-NESS	NO	16 (80%)	20 (100%)	20 (100%)	56 (93.33%)	0.030	Signifi-cant
	YES	4 (20%)	0 (0%)	0 (0%)	4 (6.67%)		

III. DISCUSSION

Pilonidal Sinus Disease (PSD), as the Latin origin of the name suggests hair (pilus) and the nest (nidus), is caused by shed hair drawn into the natal cleft by motion from the buttocks. This motion creates a vacuum effect forcing hair into the skin through the pits in the midline. The foreign body reaction produced by trapped hair may lead to hair filled abscess in the cavity. The abscess can drain spontaneously through the skin or back through the sinus tracts. Men are at higher risk because they tend to be more hirsute. Other associations with Pilonidal disease are obesity (37%), sedentary occupations (44%) and local irritation or trauma (34%) [(3)]. Majority of patients will initially present with an abscess cephalad to natal cleft. The presence of sinus openings along the midline of the natal cleft 4 to 8 cm from the anus is the hallmark finding in pilonidal disease.

Usually KF, LF & KIPF techniques are applied to treat PSD without any clear consensus that which procedure has a better and uneventful outcome. Previously, various studies have been conducted comparing KIPF vs. LF or KF vs. LF. In our study we compared all 3 surgical procedures in terms of early & late post-op outcomes.

This study revealed that operative time was significantly less in KF group (47.5±5.50 Mins) compared to KIPF & LF group which were (82.00±15.68) & (92±22.79) minutes respectively whereas pain-free ambulation and hospital stay was lower in KIPF group which was statistically significant (TABLE-1).

In Table-4 we have compared the results of this study with various studies conducted in past. Marius D. Roatis et al [(4)] in their comparative study of LF and KIPF revealed pain free ambulation and hospital stay in both the groups were statistically non-significant, whereas Akin Calisir & Ilhan Ece et al [(6)] in their study found a significant low operative time in KIPF group compared to LF and no statistical significance in hospital stay in both the groups.

Mina Alvandipour et al.[(5)] in their single blinded randomised trail of KF and LF in management of PSD revealed no statistical significance in hospital stay in both the procedure whreas the operative time was low in karydakis group.

İlhan Bali et al[(7)] in their study of surgical management of recurrent PSD revealed KF group has low mean operative time, hospital stay and day to pain free ambulation compared to LF.

Similarly Sabahattin Destek et al (8) in their study about KF and LF revealed low operative time in KF with no difference in hospital stay post procedure.

KF being relatively simple has less operative time but the wound closure may be under significant tension resulting in more complication. KIPF has proven to be superior technique with better outcome and low complication rate as revealed by present study.

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TABLE - 4:

	KARYDAKIS FLAP (KF)			KEYSTONE PERFORATOR ISLAND FLAP (KIPF)			LIMBERG FLAP (LF)		
	HOSPITAL STAY (Days)	OPERATIVE TIME (Mins)	PAIN FREE AMBULATION (Days)	HOSPITAL STAY(Days)	OPERATIVE TIME (Mins)	PAIN FREE AMBULATION (Days)	HOSPITAL STAY (Days)	OPERATIVE TIME (Mins)	PAIN FREE AMBULATION (Days)
	14.6 ± 2.46	41.7 ± 4.22					16.8 ± 2.39	51.5 ± 4.17	
Marius D. Roatis et al [4]	-	-	-	2.33 ± 0.48	-	9.06 ± 1.48	4 ± 1.98		9.60 ± 1.45
Mina Alvandipour et al [5]	1.41 ± 0.49	23.03 ± 6.06					1.48 ± 0.50	29.15 ± 7.69	
Akin Calisir et al [6]				2.21 ± 0.84	35.86 ± 8.29		2.42 ± 0.65	45.31 ± 6.19	
İlhan Bali et al [7]	1.44	48	1				3	54	2
Sabahattin Destek et al [8]	2.5	45					2.3	54	
Present Study	5.85 ± 1.46	47.50 ± 5.5	4.35 ± 0.67	3.45 ± 1.32	90.0 ± 15.68	2.15 ± 0.59	5.55 ± 2.74	92.0 ± 22.79	3.55 ± 1.32

In this study, although there is no statistical significance in post-op complications, 03 patients developed flap necrosis (TABLE-2). 01 in KF and 02 patients in LF group managed with healing by secondary intention and SSG cover respectively. 04 patients in KF group continued to be symptomatic even after 03 months follow-up with scar tenderness compared to KIPF and LF which is statistically significant (TABLE-3).

The fundamental of flap surgery is the intact vascular supply to the flap, which prevents flap necrosis and hastens wound healing. In KF there is some degree of tension in wound which results in wound dehiscence. In LF there is massive tissue mobilization & it relies on axial supply, whereas in KIPF there are multiple perforators supplying the flap and minimal tissue dissection is required, enhancing tension-free closure and thus there is minimal chance of wound dehiscence and seroma formation which further enhances early recovery and early return to work. Tension on wound line may disrupt normal wound healing process and may lead to formation of hypertrophic scar.

The study revealed that KIPF has low hospital stay and early pain-free ambulation with good scar characteristic. Though there is no statistical significance observed in early post-op complication, the results clearly show that KIPF is a better surgical technique for managing PSD as it has low complication rate compared to KF and LF, has early recovery, reducing morbidity that is associated with other procedures as well as cost benefits, resulting in early return to work and patient satisfaction.

LIMITATION

The study was conducted in a small subset of patient with a defined geographical location and uncongenial environment with limited resources. The results have to be validated in large sample

size & general population with long term follow-up.

Till then PSD will continue to be a challenge to general surgery practice.

REFERENCES

[1]. Townsend CM, Beauchamp RD, Evers BM, Mattox KL. Sabiston textbook of surgery. Elsevier Health Sciences; 2016 Apr 22.
[2]. Bascom J. Surgical treatment of pilonidal disease. Bmj. 2008 Apr 17;336(7649):842-3.
[3]. Søndenaa K, Andersen E, Nesvik I, Søreide JA. Patient characteristics and symptoms in chronic pilonidal sinus disease. International journal of colorectal disease. 1995 Feb;10(1):39-42.
[4]. Roatis MD, Georgescu AV. Rhomboid Flap vs. Keystone Perforator Island Flap (KPIF) in the Treatment of Pilonidal Sinus Disease: Comparison of Short-Term Results. International Journal of Clinical Medicine. 2020 Jul 14;11(7):454-64.
[5]. Alvandipour M, Zamani MS, Ghorbani M, Charati JY, Karami MY. Comparison of Limberg flap and Karydakis flap surgery for the treatment of patients with pilonidal sinus disease: a single-blinded parallel randomized study. Annals of Coloproctology. 2019 Dec;35(6):313.
[6]. Calisir A, Ece I. Comparison of the Keystone flap and the Limberg flap technique in the surgical treatment of pilonidal sinus disease. Updates in Surgery. 2021 Dec;73(6):2341-6.
[7]. Bali İ, Aziret M, Sözen S, Emir S, Erdem H, Çetinkünar S, İrkörücü O. Effectiveness of Limberg and Karydakis flap in recurrent pilonidal sinus disease. Clinics. 2015;70:350-5
[8]. Destek S, Bektaşoğlu HK, Kunduz E, Akyüz MN. Comparison of postoperative quality of life of Limberg flap and Karydakis flap in pilonidal sinus operations. Turkish Journal of Surgery. 2020 Mar;36(1):59.