KEYSTONE FLAP VERSUS LIMBERG FLAP IN THE MANAGEMENT OF PILONIDAL SINUS: RANDOMISED CONTROL TRIAL

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Introduction

Pilonidal sinus (PS) is a chronic inflammatory condition typically affecting the sacrococcygeal region, though it may occur in other body parts. First reported in 1833 and named in 1880, it is most common in young males, particularly those aged 15–30. The disease is often associated with hair insertion, friction, poor hygiene, obesity, and prolonged sitting. Though earlier theories suggested a congenital origin, current evidence supports an acquired pathogenesis. PS commonly presents as painful midline pits, sometimes forming abscesses or sinus tracts. Differential diagnoses include perianal abscesses and hidradenitis suppurativa. Management strategies range from conservative approaches like shaving, phenol injections, and PRP to surgical excision and flap techniques. Among surgical methods, off-midline closure (e.g., Karydakis, Limberg, and Keystone flaps) shows reduced recurrence. The choice of treatment depends on disease complexity, with goals of minimizing morbidity, ensuring faster healing, and maximizing patient satisfaction and return to normal function.

Aim of the Work

This study aims to compare the Keystone Flap (KSF), & the Limberg Flap (LF) approaches, in terms of intra-op time, intra-op bleeding, and early post-op complications like Seroma, Hematoma, Flap Necrosis, Hospital Stay, Wound Dehiscence, Recurrence and Scar Characteristics within a 6 months follow-up period.

Secondary outcome includes complete wound-healing time, duration of the incapacity to work, quality of life and/or patient satisfaction (graded from 1 to 5, with 1 being the least satisfied and 5 being the most satisfied), postoperative pain, wound infection, bleeding or hematoma, skin wound complications, and duration of hospital stay.

Patients and Methods

A randomized controlled trial was conducted from September 2023 to January 2024 at Alexandria Main University Hospital to compare the Keystone Flap (KSF) and Limberg Flap (LF) techniques in treating pilonidal sinus disease. Fifty patients aged 18–50 years were included and randomized into two groups: Group I (LF) and Group II (KSF). Exclusion criteria included age <18 or >50, recurrent or complex disease, and comorbidities like uncontrolled diabetes or immunodeficiency. All patients provided informed consent and underwent preoperative counseling. Surgeries were performed under spinal anesthesia in the prone position with standard antiseptic preparation. LF involved rhomboid excision and transposition of a gluteal flap. KSF was designed as a curvilinear flap advanced to cover the excised area with minimal undermining. Wounds were closed in two layers, and drains were removed when output was <20 mL/day. Follow-up included wound healing assessment, complications, recurrence, and return to activity. Statistical analysis was performed using SPSS v20.

Results

RESULTS (PICTURES)

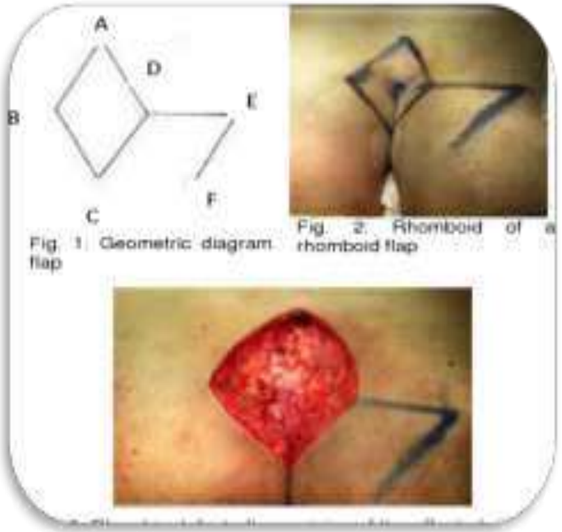

Fig. 1 Geometric diagram

Fig. 2 Rhomboid of a rhomboid flap

RESULTS (TABLES):

Comparison between the two studied groups according to intraoperative data

	LF group(n = 25)		KSF group(n=25)		Test of Sig.	p
	No.	%	No.	%		
Type of anesthesia						
General	0	0.0	0	0.0	–	–
Spinal	25	100.0	25	100.0		
Total operative time						
Min. – Max.	61.0 – 86.0		50.0 – 65.0		t= 10.555*	<0.001*
Mean ± SD.	73.44 ± 7.94		54.96 ± 3.69			
Median (IQR)	73.0 (65.0 – 79.0)		55.0 (52.0 – 58.0)			
Defect Dimensions						
Defect length (cm)	5.9 ±1		5.6 ± 0.8		–	0.09
Defect width (cm)	4.2 ± 0.4		3.7 ± 0.7			0.42
Resection time						
Min. – Max.	15.0 – 25.0		11.0 – 25.0		U= 232.50	0.108
Mean ± SD.	19.80 ± 4.20		17.28 ± 2.97			
Median (IQR)	20.0 (15.0 – 25.0)		16.0 (15.0 – 20.0)			
Flap reconstruction time						
Min. – Max.	43.0 – 71.0		32.0 – 45.0		t= 9.054*	<0.001*
Mean ± SD.	53.64 ± 8.12		37.84 ± 3.20			
Median (IQR)	50.0 (48.0 – 59.0)		38.0 (35.0 – 40.0)			
Blood Loss (ml)						
<50	13	52.0	13	52.0	χ^2= 0.381	MCp= 1.000
50 – 100	10	40.0	11	44.0		
>100	2	8.0	1	4.0		
Min. – Max.	20.0 – 130.0		20.0 – 120.0		U= 275.00	0.465
Mean ± SD.	59.20 ± 31.35		52.80 ± 27.65			
Median (IQR)	45.0 (35.0 – 80.0)		45.0 (30.0 – 70.0)			

Conclusion

This study compared the Keystone Flap (KSF) and Limberg Flap (LF) techniques in the surgical management of pilonidal sinus disease. Both methods were effective, but the Keystone Flap demonstrated superior outcomes in several areas. It significantly reduced operative time, healing duration, postoperative pain, and time to return to normal activity. Additionally, patients treated with the Keystone Flap reported higher satisfaction scores and required fewer postoperative visits and dressings, with fewer complications such as wound dehiscence and seroma.