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Modified Advancement Flaps a Promising Approach for the Pilonidal Sinus Surgery

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Abstract: Background: Pilonidal sinus disease, a chronic inflammatory disease, affects sacrococcygeal soft tissue, especially in young adults. The ideal treatment for Pilonidal sinus disease stays divergence.

Aim of the study: the purpose of this study was to share the findings of the Modified advancement flap technique surgery combined with vacuum-assisted closure for treating Pilonidal sinus disease.

Method: This prospective study was conducted from January 2022 to October 2024 in Al-Diwaniyah Teaching Hospital, the study included 63 patients with mean age of 17.44±3.02 years range (15-28) mostly were below 20 years, 52 (82.5%). Males were 40 (63.5%) more common than females 23 (36.5%). Under general anesthesia, all patients underwent modified advancement flap with vacuum-assisted closure. The patient's, surgical time, hospital stay, post operative hematoma, necrosis, and recurrence rate were recorded. The visual analogue scale (VAS) score and the Vancouver scar score were used to score patients' pain and scars in the surgical area.

Results: Mean operative time was 34.21±4.23 minutes range between (30-40), mean healing

time was 14.44±0.64 days range between (14-16), while mean duration of drain removal was 14.0±0.0 days among patients, no patients were lost to follow-up. None of the patients experienced post-operative recurrence

Post operative pain score was 3.49±0.50 range between (3-4), scar score was range between 3.39±0.97 (6-8), while cosmetic effect score was 8.08±0.70 range between (7-9).

Conclusions: Modified advancement flap surgery is an effective and innovative method for the treatment of Pilonidal sinus disease, with no recurrence rate and rapid recovery.

Key words: Pilonidal sinus disease, Postoperative complication, recurrence.

Introduction:

The term ‘pilonidal sinus’ describes a condition found in the natal cleft overlying the coccyx, consisting of one or more, usually non-infected, midline openings, which communicate with a fibrous track lined by granulation tissue and containing hair lying loosely within the lumen [(1)]

26 the prevalence of pilonidal sinus cases per 100,000, affecting males thrice as much as females. Men are thought to be at higher risk because of their hirsute nature. The pilonidal sinus is also associated with obesity (37%), sedentary occupation (44%), and local irritation or trauma (34%). It may manifest as pilonidal cyst, sinus, or abscess, and inflammation may lead to rapid progression of the disease. During the Second World War, pilonidal disease very commonly appeared in jeep drivers, so called "jeep disease" [(2)]

The pathogenesis of the disease is still unclear, with prominent theories including: 1. “Congenital theory ,this theory posits that the pilonidal sinus in the sacrococcygeal region results from skin depression in the intergluteal fissure, which may stem from a developmental anomaly or congenital malformation in the sacrococcygeal region and 2. “Acquired theory”: This theory suggests that inflammatory reactions arise from blockages within hair follicles or hair penetration into the follicle. It encompasses Karydakis’ foreign body reaction theory and Bascom's hypothesis of “midline concavity” Related studies have indicated that foreign hair can serve as a trigger for sinus formation, as even short, broken hair resulting from haircuts can puncture intact skin. Moreover, the most robust hairs found within the sinus are primarily of occipital origin reported that a deeper natal cleft can increase susceptibility to pilonidal sinus disease. This deeper cleft may facilitate the complete erection of cut hair, thereby exerting significant local force on the skin. In addition, recent studies have shown that sweating may have a protective effect on pilonidal sinus disease rather than being a risk factor [(4),] Although a study often described incorrectly as a cyst, pilonidal cavities are not true cysts and lack a fully epithelialized lining; however, the fibrous tracts of the sinus may be epithelialized. [(5)]

The condition is seen much more frequently in men than in women, usually after puberty and beforefourth decade of life and is characteristically seen in dark-haired individuals rather than those with softer blond hair (Oldham). Patients complain of intermittent pain, swelling and discharge at the base of the spine, but little in the way of constitutional symptoms. There is often a history of repeated abscesses that have burst spontaneously or which have been incised, usually

away from the midline. The primary sinus may have one or many openings, all of which are strictly in the midline between the level of the sacrococcygeal joint and the tip of the coccyx and the typical location of the midline pits is approx. 5 cm posterior to the anus overlying the sacrum and coccyx—In the intergluteal cleft. Secondary openings are marked by elevations of granulation tissue and discharge of seropurulent material hairs seen protruding from the pit . Risk of cancer, Cancer originating on the background of chronic pilonidal sinus disease (PSD) is extremely rare. The first case was reported by Heinrich Wolff in 1900, who described a 21-year-old woman with two recurrences after surgical treatment of pilonidal sinus. With no initial signs of malignancy [1,7,8] The purpose of this study was to share the findings of the Modified advancement flap technique surgery combined with vacuum-assisted closure for treating PSD

Methods:

We have a prospective observational cohort study of 63 sequential patients with sacrococcygeal pilonidal sinus disease (PNS) the patients were admitted to Al- Diwaniyah Teaching Hospital during the period from: January 2022 to October 2024

All patients Pre, intra- and post-operative data were obtained and analyzed with patient consent and Hospital approve.

Surgery was performed by senior surgeon. The type of surgical procedure was selected to match specific inclusion criteria

PNS with primary sinus not infected exclusion criteria

1. PNS with multiple and secondary sinuses
2. Recurrent PNS with previous median scar
3. Acute PNS with abscess
4. immune compromise patients

The analysis of the data was performed using the Statistical Package for the Social Sciences software, version 23. The data were presented in simple measures of percentage, mean, range (minimum-maximum) values, and standard deviation (SD). The level of significance for the differences in the quantitative data was tested using Student t -test, and the level for the differences in the qualitative data, using the Pearson chi-squared test. Values of $p < 0.05$ were considered statistically significant.

Surgical procedure

Patients were taken to surgery on the day of their hospitalization. They were operated on under general anesthesia in line with the decision taken by the patient and the anesthesiologist. In the operating room, the surgical area was shaved, and Preop prophylactic dose 3rd generation cephalosporin IV was given to all patients during anesthesia induction. The patient' was placed in the Jack-knife position with pillow under the pelvic girdle and chest and was lateralized with the help of adhesive tapes on both sides to make the surgical field more visible, Gluteal and sacral regions were prepared with the help of iodine solution, Prone position with pillow under the pelvic girdle and chest

A curved vertical incision 4 cm from the median sulcus ipsilateral to the sinus created with advancement flap up to 4 cm from the opening of the sinus the mass of the granulation tissue

The medial flap crossing the midline involving the opening of the =sinus within the flap

Care to the skin avoiding thermal injury

Dissection down to the presacral fascia

The opening of the sinus curated and left without closure

Meticulous hemostasis of the dead space and radivac drain put in the presacral areal Inverted intermitted sutures using vicryl 0 size obliterating the dead space completely over the active drain

Skin closed with subcutical suture of nylon OO

All Patients discharged in day 0

Drain left for two wks. post operatively

Change of dressing on day 5

Assessments

The length of the patient's surgery, hospital stay, and the incidence of post-operative hematoma, necrosis, and recurrence were recorded. A post-operative pain score was evaluated on the day after surgery. "Recurrence" was defined as the return of disease symptoms once the wound had fully healed. The first follow-up took place 14 days post-surgery, with additional check-ups at 6 months and one year. During these follow-ups, the recurrence rate and surgical scar were assessed using the Vancouver scar score.

Results:

A total of 63 patients were included with mean age of 17.44±3.02 years range (15-28) mostly were below 20 years, 52 (82.5%). Males were 40 (63.5%) more common than females 23 (36.5%).

Hair type was fair among 20 (31.7%) patients and thick among 43 (68.3%) patients. Skin was corny colored among 25 (39.7%) patients and black colored among 38 (60.3%) patients.

The location of sinus was Median among 42 (67.7%) patients and Lateral among 20 (32.3%) patients. Table 1.

Table 1: Demographic and clinical data of patients

Variables		No.	%
Age group/ years	<20	52	82.5%
	≥20	11	17.5%
Gender	Male	40	63.5%
	Female	23	36.5%
Hair Type	Fair	20	31.7%
	Thick Hairy	43	68.3%
Skin color	Corny Colored	25	39.7%
	Black Colored	38	60.3%
Location of sinus	Median	42	67.7%
	Lateral	20	32.3%

Post-Surgery complications were Hematoma among 2 (3.2%) patients, Partial flap necrosis among 2 (3.2%) patients, Complete flap necrosis among one (1.6%) patient, and Hypertrophic scar among 4 (6.3%) patients. Table 2, figure 1.

There was no recurrence of symptoms after surgery within 6 months and 1 year follow-up among all patients. No paresthesia was observed among all patients.

All 63 (100%) patients were discharged home during the 1st 24 hours postoperative. Table 2.

Table 2: Surgical outcomes among patients

Variables	No.	%
Post-Surgery Outcomes:		
Hematoma	2	3.2%
Partial flap necrosis	2	3.2%
Complete flap necrosis	1	1.6%
Hypertrophic scar	4	6.3%
Recurrence of symptoms after surgery:		
Recurrence after 6 months	0	0.0%
Recurrence after 1 year	0	0.0%
Paresthesia	0	0.0%
Discharge home during 1st 24 hours postoperative	63	100.0%

Mean operative time was 34.21±4.23 minutes range between (30-40), mean healing time was 14.44±0.64 days range between (14-16), while mean duration of drain removal was 14.0±0.0 days among patients. Table 3.

Visual analysis score (pain score) was 3.49±0.50 range between (3-4), Vancouver scar score was 3.39±0.97 range between (2-5), while cosmetic effect score was 8.08±0.70 range between (7-9). Table 3, figure 2.

Table 3: Mean surgical outcomes among patients

Variables	Minimum	Maximum	Mean	SD
Operative time/ min	30	40	34.21	4.23
Healing time/ days	14	16	14.44	0.64
Drain removal/ days	14	14	14.00	0.00
Visual analysis score	3	4	3.49	0.50
Vancouver Scar score	2	5	3.39	0.97
Cosmetic effect score	7	9	8.08	0.70

Distribution of demographic and clinical data of patients regarding their gender were shown in table 4.

The age of 20 years or older was significantly more common among males (P=0.005). While most post-surgery complications were observed in males, the association was not statistically significant (P > 0.05). Table 4.

Table 4: Distribution of demographic and clinical data of patients regarding their gender

Variables		Gender				P* value
		Male		Female		
		No.	%	No.	%	
Age group/ years	<20	29	55.8%	23	44.2%	0.005
	≥20	11	100.0%	0	0.0%	
Location of sinus	Median	23	54.8%	19	45.2%	0.054
	Lateral	17	81.0%	4	19.0%	
Post-Surgery Outcomes:						
Post-op hematoma	Yes	2	100.0%	0	0.0%	0.52
	No	38	62.3%	23	37.7%	
Partial flap necrosis	Yes	2	100.0%	0	0.0%	0.52
	No	38	62.3%	23	37.7%	
Complete flap necrosis	Yes	1	100.0%	0	0.0%	1
	No	39	62.9%	23	37.1%	
Hypertrophic scar	Yes	3	75.0%	1	25.0%	1

	No	37	62.7%	22	37.3%	

**** Chi-Square or Fisher's Exact Test***

Post operative pain score among males was 3.38±0.49 which was significantly lower than that among females (3.70±0.47), P=0.01.

Scar score among males was 7.18±0.87 which was significantly higher than that among females (6.70±0.63), P=0.02. Table 5.

Table 5: Mean distribution of surgical data of patients regarding their gender

Variables	Gender				P* value
	Male		Female		
	Mean	SD	Mean	SD	
Operative time/ min	34.75	4.38	33.26	3.88	0.81
Healing time/ days	14.55	0.71	14.26	0.45	0.08
Drain removal/ days	14.00	0.00	14.00	0.00	1
Post operative pain score	3.38	0.49	3.70	0.47	0.01
Scar score	7.18	0.87	6.70	0.63	0.02
Cosmetic effect score	8.02	0.83	8.17	0.39	0.42

****Independent Samples Test***

Discussion

The optimal approach for treating sacrococcygeal pilonidal sinus disease is a topic of discussion. The primary aim is to identify the most suitable technique that minimizes early postoperative complications, reduces the duration of hospitalization, and lowers the risk of long-term recurrences.

Our study involves 63 patients undergoing a new and promising surgical technique for treating pilonidal sinus, known as modified advancement flap. The key technical aspects of our study to ensure the gluteal cleft is flattened along its entire length, position of the scar away from the midline, and minimize the removal of subcutaneous fat tissue. Since this condition mainly affects the skin, excessive removal of subcutaneous tissue is not justified and may be detrimental and cause ischemia.

As for patient characteristics we found during our study, there is slightly predominance of young male age mean age of 17.44±3.02 years range (15-28) mostly were below 20 years, 52 (82.5%), Males were 40 (63.5%) more common than females 23 (36.5%) In a study done by M Kamil Yildiz et al Sacrococcygeal pilonidal sinus disease typically manifests between the ages of 15 and 24, with symptoms seldom seen before age 15 or after age 40. In patients undergoing the Karydakis procedure, the average age was 27 ± 7.71 years, spanning from 14 to 57 years, with 86.8% being male. Another study reported an average age of 25.5 years for those treated with the Karydakis technique, with ages ranging from 18 to 41 years, and 95% of the patients were male. Gurer et al. while other study involving 57 surgical patients, the gender distribution was equal, with 28 women and 29 men. [13,14]

Hair and Skin type was fair among 20 (31.7%) patients and thick among 43 (68.3%) patients, it was corny colored among 25 (39.7%) patients and black colored among 38 (60.3%) patients. Our study shows a correlation between black hair color and thick hair which increases the likelihood of developing pilonidal disease. Also, many studies referred to the correlation between thick hair and the recurrence rate. That's why it's advised to take Lazer ablation session after pilonidal sinus surgery to decrease the recurrence rate over long time.[15]

*The location of sin*us was Median among 42 (67.7%) patients and Lateral among 20 (32.3%) patients. Skin openings in midline were 47/52, and lateral was 18/52 in Excision and suture in the midline while Skin openings in midline 53/60 and lateral was 26/60 in Karydakis flap

surgery.[11]

Surgical Technique - Modified Advancement Flap: The Modified Advancement Flap technique employed in our study was characterized by its short operating time and minimal complications. The average operative time was 34.21 ± 4.23 minutes, range between (30-40)min and its combatable with operative time of excision and suture method as reported by *Oskar Hemmingsson et al*, which also show the difference from the time in the Karydakis method as in sequence Operating time (min), 31.5 (25 to 36), 60 (50 to 69).[11]

The incision was curved vertically 4 cm from the median sulcus ipsilateral to the sinus created with advancement flap up to 4 cm from the opening of the sinus, another study about the incision of Karydakis technique was semi lateral elliptic incision including the sinus [13], and Limberg technique was rhombic incision(rhomboid flap) large size wound needs excessive mobilization [18] .

mean duration of drain removal was 14.0±0.0 days among patients, Emre Gündoğdu et al, performed operation such as Fasciocutaneous Elliptical Rotation Flap reported Mean time of the patients' drain removal was 2.20 ± 1.18 days. [20], Steven C Immerman et al, drain is removed sometime after post-operative day 3,[17]

Regarding to the discharged All patients 63 (100%) were discharged home during 1st 24 hours postoperative. While in other study in flap method surgeries such as Karydakis reported mean hospital length of stay was 3.34 ± 1.42 days, and for Limbreg flap procedure days (mean ± SD) 23.2 ± 14.7. Yaoyao Song et al.[13,16]

Mean healing time was 14.44±0.64 days range between (14-16). Oskar Hemmingsson reported period was 3-4 weeks using the primary midline closure technique but has been reported to be 12.4–20 days in the Karydakis method.[13]

References:

1. Bailey & Love's Short Practice of Surgery - 26th Edition
2. Pilonidal sinus disease with especially reference to Limberg flap 24 August 2015, Version of Record 1 October 2015.
3. Comparison of Limberg Flap and Karydakis Flap Surgery for the Treatment of Patients with Pilonidal Sinus Disease: A Single-Blinded Parallel Randomized Study. 2019 May
4. The application of ERAS in pilonidal sinus: comparison of postoperative recovery between primary suture and Limberg flap procedure in a multicenter prospective randomized trial. 2024 Jun
5. Pilonidal Disease, Colon Rectal Surg. 2011 Mar
6. Failed Pilonidal Surgery: New Paradigm and New Operation leading to cure 2002/10
7. Demographic overview of pilonidal sinus carcinoma: updated insights into the incidence, Colorectal Dis. 2023 Feb -Illustrated Surgery A Road Map 8
8. Advancements and Innovations in the Surgical Management of Sacrococcygeal Pilonidal Sinus: A Comprehensive Review 2024 May 26
9. 2024 Aug 8 Postoperative Outcomes of Bascom Cleft Lift Versus Excision with Secondary Wound Healing for Pilonidal Sinus Disease: A Multicenter Retrospective Analysis
10. Excision and suture in the midline versus Karydakis flap surgery for pilonidal sinus: randomized clinical trial 2022 Mar 15
11. Pilonidal Cyst and Sinus Alexander T. Nixon August 8, 2023.

12. Karydakis Flap Procedure in Patients with Sacrococcygeal Pilonidal Sinus Disease: Experience of a Single Centre in Istanbul 2013 May 14
13. Pilonidal sinus in pediatric age: primary vs. secondary closure
14. Evaluation of 60 patients with pilonidal sinus treated with laser epilation after surgery
15. The application of the Limberg flap repair technique in the surgical treatment of pilonidal sinus disease
16. The Bascom Cleft Lift as a Solution for All Presentations of Pilonidal Disease
17. Limberg transposition flap in the treatment of pilonidal sinus – Our experience K. Senthil Kumar
18. V-Y Advancement Flap Technique in Resurfacing Postexcisional Defect in Cases with Pilonidal Sinus Disease—Study of 25 Cases
19. Fasciocutaneous Elliptical Rotation Flap for Pilonidal Sinus Disease and Its Outcomes