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ORIGINAL ARTICLE

A New Surgical Approach for Pilonidal Sinus Disease: 'De-epithelialization Technique' (Revisited Study)

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Abstract

Background: **Different techniques, including conservative therapy and a fasciocutaneous rotation flap, are utilized to treat pilonidal sinus illness (PSD).**

The aim of the study was to assess the effectiveness of 'de-epithelialization technique' as a novel method for managing PSD condition.

Patients and methods: **Forty patients with PSD who had de-epithelialization therapy were assessed. Age, sex, BMI, number of operations, length of hospital stays, visual analog scale scores, complications, and recurrent rates for each patient were assessed.**

Results: **In this research, there were 37 male patients and three female patients. The patients' average age was 26.52 years, and their average BMI was 24.58. The average procedure lasted 63.23 min, and the majority of patients were released the same day. Healing times for wounds ranged from 9 to 14 days. Two individuals with high BMI had wound dehiscence and infection. Postoperative hematoma was found in only one patient. Throughout the follow-up period, no patient had seromas or a recurrence.**

Conclusion: **With satisfactory cosmetic results and recurrence rates, 'de-epithelialization' may be used in conjunction with other therapies for PSD.**

Keywords: De-epithelialization, Flap, Natal cleft, Pilonidal sinus disorder, Sacrococcygeal area

1. Introduction

Pilonidal sinus disease (PSD) is considered a frequent condition affecting the sacrococcygeal area, in which there may be found a nidus of epithelial and hair cells submerged in the cutaneous tissues of the intergluteal cleft. These elements under certain conditions give rise to symptoms or signs. The presence is indicated by a number of fine circular pits, which are aligned vertically and are of variable orifice-diameter.[1] The stated prevalence rate is 6/100 000 people.[2] For many years the cause of sacrococcygeal PNS has been a matter of debate. The etiopathogenesis, however, is yet unknown. Additionally, some scholars have lately asserted that it is an acquired disease.[3,4]

Management of the PSD is still debatable, and various surgical techniques have been described. There is no agreement on a particular treatment, however, rates of complications and relapses vary.[1,5,6]

The major aim to be taken into account to establish an optimum treatment approach were practical surgical approach to reduced duration of hospital stay, rapid recovery time, less postoperative problems and discomfort, and low rates of relapse.[1]

After removal of the pilonidal cyst and surrounding healthy tissue using any technique (flap or

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main closure), a cavity is left behind. This cavity needs to be filled or sealed in order to prevent complications like 'dead space', hematomas, wound infections, and wound separation in the early post-operative period.[7,8]

The primary disadvantage is the complexity of wound healing. Hypoesthesia and aesthetic issues with the sacrococcygeal area are often seen, particularly with flap techniques, at the later stage.[9]

This procedure is known as a cutaneous layer flap or graft.[10]

The present work aimed to describe the condition and the 'de-epithelialization procedure' as a novel strategy for managing PSD.

2. Patients and methods

Prospective research involved 40 patients who have PSD, were managed with de-epithelization method by the same surgeon on each patient, in order to evaluate the method.

Including both males and females aged from 18 to 60 years old with denovo uncomplicated PSD. We avoided situations of complex pilonidal sinuses such infected sinus cavity abscess and recurring illness.

The preoperative assessment for patients included sex, age, BMI. The intraoperative assessment for patients included operation time. A visual analog pain scale was used to measure pain at 24 h, wound healing time, and surgical problems such as wound dehiscence, infection, seroma, and hematoma. These factors were included in the postoperative evaluation for patients.

2.1. Surgical procedure

Positioning the patient in prone position with the buttocks taped apart to reveal the natal cleft. Then sterilization of the skin using povidone iodine (Fig. 1).

Fig. 1. Positiong if prone position.

Then, a sterile solution of methylene blue or betadine was administered through a plastic cannula to define the tract. After that, an intergluteal incision was made along the sinus and extended deep into the presacral fascia. The cutaneous and some subcutaneous tissues around the pilonidal cyst and tract were exposed and removed along with the surrounding healthy fatty tissue.

The top and lower points of the intergluteal incisions, which included sinus orifices, served as the upper and lower limits of an elliptical intradermal incision of partial thickness. Thus, by exerting traction force with the scalpel blade at a 90-degree angle to the surface, like 'peeling an orange', this ellipsoid region was simply de-epithelialized (Fig. 2).

Multiple stay sutures along the wound were taken and tied after closure of the wound to decrease tension along suture line. A drain was placed in the cavity (Fig. 3).

The first sutures were performed between edge of the de-epithelialized skin, presacral fascia and the other free edge, respectively, with zero absorbable suture sutured (Fig. 4).

Subsequently, the de-epithelialized wound was inverted and sutured to cause reciprocal overlapping with 3/0 absorbable sutures (Fig. 5).

Finally, the wound was closed primarily with 3/0 nonabsorbable sutures. Thus, the cavity of excised

Fig. 2. Excision of the tract up to presacral fascia.

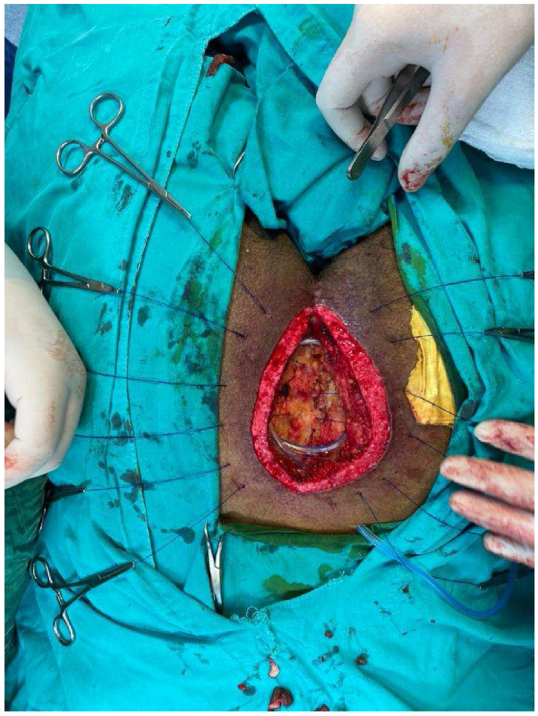

Fig. 3. Stay sutures and drian insertion.

Fig. 5. Inversion of the de-epithelized edge.

pilonidal cyst was filled by inverting de-epithelialized skin (Fig. 6).

The stay sutures were tied over gauze (Fig. 7).

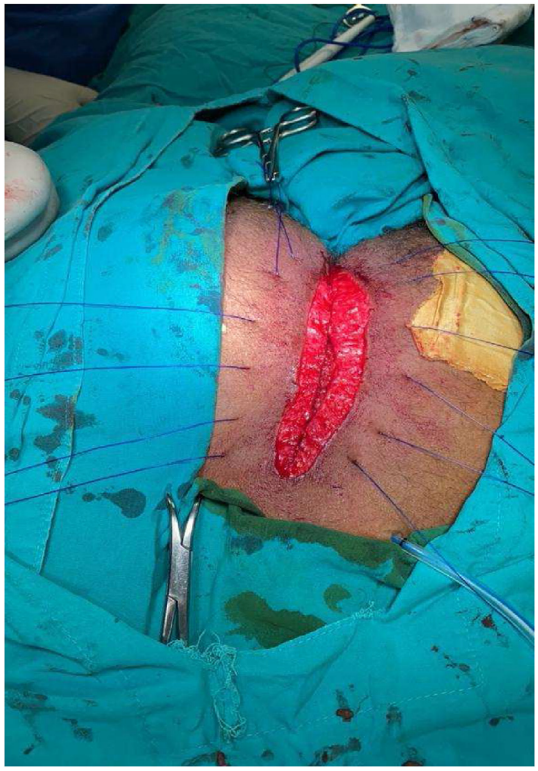

Fig. 4. Sutures between edges of de-epithelized skin.

2.2. Follow-up

Outpatient follow-up was obtained through subjective assessment of the length of postoperative hospitalization, pain score at 24 h (utilizing VAS),

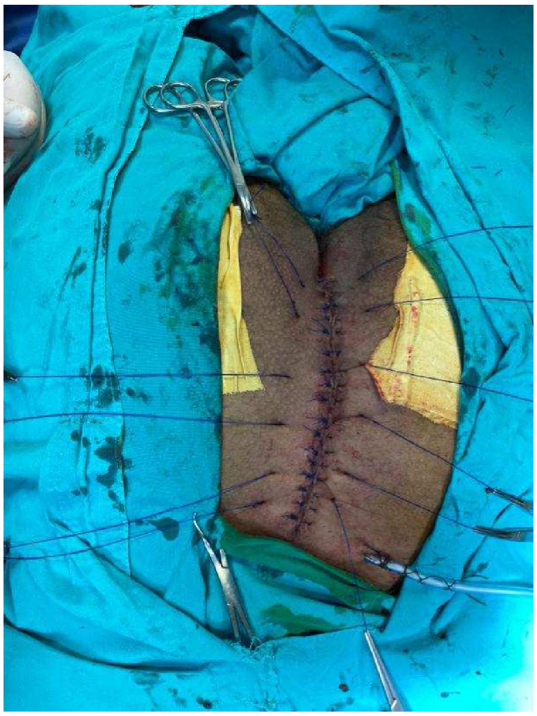

Fig. 6. Skin closure.

Fig. 7. Stay sutures over a gauze.

wound healing time, postsurgical consequences (Dehiscence of the wound, infections, seroma, and hematoma), cosmetic outcomes was also recorded (1–5; 1 = worst result, 5 = best result), and recurrence were retrospectively assessed from the hospital data.

The patients were called and invited to the clinics throughout the follow-up duration (Fig. 8).

2.3. Statistical methods

The statistical software for the social sciences (SPSS) version 28 was employed to code and input the data (IBM Corp., Armonk, NY, USA). Quantitative data were summarized utilizing the mean, SD, minimum and maximum, while categorical data were summarized employing frequency (count) and frequency (%).

Fig. 8. Wound after 2 weeks.

3. Results

This method was used to operate on 40 individuals. 37 of the total cases included men (92.5 %). While only three cases were females (7.5 %) (Table 1).

The mean age of the patients was 26.52 ± 4.87 years (18–37 years) and median BMI was 24.58 ± 3.13 (19–32). The median operation time was 63.02 ± 9.66 min (47–88 min) (Table 2).

With a median hospital stay of 1.03 ± 0.16 days, all patients had surgery under spinal anesthetic and were all released on the first postoperative day. Wound healing time ranged from 9 to 14 days with a median 11.48 ± 1.58 days (Table 3).

The postoperative 24 h visual analog pain scale (VAS) rating were 3 for 11 patients (27.5 %) and 4 for 11 additional patients. The average level of cosmetic pleasure was 4.55 ± 0.68 (1 point for the worst cosmesis and 5 points for the best). In all cases, we saw that the de-epithelialization approach flattens the natal cleft (Table 3).

None of the patients experienced a seroma or recurrence, while two patients (5 %) complicated with wound infection, and two patients (5 %) complicated with wound dehiscence, and only one

Table 1. Features of the patients regarding the gender.

	Count	%	
Sex	F	3	7.5 %
	M	37	92.5 %

Table 2. Demographic results and patient features.

	Mean	Standard deviation	Minimum	Maximum
Age (Years)	26.52	4.87	18.00	37.00
BMI	24.58	3.13	19.00	32.00
Operation time (minutes)	63.23	9.66	47.00	88.00

Table 3. Postoperative stay, pain and wound healing.

	Mean	standard deviation	Minimum	Maximum
Postoperative Hospital stay (days)	1.03	0.16	1.00	2.00
Pain VAS	3.33	1.29	1.00	6.00
Wound healing (sutures removal) (days)	11.48	1.58	9.00	14.00

Table 4. Postoperative complication.

	Count	%	
Wound dehisce	+	2	5.0 %
	−	38	95.0 %
Infection	+	2	5.0 %
	−	38	95.0 %
Seroma	−	40	100.0 %
Hematoma	+	1	2.5 %
	−	39	97.5 %
Recurrence (6 months)	−	40	100.0 %

patient (2.5 %) complicated with hematoma (Table 4).

4. Discussion

PS disease causes considerable discomfort and local morbidity for patients due to infective complications, that can be treated surgically and non-surgically, and thus far, no treatment modality has proven to be superior.[10]

The direct cause of PSD on the sacrococcygeal area is not clear yet. However, hair insertion into the skin, followed by formation of foreign body granuloma, is believed to be the most likely cause. Karydakis emphasized three key factors contributing to this process. The first is the invasion of the foreign body; mostly, hair. Second is the external force caused by the narrow cleft which causes the insertion of the hair, and finally is the weakness of the raphe.[11]

Cubukcu et al.[11] suggested that BMI can be a risk factor that contributes to early onset and worsens the course of the disease. While the general consensus for management of PSD is that the surgeon should completely remove the sinus, a 'gold standard' method for reconstruction is yet to be established. Surgical techniques are classified into three types; the first is the open technique, the second is the midline and off-midline or closing with asymmetry and the last is flap surgery.

The surgical procedure known as 'de-epithelialization' has been used effectively in many intervesions such as mammaplasty by cosmetic and reconstructive surgeons.[12,13]

Many uncommon indications have been treated with this method in a variety of specialized fields. Davis et al.[14] employed this after removing the tumor surgically to repair oral and/or pharyngeal abnormalities. Additionally, Lee et al.[15] By applying a de-epithelialized cutaneous graft from the wound's margins, finger deformities with exposing tendon or bone were repaired.

Balat et al.[16] acquired a successful outcome while treating vulvar cancer with a de-epithelialized rhomboid flap. Another instance was the successful use of a de-epithelialized Belman (external pudendal superficial artery) flap for penile reconstruction on a patient with Peyronie's disease Hakala et al.,[17] and Gupta et al.[18]

Many alternative methods have been labeled as PSD treatment approaches throughout the years. For instance, Thompson et al.[19] suggested removing midline skin pits quickly and easily without making large incisions. Similarly, several publications recommended therapeutic ablation of cavity epithelia with phenol or radiofrequency as a less invasive method in place of cyst removal Dag et al.,[20] and Gupta.[21]

Washer et al.[22] suggested the use of the considerably more intricate flap technique known as gluteal fascial advancement as the ideal treatment for PSD. There is no agreement on the 'gold standard' surgical technique in this book. Of course, the surgical technique used will depend on the patient's health and the surgeon's skill. However, it is generally agreed that the ideal PSD therapy should be based on concepts like a simple and painless procedure, quick hospital release, few postoperative problems, and also low rates of recurrence.

In most published research, the total success percentage of phenol treatment ranges between 67 and 95 % Dag et al.[20] and Dogru et al.[23] Khan et al.[23] revealed in their investigation, the relapse rate after the main closure approach was found to be 8 %. According to Dass et al.[24] prospective randomized trial, the Limberg flap may be successful up to 100 % of the time. In the case study of Yildiz et al.[25] who conducted the Karydakis flap operation, relapses were found in 2 % of patients.

Despite the very short median follow-up period in our data, no patient had a relapse during that time. The de-epithelialization technique's resultant flattening of the natal cleft may be the key factor contributing to the low recurrent rate. In fact, Yildiz et al.[25] has previously identified the optimum therapy for PSD as aiming to flatten the natal cleft and promote lateralization. But after a longer follow-up time, the data will need to be reassessed.

Wide excision with flap repair is often carried out in practice under spinal anesthesia, and patients must stay in the hospital for at least one night Akan et al.[5] De-epithelialization is a less intrusive technique that may be carried out while a patient is under local anesthesia, avoiding the risks associated with spinal anesthesia and enabling patients to leave the hospital the same day as the treatment. Additionally, compared with other excisional operations, the average operative time is shown to be substantially shorter (63.02 ± 9.66 min).

For example, in randomized research by Dass et al.,[24] the median operation time for primary

closure was 44 min; in the randomized research by Khan et al.,[26] the median operation time in the excision + primary closure group was recorded as 55 min and in the excision + Limberg flap group as 70 min.

Hemostasis, seroma, and wound infections are known to increase the likelihood of relapse.[27] Kõrkõl et al.[28] showed that risk of complications for the Limberg flap groups with and without drainage were 17.8 % and 29.6 %, respectively. Käser et al.[29] showed the proportion of total complications was 12% in the excision-only group and 49% in the Limberg flap group. In the research of Arslan et al.,[27] Patients who had the Karydakis flap operation experienced a 15.4% wound dehiscence rate and a 19.8% seroma development rate. In our series, we saw no seroma, only 2.5% hematoma development, and 5% wound infection, all of which led to wound dehiscence and were managed by leaving the wound's exposed area for secondary healing. The reduction of the cavity by flipping the de-epithelialized skin graft and preventing the seroma and/or hematoma, wound infections, and dehiscence brought on by dead space were thought to be the sources of the positive results in the early stages. The average BMI of our research group was discovered to be 24.58 ± 3.13, which is at the upper limit of the normal range. Therefore, bigger series should be used to assess the relationship between BMI and wound consequences.

In their research, Krkl et al.[28] questioned the effectiveness of cavity drainage after comparing the risk of complications of the drained and undrained Limberg flap groups. Here, the authors asserted that surgical site problems in the Limberg flap method for PSD were unaffected by regular drain administration. In every instance, we used an aspiration drain with the intention of preventing intracavitary seroma and/or hematoma, although a controlled randomized trial is needed to more accurately assess the drain's efficacy.

According to Akca et al.[30] randomized clinical research, the average pain VAS score was 4 in the group receiving excision and primary closure compared with 2 in the group receiving rhomboid excision and Limberg flap method. In the Limberg flap group and the excision alone group, Käser et al.[29] reported that the mean pain scores upon discharge were, respectively, 2.4 and 2.5. Dass et al.[24] emphasized the link between wound tension and a higher pain VAS score and said that primary closure was a more painful method. In our research, the average pain VAS score was determined to be 3 (with a range of 1–6), which is consistent with the pain ratings of previous surgical procedures mentioned. But as anticipated, less intrusive methods like radiofrequency appear to result in less postoperative discomfort Gupta.[31]

Arslan et al.[27] Patient satisfaction in the first year after surgery was rated as 'outstanding,' 'good,' 'not bad,' and 'poor,' respectively. At the conclusion of the first year, the percentages of 'excellent' and 'good' patient satisfaction across all flap groups (Karydakis flap, modified Limberg, and Limberg) were 74%, 78%, and 70%, respectively. In our research, 25 of the 40 patients said they were 'excellently' satisfied with their aesthetic results (score: 5). One patient only had a 'poor' score of two. No patient said the cosmetic outcomes were 'extremely terrible' (score = 1). Only studies looking at less invasive procedures like phenol application or cavity ablation revealed improved patient cosmesis Akan et al.[5] and Gupta.[31]

4.1. Study limitations

Our research has several limitations. It is retrospective in nature and has a brief follow-up time frame. Additionally, the exclusion of complex patients was a limitation of this research; as a consequence, bigger randomized trials should be conducted to further analyze the outcomes of the de-epithelialization procedure in problematic PSD cases. Another drawback was the absence of a prospective comparison between the stated strategy and a commonly used alternative technique; this prevented the evaluation of any novel ideas without a control group. However, there are several descriptions of numerous surgical procedures in the literature, including marsupialization, Karydakis, oblique primary repair, and flap approaches. Consequently, this could not be seen as a total constraint. Mortalities.

4.2. Conclusion

De-epithelialized flap produced a healthy, new dermal bed with great vascularity. As a result, by promoting faster wound healing, some issues such wound separation may be avoided. We also intended to use this approach in PSD surgery to flip de-epithelialized tissue in order to reduce the cavity left behind after excision. De-epithelialization of skin is also simple. Our innovative method has reduced postoperative morbidity and shortens hospital stays and surgery times. The lack of a hospital stay need is this technique's main benefit. It lowers expenditures and enables a speedier return to regular activities. Additionally, we think that by adjusting the natal cleft's angle during this procedure, the likelihood of recurrence may be decreased. Additionally, this approach yields a pleasing visual result.

Conflicts of interest

None declared.

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