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Evaluation of De Epithelization technique in management of pilonidal sinus disease

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Abstract: Pilonidal sinus disease (PSD) is a common disorder of the sacrococcygeal region. The incidence is reported in 6 per 100,000 individuals. However, the etiopathogenesis is still unclear. Further, it has recently been suggested to be an acquired disease by some authors. Treatment of pilonidal sinus is still controversial and different surgical methods have been applied. However, rates of complications and recurrences vary, and yet there is no consensus on a specific technique. Different surgical methods have been compared for many years. The main factors to be considered to form an ideal treatment procedure are practical surgical technique, shorter length of stay at the hospital, short recovery period, fewer postoperative complications and pain, low rates of recurrence. In all techniques (primary closure or flap), a cavity is created after the excision of the pilonidal cyst accompanying healthy tissue; this should be filled or closed, or else it causes is a technical problem, which is frequently encountered, and can result in complications such as "dead space", hematoma, wound infection, and wound separation during the early postoperative period. The main drawback is the complication of wound healing. Hypoesthesia and cosmetic problems of the sacrococcygeal region are also seen, especially in flap technique, at the late period. This method is defined as a flap or graft of thinned cutaneous layer. Aesthetic surgeons usually perform this method for mammaplasty. Basically, in this method, after de-epithelization of the cutaneous tissue is performed, cutaneous flap and fatty tissue are inverted to create the breast protrusion. De-epithelialized skin grafts are used for many indications. **The aim of the study** is to describe and discuss the "de-epithelialization technique" as a new approach in PSD treatment. **Methodology**: a total of 40 adult patients with PSD were randomly allocated intraoperatively to undergo deepithelization technique. **Results**: According to our scale evaluating outcome, deepithelization technique is effective and safe with least post operative complications regarding pilonidal sinus disease. **Conclusion**: De-epithelialization of skin is easy. Our new technique provides a short operation time, short duration of hospital stay, and less postoperative morbidity. The major advantage of this technique is the absence of any need for hospitalization. It allows a quicker return to daily activities and reduces costs. Also, this method has a satisfying aesthetic outcome.

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1. Introduction

The first description of pilonidal disease in the modern medical literature was in 1833 when Herbert Mayo presented the case of a young woman with a hair-containing sinus in the sacrococcygeal region. About one and half decade later, Anderson published another case report under the title of "Hair extracted from an ulcer".[1]

In 1854, J. M. Warren described incising a discharging sinus at the sacrococcygeal region extracting a hairball from it. He left the wound to heal by secondary intention and obtained a good result. Later in 1877, Warren more presented three similar cases and stated that he thought the condition apparently derived by the ingrowth of a hair or hairs from a single follicle.[1]

Previously described lesions did not have a name until 1880 when Hodges released the name "Pilonidal" derived from the Latin meaning literally nest (nidus) of hair (pilus) proposing a congenital theory of its origin.[1, 2]

Nowadays, the term sacrococcygeal pilonidal disease is used to describe the surgical entity describing the presence of subcutaneous infection with a characteristic epithelial track situated mostly in the upper half of the natal cleft and generally containing hair. It may present as an acute pilonidal abscess or an indolent seropurulent discharging sinus resistant to spontaneous healing.[3-6]

Aim of the work

To evaluate de epithelization technique as a new approach in management of pilonidal sinus disease together with of the main factors considered to form an ideal treatment of pilonidal sinus disease.

2. Patients and methods

This prospective study will include 40 cases, admitted to GIT unit in EL SAYED GALAL & Mahmoudia hospital from 9-2018 to 3-2019 who met the inclusion criteria.

Inclusion criteria

1- Simple pilo nidal sinus.

Exclusion criteria:

1- Acute pilonidal abscess.
2- Disorders that affect wound healing such as diabetes, immuno deficiency disease previous surgery in sacro coccygeal region.
3- Pychic disoreders.
4- Poor hygiene.
5- Recurrence.

Post operative follow up

All patients will be followed up during hospital stay and after discharge at interval of 3; 6 months postoperative in the outpatient clinic of general surgery according to.

1- Time of operation.
2- Pain management.
3- Hospital stay.
4- Removal of drain.
5- Wound healing period.
6- Risk of infection and heamatoma.
7- Recurrence rate within 6 months.

Method:-

Preoperative Management:-

A) Signed informed consent, Full history taking and Clinical examination:

B) Investigations:

- Routine laboratory investigations required for preoperative assessment as CBC, RBS, (AST, ALT), bilirubin albumin, kidney function tests.

C) Preoperative management of the general condition:

- Control of concomitant illness, like DM and hypertension.

D) Antibiotic prophylaxis:

- All patients will receive broad spectrum antibiotic as 3rd generation cephalosporin cefotaxime (cefotaxime) 1gm by intravenous drip one dose preoperative and another dose after 2-hours postoperative.

E) Anti-thromboembolic measures;

- Low dose of low molecular weight heparin, enoxaparin sodium (Clexane 1mg/kg s.c. preoperative) especially for high risk patients.

F) Optimum skin hygiene:

- including showers with hexachlorophene soap and on table shaving of the anterior abdominal wall hair

Surgical Procedure

1. The patient was placed in the prone position with the buttocks taped apart for exposing the natal cleft.
2. Subsequent to the skin disinfection via povidone iodine, 20 mL of 2% prilocaine was applied to the sacrococcygeal area around the surgical site for local anesthesia.
3. The tract was then delineated, using a sterile solution of methylene blue, injected via a plastic cannula.
4. Thereafter, a flat intergluteal incision of approximately 5 cm in length and till the postsacral fascia in depth was performed.
5. Pilonidal cyst and tract were exposed and excised with surrounding healthy fatty tissue but the surrounding cutaneous and some subcutaneous tissue were preserved.
6. An elliptical intradermal incision of partial thickness was made with a number 10 scalpel blade, limited by the upper and lower point of the intergluteal incision including sinus orifices Thus, this ellipsoid area was easily de-epithelialized by applying traction force both at 90-degree angle to the surface with the scalpel blade, similar to “peeling an orange” A Penrose drain was placed in the cavity.
7. The drain was passed through the tract orifice.
8. Primarily, the first suturations were performed between edge of the de-epithelialized skin, presacral fascia and the other reciprocal free edge, respectively, with 0 nonabsorbable suture sutured.
9. Subsequently, the de-epithelialized wound was inverted and sutured to cause reciprocal overlapping with 3/0 nonabsorbable sutures (Finally, the wound was closed primarily with 3/0 nonabsorbable sutures.

Thus, the cavity of excised pilonidal cyst was filled by inverting de-epithelialized skin.

3. Results

Data obtained from 40 cases, admitted to GIT unit in EL SAYED GALAL & Mahmoudia hospital from 9-2018 to 3-2019 who met the inclusion criteria.

Post operative follow up

All patients will be followed up during hospital stay and after discharge at interval of 3; 6 months postoperative in the outpatient clinic of general surgery according to.

8- Time of operation.
9- Pain management.
10- Hospital stay.
11- Removal of drain.
12- Wound healing period.
13- Risk of infection and heamatoma.
14- Recurrence rate within 6 months.

Data obtained from the present study were selected statistically analysis computed using SPSS. Continuous data were expressed in the form of mean +

SD while categorical data were expressed in the form of count and percent.

Table (3): Distribution of the studied cases according to gender & age (n = 40)

	No.	%
Gender		
Male	36	90.0
Female	4	10.0
Age		
Min. – Max.	19.0 – 39.0	
Mean ± SD.	26.90 ± 5.12	
Median (IQR)	25.5(24.0 – 30.0)	

Table (4): Distributive of the studied cases according to different parameters (n = 40)

	Min. – Max.	Mean ± SD.	Median (IQR)
Post-operative pain score	1.0 – 4.0	1.45 ± 0.75	1.0(1.0 – 2.0)
Wound healing period	10.0 – 20.0	11.03 ± 2.41	10.0(10.0 – 11.0)
Cosmetic results	3.0 – 5.0	4.38 ± 0.77	5.0(4.0 – 5.0)
Operative time	25.0 –55.0	38.10 ± 6.62	35.50(35.0 – 44.3)
Stay of drain	2.0 – 5.0	2.35 ± 0.92	2.0(2.0 – 2.0)
Suture removal time	7.0 – 20.0	11.15 ± 3.21	10.0(10.0 – 11.0)
Hospital stay	1.0 – 2.0	1.03 ± 0.16	1.0(1.0 – 1.0)

Table (5): Distribution of the studied cases according to different parameters (n = 40)

	No.	%
Bleeding	4	10.0
Seroma	2	5
Infection	1	2.5
Recurrence	3	7.5
Past surgical history	0	0.0
Hematoma	1	2.5

Table (6): Distribution of the studied cases according to post operative pain score (n = 40)

	No.	%
Post-operative pain score		
≤1	26	65.0
>1	14	35.0
Min. – Max.	1.0 – 4.0	
Mean ± SD.	1.45 ± 0.75	
Median (IQR)	1.0(1.0 – 2.0)	

Table (7): Distribution of the studied cases according to wound healing period (n = 40)

	No.	%
Wound healing period		
≤10	29	72.5
>10	11	27.5
Min. – Max.	10.0 – 20.0	
Mean ± SD.	11.03 ± 2.41	
Median (IQR)	10.0(10.0 – 11.0)	

Table (8): Distribution of the studied cases according to Cosmetic results (n = 40)

	No.	%
Cosmetic results		
≤4	18	45.0
>4	22	55.0
Min. – Max.	3.0 – 5.0	
Mean ± SD.	4.38 ± 0.77	
Median (IQR)	5.0(4.0 – 5.0)	

Table (9): Distribution of the studied cases according to Operative time (n = 40)

	No.	%
Operative time		
25 – 35	20	50.0
>35	20	50.0
Min. – Max.	25.0 –55.0	
Mean ± SD.	38.10 ± 6.62	
Median (IQR)	35.50(35.0 – 44.3)	

Table (10): Distribution of the studied cases according to Stay of drain

	No.	%
Stay of drain		
2	34	85.0
>2	6	15.0
Min. – Max.	2.0 – 5.0	
Mean ± SD.	2.35 ± 0.92	
Median (IQR)	2.0(2.0 – 2.0)	

Table (11): Distribution of the studied cases according to Suture removal time (n = 40)

	No.	%
Suture removal time		
7 – 10	29	72.5
>10	11	27.5
Min. – Max.	7.0 – 20.0	
Mean ± SD.	11.15 ± 3.21	
Median (IQR)	10.0(10.0 – 11.0)	

Table (12): Distribution of the studied cases according to Hospital stay (n = 40)

	No.	%
Hospital stay		
1	39	97.5
>1	1	2.5
Min. – Max.	1.0 – 2.0	
Mean ± SD.	1.03 ± 0.16	
Median (IQR)	1.0(1.0 – 1.0)	

Table (13): Distribution of the studied cases according to different parameters (n = 40)

	No.	%
Bleeding	4	10.0
Previous medical condition (hypertensive)	4	10.0
Seroma	3	7.5
Infection	1	2.5
Recurrence	0	0.0
Past surgical history	0	0.0
Hematoma	1	2.5

4. Discussion

"de-epithelialization" is not a new surgical technique, and has been performed successfully since 1970's in mammaplasty by plastic and reconstructive surgeons ([10–12])

This technique has been used for many rare indications in various specialist areas. Yoon et al. ([13]) used this for reconstructing oral and/or oropharyngeal defects after surgically removing the tumor. Additionally, Jun Hee Lee et al. ([14]) treated finger defects with exposed tendon or bone by using de-epithelialized cutaneous graft of the wound edges. Balat et al. ([15]) obtained satisfactory result after using de-epithelialized rhomboid flap in the treatment of vulvar cancer.

In another case, a patient who had Peyronie's disease was treated with penile reconstruction using a de-epithelialized Belman (superficial external pudendal artery) flap and the result was well ([16]). In a case series by Park et al. ([17]), bronchopleural fistulas were obliterated using a musculocutaneous flap of serratus anterior after de-epithelization. Additionally, a right ventricle rupture related to sternal wound infection was reconstructed by utilizing de-epithelialized myocutaneous latissimus dorsi flap which is previously.

published ([18])

According to our knowledge, no study has been found in English literature reporting the use of de-epithelialization in PSD treatment so far, except the work of Özgür Dandin et al paper which applied this well-known surgical procedure to PSD.

Over the years, many different techniques have been described as PSD treatment modalities. For instance, Thompson et al. ([19]) proposed simple removal of midline skin pits without wide excisions. Likewise, as a minimally invasive approach, therapeutic ablation of cavity epithelia with phenol or radiofrequency were suggested by some authors instead of cyst excision ([9, 20, 21]). Washer et al. ([22]) described a much more complicated flap technique (gluteal fascial advancement) as a perfect method to cure PSD.

In this text, there is no consensus on the "gold standard" surgical approach. Obviously, the chosen technical method may differ with the experience of the surgeon and patient condition. Nevertheless, widely accepted prospects for an ideal PSD treatment should be based on principles such as a practical and painless technique, rapid discharge from the hospital, minimal postoperative complications, and also low rates of recurrence.

The overall success rate of phenol application varies between 67% and 95% in most reported studies ([9, 20, 23]). Khan et al. ([24]) report the recurrence rate after the primary closure technique to be 8% in their study. In their prospective randomized study, Dass et al. ([25]) indicated the success of the Limberg flap to be up to 100%. Recurrences were noted in 2% of patients in the case series of Yildiz et al. ([26]) who performed the Karydakis flap procedure.

Although the median follow-up period (6 months) is relatively short in our series, during the follow-up period, three of the patients had a recurrence. Flattening the natal cleft, which was the outcome of the de-epithelialization technique, could be the main reason of the low recurrence rate.

As a matter of fact, flattening of the natal cleft and lateralization have already been described by Yildiz et al. ([26]) as the goal of an ideal treatment for PSD. However, the data will need to be reevaluated at the end of a longer follow-up period.

In practice, wide excision with flap reconstruction is usually performed under spinal anesthesia and the patients need to spend at least one night in the hospital ([9])

De-epithelialization is a less invasive method and can be performed under local anesthesia, which prevents the complications of spinal anesthesia, and allows patients to get discharged on the very same day of the procedure. Additionally, the mean operational time is found to be relatively shorter.

([38.10 ± 6.62]) compared with other excisional procedures. For instance, in the randomized clinical trial by Khan et al. ([24]), the mean operating time in excision+primary closure group was reported as 55

min and in excision+Limberg flap group as 70 min; in the randomized study by Dass et al. ([115]), the mean operating time for primary closure was 44 min.

It is well-known that the presence of hematoma, seroma, and wound infection are risk factors for recurrence ([27])

Kirkil et al. ([28]) mentioned that the complication rates of drained and non-drained Limberg flap group were 17.8% and 29.6%, respectively. Käser et al. ([119]) reported the overall complication percentage as 49% in Limberg flap group and 12% in the excision only group. In the study of Arslan et al. ([27]), 19.8% seroma formation and 15.4% wound dehiscence was noted in patients treated with Karydakis flap procedure. We did not observe any wound infection, seroma, and/or hematoma formation in our series, except four overweight hypertensive patients (BMI>30) had intraoperative bleeding and were treated by good heamostic procedures and the bleeding was controlled, only one patient had heamatoma which was controlled by conservative procedures as ice packs applications five times per day, anti inflammatory, antibiotic prophylaxis and delayed drain removal. only one overweight patient (BMI=36.5) had partial wound dehiscence and was treated by leaving the open part of the wound for secondary healing.

It was considered that the causes of satisfactory result in the early period were reducing the cavity by inverting de-epithelialized skin graft and protecting the seroma and/or hematoma, wound infection and dehiscence caused by dead space in most cases. However, mean BMI of our study group was found to be (26.6±3.76,) which is mildly higher than the normal upper limit. Thus, the correlation between BMI and wound complication should be evaluated in larger series.

In their study, Kirkil et al. ([28]) question the efficiency of cavity drainage: they compared complication rates between drained and non-drained Limberg flap groups and found that these rates were similar. Herewith the authors claimed that routine drain usage did not affect surgical site complications in Limberg flap technique for PSD ([28]). We chose to use an aspiration drain in every case intending to avoid intracavitary seroma and/or hematoma, but a controlled randomized study is required to evaluate the drain's effectiveness in a better manner. In their randomized clinical trial, Akca et al. ([30]) remarked that median pain VAS score was 4 in excision and primary closure group and 2 in rhomboid excision and Limberg flap technique. Käser et al. ([29]) found 2.4 and 2.5 as mean pain score at discharge in Limberg flap group and excision only group, respectively. Dass et al. ([25]) pointed out the association between wound tension and increased pain VAS score and claimed that primary closure was a more painful technique. In our study, median pain VAS score was found to be 1.0(1.0 – 2.0), concordant to pain scores of other described surgical methods. However, as expected, less invasive procedures such as radiofrequency seem to cause less postoperative pain ([30])

Arslan et al. ([30]) categorized first-postoperative-year patient satisfaction in four ratings as "excellent," "good," "not bad," and "bad." In all different flap groups (Limberg, modified Limberg, and Karydakis flap group) total "excellent" and "good" patient satisfaction ratings at the end of the first year were 74%, 78%, and 70%, respectively. In our study, 90% of all 40 patients indicated their cosmetic satisfaction rate as "excellent" and very good (score=5,4). None of the patients described the cosmetic results as "bad" (score=2) or "very bad" (score=1). Better patient cosmesis was only reported in studies investigating the less invasive interventions, such as phenol application or cavity ablation ([9, 3])

Conclusion

Healthy, fresh dermal bed with high vascularity was obtained with de-epithelialized flap. Thus, some complications such as wound separation can be prevented by providing stronger wound healing. We also planned to minimize the cavity after excision by inverting de-epithelialized tissue with this technique in PSD surgery. Moreover, de-epithelialization of skin is easy.

Our new technique provides a short operation time, short duration of hospital stay, and less postoperative morbidity. The major advantage of this technique is the absence of any need for hospitalization.

It allows a quicker return to daily activities and reduces costs. Furthermore, we believe that the risk of recurrence may be reduced by increasing the angle of the natal cleft during this technique. Also, this method has a satisfying aesthetic outcome.

This preliminary report suggests that this new surgical approach seems to be a reasonable method in the treatment of PSD, especially in patients with uncomplicated primary disease, and is worth studying further.

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