

Outcome of Dufourmental Flap in the Management of Complex Pilonidal Sinus

Ahmed M. Ghalab¹, Ahmed M.K. Tohamy², Mohamed A. Elsayed²,
Mahmoud Zakaria¹, Ahmed T. Barakat¹, Mohamed F. Abdelfattah³

¹ Department of General Surgery, ² Plastic Surgery Unit, Department of General Surgery,
Faculty of Medicine, Benha University, Egypt

³ Department of General Surgery, Benha Teaching Hospital, Egypt

Corresponding author: Ahmed M.K.Tohamy, E-mail: amktsa@gmail.com, Tel: 01062868901, ORCID: 0000-0002-7963-8503

ABSTRACT

Background: There are numerous surgical and non-surgical therapy options for pilonidal sinus disease (PSD) with varying degrees of efficacy.

Objectives: This study aimed to evaluate the outcome of Dufourmental flap in complex pilonidal diseases.

Patients and methods: The study included 34 patients with complex and recurrent pilonidal sinus eligible for surgical excision and reconstruction using the dufourmental flap. Follow-up was planned for 12 months to document the postoperative complications and the aesthetic outcome.

Results: The patients' mean age was 28.4 ± 3.6 years. The main clinical presentation was discharge in 44.1% of patients. The mean operative time was 41.6 ± 9.4 minutes. The Mean VAS showed a gradual decrease from 7.6 ± 1.6 immediately postoperatively to 2.1 ± 0.5 after one week. Seroma was reported in 5.9% of patients, while wound dehiscence occurred in 11.75% of patients. No total flap loss was reported, while partial flap loss was reported in 5.9% of cases. No reported cases of recurrence after 1-year follow-up. There was a strong positive correlation between patients' evaluation and independent surgeons' assessment ($r=0.86$).

Conclusion: The Dufourmental flap can be considered as an appropriate approach in managing complex pilonidal disease

Keywords: Pilonidal disease, Dufourmental flap, Flap loss.

INTRODUCTION

According to the American Society of Colon and Rectal Surgeons, pilonidal disease (PD) is a potentially crippling illness that affects over 70,000 people in the United States alone each year [1].

The current opinion is that pilonidal illness is an acquired disorder closely associated with the presence of hair in the gluteal cleft, despite opposing etiological explanations [2]. Midline pits and, in certain situations, secondary infection may develop as a result of the foreign body reaction caused by loose hairs trapped in the natal cleft, traumatizing and penetrating the skin [3].

The manifestation of pilonidal disease can range from a more acute presentation of an accompanying abscess to a chronic cyst and/or sinus with continuous drainage and/or large subcutaneous tracts. Gluteal cleft hair removal, tract ablation, simple excision, and wide excision

with flap restoration are just a few of the many potential treatment methods. The assessment and treatment of pilonidal illness were the main topics of the clinical practice guideline [4].

Since Mayo's [5] original description of it in 1833, there has been debate over the best course of therapy and a gold standard has yet to be established, particularly in cases of complex PSD. The Italian Society of Colorectal Surgery (SICCR) recently proposed new guidelines for treating PSD, emphasizing that the primary option for treating restricted PSD should be minimally invasive

surgery (MIS), whether or not it is endoscopic. However, the result in complicated cases is still unknown [5-7].

A limited proportion of patients with complex pilonidal illness present with atypical, extensive, recurrent disease with branching tracts and accompanying abscesses, as well as an overall poor quality of life, either as a result of excessive neglect or unsuccessful surgical operations [8].

For complicated and recurrent instances, surgery is the usual course of treatment, either with or without primary closure (including several flap methods). Compared to healing by secondary intention, excision with primary closure has a much higher healing rate [1,9]. Complex PND is commonly treated using the Limberg flap and the dufourmental flap, which combine rotation of a lipocutaneous flap with closure that flattens the gluteal cleft and excises all of the afflicted skin and sinuses to varied depths [10].

Rhombus-shaped lesions with any combination of internal angles can be repaired with the Dufourmental flap. A very flexible and patient-specific surgery is the Dufourmental flap. Because of its smaller pivot region, it has a smaller standing cutaneous malformation [11].

The Dufourmental can be a successful treatment for complex pilonidal disease and this motivated the authors to do this investigation.

PATIENTS AND METHODS

Study design: The present prospective study was conducted at the General Surgery Department in Benha University Hospital and the Department of General Surgery, Benha Teaching Hospital, throughout the period from June 2023 to June 2025. The study included 34 patients with complex and recurrent pilonidal sinus, eligible for Surgical Excision and reconstruction using Dufourmental flap. Simple cases of PD were excluded as well as unfit patients for Surgery:

All included patients underwent comprehensive history taking and examination.

Procedure: On the surgical table, patients received prophylactic antibiotics (1 gm ceftriaxone IV) and underwent spinal anesthesia. After that, they were put in a prone position and had their buttocks separated using adhesive tape strips that were fastened to the sides of the operating table. Short lengths of adhesive tape were then applied at a right angle to the underlying layer, creating a T-shaped pattern that exposed the natal cleft and anal verge. 10% povidone iodine solution was used to disinfect the skin of the buttocks and back. Surgical curtains were used to keep the anus out of the operating field. In order to properly remove the sinus and its consequences without unintentionally contaminating the incision by opening the track, methylene blue dye was injected into the sinus orifices.

Dufourmental flap procedure (Figure1): Once the buttocks were separated, a rhombus was drawn up in the gluteal region, covering all visible lesions, descending as far as the presacral fascia, until the rhombus was completely removed. On adjacent tissue, a diagonal line that cut the 120-degree angle was extended outside the defect to the same length. A donor location that could be closed mostly without strain and would leave a scar parallel to skin tension lines was then preferable, depending on the skin laxity surrounding the defect. The flap was placed over the flap after preparation. After meticulous hemostasis, the flap, which included the gluteus maximus fascia was produced and then applied to the presacral fascia defect. The gluteus maximus fascia was sutured to the flap's subcutaneous tissue using individual polyglactin-0 sutures. Polyglactin2/0 was used to stitch the subcutaneous cells, and polypropylene 3/0 or 4/0 was used to suture the skin.



Figure (1): Dufourmental flap procedure.

Follow-up and outcomes: All patients were mobilized and discharged with appropriate wound care instructions on the first postoperative days. Skin sutures were taken out ten days following the surgery. Patients were then clinically monitored at 1, 3, and 12 months. Follow-up appointments were scheduled one week after surgery and continued every two weeks until full recovery. There were reports of complications. Regularly shaving the navicular region and taking a shower shortly after a haircut are examples of personal hygiene practices as well as not sitting for extended periods of time was advised.

Outcomes: The primary outcome was the pilonidal sinus being successfully removed and the defect being closed with little problems following surgery.

The accepted final cosmetic results, which were evaluated using the Vancouver scar scale that has a total score ranging from 0 (normal skin) to 13 (the worst possible scar) constitutes the secondary outcome. A five-point Likert scale was used to gauge patient satisfaction.

Ethical Approval: This study was ethically approved by the Institutional Review Board of the Faculty of Medicine, Benha University. Written informed consents were obtained from all participants. This study was executed according to the code of ethics of the World Medical Association (Declaration of Helsinki) for studies on humans.

Sample size was calculated Using G*Power 3.1 software (University, Dusseldorf, Germany), a sample size of 34 was taken into consideration with a power of 80%, P-value of 0.05 and an effect size of 0.7 based on the occurrence of postoperative problems.

Statistical analysis

The statistical analysis was conducted using SPSS version 25 (IBM Corp., Armonk, New York, USA). Quantitative parameters were given by mean $\pm$ SD and were subjected to the Student's t test. For qualitative indicators that were expressed as the frequency with percent, the χ^2 test was employed. Pearson's linear correlation between quantitative variables, specifically Vancouver's scar scale and patient satisfaction, was measured using the rank correlation coefficient (r).

RESULTS

The current study included 34 patients with complex pilonidal disease with a mean age of 28.4 ± 3.6 years. 41.2% of the included patients were smokers. The main clinical presentation of the included patients was discharge which was presented in 44.1% of patients, while pain was present in 32.4% of patients. Recurrent cases represented 23.5 % of the included patients (Table 1).

Table 1: Demographic data, comorbidities, and clinical presentations

Variable	Patients Dufourmental flap (N=34)	
Age (Years)	Mean $\pm$ SD	28.4 ± 3.6
Sex Males	N (%)	26 (76.5%)
Females	N (%)	8 (23.5%)
BMI (kg/m ²)	Mean $\pm$ SD	27.8 ± 4.6
Comorbidities		
DM	N (%)	2 (5.9%)
HTN	N (%)	1 (2.95%)
IHD	N (%)	1 (2.95%)
Smoking	N (%)	14 (41.2%)
Clinical Presentation		
Recurrence	N (%)	8 (23.5%)
Pain	N (%)	11 (32.4%)
Discharge	N (%)	15 (44.1%)

The mean operative time was 41.6 ± 9.4 minutes. The mean length of the flap was 58.2 ± 7.6 mm, while the width of the flap was 42.3 ± 8.9 mm (Table 2).

The Mean VAS decreased gradually from 7.6 ± 1.6 immediately postoperatively to 2.1 ± 0.5 after one week. Seroma was reported in 5.9% of patients, while wound dehiscence occurred in 11.75% of patients. No total flap loss was reported, while partial flap loss was reported in 5.9% of cases. No reported cases of recurrence after 1-year follow-up (Table 3).

Table 2: Operative Data, flap dimensions, in the studied group

Variable	Patients Dufourmental flap (N=34)	
Operative time (minutes)	Mean $\pm$ SD	41.6 ± 9.4
Hospital Stay (days)	Mean $\pm$ SD	1.1 ± 0.4
Flap Dimensions		
Flap length (mm)	Mean $\pm$ SD	58.2 ± 7.6
flap width (mm)	Mean $\pm$ SD	42.3 ± 8.9

Table 3: Post-operative complications

Variable	Patients Dufourmental flap (N=34)	
Postoperative pain		
Immediately post-operative	Mean ± SD	7.6 ± 1.6
1st day post-operative	Mean ± SD	5.4 ± 0.9
One-week post-operative	Mean ± SD	2.1 ± 0.5
Postoperative complications		
Hematoma	N (%)	1(2.95%)
Seroma	N (%)	2 (5.9%)
Infection	N (%)	3 (8.85%)
Wound dehiscence	N (%)	4 (11.75%)
Partial flap loss	N (%)	2 (5.9%)
Total flap loss	N (%)	0 (0%)
Recurrence after 1 year	N (%)	0 (0%)

As regards patient satisfaction, 23.5 % of cases reported excellent outcomes, while good outcomes were reported in 47% of cases, and fair outcomes were reported in only 5.9% of cases and no bad results were reported. There was a strong positive correlation between patients' evaluation and independent surgeons' assessment ($r=0.86$) (FIG 2) (Table 4).

Table 4: Patient satisfaction and independent investigator assessment

Patient Satisfaction		
Excellent	N (%)	8 (23.5%)
Good	N (%)	16(47%)
Fair	N (%)	8 (23.5%)
Poor	N (%)	2(5.9%)
Bad	N (%)	0((0%)
Physician evaluation		
Range	N (%)	1-8
Mean ± SD	N (%)	2.7±1.2
		R=0.86

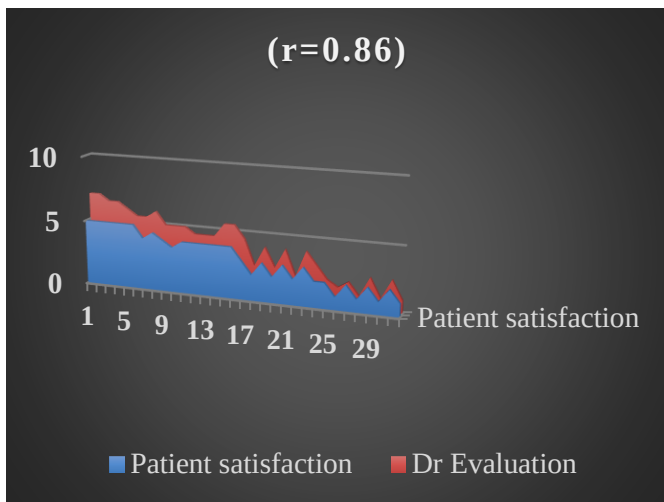


Figure (2): Patient satisfaction and independent investigator assessment.

DISCUSSION

A prevalent and crippling ailment is pilonidal sinus disease. This disorder usually affects young, hirsute guys. It is now recognized that pilonidal disease is an acquired disorder brought on by the presence of hair in the gluteal cleft, rather than a congenital ailment caused by aberrant skin in the gap ^[12].

There are numerous surgical and non-surgical therapy options for PSD. With varying degrees of efficacy, laser epilation, shaving, and better personal cleanliness are conservative treatments for PSD in its early phases. For the treatment of PSD, surgical techniques such as excision and primary closure, open method technique, marsupialization, and flap techniques like the rhomboid flap, modified Limberg flap, Karydakias and Bascom flaps have been used ^[1].

Flap treatments are better than primary closure and open method approaches, according to numerous studies. There is currently no ideal treatment plan with minimal risks of complications and recurrences. The method is the best since it is easy to use, requires little time in the hospital, and has a low recurrence rate ^[13].

A shorter hospital stay and a lower recurrence rate are linked to allowing wound healing by secondary intention. Longer wound healing times and the need for longer-term wound dressings are two drawbacks of this approach. However, research has also shown that the lay open technique is more likely to result in postoperative infection than primary closure or other flap transposition techniques ^[14].

By flattening the intergluteal sulcus with significantly less hairy fascio-cutaneous flaps and less sweating, flap reconstruction procedures eliminate the disease's cause. Recurrence rates, wound dehiscence and the risk of infection are all increased in flap reconstructions with a midline bottom edge or suture line on the intergluteal sulcus. The Modified Limberg Flap

(MLF) technique ensures that the natal cleft is flattened and achieves an off-midline closure. Due to its low rates of complications and recurrence when compared to other surgical procedures, the MLF operation is one of the most popular treatments for sacrococcygeal pilonidal sinus illness ^[15].

Females make up 23.5% of the Dufourmental group, which is comparable to the findings of a prior study by **Abdelnaby et al.** ^[16], which indicated a greater incidence in males with a male-to-female ratio of 2.5:1. This could be explained by the nest of hair theory, which holds that males are more hairy than females.

According to **Lieto et al.** ^[17] and **Yildar et al.** ^[18], the mean operative time for the Dufourmental flap technique was 40 minutes, ranging from 30 to 55 minutes, and 40.3 minutes respectively. The reported mean operative time in this study was 41.6 ± 9.4 minutes. It is unlikely that the shortened operating time reported by **Ekici et al.** ^[14] was caused by the inclusion of patients with uncomplicated pilonidal sinus.

The reported incidence of seroma in the current investigation was 5.9%, which is consistent with the 7% incidence reported by **Ekici et al.** ^[14]. However, **Akin et al.** ^[19] found that patients treated with the dufourmental flap technique had a lower incidence of seroma (2.91%), which can be easily explained by their study's inclusion of simpler cases.

According to **Cihan et al.** ^[20], the Dufourmental flap led to a shorter hospital stay, a speedier return to work, a lower rate of wound infection, and a lower recurrence rate. Matching the findings as of right now, **Alptekin et al.** ^[21] found a correlation between surgical site infection and the quantity of the removed specimen after PD operations.

Our study's 5.9% infection rate among patients receiving Dufourmental flap treatment is comparable to that of a study by **Sebastian et al.** ^[22] who found that 5.4% of patients receiving Dufourmental flap treatment had both wound discharge and infection. Because the base of the Dufourmental flap is wider, flap feeding is easier and less stressful, which explains why **Yildar et al.** ^[18] found no incidences of flap necrosis or wound infection in patients treated with Dufourmental flap surgeries. The findings of **Friedl et al.** ^[23] reported no cases complicated with flap necrosis or flap loss. Similarly, our analysis found no cases of partial flap loss in the dufourmental flap group. This can be easily explained by the improved blood flow and larger base of the Dufourmental flap.

When evaluating the effectiveness of a surgical method for a confined disease, patient satisfaction is a crucial factor. Similar to the findings of **Lieto et al.** ^[17], which show that no patient expressed unhappiness with the cosmetic outcomes of Dufourmental flap surgeries, we discovered statistically significant cosmetic satisfaction in the current study. Recurrence sinuses

occurred in about 18% of individuals who had the Dufourmental flap surgery described by **Lieto *et al.*** ^[17]. The very short follow-up time may have contributed to the current study's lack of recurrent instances after a year of follow-up.

CONCLUSION

The Dufourmental flap can be considered as an appropriate approach in managing complex PND.

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Conflicts of interest: Nil.

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