Management of extensive (multiple pits) pilonidal disease by wide local excision: a prospective study

Ahmed H. Amer[a], Ahmed Maarof[b], Ahmed Sharaby[a], Elghamry E. Elghamry[a]

[a]Department of General Surgery, Faculty of Medicine, Tanta University, Tanta, [b]Department of General Surgery, 6 October University, 6 October, Egypt

Correspondence to Ahmed Hazem Saad Amer, MD, PHD, Department of General Surgery, Faculty of Medicine, Tanta University, Tanta 3111, Egypt. Tel (office): 01033879833; Fax: 040332879833; e-mail: ahmed.amer@med.tanta.edu.eg

Background

Pilonidal disease is a pathology that has variable presentations, each of them may have different modalities of treatment and variable surgical approaches, and this is always a matter of debate, which is why there were always difficulty to get a perfect classification or staging system in most of the available studies.

Patients and methods

This prospective study was conducted on 25 adult patients admitted to the Surgery Department, Tanta University. The study was carried out over 6 months; these patients had extensive pilonidal disease (multiple pits in the midline with or without pits lateral to the midline). All surgeries were done by wide local excision with off-midline closure.

Results

The follow-up period ranged from 6 to 11 months and wound complications in the picture of wound infection and minor disruption of the stitches in the lower part of the wound (near the anus) were recorded. These complications were noticed in six (24%) patients and managed conservatively by antibiotics and wound dressing. They healed completely in four patients, but two (8%) patients did not respond to conservative measures and after failure, they were considered a recurrence of the disease. There was significant relation between the number of midline pits (especially if >10) and wound complications. Also, diabetes had a significant role in the development of wound complications that may predispose to the recurrence of the disease.

Conclusion

Wide local excision and off-midline closure is a feasible treatment for extensive pathology of the pilonidal disease. Also, the number of midline pits is an important influential factor on the results of surgery and should have a role in the journey to settle a widely accepted classification system besides other factors such as diabetes, recurrence, and lateral extension of the disease.

Keywords:

midline pits, pilonidal disease, wound complications and recurrence

Introduction

Pilonidal sinus is a chronic disease that has different presentations but usually seems as a single or multiple discharging sinuses that are occasionally painful in the region of the natal cleft [1].

Loose hair implanted in the skin of the region of the intergluteal cleft is believed to be the etiology of this disease. Multiple factors are claimed to predispose to this disease including the depth of cleft, number of loose hairs implanted, weak skin, and breaking its continuity by erosions and trauma of friction and large pores [2].

Many procedures were described for treatment but till now no one is widely accepted by surgeons. The commonest procedures include excision with either primary closure or left open for healing and excision with flap reconstruction (rhomboid excision and Limberg flap). All procedures had considerable rate of complications including infection, wound dehiscence, and recurrence [3,4].

Some authors also claimed that the absence of a commonly agreed staging or scoring system for the disease may play a role in the absence of a widely accepted procedure or surgery because it does not make sense to treat simple midline single pit disease in the same way as extensive multiple pits disease; however, there were some trials to set the staging systems for the disease that did not gain popularity yet [5,6].

Beal *et al.* [7] identified eight scoring or staging systems in the available literature, but according to them none of these staging systems is perfectly organized to predict prognosis or to correlate the extension of the disease with the different modalities of treatment. Three of these literatures claimed that a single pit disease within the intergluteal sulcus could be classified as a separate category, as this represented a mild disease that could be treated differently from multiple pits (extensive disease) [8–10].

Although many randomized controlled studies recommend the superiority of flap repair over excision with primary closure regarding wound complications and recurrence, few of them reported the incidence of postoperative numbness, which may reach up to 19% following the Limberg flap. In addition, there is no available data about patient satisfaction concerning the resulting scar, which invariably causes significant disfigurement, especially with extensive resection; indeed, this may cause embarrassment, especially to young patients [11].

Aim
The aim of the study is to evaluate the feasibility of wide local excision and primary closure of complex multiple pits pilonidal disease and avoiding flap construction techniques (rhomboid flap and similar procedures) that may embarrass the patient because of disfigurement and numbness.

Primary outcome: feasibility, wound complications.

Secondary outcome: rate of recurrence.

Patients and methods
This prospective study was conducted on 25 adult patients admitted to the Surgery Department, Tanta University. The study was carried out over 6 months (November 2021–April 2022) after obtaining ethical committee approval, and an informed written consent was included.

All participant surgeons are experienced and familiar with the field.

There was adequate supervision to maintain the privacy of patients and confidentiality.

There was no conflict of interest nor conflict with religion, law, or societal standards.

Inclusion criteria
Adult patients of 18–60 years.

Extensive pilonidal disease (multiple pits in the midline with or without pits lateral to the midline) (Fig. 1).

Exclusion criteria
(1) Recurrent disease after previous flap repair.
(2) Bleeding disorders.

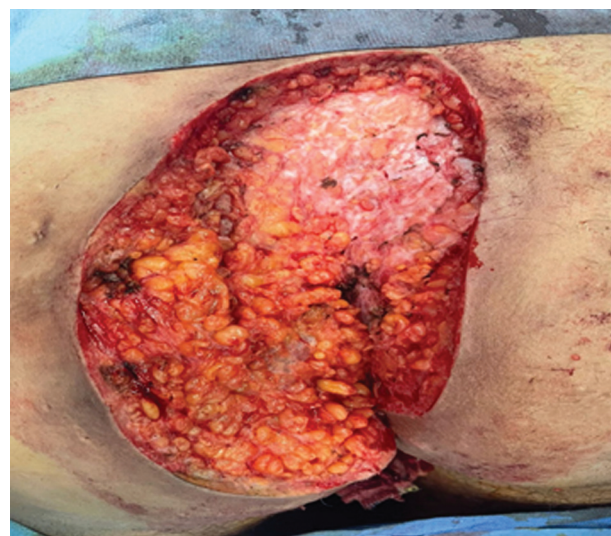### Operative technique
After preparation of the field by wide strapping and sterilization, asymmetrical elliptical incision including

Figure 1

Pilonidal disease with extensive affection of the midline with multiple pits down to very close to the anus.

Figure 2

Excision of multiple pits pilonidal disease, and if there is lateral sinus away from the midline it should be excised separately.

all pits and displacing the two angles about 2 cm off-midline to the side, where may some pits are there if at all in the midline so any side was chosen. If there are lateral pits (sinuses) away from the midline, then they cannot be included, they can be excised separately (Fig. 2). All tissues were excised down to the sacrococcygeal fascia (Fig. 3); after complete excision, the fasciocutaneous flap was prepared on one side at the level of gluteus maximus fascia and then fully mobilized toward the other side, and closure of the layers is done (fascia of the flap to the other side or presacral fascia with Vicryl 0 interrupted sutures and skin closure with interrupted polypropylene 2–0 sutures) with trial to displace the skin line of closure away from the midline. A closed suction drain is inserted.

Postoperative care
Patients are prescribed pain control medications, and are instructed about self-hygiene and wound care and dressing and to carefully deal with the drain that is daily evacuated with an assessment of the amount of discharge and removed if there is a discharge of less than 20 ml, but not less than 7 days. There was follow-up for wound complications and possible recurrence for at least 6 months.

Data were fed to a computer and analyzed using IBM SPSS software package, Version 20.0 (IBM Corp., Armonk, New York, USA). Categorical data were represented as numbers and percentages. χ^2 test was applied to compare between two groups. Alternatively, Fisher's exact or Monte Carlo correction test was applied when more than 20% of the cells have an expected count of less than 5. For continuous data, they were tested for normality by the Shapiro–Wilk test. Quantitative data were expressed as range (minimum and maximum), mean, SD, and median. Student's *t* test was used to compare two groups for normally distributed quantitative variables. However, Mann–Whitney test was used to compare two groups for not normally distributed quantitative variables. Significance of the obtained results was judged at the 5% level.

Results
During the period of the study (from November 2021 to April 2022), 25 cases of complex extensive pilonidal disease were performed at Tanta University Hospitals; 22 of them were males and only three were females. The mean age was (27.76±7.86) (minimum, 18 and maximum, 45) and the BMI was (30.28±2.64 kg/m^2) (minimum, 26 and maximum, 38).

Three of the patients were on diabetic therapy and four of them were recurrent after previous surgery; the number of midline pits was 5 or less in seven patients, 6–10 in 11 patients, and more than 10 pits (very extensive disease) in seven patients. Also in four patients, there were lateral pits or sinuses away from the midline; if they could not be included in the incision they were excised separately.

Figure 3

Wide local excision of the whole pilonidal disease, if there are lateral pits not so far from the midline, it should be included within the incision.

Figure 4

Minor disruption after excision of extensive pilonidal disease; the disruption is almost always at the lower edge of the wound and can be managed conservatively, to the right near-complete closure after antibiotics and good dressing.

The follow-up period ranged from 6 to 11 months. Wound complications in the picture of wound infection and minor disruptions of the stitches in the lower part of the wound (near the anus) were recorded (Fig. 4). These complications were noticed in six patients and managed conservatively by antibiotics and wound dressing; they healed completely in four patients (Fig. 5) but two patients did not respond to conservative measures and after failure they were considered a recurrence of the disease (Fig. 6).

According to the number of midline pits, we had three groups; seven patients in the first group had less than five pits; 11 patients in the second group had from 5 to 10 pits; in the third group seven patients had more than 10 midline pits with or without lateral extension. Four of the cases had lateral pits away from the midline and one of them had also more than 10 midline pits (this case had recurrence later on). We settled these groups to have a step in the upcoming classification or staging system.

Table 1 shows the relation between different parameters and the occurrence of wound infection or disruption that may be a cause of recurrence later on. There is a significant relation between the number of midline pits and wound complications with a P value of 0.045 (four of the six patients who showed wound complications had >10 midline pits preoperatively). In addition, there was a significant relation between the

presence of diabetes and the development of wound complications ($P=0.009$). Also, the presence of lateral pits may also increase the possibility of complications, and also did not reach a significant value ($P=0.234$).

Table 2 demonstrates the relations of different patient parameters (including diabetes, previous surgery, number of midline pits, presence of pits lateral to the midline) to the possibility of recurrence of the disease after surgery. There were two patients diagnosed to have a recurrent disease after 3 months from the surgery; both of them had midline pits of more than 10 and one of them had extra lateral pits but both factors had no significant value ($P=0.139$ and 0.3, respectively). Also other factors such as diabetes and previous surgeries had no significant relation with the recurrence of the disease.

Discussion

Although the exact etiology of the development of pilonidal disease is not clearly identified, Karydakis nominated three factors that may play a major role. Implantation of hair underneath skin layers is the first, narrow natal cleft that performs external pressure causing the hair to be inserted, and weak skin at the area of the median raphe [12].

The procedures, which include lateral displacement of the gluteal cleft laterally before closing it with an asymmetrical off-midline suture, have been the subject of much research, and also they are the scope of our study. The two main methods were developed by the Greek surgeon George Karydakis in 1973 and the

Figure 5

Near-complete closure after antibiotics and good dressing.

Figure 6

Failure of response to conservative treatment that can be considered as recurrence.

Table 1 Relation between different parameters and occurrence of wound disruption or infection (*N*=25)

	Total (*N*=25)	Complications [*n* (%)]		Test of significance	*P*
		No (*N*=19)	Yes (*N*=6)		
Gender					
Male	22 (88.0)	16 (84.2)	6 (100.0)	χ^2=1.077	FE*P*=0.554
Female	3 (12.0)	3 (15.8)	0		
Age (years)					
Mean±SD	27.76±7.86	27.05±6.68	30.0±11.33	*t*=0.605	0.567
Median (minimum–maximum)	25 (18–45)	25 (18–42)	26.5 (18–45)		
BMI (kg/m^2)					
Mean±SD	30.28±2.64	30.0±2.19	31.17±3.87	*t*=0.942	0.356
Median (minimum–maximum)	30 (26–38)	30 (26–35)	30 (28–38)		
Operative time (min)					
Mean±SD	56.80±9.45	55.0±8.82	62.5±9.87	*U*=29.50	0.080
Median (minimum–maximum)	55 (45–75)	55 (45–75)	67.5 (50–70)		
DM	3 (12.0)	0	3 (50.0)	χ^2=10.795*	FE*P*=0.009*
Previous surgery	4 (16.0)	3 (15.8)	1 (16.7)	χ^2=0.003	FE*P*=1.00
Number of pits					
1–5	7 (28.0)	7 (36.8)	0	χ^2=5.70*	MC*P*=0.045*
6–10	11 (44.0)	9 (47.4)	2 (33.3)		
>10	7 (28.0)	3 (15.8)	4 (66.7)		
Presence of lateral pits	4 (16.0)	2 (10.5)	2 (33.3)	χ^2=1.765	FE*P*=0.234
Drain removal (days)					
Mean±SD	7.44±0 .82	7.16±0.69	8.33±0.52	*t*=3.834*	0.001*
Median (minimum–maximum)	7 (6–9)	7 (6–9)	8 (8–9)		
Follow up (month)					
Mean±SD	8.20±1.66	8.11±1.63	8.50±1.87	*U*=49.50	0.642
Median (minimum–maximum)	8 (6–11)	8 (6–11)	8.5 (6–11)		

χ^2, χ^2 test; FE, Fisher's exact; MC, Monte Carlo; *t*, Student's *t* test; *U*, Mann–Whitney test. *P*: *P* value for the relation between complications and different parameters. *Statistically significant at *P* value less than or equal to 0.05.

American John Bascom in 1987. These procedures are founded on the idea that mechanical stress at the level of the gluteal cleft might impair the suture line's ability to mend. Particularly when the suture line is in the midline, contraction of the strong gluteal muscles tend to put a strain on it, which is similar to what is seen with sacral decubitus ulcers. To flatten the depression of the gluteal crease and lessen the mechanical stress placed on the body during postoperative movements, the Karydakis and Bascom procedures attempt to displace the suture line to one side of the midline. To fix the deep plane to the bony fascia and suture the skin edge-to-edge off the midline, the Karydakis technique entails a unilateral elliptical excision of the infected pilonidal sinus followed by mobilization of the entire thickness of the contralateral skin margin, including the subcutaneous fatty tissues. Several teams have reported findings that are quite comparable, and this approach has attracted their attention [13–17].

Many studies including multiple meta-analyses suggested that between the two most accepted techniques, there is the superiority of flap techniques (modified Limberg, leaf flap, V-Y flap, and others)

over excision and off-midline closure [18]. They claim that flap procedures can remove more of the raphe, flattening more the contour of the natal cleft, and repositioning hair follicles, and so reducing the three risk factors of Karydakis [19], but also there are systematic reviews that suggested that the two methods had similar short-term and long-term outcomes [20].

Based on these reviews and comparable results, our choice was to use excision and off-midline procedure in our study; this met our personal experience as we consider this technique less challenging and does not distort the normal shape leaving the patient with considerable disfigurement and dissatisfaction. In a study performed by Eryilmaz *et al.* [11] conducted on 63 patients treated with the use of a rhomboid excision and Limberg flap closure, 19% of the patients had numbness at the operation site and 63% of them were not satisfied with the cosmetic appearance of the scars.

The role of any classification or staging system is a trial to predict prognosis or to be linked to choices of modalities of treatment. In the Beal *et al.* [7]

Table 2 Relation between different parameters and recurrence of pilonidal disease (N=25)

	Recurrence [n (%)]		Test of significance	P
	No (N=23)	Yes (N=2)		
Gender				
Male	20 (87.0)	2 (100.0)	χ^2=0.296	FEP=1.00
Female	3 (13.0)	0		
Age (years)				
Mean±SD	27.87±8.09	26.50±6.36	t=0.232	0.819
Median (minimum–maximum)	25 (18–45)	26.50 (22–31)		
BMI (kg/m²)				
Mean±SD	30.43±2.69	28.50±0.71	t=0.995	0.330
Median (minimum–maximum)	30 (26–38)	28.5 (28–29)		
Operative time (min)				
Mean±SD	55.65±8.96	70±0	U=3.00*	0.040*
Median (minimum–maximum)	55 (45–75)	70 (70–70)		
DM	2 (8.7)	1 (50)	χ^2=2.973	FEP=0.230
Previous surgery	4 (17.4)	0	χ^2=0.414	FEP=1.0
Number of pits				
1–5	7 (30.4)	0	χ^2=3.790	MCP=0.139
6–10	11 (47.8)	0		
>10	5 (21.7)	2 (100.0)		
Presence of lateral pits	3 (13)	1 (50)	χ^2=1.870	FEP=0.30
Presence of lateral pits and pits >10	1 (4.3)	1 (50.0)	χ^2=5.210	FEP=0.157
Drain removal				
Mean±SD	7.3±0.7	9±0	t=3.346*	0.003*
Median (minimum–maximum)	7 (6–9)	9 (9–9)		
Follow-up (month)				
Mean±SD	8.22±1.62	8.0±2.83	U=21.00	0.880
Median (minimum–maximum)	8 (6–11)	8 (6–10)		

χ^2, χ^2 test; FE, Fisher's Exact; MC, Monte Carlo; t, Student's t test; U, Mann–Whitney test. P: P value for the relation between recurrence and different parameters. *Statistically significant at P value less than or equal to 0.05.

systematic review, they found eight well-organized classification systems, but unfortunately none of them had a definite role in the prognosis of recurrence or could be validated well to choose the ideal treatment.

In our study, we tried to have a step to perform a simple classification to use and link this classification to the possibility of recurrence and wound complications. We think that two factors can be of major importance (number of midline pits and presence of lateral pits away from the midline). Also we included other factors that we thought could be of significance such as diabetes and previous surgeries (recurrent disease). Wysocki et al. [21] in their international online discussion stated that 79% of surgeons felt that categorization of the disease is mandatory and they suggested multiple factors including midline disease, lateral extension, the distance between the highest and lowest midline pits, presence of hair tufts within the sinuses, and many other factors.

Guner and colleagues, in their study on 367 patients settled a staging system depending on the morphology of the disease and the progressive character of the disease (according to them); in this staging system, stage 1 was a single midline pit to progress up to stage 4, which is multiple midline pits (>3) with lateral extension on both sides. Almost 80% of their patients were more than stage 1 (more than one pit), Infection was observed 5.4% of patients, seroma in 7.6%, and partial dehiscence in 3.8%. Recurrence was identified in 1.6% of patients (all of them were stage 2 or more) within a median follow-up period of 29 months, but there was no significant relation between recurrence and their staging system. According to them it needs more studies to be well validated and to be correlated well to different modalities of treatment, especially in extensive disease [22]. In our study, six (24%) out of our 25 patients showed wound complications (infection, disruption especially in the lower edge), and two (8%) cases had a recurrence in the median follow-up period of 8 (6–11) months. We think that this variation is because we focused to study the extensive disease exclusively.

Seroma, hematoma, maceration, wound infection, and disruption are the most common wound complications. Invariably, these complications will delay the healing

process and increase the possibility of recurrence. In a study designed by Bessa [23] (single-surgeon experience), he found less wound complications with the flap technique (modified Limberg) in 10.5% of the cases than in the modified Karydakis technique (complications in 12.2% of cases); also recurrence was 2.2% in the modified Limberg compared with 4% in Karydakis, but his study was limited because of the few number of cases.

To the best of our knowledge, there was always difficulty to get a perfect classification or staging system in most of the available studies, sometimes because of the low number of cases and usually due to the high variety of the clinical presentation of the disease and variety of surgical techniques. We faced here the same limitations and aimed to have a step to settle a new system concerning the extensive disease exclusively as our results supported the relation between the number of midline pits and other factors such as diabetes with the occurrence of wound complications that predispose to recurrence of the pathology.

Conclusion
Wide local excision and off-midline closure is a feasible treatment for extensive pathology of the pilonidal disease with comparable results and less disfigurement in comparison with flap techniques (according to available research). Also, the number of midline pits is an important influential factor on the results of surgery and should have a role in the journey to settle a widely accepted classification system besides other factors such as diabetes, recurrence, and lateral extension of the disease.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

References
1 Humphries AE, Duncan JE. Evaluation and management of pilonidal disease. Surg Clin N Am 2010; 90:113–124.

2 Harlak A, Mentes O, Kilic S, Coskun K, Duman K, Yilmaz F. Sacrococcygeal pilonidal disease: analysis of previously proposed risk factors. Clinics 2010; 65:125–131.

3 Al-Hassan HK, Francis IM, Neglen P. Primary closure or secondary granulation after excision of pilonidal sinus?. Acta Chir Scand 1990; 156:695–699.

4 Khawaja HT, Bryan S, Weaver PC. Treatment of natal cleft sinus: a prospective clinical and economic evaluation. BMJ 1992; 304:1282–1283.

5 Tezel E. A new classification according to navicular area concept for sacrococcygeal pilonidal disease. Colorectal Dis 2007; 9:572–576.

6 Awad MMS, Elbaset AA, Ebraheem S, Tantawy E, Elhafez MA, Elsayed AM. A scoring system as a method to evaluate pilonidal sinus disease to make an easy decision for its management. Indian J Plast Surg 2009; 42:43–48.

7 Beal EM, Lee MJ, Hind D, Wysocki AP, Yang F, Brown SR. A systematic review of classification systems for pilonidal sinus. Tech Coloproctol 2019; 23:435–443.

8 Quinodoz PD, Chilcott M, Grolleau JL, Chavoin JP, Costagliola M. Surgical treatment of sacrococcygeal pilonidal sinus disease and skin flaps: the Toulouse experience. Eur J Surg 1999; 165:1061–1065.

9 Guner A, Cekic AB, Boz A, Turkyilmaz S, Kucuktulu U. A proposed staging system for chronic symptomatic pilonidal sinus disease and results in patients treated with stage-based approach. BMC Surg 2016; 16:18.

10 Milone M, Basso L, Manigrasso M, Pietroletti R, Bondurri A, La Torre M, et al. Congress of Turkish colon and rectal surgery on 19–23. Color Dis 2017; 27:65–66.

11 Eryilmaz R, Sahin M, Alimoglu O, Dasiran F. Surgical treatment of sacrococcygeal pilonidal sinus with the limberg transposition flap. Surgery 2003; 134:745–749.

12 Karydakis GE. Easy and successful treatment of pilonidal sinus after explanation of its causative process. Aust N Z J Surg 1992; 62:385–389.

13 Gurer A, Gomceli I, Ozdogan M, Ozlem N, Sozen S, Aydin R. Is routine cavity drainage necessary in Karydakis flap operation? A prospective, randomized trial. Dis Colon Rectum 2005; 48:1797–1799.

14 Ersoy E, Devay AO, Aktimur R, Doganay B, Ozdogan M, Gündogdu RH. Comparison of the short-term results after Limberg and Karydakis procedures for pilonidal disease: randomized prospective analysis of 100 patients. Colorectal Dis 2009; 11:705–710.

15 Can MF, Sevinc MM, Hancerliogullari O, Yilmaz M, Yagci G. Multicenter prospective randomized trial comparing modified Limberg flap transposition and Karydakis flap reconstruction in patients with sacrococcygeal pilonidal disease. Am J Surg 2010; 200:318–327.

16 Moran DC, Kavanagh DO, Adhmed I, Regan MC. Excision and primary closure using the Karydakis flap for the treatment of pilonidal disease: outcomes from a single institution. World J Surg 2011; 35:1803–1808.

17 Ates M, Dirican A, Sarac M, Aslan A, Colak C. Short and longterm results of the Karydakis flap versus the Limberg flap for treating pilonidal sinus disease: a prospective randomized study. Am J Surg 2011; 202:568–573.

18 Boshnaq M, Phan YC, Martini I, Harilingam M, Akhtar M, Tsavellas G. Limberg flap in management of pilonidal sinus disease: systematic review and a local experience. Acta Chir Belg 2018; 118:78–84.

19 Kim JH, Nam SM, Park ES, Choi CY, Cha HG. Surgical treatment of sacrococcygeal pilonidal sinus with a leaf flap. Wound Manage Res 2021; 17:102–107.

20 Iesalnieks L, Ommer A, Herold A, Dol D. German National Guideline on the management of pilonidal disease: update 2020. Langenbeck's Arch Surg 2021; 406:2569–2580.

21 Wysocki P, Andersson RE, Gips M, Gips M, Girgin M, Guner A, et al. Towards a classification of sacroccygeal pilonidal disease- Berlin 2017. Pilonidal Sinus J 2018; 4:5–12.

22 Guner A, Cekic AB, Boz A, Turkyilmaz S, Kucuktulu U. A proposed staging system for chronic symptomatic pilonidal sinus disease and results in patients treated with stage-based approach. BMC Surg 2016; 16:18.

23 Bessa SS. Results of the lateral advancing flap operation (modified Karydakis procedure) for the management of pilonidal sinus disease. Dis Colon Rectum 2007; 50:1935–1940.