Modified limberg versus lateral advancement flaps in the surgical treatment of pilonidal sinus

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Sacrococcygeal pilonidal disease is a frustrating health problem that occurs at least two times as frequently in men as in women usually between the ages of 15 and 30 years with exceptional occurrence before puberty or after the age of 60 years. During the past years a wide variety of approaches have been developed for treating pilonidal disease ranging from conservative methods (simple opening, curettage, brushing, and phenol injection) to wide surgical excision. Lately, surgical procedures have changed in favor of the flap techniques as they effectively provide wide excision of the diseased tissues and obliteration of the natal cleft thus neutralizing the causative factors that lead to a vicious circle of infection and recurrence. The aim of the study was to compare the short-term results of modified Limberg flap transposition, a widely used technique in pilonidal sinus surgical treatment, with lateral advancement flap (LAF) transposition, a relatively less frequently used technique, from the point of view of operative time, wound complications, recurrence, and patient satisfaction regarding cosmetic appearance using visual analog scale in the first 12 months postoperatively. The study included 60 consecutive patients with chronic pilonidal sinus disease admitted to Alexandria Main University Hospital between January 2013 and June 2014. The current study has proved equivalence between the modified Limberg flap and LAF in terms of postoperative wound complications and late disease recurrence. On the other hand, the LAF has proven its superiority with a statistically significant shorter operative time and more accepted aesthetic results.

Keywords:
lateral advancement flap, modified Limberg flap, pilonidal sinus, surgical treatment

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Introduction

Sacrococcygeal pilonidal disease is 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 [1–4].

Sacrococcygeal pilonidal disease is a frustrating health problem with an estimated prevalence from a low of 26 to a high of 700 per 100 000 [1,5–7]. It occurs at least two times as frequently in men as in women usually between the ages of 15 and 30 years with exceptional occurrence before puberty or after the age of 60 years. The disease has a higher incidence in Caucasians and prevails epidemiologically in the Mediterranean and Gulf regions [1,5–8].

During the past years, a wide variety of approaches have been developed for treating the pilonidal disease ranging from conservative methods (simple opening, curettage, brushing, and phenol injection) to surgical excision [1,6].

The goal of treatment of the pilonidal sinus can be summarized into two-folds: the first being excision of all diseased tissue with subsequent wound management and dealing with risk factors in order to decrease disease recurrence. The second fold deals with minimizing patient inconvenience and morbidity after surgical procedures [7,9]. Although these goals seem achievable, no optimal treatment has been reported to date in the literature [1]. Excision of the diseased tissue down to the sacral fascia has been still the most widely practiced technique with the reconstruction step being a matter of great debate [10].

Despite controversy about the best surgical technique, an ideal surgical procedure was expected to be simple, does not necessitate prolonged hospital stay with low recurrence rate, associated with minimal pain and wound care and when possible should have a good aesthetic result [1,6,11,12].

In the light of these widely accepted concepts, surgical procedures have changed in favor of the flap techniques as they effectively provide wide excision of the diseased tissues and obliteration of the natal cleft thus neutralizing the causative factors that lead to a vicious circle of infection and recurrence [11,12].

The aim of this study was to compare the short-term results of modified Limberg flap (MLF) transposition, a widely used technique in pilonidal sinus surgical treatment, with lateral advancement flap (LAF) transposition, a relatively less frequently used technique, from the point of view of operative time, wound complications, recurrence, and patient satisfaction regarding cosmetic appearance using the visual analog scale (VAS) in the first 12 months postoperatively.

Patients and methods

Study design

This study was planned as a prospective, randomized comparative study. The study patients were 60 consecutive patients with chronic pilonidal sinus disease admitted to Alexandria Main University Hospital between January 2013 and June 2014. All patients were adults with symptomatic chronic sinuses of the natal cleft. Only patients with simple chronic pilonidal sinus disease were included in the study, who were defined by having minimal to no acute inflammation with easily visualized midline pits and secondary openings over a limited area of the natal cleft.

Those with acute pilonidal abscesses, disorders known to affect wound healing such as diabetes and immunodeficiency, previous surgery in the sacrococcygeal region other than surgeries for pilonidal sinus, psychic disorders, or apparently poor hygiene were excluded from the study.

Patients were classified into two groups of 30 patients each through a randomized closed envelope technique. One group was treated with asymmetrical rhomboid excision of pilonidal sinus and reconstruction by the MLF. The other group was treated by rectangular excision of pilonidal sinus and by reconstruction of the resultant defect with the lateral advancement adipofasciocutaneous flap. The protocol was submitted to and approved by an ethics committee and all patients provided informed consent to participate in the study.

Surgical technique

Apart from the routine preparation of any surgical patient, the patients were allowed a fluid only in the afternoon before the surgery. Meticulous shaving of hair of the lower back and both gluteal regions was performed the evening before the day of the surgery. A cleansing enema was also done 4 h before the surgery.

The type of anesthesia was justified according to the anesthesiologist and patient preference. Apart from one patient who refused a spinal needle brick, all patients were operated under saddle block. Intravenous antibiotic prophylaxis of 1 g ampicillin–sulbactam acid and 500 mg of metronidazole were given at the time of induction and were continued for 48 h postoperatively.

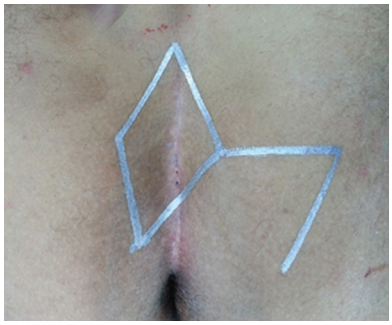
The patients were positioned in the prone position and the trunk was slightly jackknifed at the hips. The buttocks were strapped apart by an adhesive tape to allow wide exposure of the operative field.

The surgical area was disinfected with 10% povidone-iodine solution. After skin preparation, the anus was excluded from the operative field by surgical drapes. Using a sterile skin-marking pen, the pathologic area to be excised and the flap design were mapped on the skin.

In the group managed by the MLF, the flap was performed according to the technique described by Mentes *et al.* [13]. During the procedure, a rhomboid incision was made, followed by removal of the affected area plus a rim of healthy tissue surrounding the cyst and sinuses en bloc. The lower corner of the excised rhomboid area was placed ~1.5 cm lateral to the midline as shown in Fig. 1.

A fascio-lipocutaneous Limberg flap was prepared on the gluteal region contralateral to the asymmetric lower corner of the defect. Then, the flap was transposed medially to fill the cavity as demonstrated in Fig. 2.

Figure 1



Flap design.

The defect in the donor region was closed primarily as shown in Fig. 3.

In the group treated with the LAF, the flap was performed according to the technique described by Singh *et al.* [14]. A rectangular excision was used to include all the sinuses and their ramifications and removed en bloc down to the presacral fascia as shown in Fig. 4.

The flap was then tailored and the optimum size of the flap was kept at about 1.5–2 times the size of the defect to be closed as demonstrated in Fig. 5. Mattress polypropylene 2–0 sutures were used for skin closure as shown in Fig. 6.

Postoperative care and follow-up

The patients were instructed not to lie supine for the first 48 h postoperatively. The wound was exposed on the first postoperative day to check for flap viability.

Suction drain was removed when the output is less than 10 ml in 24 h. Stitches were removed on the 14th postoperative day. The patients were allowed to return to normal activities after the removal of stitches, but to avoid prolonged sitting, excessive physical strain, and strenuous sports for the following 3–4 weeks. The patients were advised hygienic measures and adoption of the regular habit of shaving hair of the anal cleft and buttocks on weekly basis. Patients were followed up on weekly basis for the first month, then on monthly basis for the following 2 months and then every 3 months thereafter till completion of 1 year.

During the follow-up visits, the patients were reviewed for wound breakdown, wound seroma, wound infection, and recurrence. Patient satisfaction regarding their cosmetic appearance was evaluated 6 months postoperatively by asking the patient to describe their satisfaction with the resultant scar.

Figure 2

Flap mobilization.

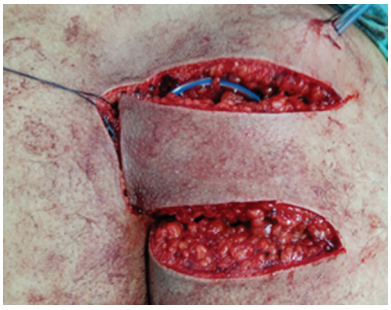
Figure 3

Skin closure.

Figure 4

Flap design.

Figure 5



Flap mobilization.

Figure 6

Skin closure.

Table 1 Demographic criteria and clinical outcomes

Variables	Modified Limberg flap (n=30) [n (%)]	Lateral advancement flap (n=30) [n (%)]	P value
Sex			
Male	23 (76.6)	24 (80)	0.754
Female	7 (23.3)	6 (20)	
Wound seroma	4 (13.3)	3 (10)	1.000
Wound infection and breakdown	2 (6.7)	1 (3.3)	1.000
Recurrence	1 (3.3)	0 (0)	1.000
Age [median (range)] (years)	25.5 (17–39)	26 (18–38)	1.000
Operative time [median (range)] (min)	50 (40–70)	40 (35–50)	<0.0001
Postoperative pain (VAS) [median (range)]	4 (2–7)	4 (2–7)	0.660
Cosmetic satisfaction (VAS) [median (range)]	4.5 (2–7)	8 (5–9)	<0.0001

VAS, visual analog scale.

VAS was also used to help the patients rate their satisfaction from 0 (not satisfied at all) to 10 (completely satisfied).

Results

The study patients consisted of 47 (78.33%) men and 23 (21.67%) women with an overall male to female ratio of 3.6 : 1. The age of the included patients ranged from 17 to 39 years. No statistically significant differences were found in age (P=0.754) or sex (P=1.000) between both the groups (Table 1).

The operative time was determined as follows: minimum: 35 min and maximum: 70 min Comparing the two groups regarding the operative time, it has been shown that the LAF group was found to have a statistically significant shorter operative time (P≤0.0001) (Table 1).

The VAS scores for assessing postoperative pain were similar between groups (P=0.660).

Wound infection and breakdown were observed in two (6.7%) patients in the MLF group and in one (3.3%) patient in the LAF. Wound noninfected seroma occurred in four (13.3%) patients in the MLF group and in two (6.7%) patients in the LAF group with no statistically significant difference in postoperative wound complications between the two groups (P=1.000) (Table 1).

The VAS scores for assessing patient satisfaction with the aesthetic results of their performed procedures were higher in the LAF group 8 (5–9) than in the MLF group 4.5 (2–7) resulting in a statistically proven cosmetic superiority of the LAF group (P≤0.0001) (Table 1).

Recurrent disease occurred in one (3.3%) patient in the MLF group and in none of the patients included in the LAF group with no statistically significant difference between the two groups in terms of disease recurrence (P=1.000) (Table 1).

Discussion

Believing in what was reported by Bascom about the impossibility of the sacrococcygeal pilonidal sinus disease to start on a convex surface, many surgeons became interested in local perforator flaps for reconstructing defects following diseased tissue excision hoping to change the contour of the natal cleft, thus reducing disease recurrence. The main principles of flap repairs include wide excision of the diseased tissues, flattening the natal cleft, and closure without tension depending on a well-vascularized mobilized local flap [5,15–17].

With the wide variety in the proposed designs of local flaps in the gluteal region, several studies have been conducted by those who believe in the superiority of flaps in treating chronic pilonidal sinus disease to reach a common consensus about the ideal flap. Among the multiple flaps suggested to be used in the management of sacrococcygeal pilonidal sinus disease, the rhomboid flap especially gained wide popularity since its introduced by Azab *et al.* [18].

The main drawback of the classic rhomboid or Limberg flap (CLF) was that the inferior apex of the flap was located deep in the intergluteal region near the anal canal with it being the main site of wound infection, maceration, breakdown, and late disease recurrence can occur. For overcoming this point, several modifications were suggested to bring the inferior apex of the CLF away from the midline. Some symmetrically rotated the Limberg flap and some have shifted the whole flap lateral to the midline but most lateralized only the inferior flap apex with a resultant asymmetric rhomboid, which

have much lower rates of complications than the CLF [5,18].

The asymmetric rhomboid flap lateralizing only the inferior apex of the rhomboid 1–2 cm away from the midline is the one commonly referred to as the MLF. The MLF was proven to be an effective option for treating pilonidal sinus disease with a lower rate of early wound complications and late disease recurrence than the CLF, although both have same drawback of the less enjoyable cosmetic appearance of their resultant scars [19].

In the current study, we tested the good reputation of the popular MLF by comparing it to the less widely used LAF in treating simple chronic pilonidal sinus.

Many researchers were interested in evaluating the efficacy of the MLF in treating chronic pilonidal sinus disease either as a single arm of their studies, by comparing it to other methods of treatment or even by including it among other flaps to prove the superiority of flap techniques in treating pilonidal sinus disease [6,9,13,18,20–27].

Unlike the MLF, the LAF has gained a much less spread. To date, only few studies of the published literature discussing the management of pilonidal sinus were exposed to the LAF as a treatment option for chronic pilonidal sinus disease [9,14,20]. From these studies only that published by Saydam *et al.* [20] assessed the LAF as a separate arm in their conducted research with the MLF being the other arm proving equivalence between both flaps in operative time, postoperative wound complications, and late disease recurrence. In the other studies, the LAF was included among other flaps to assess the flap techniques in general in the management of pilonidal sinus disease with little reported data evaluating the LAF as a separate entity [9,14].

The current study has proved equivalence between the MLF and LAF in terms of postoperative wound complications and late disease recurrence. On the other hand, the LAF has proven its superiority with a statistically significant shorter operative time and more accepted aesthetic results.

The operative time in the present study was defined as the time elapsed between the beginnings of flap design to the last stitch in skin closure. Including the step of flap design in the operative time was thought to be the cause behind the shorter operative times recorded in the LAF group in the present study. The LAF was found to be easier to be designed with fewer calculations needed and subsequent less effort required for tissue opposition during the step of reconstruction.

In this study, the cosmetic satisfaction of patients treated by LAF was significantly higher than those treated by MLF with a P value of less than 0.0001. The way of assessing patient satisfaction in the present study is still the subjective way, which depends mainly on the patients themselves and their standards regarding the cosmetic appearance of their scars, which may play an important incomparable element in the reported difference between the two groups. It is worth mentioning that the objective observations of the authors of the present study were consistent with that of the patients supporting the cosmetic superiority of the LAF. The cosmetic superiority of the resultant scar following LAF was mainly attributed to the simplicity of the flap design in comparison to the MLF with consequent less tissue mobilization and a lesser degree of tissue displacement, thus resulting in healing with relatively more preserved landmarks of the gluteal area.

Conclusion

By analyzing the data retrieved from this study and as previously displayed, the less popular LAF has proven its technical feasibility and superiority of its aesthetic results when compared with the widespread MLF in the treatment of simple chronic pilonidal sinus disease. The LAF has provided a simpler flap design with less time required for it to be designed and implemented resulting in a lesser degree of tissue displacement and more preservation of the landmarks of the gluteal region thus achieving a higher degree of satisfaction among not only the managed patients but also their managing surgeons. On this patient, further randomized controlled studies with a large number of patients and a longer follow-up period are needed for formal testing of the results reported in the current study.

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Nil.

Conflicts of interest

There are no conflicts of interest.

References

1 Ates M, Dirican A, Sarac M, Aslan A, Colak C. Short and long-term 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.

2 Da Silva JH. Pilonidal cyst: cause and treatment. Dis Colon Rectum 2000; 43:1146–1156.

3 El-Khadrawy O, Hashish M, Ismail K, Shalaby H. Outcome of the rhomboid flap for recurrent pilonidal disease. World J Surg 2009; 33:1064–1068.

4 Khanna A, Rombeau JL. Pilonidal disease. Clin Colon Rectal Surg 2011; 24:46–53.

5 Afsarlar CE, Yilmaz E, Karaman A, Karaman I, Ozguner IF, Erdogan D, *et al.* Treatment of adolescent pilonidal disease with a new modification to the Limberg flap: symmetrically rotated rhomboid excision and lateralization of the Limberg flap technique. J Pediatr Surg 2013; 48:1744–1749.

6 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.

7 De Parades V, Bouchard D, Janier M, Berger A. Pilonidal sinus disease. J Visc Surg 2013; 150:237–247.

8 Tavassoli A, Noorshafiee S, Nazarzadeh R. Comparison of excision with primary repair versus Limberg flap. Int J Surg 2011; 9:343–346.

9 Mahdy T. Surgical treatment of the pilonidal disease: primary closure or flap reconstruction after excision. Dis Colon Rectum 2008; 51:1816–1822.

10 Muzi MG, Milito G, Cadeddu F, Nigro C, Andreoli F, Amabile D, *et al.* Randomized comparison of Limberg flap versus modified primary closure for the treatment of pilonidal disease. Am J Surg 2010; 200:9–14.

11 Yamout SZ, Caty MG, Lee YH, Lau ST, Escobar MA, Glick PL. Early experience with the use of rhomboid excision and Limberg flap in 16 adolescents with pilonidal disease. J Pediatr Surg 2009; 44:1586–1590.

12 Ibrahim H. Rhomboid flap for management of pilonidal sinus: a comparative study. Kasr El Aini J Surg 2008; 9:11–18.

13 Mentes BB, Leventoglu S, Cihan A, Tatlicioglu E, Akin M, Oguz M. Modified Limberg transposition flap for sacrococcygeal pilonidal sinus. Surg Today 2004; 34:419–423.

14 Singh R, Pavithran NM. Adipo-fascio-cutaneous flaps in the treatment of pilonidal sinus: experience with 50 cases. Asian J Surg 2005; 28:198–201.

15 Ersoy OF, Karaca S, Kayaoglu HA, Ozkan N, Celik A, Ozum T. Comparison of different surgical options in the treatment of pilonidal disease: retrospective analysis of 175 patients. Kaohsiung J Med Sci 2007; 23:67–70.

16 Hull TL, Wu J. Pilonidal disease. Surg Clin North Am 2002; 82:1169–1185.

17 Lee PJ, Raniga S, Biyani DK, Watson AJ, Faragher IG, Frizelle FA. Sacrococcygeal pilonidal disease. Colorectal Dis 2008; 10:639–650; [discussion 51-2].

18 Azab ASG, Kamal MS, Saad RA, *et al.* Radical cure of pilonidal sinus by a transposition rhomboid flap. Br J Surg 1984; 71:154.

19 Beck D, Roberts P, Saclarides T, Senagore A, Stamos M, Wexner S. The ASCRS textbook of colon and rectal surgery. 2nd ed. LLC: Springer Science, Business Media; 2011.

20 Saydam M, Ozturk B, Sinan H, Balta AZ, Demir P, Ozer MT, *et al.* Comparison of modified Limberg flap transposition and lateral advancement flap transposition with Burow's triangle in the treatment of pilonidal sinus disease. Am J Surg 2015; 210:772–777.

21 Akin M, Leventoglu S, Mentes BB, Bostanci H, Gokbayir H, Kilic K, *et al.* Comparison of the classic Limberg flap and modified Limberg flap in the treatment of pilonidal sinus disease: a retrospective analysis of 416 patients. Surg Today 2010; 40:757–762.

22 Bessa SS. Comparison of short-term results between the modified Karydakis flap and the modified Limberg flap in the management of pilonidal sinus disease: a randomized controlled study. Dis Colon Rectum 2013; 56:491–498.

23 Cihan A, Ucan BH, Comert M, Cesur A, Cakmak GK, Tascilar O. Superiority of asymmetric modified Limberg flap for surgical treatment of pilonidal disease. Dis Colon Rectum 2006; 49:244–249.

24 Elshazly W, Said K. Clinical trial comparing excision and primary closure with modified Limberg flap in the treatment of uncomplicated sacrococcygeal pilonidal disease. Alexandria J Med 2012; 48:13–18.

25 Omer Y, Hayrettin D, Murat C, Mustafa Y, Evren D. Comparison of modified limberg flap and modified elliptical rotation flap for pilonidal sinus surgery: a retrospective cohort study. Int J Surg 2015; 16:74–77.

26 Shabbir F, Ayyaz M, Farooka MW, Toor AA, Sarwar H, Malik AA. Modified Limberg's flap versus primary closure for treatment of pilonidal sinus disease: a comparative study. J Pak Med Assoc 2014; 64:1270–1273.

27 Yildiz T, Ilce Z, Kucuk A. Modified Limberg flap technique in the treatment of pilonidal sinus disease in teenagers. J Pediatr Surg 2014; 49:1610–1613.