A comparative study between Limberg flap and cleft lift procedures in the treatment of sacrococcygeal pilonidal sinus disease

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Introduction This was a prospective, randomized study designed to compare the effects and outcomes of Limberg flap (rhomboid excision) and cleft lift procedure.

Patients and methods Between June 2014 and June 2017, 40 patients underwent surgical treatment for uncomplicated sacrococcygeal pilonidal sinus in the Surgery Department, Al-Azhar University Hospital, New Damietta. The patients were randomly subdivided into two groups: group A comprising 20 patients who underwent the Limberg flap procedure (rhomboid excision) and group B comprising 20 patients who underwent the cleft lift procedure.

Results As regards operative time and weight of resected tissue, there was a significant decrease in group B (carried out by cleft lift procedure) in comparison with group A (carried out by Limberg flap procedure) (33±4.2, 12.1±5.23 vs. 42 ±5.1, 25.4±3.59, respectively). Moreover, there was a decrease in the postoperative pain (measured by a visual analog scale) in group B in comparison with group A, mainly on the first and seventh days, but this difference in the postoperative pain was nonsignificant. In addition, there was a nonsignificant decrease in the mean hospital stay and healing time in group B in comparison with group A. As regards the postoperative complications, there was nonsignificant decrease in postoperative seroma and superficial skin separation in group B in comparison with group A. The recurrence rate shows no statistically significant difference between the two groups.

Conclusion Both the cleft lift and the Limberg flap procedures gave similar good results, except that the cleft lift procedure has a shorter operative time.

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Introduction

Pilonidal sinus disease is an old disease first described by Hodges in 1880. Pilonidal is from the Latin words (Latin: pilus=hair and nidus=nest), and pilonidal sinus disease indicates a disease consisting of hair-containing sinus usually found in the sacrococcygeal area. This disease is considered to be caused by damaged hair follicles and entrapped hair resulting in folliculitis, infection, and rupture into the surrounding subcutaneous tissue, and this is the acquired theory for explanation of pilonidal sinus; the congenital theory suggests that a pit presents at birth resulting from the absence of coalescence of the primitive ectoderm [1–3].

It occurs in ~0.7% of the population, with a peak age of incidence at 16–25 years, exceptionally before puberty or after the age of 60 [4,5]. The predisposing factors include hairy body, thick skin, overweight, a deep gluteal cleft, poor hygiene, long seated hours, repeated chafing, and family history of this disease [6].

There are three main series of management for this chronic condition: (a) conservative local management, which includes fibrin glue instillation [7], and phenol application [8], but definitive proof of their effectiveness is lacking; (b) surgical debridement/marsupialization with healing by secondary intention; and (c) primary excision and closure.

Although wide wound excision leaving the wound open to heal by secondary intention is time-honored, safe, and has a low recurrence rate, this method has the slowest healing time compared with primary closure. This makes it unacceptable to many younger patients [9–11].

A new Cochrane study proposed that 'off-midline closure should be the standard treatment'. This is the most clear-cut approach [12].

Off-midline surgical closure of pilonidal sinus has different methods such as the Limberg flap (rhomboid excision) in which flattening the natal cleft occurs and a tension-free repair is performed using a wide, well-vascularized flap. It is considered one of the best treatment techniques, with a 0–16% rate of surgical area-related complications and 0–5% recurrence rate

[13]. The other off-midline technique is the cleft lift operation, which was described by Bascom and in which a contralateral flap was designed, releasing the attachments to the sacrum and coccyx to ensure a tightness-free wound closure and lateralization of the suture line. This technique was initially developed to deal with operations that had failed to heal or where symptoms continued to recur, but, later on, it was carried out more and more as a first-time procedure, as it has a short healing period and a low recurrence rate that have been reported in cohort studies [14,15].

The present prospective, randomized study is designed to compare the effects and outcomes of the Limberg flap (rhomboid excision) and cleft lift procedure with regard to postoperative pain, healing duration, recurrence rate, and wound complication rate.

Patients and methods

Between June 2014 and June 2017, 40 patients underwent surgical treatment for uncomplicated sacrococcygeal pilonidal sinus in the Surgery Department, Al-Azhar University Hospital, New Damietta. The study was approved by the Ethics Board of Al-Azhar University. The patients were randomly subdivided into two groups using a table created on computer software:

(1) Group A comprised 20 patients who underwent the Limberg flap procedure (rhomboid excision).
(2) Group B comprised 20 patients who underwent the cleft lift procedure.

Inclusion criteria for surgical treatment included patients who presented with sacrococcygeal pilonidal sinus.

Exclusion criteria included patients who presented with acute pilonidal abscesses and recurrent or complex pilonidal sinuses and patients who presented with uncontrolled diabetes.

The study procedure was explained for each participant, and informed consent was obtained.

Full history taking, clinical examination, and routine laboratory tests were performed for all patients.

Patients' information such as age, sex, BMI, assigned procedure, previous treatments, and duration of symptoms was recorded. The operation time and weight of the resected part were also recorded.

Postoperative pain (on the first day, the seventh day, and the twenty first day after the operation), time of complete wound healing, duration of hospital stay, time of return to work, postoperative complications, and recurrence rate were recorded. The postoperative pain was assessed using a visual analog scale on which the patients were asked to mark the degree of pain they felt.

All patients received 1 g of third-generation cephalosporin intravenously just before the operation. Methylene blue was injected through all sinus openings to visualize the border of the cysts and all tracts.

Surgical techniques

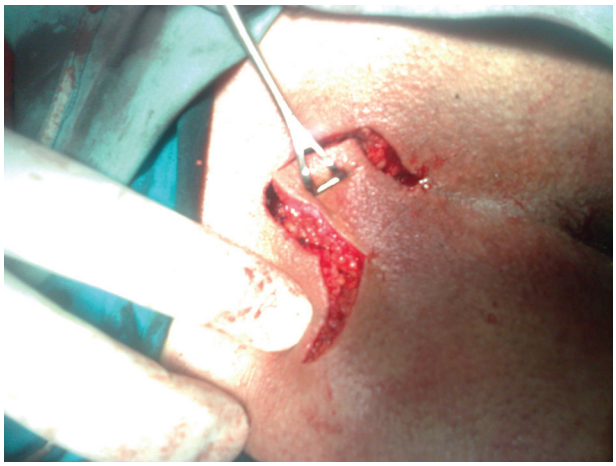
Limberg flap procedure (rhomboid excision)

This technique (performed for group A) was carried out, as described by Mentes *et al.* [16]. Under spinal anesthesia, patients were placed in prone jack-knife position. The area to be excised was marked on the skin in a rhomboid form, and the flap lines were designed. The skin incision was dissected to the postsacral fascia (Fig. 1). Full mobilization and transposition of the created tension-free flap medially was carried out to fill the rhomboid defect created by excision of the sinus; the flap must be not tight (Fig. 2). The wound was closed in two layers; the subcutaneous tissue layer with

Figure 1

The skin incision was deepened to the postsacral fascia.

Figure 2



The flap was mobilized and transported medially.

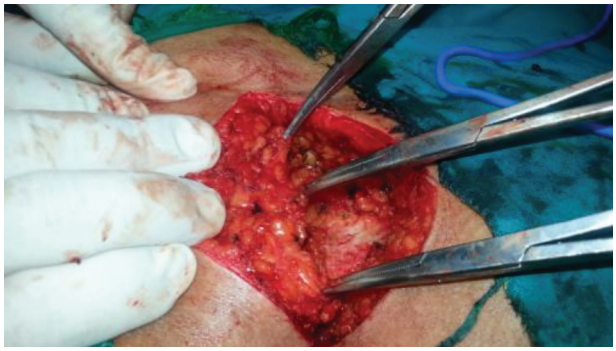
Figure 3

Closure of the skin with nonabsorbable interrupted mattress sutures.

Figure 4

Skin incision was more to the right.

Figure 5



Skin and subcutaneous tissues were excised.

absorbable sutures, while the skin layer was closed with nonabsorbable interrupted mattress sutures (Fig. 3).

Cleft lift procedure

The Bascom cleft lift procedure (group B) was performed, as described by Bascom and Bascom [14,17].

Under spinal anesthesia, patients were placed in prone jack-knife position. The buttocks were pushed together, and the edges of the natal cleft were marked. An 'eccentric' elliptical incision was marked at the right or left side, depending on the location of the pits or sinus openings; the incision was planned so that the final scar would be outside the natal cleft. The buttocks were taped in abduction. The ellipse bearing the pilonidal disease was excised (Figs 4,5), and the skin opposite the side of the suture line was undermined to the opposite edge of the natal cleft, releasing the attachments to the sacrum and coccyx, to ensure a tension-free closure and lateralization of the suture line (Fig. 6).

A suction drain was brought through a separate stab incision above the weight-bearing area of the buttock. The tapes were released. The subcutaneous tissues were approximated with absorbable sutures, and the skin was closed with nonabsorbable sutures. The result is a flattening of the natal cleft with a suture line located outside the midline (Fig. 7).

Wound coverage was also advised for both procedures until complete healing of the surgical wound and cessation of any discharge from the wound.

A single dose of intramuscular diclofenac potassium injection was taken 8 h after the surgery; thereafter, diclofenac potassium tablets were administered every 12 h on the first day.

The drains were removed when drainage became less than 20 ml/day. The sutures were removed on postoperative day 10.

The patients came for follow-up visits on postoperative days 7 and 21 and were then followed-up for recurrence until 6 months at the outpatient clinic.

Statistical analysis

It was performed by the usage of the SPSS (version 18; IBM, SPSS, Chicago, Illinois, USA). Pearson's χ^2 test was used to compare qualitative variables between the two groups, while the independent samples t test was used to compare the quantitative variables. P values less than 0.05 were considered significant for the interpretation of data.

Figure 6

Skin flap is moved to the right.

Figure 7

Results

In this study, the total number of patients was 40 (20 patients for each group); all the patients were male individuals; there was no significant difference between the two groups with regard to age, BMI, or symptoms' duration (Table 1).

With regard to operative time and weight of resected tissue, there was a significant decrease in group B (carried out by cleft lift procedure) in comparison with group A (carried out by Limberg flap procedure) (33±4.2, 12.1±5.23 vs. 42±5.1, 25.4±3.59, respectively).

Moreover, there was a decrease in the postoperative pain (measured by a visual analog scale) in group B in comparison with group A, mainly on the first and seventh days, but this difference in the postoperative pain was nonsignificant. In addition, there was a nonsignificant decrease in the mean hospital stay and healing time in group B in comparison with group A (Table 2).

With regard to the postoperative complications, there was a nonsignificant decrease in postoperative seroma and superficial skin separation in group B in comparison with group A. The recurrence rate shows no statistically significant difference between the two groups (Table 3).

Discussion

In the present study, no statistically significant variation was shown between the two groups with regard to the postoperative pain.

Other studies reported lower postoperative pain (visual analog scale values) for both Limberg flap and cleft lift procedures when compared with excisions and primary closure or with secondary healing without wound closure [18–21]. This is due to decreased surgical

Table 1 Patient characteristics

	Limberg flap group (N=20)	Cleft lift group (N=20)	P value
Sex			
Male	20	20	
Female	0	0	
Age (years)	25.30±3.6	25.48±2.8	0.82 (NS)
BMI (kg/m^2)	26.03±0.44	25.93±0.28	0.39 (NS)
Symptoms' duration (months)	14.5±8.6	15±9.2	0.86 (NS)

Values are displayed as mean±SD and n.

Table 2 Comparison of the outcomes of the two procedures

	Limberg flap group (*N*=20)	Cleft lift group (*N*=20)	*P* value
VAS score (0–10)			
Day 2	5.22±0.93	4.08±0.61	< 0.1 (NS)
Day 7	3.12±0.83	2.70±0.73	< 0.1 (NS)
Day 14	1.60±0.32	1.45±0.39	< 0.2 (NS)
Day 21	1.1±0.57	0.94±0.35	< 0.3 (NS)
Weight of resected tissue (g)	25.4±3.59	12.1±5.23	< 0.0001*
Operative time (min)	42±5.1	33±4.2	< 0.0001*
Mean hospital stay (days)	1.35±0.62	1.18±0.53	0.35 (NS)
Healing time (days)	10.77±3.1	10.25±2.8	0.58 (NS)

Values are presented as mean±SD. VAS, visual analog scale. *Significant.

Table 3 Complications of the two procedures

Complication	Limberg flap group (*N*=20)	Cleft lift group (*N*=20)	*P* value
Seroma	2 (10)	3 (15)	0.64 (NS)
Hematoma	0	0	–
Superficial infection	2 (10)	2 (10)	–
Superficial skin separation	2 (10)	1 (5)	0.55 (NS)
Recurrence rate	1 (5)	1 (5)	–

Values are presented as *n* (%).

area-related complications and patient discomfort during the early postoperative period as a result of tension-free closure of the wound and flattening of the previously deep natal cleft during pilonidal sinus surgery, which can also decrease the recurrence rate in the long term.

Ali and colleagues performed a prospective study on two groups of patients (122 patients), Limberg flap group and Bascom cleft lift group. They evaluated and compared the following parameters between the two groups: quality of life scores, postoperative pain scores, healing time, hospital stay duration, wound complications, the weight of resected tissue, and recurrence rate. Patients in the Bascom cleft lift group reported shorter operation duration and lesser weight of excised tissue. The patients also showed better 'bodily pain' score, and 'less role limitation due to physical problems' score on postoperative day 10. The two groups showed no statistically significant variation for the other parameters such as postoperative pain score, and postoperative complications and recurrence rate [22].This study showed similar results; there was a significant decrease in the operative time and weight of resected tissue in the cleft lift group than in the Limberg flap group (33±4.2, 12.1±5.23 vs. 42±5.1, 25.4±3.59, respectively). The postoperative pain, mean hospital stay, healing time, and superficial skin separation were nonsignificantly decreased in the cleft lift group than in the Limberg flap group.

The Limberg procedure needs a longer time for preparation because of the wider tissue dissected from under the postsacral fascia and its fixation to the other side, which may take time and leads to the difference in operation duration of the two techniques.

The postoperative infection and recurrence rate showed no differences between the two groups.

Longer follow-up periods are needed, as recurrence rate increases over time, rather than being observed during the early period after surgery [16,23].

Conclusion

Both cleft lift and the Limberg flap procedures gave similar good results, except that the cleft lift procedure had a shorter operative time.

Conflicts of interest

There are no conflicts of interest.

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