Comparative study between Limberg flap and local rotation flap for pilonidal sinus, as a new modified technique

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Introduction Pilonidal sinus is a common chronic disease of the sacrococcygeal region. Treatment varies according to the clinical presentation of the disease. Although many surgical methods have been suggested, an ideal method is still lacking because of high recurrence rates. Recurrent disease causes significant morbidity and consequent time off work.

Aim The aim of this study was to assess the role of the local rotation flap in promoting primary healing in pilonidal disease and to evaluate morbidity and recurrence in comparison with Limberg flap.

Patients and methods This prospective study was conducted at Al-Azhar University Hospitals, from April 2015 to July 2018. It involved 80 patients with pilonidal disease. There were 56 males and 24 females aged between 21 and 42 years old. They were divided randomly into two groups, with 40 patients each. Group A underwent Limberg flap, whereas group B underwent a local rotation flap closure for sacrococcygeal pilonidal sinus.

Results The operative time was ~1.5 h in group A, whereas in group B was ~45–60 min. The duration of hospital stay was 1 day, as all patients were discharged on the same day of surgery in both groups. In group A, there was no wound infection, but two cases had wound dehiscence, one case flap necrosis, and two cases with seroma after removal of drain. In group B, there was no wound infection, flap necrosis, or wound dehiscence, but there were six cases with seroma in the follow-up period. There was one case of recurrence in group A and no recurrence in group B.

Conclusion This study favors the local rotation flap for sacrococcygeal pilonidal sinus because it had the same outcomes as in Limberg flap, in addition to its simplicity and short operative time.

Sci J Al-Azhar Med Fac, Girls 2019 3:432–436

The Scientific Journal of Al-Azhar Medical Faculty, Girls
2019 3:432–436

Keywords: flap, pilonidal, sacrococcygeal disease, sinus

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Received 13 May 2019 **Accepted** 10 June 2019

Introduction

Cyclic sinuses often affect younger patients, usually occurring in the sacral area. Acquired and environmental factors are considered to contribute more to the causes than the congenital factors. The incidence rate is reported to be 26 per 100 000 population [1]. They occur more frequently in young males, rarely occurring before puberty or after the age of 40 years [2].

There exist several methods of treatment for pilonidal sinuses (PS), ranging from conservative nonsurgical treatments to extensive ablation and flap procedures. An ideal surgical procedure should be simple, not require long hospital stays, and have low recurrence rate. In addition, it must be associated with minimum wound care, and should minimize the patient's working time to a maximum extent [3].

In surgical practice, the most commonly used techniques are the initial closure and different types of eradication procedures in addition to the plates. The primary goal of circumcision and initial closure is rapid healing. However, injury rates at the surgical site were reported to be 6–14% after the initial closure [4]. The Limberg flap repair is currently preferred for PS treatment owing to the low recurrence rate [5]. Nevertheless, the risk of wound infection and PS recurrence has not been completely eliminated after Limberg flap repair [6].

Injuries result in the disintegration of the wound and long healing times. It is clear that improved results for ring sinus administration can be achieved by preventing wound infection. Identification of risk factors for wound infection may increase prevention [7].

The eradication of the sinus tract and complete healing of the overlying skin are essential principles of surgical treatment. The first step in the surgical treatment is wide radical excision of the affected tissue. In patients with extensive disease, the volume of tissue to be excised will be greater, because it is necessary to remove all branches of the sinus tract. The relationship between flap and

site of defect must be nearly equal to close the defect without tension and avoid occurrence of any gapped wound or infection.

In this study, we tried to assess new local rotation flap to close the defect and assess its feasibility, simplicity, and its outcome from point of recurrence, infection, or incidence of gapped wound in comparison with Limberg flap.

Patients and methods

This prospective study was conducted at Al-Azhar University Hospitals, from April 2015 to July 2018. It involved 80 patients with pilonidal disease, who were randomized into two groups:

(1) Group A included 40 patients who underwent Limberg flap.
(2) Group B included 40 patients who underwent local rotation flap.

Inclusion criteria

All cases with primary PS with no contraindication for anesthesia were included.

Exclusion criteria

Recurrent cases of PS were excluded.

Ethical statements were followed for the study. All patients agreed to participate in the study, and consents were taken from them.

All patients were prospectively evaluated in terms of sex, age, location of sinus pits, postoperative length of hospital stay, postoperative complications (wound dehiscence, infection, hematoma, seroma, and cosmetics), and recurrence.

Surgical procedure

Flap method: all patients were operated on under spinal anesthesia in the operating room. After anesthesia, the patients were placed in the prone position, with the buttocks strapped apart using wide adhesive tape. Methylene blue was injected into the sinus tract using a blue cannula. The excision was carried down to the fascia overlying the sacrum and laterally to the fascia of the gluteus maximus muscle. Dissection of the tract was performed with electrocautery, but number 15 surgical blade was used for the flap dissection to prevent flap necrosis and minimize seroma formation.

In group A, a rhomboid (Limberg) flap was prepared from right gluteal region as in Figs 1–4.

Figure 1

Rhomboid flap.

Figure 2

Pilonidal sinus and mapping of flap.

Figure 3

At end of operation and obliteration of natal cleft.

In group B, a local rotation flap, which is a semicircular flap, was prepared also from right gluteal region. A 16-Fr suction drain was placed below the flap and removed on postoperative fifth to 10th day when the output was less than 30 ml/day.

Statistical analysis

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were

Figure 4

Two weeks after surgery and wound healing.

expressed as mean±SD. Qualitative data were expressed as frequency and percentage.

Results

A total of 80 patients with pilonidal disease were enrolled in this study and divided into two groups A and B, with 40 patients each.

In group A, there were 30 males and 10 females, with mean age of 23±3 years. Most of the cases had a history of pilonidal abscess which drained spontaneously or by surgical procedure. Overall, 8 patients had comorbidities in the form of diabetes mellitus, morbid obesity, smoking, bronchial asthma, and hypertension.

In group B, there were 26 males and 14 females, with mean age of 25±2 years. A total of 30 patients had side branch owing to recurrent attack of inflammation. Only six patients had comorbidities in the form of diabetes mellitus, morbid obesity, smoking, bronchial asthma, and hypertension.

As it was showed in Table 1, there was no significant difference between the two groups regarding their demographic data.

The operative time was ~1.5 h in group A, whereas in group B, it was ~45–60 min. The duration of hospital stay was 1 day, as all patients were discharged on the same day of surgery in both groups. Most of the patients were mobilized on the first postoperative day.

Early postoperative complication

In group A, there was no wound infection, but two cases had wound dehiscence, one case had flap necrosis, and two cases had seroma after removal of drain.

Table 1 Demographic data of the patients in both groups

	Group A	Group B	*P* value (significance)
Age [mean±SD (range)]	23±3 (18–40)	25±2 (17–38)	NS
Sex			
Male	30	26	NS
Female	10	14	NS
Comorbidity (*n*)	8	6	NS
Presence of side branch	26	30	NS

Table 2 Postoperative complications in both groups

	Group A	Group B	*P* value (significance)
Wound infection	No	No	NS
Wound dehiscence	2	0	S
Flap necrosis	1	0	NS
Wound seroma	2	6	S

In group B, there was no wound infection, flap necrosis, or wound dehiscence, but there were six cases with seroma in the follow-up period.

All cases with seroma in both groups were treated by aspiration of serous fluid one time, except one case in group B that needed aspiration three times.

In both groups, the mean time for complete healing of the wound after excision and flap construction was 15 ±4.6 days.

From Table 2, there was a significant incidence of wound dehiscence in group A and significant incidence of seroma formation in group B, although there was no significant difference in both group regarding wound infection and flap necrosis.

Late postoperative complication

There was one case of recurrence within the follow-up period of 6 months and some cases after more than 1 year in group A, there were no cases of recurrence in group B. There was no loss of sensation over flap in both groups. All patients accepted their cosmetic appearance in group B. However, most females in group A did not accept their cosmetic appearance owing to complete disappearance of cleft between two glutei.

Table 3 shows that there was a significant difference between the two groups regarding cosmetic appearance, which was better in group B. There was no significant difference between both groups regarding numbness over flap or recurrence.

Table 3 Late postoperative complications

	Group A	Group B	*P* value (significance)
Cosmetic appearance	Not accepted to 8 patients	Accepted to all	S
Numbness over flap	No	No	NS
Recurrence	1	No	NS

Discussion

PS was first described by Anderson in 1847 and is often seen in the intergluteal region. This chronic disease is characterized by acute exacerbations [8].

PS usually occurs in healthy young men (male/female=4–5/1). It has a negative cosmetic appearance and can cause loss of work time [9]. Gurer *et al.* [10] reported a mean patient age of 25.5 years and a sex balance of 95% males in a series detailing the Karydakis flap procedure. In our series, the mean ages were 23±3 and 25±2 years in groups A and B, respectively, and most of the patients were males.

The etiology and pathogenesis of PS is frequently associated with both congenital and acquired factors. It has been suggested that PS starts as a chronic process involving the accumulation of lifeless hairs and subcutaneous hair deposition in the intergluteal region that leads to inflammation and infection [11].

Several treatment procedures have been described in the literature, ranging from simple incision and drainage to the use of complex plastic flaps for cleft obliteration. The ideal technique for the treatment of sacrococcygeal PS disease is controversial [12]. Medical treatment methods include alcohol, phenol, and silver nitrate injection into the cavity. Surgical treatment methods include curettage after fistulotomy, leaving an open or marsupialized wound after excision of sinus, Bascom surgery, primary excision and closure, the Karydakis flap procedure, or sinus excision and skin graft and flap methods such as Limberg flap rotation. Surgical treatment is often preferred [13]. Ideally, the goals of treatment for this disease should be reliable wound healing with a low risk of recurrence, a short period of hospitalization, minimal inconvenience to the patient, and low morbidity with few wound management problems [14].

Several meta-analysis have been carried out to evaluate which is the best treatment for PSD. but none of these are based on an appropriate follow-up.

Recurrence is the main problem in the treatment of PS. In 2008, Bascom reported [13] reported a collective series of 1129 patients with PS treated with excision and primary closure by different investigators. The failure rate of primary healing was 16%, the length of hospitalization averaged 21.7 days, and the recurrence rate was 16%. Several flap techniques have been described with recurrence rates ranging between 0 and 6–8%.

The procedures in the groups A and B in this study not only cover the wound but also flatten the natal cleft and decreases hair accumulation, mechanical irritation, and the risk of recurrence.

Braungart *et al.* [15] showed that excision with primary midline closure of flaps had a higher morbidity rate than they had expected, as most patients had dehiscence or infection owing to tension on suture.

In this study, we did rotation flap so there was no tension on the wound, which explains why there was no wound infection, flap necrosis, or wound dehiscence in cases of group B, but two cases of wound dehiscence occurred in group A. The idea of local rotation flap in group B was taken from use of large rotation gluteal flap to cover large area of bedsore. Therefore, we used small rotation flap in comparison with that of bedsore, which gave us good choice for wide local excision of the sinuses and its side branches with no fear from coverage area. Incidence of recurrence has relation to volume of excised part as reported by Alptekin *et al.* [16] In this technique, we did good excision so incidence of recurrence was zero in this study in group B. However, a long-term follow-up is needed for good assessment if there is any recurrence in the long run.

Surgical site infection is one of the main problems in PS surgery. It is reported to be up to 11.9% [17]. In this study, there was no wound infection in both groups. This might be related to wide local excision and use of prophylactic antibiotic preoperatively and postoperatively till the wound had healed completely.

Operative time in all cases was about one and half hours in group A, but in group B, it was about 45–60 min, as it is a simple procedure and easy to be done and learned.

Regarding flap necrosis, it occurred in one case in group A with Limberg flap, especially distal angle of rotation, whereas the incidence was zero in group B as we had a wide base and good blood supply to flap.

Local rotation flap is clearly preferred for safety reasons as low recurrence and complication rates [18].

In patients with multiple sinuses, lateral flap rotations are implemented by removing the midline [19]. Ertan *et al*. [20] reported a Limberg flap recurrence rate of 2% as opposed to 12% in a primary closure group and this is in agreement with the scope of our study. as recurrence in group A was 2.5%, but in group B, recurrence was not observed. In addition, time to discharge from hospital and complication rates were more favorable in both groups than those reported in the literature.

Other important points in the treatment of PS surgery are return to daily activities and work, duration of operation, time sitting on the toilet, and patient esthetic satisfaction. In patients with multiple side tract and large defects, flap procedures can reduce esthetic satisfaction, and this was more in group A than in group B.

All cases in both groups were discharged on the first day of surgery and returned to normal life within 2 weeks of surgery and that was ideal outcome to our procedure.

In this study, patients achieved complete healing within a shorter time (14–22 days). The Limberg flap procedure is a safe choice for the surgical treatment of sacrococcygeal recurrent PS disease owing to its low complication rate, short length of hospital stay, early return to work, high patient satisfaction, and shorter time to complete healing. Consequently, we recommend the local rotation flap procedure for the treatment of PS disease with similar results as Limberg flap, in addition to that it is a simple procedure, easy to be learned, and of short operative time.

Conclusion

This study favored the local rotation flap for sacrococcygeal PS, especially for complex sinuses, and found it suitable for all cases as it was simple, safe, easy done, allows early return to full activity, and has a very low recurrence and complication rate, similar to Limberg flap.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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