Bascom's cleft lift versus rhomboid flap procedure for the management of primary sacrococcygeal pilonidal sinus

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Received 07 March 2015
Accepted 16 March 2015

The Egyptian Journal of Surgery
2015, 34:146–151

Objective
The aim of this study was to evaluate and compare clinical safety and efficacy after Bascom's cleft lift and rhomboid flap (Limberg) procedures for the treatment of primary sacrococcygeal pilonidal sinus (SCPS).

Patients and methods
This study included 100 adult patients with primary (nonrecurrent) SCPS who were randomized to Bascom's cleft lift procedure (n = 50) or to rhomboid flap procedure (rhomboid-shaped excision and Limberg flap) (n = 50). Through the follow-up period, which ranged from 6 to 12 months, with an average of 9.1 ± 1.7 months, patients were evaluated for wound-related complications and recurrence of symptoms after complete wound healing.

Results
There were insignificant differences in the baseline characteristics between both groups. Compared with Bascom's cleft lift procedure, the rhomboid flap procedure involved a longer duration of operation (61.14 ± 16.36 vs. 40.78 ± 11.96 min; $P < 0.001$). A significant clinical outcome was achieved after the rhomboid flap procedure in terms of less duration to pain relief (12.42 ± 1.59 vs. 17.86 ± 3.10; $P < 0.001$) and less healing time (17.42 ± 4.68 vs. 20.06 ± 5.94; $P < 0.05$). The incidences of postoperative wound-related complications and recurrence were 6 and 2%, respectively, after the Bascom's cleft lift procedure and 4 and 2%, respectively, after the rhomboid flap procedure, with insignificant differences.

Conclusion
Although Bascom's cleft lift operation involves a shorter duration of operation, the rhomboid-shaped excision with the Limberg flap procedure was superior in terms of early wound healing, with similar incidences of wound-related complications and recurrence after treatment of primary SCPS.

Keywords:
Bascom's cleft lift, excision, pilonidal sinus, recurrence, rhomboid flap

Egyptian J Surgery 34:146–151

1110-1121

Introduction

Pilonodal disease occurs in ~0.7% of the population, with the peak age of incidence being 16–25 years [1]. There are various theories on the predisposing factors and causes of the disease. It most often results from mechanical stretch, which causes enlargement and rupture of hair follicles in the natal cleft of the sacrococcygeal area [2]. Pilonidal disease may arise in one of three forms: acute abscess, sinus tracts, or complex disease characterized by chronic or recurrent abscesses with extensive branching sinus tracts [3].

There are many different techniques for the treatment of sacrococcygeal pilonidal sinus (SCPS), ranging from open wound fistulotomy and curettage, marsupialization, midline excision and closure, asymmetric/oblique excision, and closure (Karydakis procedure, Bascom's procedure, cleft closure), to flaps (rhomboid, V–Y advancement, Z-plasty, gluteal myocutaneous) [4]. However, no single surgical procedure has been widely accepted as the gold standard for the treatment of SCPS [5].

The importance of avoiding midline incisions and placing any healing wounds off midline to reduce recurrence was recognized by Bascom [6]. Bascom's cleft lift procedure involves only the excision of midline pits and scarred skin, avoiding removal of deep tissues, and places the incision sufficiently to the side so that it can heal well [4,7]. The procedure can be used for primary or recurrent cases of SCPS.

Limberg flap reconstruction following rhomboid excision of the sinus area, involves closing a 60° rhombus-shaped defect with a transposition flap, with sutures away from the midline, giving rise to a tensionless flap of unscarred skin in the midline [8]. In the literature, this procedure has been shown to be superior to primary closure [9] and other flaps [10]. It can be performed for the management of primary or recurrent pilonidal sinus, with a low complication rate, short hospital stay, short time to return to normal activity, and good long-term results [11].

 DOI: 10.4103/1110-1121.163111

The aim of the present study was to evaluate and compare the postoperative outcomes of two surgical techniques for the treatment of primary SCPS: Bascom's cleft lift procedure and rhomboid flap operation (rhomboid excision and Limberg flap rotation), particularly in terms of postoperative complications and recurrence rate.

Patients and methods

Patients

This prospective study was carried out in the General Surgery Department at Al Jafel Hospital (Riyadh, KSA) from July 2008 to July 2013 after approval of the study protocol by the local ethical committee and obtaining written fully informed consent from the patients. One hundred patients with SCPS were divided randomly into two groups equal in number on the basis of the type of procedure performed: Bascom's procedure or rhomboid flap. The inclusion criteria were adult patients (>18 years old) with primary nonrecurrent SCPS. The exclusion criteria included patients with diabetes mellitus, obesity, acute pilonidal abscess, pregnancy, immunosuppression, dermatological diseases, recurrent SCPS, and patients who had undergone previous flap surgery for pilonidal sinus.

Preoperative preparation

Standard routine tests were carried out. If purulent discharge and infection were present, antibiogramme culture, appropriate antibiotic treatment, and preoperative drainage were performed. The rectum was evacuated through enema on the morning of the operation. Shaving of the operation field was performed on the operating table immediately before the operation. A single dose of 1 g cefazolin antibiotic was administered for prophylaxis.

Figure 1

Bascom's cleft lift procedure before closing the flap.

Surgical techniques

All operations were performed under spinal or general anesthesia. Bascom's cleft lift operation was performed as described previously [7]. With the patient was placed in the prone position, the sinuses and scarred skin were removed. Skin from one side of the natal cleft was excised and skin on the opposite side was freed from the underlying tissue and mobilized out past the edge of the natal cleft on the other side (Fig. 1). The deeper tissues were drawn and sewn together to 'shallow the valley' and to recontour the cleft. The skin flap was then closed and sutured to the side outside the cleft. The new natal cleft was less deep and smoothly transitioned down toward the anus. A temporary drain was placed under the flap of skin and removed in most of the cases within a week (Fig. 2).

The rhomboid flap procedure (rhomboid excision and Limberg flap transposition) was performed as described previously [8]. With the patients were placed in a prone jack-knife position on the operating table with the legs slightly abducted and the buttocks strapped apart by adhesive tapes, a rhomboid-shaped excision containing the sinus orifice with 60 and 120° of internal angles was completed by an incision (Fig. 3). The skin flap's edge lengths, marked as equal to the rhomboid incision, were transposed to the excised field from the right or the left gluteus together with the subcutaneous fat tissue and fascia of gluteus muscle. A suction drain was inserted, and the fascia under flap was sutured to presacral fascia using 2/0 polyglactin. The subcutaneous tissue was closed with two-layer 2/0 polyglactin and the skin was closed with 3/0 polypropylene sutures (Fig. 4).

Postoperative care and follow-up

The administration of intravenous antibiotic and oral metronidazole 500 mg was continued for 3 days after

Figure 2

Bascom's cleft lift procedure after closure. The wound past the midline toward the left side.

surgery. Regular shaving of the operative field and hygienic measures were performed for all cases. Skin sutures were removed on the 10th day after surgery when there were no wound-related complications. Healing time was defined as the time to removal of stitches after surgery or until complete wound healing. Wound-related complications included seroma, hematoma, dehiscence, and infection. Recurrence was defined as recurring symptoms of SCPS after complete wound healing.

Statistical analysis

Statistical analysis was carried out using the SPSS statistical software (version 16.0; SPSS Inc., Chicago, Illinois, USA). The continuous variables were compared using Student's *t*-test and the categorical variables were compared using the χ^2-test or the Fisher exact test. Continuous variables were presented as mean ± SD and categorical variables were presented as number and percent. A *P*-value less than 0.05 was considered statistically significant.

Results

The baseline characteristics were similar between both groups (Table 1). Bascom's procedure was performed in 50 patients (44 men and six women, mean age 30 ± 7 years) and the rhomboid flap procedure was performed in the other 50 patients (41 men and nine women, mean age 29.1 ± 4.9 years). The mean duration of symptoms was 12.5 ± 6.7 months in the Bascom's procedure group and 13.9 ± 6.6 months in the rhomboid flap group. Previous infection had occurred in 31 (62%) patients of the Bascom's procedure group and in 33 (66%) patients of the rhomboid flap group. Previous abscess drainage was performed in 18 (36%) patients of the Bascom's procedure group and 15 (30%) patients of the rhomboid flap group.

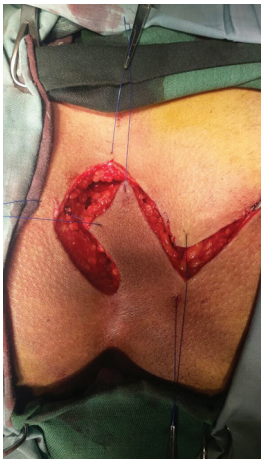
Both groups were comparable in clinical outcome as shown in Table 2. The rhomboid flap procedure involved a longer duration of operation (61.14 ± 16.36 vs. 40.78 ± 11.96 min; $P < 0.001$); however, it resulted in reduced healing time (17.42 ± 4.68 vs. 20.06 ± 5.94; $P < 0.05$). There was an insignificant difference between both procedures in postoperative hospital stay (3.66 ± 1.75 for the rhomboid flap procedure vs. 3.18 ± 1.36 for Bascom's procedure; $P = 0.13$). The follow-up period ranged from 6 to 12 months, with an average of 9.1 ± 1.7 months, which was 9.34 ± 1.80 months after Bascom's procedure and 9.02 ± 1.60 months after the rhomboid flap procedure, with an insignificant difference between both procedures ($P = 0.35$).

There were statistically insignificant differences between both procedures in postoperative complications and recurrence of symptoms during the follow-up period (Table 3). Postoperative wound-related complications (Table 3) occurred in three (6%) after Bascom's procedure and in one (2%) patient underwent the rhomboid flap procedure. After Bascom's procedure,

Table 1 Baseline characteristics

Variables	Bascom's procedure (*n* = 50)	Rhomboid (Limberg) flap (*n* = 50)	*P*-value
Age (years)	30 ± 7	29.1 ± 4.9	0.46
Male/female	44/6	41/9	0.40
Duration of symptoms (months)	12.5 ± 6.7	13.9 ± 6.6	0.27
Previous infection [*n* (%)]	31 (62)	33 (66)	0.68
Previous abscess drainage [*n* (%)]	18 (36)	15 (30)	0.52

Figure 3



The rhomboid flap of limberg before closure.

Figure 4

The rhomboid flap after closure.

Table 2 Clinical outcome

Variables	Bascom's procedure (n = 50)	Rhomboid (Limberg) flap (n = 50)	P-value
Operative time (min)	40.78 ± 11.96	61.14 ± 16.36	0.0001*
Hospital stay (days)	3.18 ± 1.36	3.66 ± 1.75	0.13
Follow-up (months)	9.34 ± 1.80	9.02 ± 1.60	0.35
Healing time (days)	20.06 ± 5.94	17.42 ± 4.68	0.01

**Significant difference.

Table 3 Postoperative complications and recurrence of symptoms

Variables	n (%)		P-value
	Bascom's procedure (n = 50)	Rhomboid (Limberg) flap (n = 50)	
Wound-related complications	3 (6)	1 (2)	0.30
Seroma	1 (2)	0 (0)	0.31
Dehiscence	1 (2)	0 (0)	0.31
Infection	1 (2)	1 (2)	1
Recurrence	2 (4)	1 (2)	0.55

wound-related complications included seroma in one (2%) patient, dehiscence in one (2%) patient, and infection in one (2%) patient, whereas after the rhomboid flap procedure, these complications occurred only in one (2%) patient in the form of wound infection. Of patients subjected to Bascom's procedure, there were two (4%) recurrences, and there was one (2%) recurrence in patients subjected to the rhomboid flap procedure.

Discussion

The ideal treatment for pilonidal sinus remains controversial, with many accepted procedures in current clinical use [12]. Reduction of wound-related complications and recurrence should be the main objectives of any treatment in this respect.

Utilizing the solid concepts of Dr Karydakis' work from the 1970s, Dr John Bascom in Eugene (Oregon, USA) developed a variation of the operation called the cleft lift. Since then, the operation has evolved and improved to its current form. It results in minimal disability and yields good long-term control. In studies of Dr Bascom, the results were satisfactory up to as long as 9 years of follow-up.

With plastic flap surgery, the resulting defective area after wide excision is filled with well-vascularized tissue. Limberg originally introduced his operation (sometimes called Limbegplasty) in 1946, which avoids the suture line tension in addition to flattening of the natal cleft, which most probably are the factors responsible for the low recurrence rates [13,14].

When the rhomboid flap procedure was compared with the Bascom's cleft lift procedure in the present study, the duration of operation was longer for patients who underwent rhomboid-shaped excision with Limberg flap transposition than that for patients who underwent Bascom's procedure. This difference may be attributed to the fact that the Limberg technique required wider tissue from under the postsacral fascia with its fixation to the other side, which takes a longer time for preparation.

In the present study, the incidence of postoperative wound-site complications after Bascom's cleft lift procedure was 6% including seroma, infection, and dehiscence (2% for each). This findings are acceptable as compared with other studies. In the study by Senapati *et al.* [15], there were few postoperative complications, including bleeding in 4% and abscess formation treated by reopening of the incision in 6%. Also, Zorcolo *et al.* [16] reported postoperative complications in 4% of patients who had postoperative bleeding or wound infection.

In the present study, the recurrence rate was 4% after the Bascom's cleft lift procedure during a mean follow-up period of 9.34 ± 1.80 months. Our recurrence rate was comparable with that in the studies in the literature, which varied in relation to the follow-up period. During a mean follow-up of 24 months, Bascom [6] reported a recurrence rate of 8% (four of 50 patients), and then the same author [17] reported a recurrence rate of 16.8% (27 of 161 patients) during a mean follow-up of 42 months. In the study by Mosquera [18], during a mean follow-up of 10.6 months, 7.3% of patients (three of 41 patients) required further surgery for recurrent disease. In the study by Senapati *et al.* [15], during a mean follow-up of 12.1 (range 1–60) months, 10% of patients developed recurrence and needed reoperation. Moreover, Zorcolo *et al.* [16] reported recurrence in 9.2% of patients after Bascom's cleft lift procedure during a mean follow-up of 45 months.

In this study, in the patients subjected to rhomboid-shaped excision with Limberg flap transposition, the rate of postoperative wound-site complications was 2% (only minor wound infection). The reduced incidence of wound-related complications after rhomboid-shaped excision with Limberg flap transposition in this study may be attributed to our protocol of insertion of suction drainage in all patients and the use of prophylactic antibiotics, which help in decreasing the infective complications and seroma formation.

This rate of wound complications is in agreement with other studies in the literature. In a study by Arumugam *et al.* [19], postoperative morbidity involved superficial

wound infection in 13% of patients (seven of 53 patients), which treated with outpatient dressings. Katsoulis *et al.* [20] reported wound complications in 16% (four out of 25 patients) of patients. In the study by Akin *et al.* [14], 2.91% of patients developed a seroma and 3.64% developed wound infection. In 110 patients treated with rhombic excision and Limberg transposition flaps, Aslam *et al.* [21] reported that one (0.9%) patient had minimal necrosis of flap and two (1.8%) had gaping of flap. Minor infection occurred in three (2.7%) patients, but all these complications healed uneventfully. Also, no major wound complications were observed by Müller *et al.* [22], who reported postoperative complications in 25.7% of patients (18 of 70 patients), including superficial infection and partial suture dehiscence. In the study by Osmanoglu and Yetisir [23], the surgical-site infection rate was 4.7%. A lower rate of wound infection of 2% (one of 49 patients) was reported by Okus *et al.* [24].

However, more recent studies showed a wide variation in rates of postoperative wound complications after the classic rhomboid (Limberg) flap procedure, from 1.7% in the study by Khan *et al.* [25] to 17.9% in the study by Karaca *et al.* [26], 19.67% in the study by Guner *et al.* [27], and 20% in the study by Aithal *et al.* [28].

Surprisingly, in contrast to our results and the widely published results of the rhomboid (Limberg) flap, the recent study by Käser *et al.* [29] reported that primary wound closure with a Limberg flap has no advantage over secondary wound healing as it results in a significantly high complication rate of 49%, including seroma (6%), wound dehiscence (45%), skin necrosis (10%), hematoma (6%), infection (4%), and recurrent disease (13%). These authors reported that the main reason for the lack of advantage of the Limberg flap procedure compared with excision only seems to be the rather high complication rate, in addition to several external factors influencing the incapacity for work, such as economic and psychological factors. However, as their study was a randomized-controlled study, Käser *et al.* [29] supposed that it is unlikely that these factors were not evenly distributed in the two groups.

In this study, the recurrence rate was 2% after rhomboid-shaped excision with the Limberg flap during a mean follow-up period of 9.02 ± 1.60 months. This rate is in agreement with that reported in the literature, which ranged from 0% [5,25,28], through 0.9–4% [21–24], up to 7% [19,26].

Patients subjected to rhomboid-shaped excision with Limberg flap transposition in our study showed earlier wound healing than those subjected to Bascom's cleft lift procedure (17.42 ± 4.68 vs. 20.06 ± 5.94 days). This finding indicates that despite being a more extensive procedure, the rhomboid (Limberg) flap technique has the advantage of earlier healing, and this is supported by other findings reported in the literature. The mean healing time reported after Bascom's procedure was 3 weeks in the early studies by Bascom [6,17] and 4 weeks in the study by Senapati *et al.* [15]. However, the mean healing time after the use of the rhomboid (Limberg) flap method was 11.55 (range 10–23) days in the study by Guner *et al.* [27] and 14 days in the study by Arumugam *et al.* [19].

Finally, our results are in agreement with those of Enshaei and Motearefi [30], who compared two methods of primary repair and rotation flap and concluded that each surgeon can select the appropriate method of surgery for chronic pilonidal sinus according to the type and size of the sinuses, occupational status and social class, and the personality and individuality of the patient.

In conclusion, in this study of the treatment of primary SCPS, although Bascom's cleft lift operation was associated with a shorter duration of operation, the use of the rhomboid flap (rhomboid excision and Limberg flap transposition) was associated with early healing time. The incidences of wound related complications and recurrence were similar between both procedures.

Acknowledgements

Conflicts of interest

None declared.

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