Is There a Relation Between Natal Cleft Depth and Post-Operative Morbidity After Different Methods of Excision of Sacro-Coccygeal Pilonidal Sinus?

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Abstract The role of natal cleft depth in postoperative morbidities after pilonidal sinus disease (PSD) surgery is still uncertain. To examine the correlation between natal cleft depth and postoperative morbidities after different methods of excision of PSD. We prospectively examined data of 66 operated patients with PSD at Prince Fahd Ben Sultan hospital, Tabouk, KSA. Of the studied patients, 18 were treated by simple closure (27.3 %), 13 patients by Bascom closure (19.7 %), 21 patients by the open method (31.8 %) and 14 patients by the semiopen method (21.2 %). Postoperative morbidities were recorded. The data were analyzed using appropriate statistical tests. Sixty six patients (62 males, 4 females) underwent surgery for PSD. The mean age of the studied patients was 26.7 ± 6.9 (range 15–51). Nine patients (13.7 %) showed delayed healing with the highest incidence was among patients treated by the open method (6/21 (28.5 %)), and 5 patients (7.5 %) showed recurrence. There have been significant positive correlations between natal cleft depth and delayed healing, which was evident among patients treated by the open method ($r=+0.78$; $p<.0001$). The findings suggest that

natal cleft depth is a significant factor correlated with postoperative morbidities of PSD after surgical treatment.

Keywords Pilonidal sinus disease · Correlation · Natal cleft · Postoperative morbidities

Introduction

Sacrococcygeal pilonidal sinus disease (PSD) is commonly encountered in the surgical outpatient clinic and is prevalent worldwide, probably more common in hot humid regions like the Middle East [1]. The condition is most frequent among men in their third decade of life [2]. Patients may present after months and even years of repeated episodes of infection, resulting in deep branching tracks and multiple skin pits [3].

A large number of surgical techniques have been described in the literatures for the treatment of this disease, many of which are unfamiliar to general surgeons. Such diversity suggests that no single technique has emerged as the favorite to prevent recurrence of this condition [4]. These include Bascom procedure [5], Karydakos procedure [6], excision and leaving the wound to granulate [7] excision and primary closure with midline or asymmetric incisions [8] or excision and closure using local flaps, which include Romboid and Limberg flaps [9], Z-plasty [10] and V–Y flaps [11].

Recurrence after surgery is common and is believed to be largely secondary to persistent natal cleft following surgery [12]. The natal cleft and buttock movement exert a suction effect, collecting fallen body hairs. These, along with regrown hairs, are probably driven into the new scar by the friction of buttock movement. Together with moisture, the driven hairs encourage infection and initiate recurrence [13].

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A recent study indicates that traditional midline techniques for PNS repair give a high wound infection rate, high recurrence rate, poor cosmetic results and a long time to healing [3]. In our study, we evaluated the correlation between the natal cleft depth and the postoperative complications, particularly delayed healing of both open and closed techniques in treatment of PSD.

Patients and Methods

The present study recruited 66 consecutive patients with chronic pilonidal sinuses (the abscess excluded as it is treated first by drainage) treated at Prince Fahad Bin Sultan hospital, Tabouk, Kingdom of Saudi Arabia. All patients were diagnosed in the outpatient clinic and prepared for surgery. The weight of the patient and depth of the natal cleft were measured before surgery.

The patients are classified into four groups according to the type of repair. Group A (18 patients) was operated with the simple closure technique. Group B (13 patients) was treated by the Bascom procedure. In Group C (21 patients) the wound left open to granulate. Group D (14 patients) was a semiopen technique, in which two to three sutures closing part of the wound.

The Surgical Procedure

The surgical procedure discussed with each patient and before consent we explained the postoperative complications, incidence of recurrence and expected time of healing. All patients were placed in a prone position on their abdomen with the buttocks taped apart to expose the deep intergluteal cleft. All operations were done under intravenous general anesthesia. An ellipse of skin including all pilonidal sini was removed.

Group A patients were operated with the closed method in which the subcutaneous tissue was closed by one or two layers of absorbable sutures and the skin was closed by interrupted mattress sutures over the suction drain. Group B patients were operated through the Bascom procedure in which asymmetrical ellipse of skin including all pilonidal sini was removed from the most affected side of the intergluteal cleft while sparing subcutaneous fat. The covering skin flap from the opposite side was undermined and the sacrocoxygeal ligaments were released. A suction drain was placed deep in the entire length of the wound. The subcutaneous tissue was approximated in one or two layers with an absorbable suture while the skin was closed with a nonabsorbable intradermal suture.

In group C patients, the wounds were left open and packed with sterile Vaseline gauze. In group D patients,

the wounds were closed from their caudal ends by two or three nonabsorbable mattress sutures and the remaining part of the wounds were left open and packed with sterile Vaseline gauze.

In all patients, prophylactic antibiotics were administered intravenously (Metronidazol 1.0 g and Cefuroxime 1.5 g) at the beginning of the operation and continued orally for the first 7 days after the operation (Metronidazol 0.5 g×2 and Cefuroxime 0.5 g×2). No preoperative bowel preparation was performed. The patients were told to shower the wound after defecation if necessary. Paracetamol was recommended for postoperative pain treatment.

All patients were seen in the outpatient clinic for physical examination and dressing of wounds until complete healing. Drains were removed once the drainage was purely serous and low volume (e.g. 30 ml/day). Patients were physically examined for delayed healing or recurrent pilonidal sinus (with the patient in a relaxed prone position). Phone calls were made for follow-up of healed cases. The procedure was performed by three different surgeons. The operative technique was essentially performed as previously described.

The collected data were managed and analyzed confidentially and anonymously. All the study analyses were done by using the Statistical Analysis System Software package (SAS, version 9.0). Chi square test and *t* test were used as appropriate to study the characteristics of the studied patients and to compare the outcome of study among the studied groups. Correlation was used to examine the relation between natal cleft depth and BMI and delayed wound healing. *P* values ≤ 0.05 were considered to be statistically significance differences.

Results

Sixty two patients (94 %) were males. The mean age at operation was 26.7 ± 6.9 (range 15–51) years. Ten patients (15.2 %) were average weight ($BMI < 25 \text{ kg/m}^2$), BMI of 24 patients (36.3 %) were between 25 and < 30 , while 32 (48.5 %) patients were obese ($BMI \geq 30 \text{ kg/m}^2$). The average BMI was 30.9 ± 6.4 (range 22–52). The mean depth of the natal cleft at the sinus was $4.1 \pm 0.7 \text{ cm}$ (range 2.9–5.9). Of the studied patients, 18 were treated by simple closure (27.3 %), 13 patients by the Bascom closure (19.7 %), 21 patients by the open method (31.8 %) and 14 patients by the semiopen method (21.2 %). The mean time period of healing was 7.2 ± 8.5 weeks (range 2–40 weeks). Delayed healing was encountered in 9 patients (13.7 %), wound infection occurred in 11 patients (14.6 %) and recurrence was occurred in 5 patients (7 %) (Table 1).

Table 2 presents the delayed healing, wound infection and recurrence by the performed surgical procedure.

Table 1 Characteristics of the studied patients ($n=66$)

Characteristics ^a	
Age in years (mean $\pm$ SD)	26.7 $\pm$ 6.9
Sex	
Male	62 (94 %)
Female	4 (6 %)
BMI (kg/m ²) (mean $\pm$ SD)	30.9 $\pm$ 6.4
BMI (kg/m ²)	
<25	10 (15.2 %)
25–<30	24 (36.3 %)
≥ 30	32 (48.5 %)
Surgical procedure	
Simple closure (group A)	18 (27.3 %)
Bascom closure (group B)	13 (19.7 %)
Open (group C)	21 (31.8 %)
Semiopen (Group D)	14 (21.2 %)
Healing time in weeks (mean $\pm$ SD)	7.2 $\pm$ 8.5
Delayed healing	
Yes	9 (13.7 %)
No	57 (86.3 %)
Recurrence	
Yes	5 (7.5 %)
No	61 (91.5 %)
Wound infection	
Yes	5 (7 %)
No	61 (93 %)

^a Presented as mean $\pm$ SD or frequency number (%)

Delayed healing was the highest among patients treated by the open method (6 out of 21 patients (28.5 %)), while no delayed healing was noticed in the semiopen procedure with statistically significant difference ($p<.0001$). Seroma and wound infection were also more among patients treated by the open method compared to other surgical procedures with significant difference ($p=0.01$). Pilonidal sinus recurs in all studied groups with the highest recurrence was among the simple closure group (11.1 %) with a border line significant difference ($p=0.06$).

Table 3 shows the correlation between delayed healing and the depth of the natal cleft and BMI. There is a strong positive correlation between the depth of the natal cleft and delayed healing ($r=+ 0.60$) with a highly statistical significance

Table 3 Correlation of healing time with natal cleft depth and BMI in all studied patients ($n=66$)

Factor	Mean $\pm$ SD	Correlation coefficient (r)	P value
Natal cleft depth	4.1 $\pm$ 0.6	+0.60	<.0001*
BMI	30.9 $\pm$ 6.4	−0.01	0.96

*Significant

($p<.0001$). That is, mean increasing the depth of the natal cleft increases the time of healing, leading to delayed healing. On the other hand, however, BMI showed no or very weak negative association between healing and BMI ($r=-0.01$) with no statistical significance ($p=0.96$). Using liner regression analysis, it was found that increasing the depth of the natal cleft by 1 cm would delay healing by about 7 weeks.

Table 4 presents correlation of delayed healing with the natal cleft depth and BMI according to surgical procedure. There have been a varying positive degree of correlation between the depth of the natal cleft and delayed healing in all surgical procedures with the highest positive and significant correlation was among patients treated by the open method followed by the Bascom method ($r=+ 0.56$ in Bascom method and $r=+ 0.72$ in open method). The BMI index showed nonsignificant weak positive correlation in simple closure and semiopen methods and moderate nonsignificant negative correlation in the simple closure method.

Discussion

Pilonidal sinus of the sacrococcygeal region is a common benign disease. Its treatment is usually surgical and remains controversial between wide excision and limited excision and between primary closure and secondary closure [14]. Excision and primary repair techniques result in significantly shorter healing time and earlier return to work, when compared to excision with open packing [15], and treatment of chronic pilonidal sinus should be based on patient preferences and characteristics, especially employment status [16]. In our results, there is significant shorter healing time in closed methods than open methods. Also we discussed the technique of the surgical procedure to each patient and explained the

Table 2 Delayed healing, wound infection and recurrence by surgical procedure

Factor	Simple closure (Group A) $n=18$	Bascom (Group B) $n=13$	Open (Group C) $n=21$	Semiopen (Group D) $n=14$	P value
Delayed healing	2 (11.1 %)	1 (7.6 %)	6 (28.5 %)	0 (0.0 %)	<.0001*
Seroma and wound infection	2 (11.1 %)	2 (15.3 %)	6 (28.5 %)	1 (7.1 %)	0.01*
Recurrence	2 (11.1 %)	1 (7.6 %)	1 (4.7 %)	1 (7.1 %)	0.06

*Significant

Table 4 Correlation of healing time with natal cleft depth and BMI according to surgical procedure

Factor	Mean $\pm$ SD	Correlation coefficient (r)	P value
Simple closure method (Group A ($n=18$))			
Natal cleft depth (cm)	4.1 $\pm$ 0.5	+0.17	0.50
BMI (kg/m ²)	30.4 $\pm$ 7.6	−0.21	0.40
Bascom method (Group B ($n=13$))			
Natal cleft depth (cm)	3.7 $\pm$ 0.5	+0.56	0.04*
BMI (kg/m ²)	29.8 $\pm$ 6.9	+0.01	0.97
Open method (Group C ($n=21$))			
Natal cleft depth (cm)	4.3 $\pm$ 0.9	+0.78	<.0001
BMI (kg/m ²)	32.1 $\pm$ 5.8	−0.05	0.82
Semiopen method (Group D ($n=14$))			
Natal cleft depth (cm)	4.2 $\pm$ 0.5	+0.20	0.48
BMI (kg/m ²)	31.3 $\pm$ 5.4	+0.10	0.72

*Significant

postoperative complications, incidence of recurrence and expected time of healing. Thirty one cases (47.3 %) preferred the open method (open and semiopen procedures) to keep the shape of the natal cleft, regardless the healing time while 35 patients (53 %) chose the closed method because of less time of healing.

The findings of Arda et al. (2005) suggested that high BMI is a significant risk factor in the development of both symptoms and complications of PSD after surgical treatment [17]. We agree with Arda's suggestion that surgical treatment of PSD in obese patients was associated with delayed healing in some surgical procedures compared with nonobese patients. But not all obese patients develop complications after surgical treatment of PSD, and there are nonobese patients who developed aggressive postoperative complications. In our study, we evaluated the relation between the natal cleft depth and the occurrence of postoperative complications, in terms of delayed healing, in both open and closed techniques in treatment of PSD. The study findings revealed that the depth of the natal cleft is an important factor, and it showed a positive and significant correlation with the time of healing. Accordingly, measuring the depth of the natal cleft we can expect the result of the surgery whatever the technique.

In previous studies, there is an appreciable rate of recurrence of PSD, which has been reported in 0–37.5 % of patients undergoing excision surgery [1, 7, 12], and this recurrence is believed to be largely secondary to persistent natal cleft following surgery [1]. The recurrence is considered when the patient comes back with natal cleft sinus after closure of the wound or when the trials of treatment of delayed healing are failed. In our study, the total recurrence was considered in 5 cases (7.5 %) but with good healing results later. The recurrence rate is higher in closed methods 9.6 % (3/31 cases), especially the simple closure method 11.1 % (2/18), while there were two cases of recurrence in open methods 5.7 % (2/35cases). These results agree with the findings of Iesalnieks et al. [18].

In the present study, the open method is found to have the highest rate of complications with a high incidence of delayed healing 28.6 % (6/21 cases), which exhausts the surgeons and patients. So we stopped this technique and replaced it with the semiopen one, which showed no delay in healing more than 8 weeks. The simple closure technique has a high incidence of complications in obese patients with deep natal clefts, where the incidence of wound infection was 11.1 % (2/18cases). The Bascom procedures have a low rate of recurrence and delayed healing, but when complications occur it is catastrophic.

Another advantage of primary closure techniques is the possibility of flattening the natal cleft, in contrast to open methods, in which there is a tendency for the healing wound edges to be drawn inward by fibrosis, recreating a deep natal cleft [15]. In our study, most of the cases treated by the open method refused the change of the natal cleft shape. The main cause of true recurrences (as opposed to persistent nonhealing) is thought to be hair piercing the weak new scar, rather than inadequate excision during the first operation [5], which tends to affect the lower end of the wounds [1]. In our study, there were only two cases (3 %) of true recurrence, while the other three cases (4.5 %) considered recurrence due to failed healing. This indicates that the recurrence mainly related factors rather than inadequate excision. The rate of recurrence in this study was not affected by the type of surgical technique as it occurred in all types of used surgical procedures with the highest incidence rate in patients treated by the closed technique (11.1 %). These results agree with many literatures [1, 7, 14, 19].

Finally, this study has an advantage over other studies in that it examines the postoperative morbidities after four different surgical procedures used in treatment of PSD. In summary, the postoperative complications after surgical treatment of PSD must be discussed with the patients and according to their natal cleft characters and preferences, the surgeon can decide on the best technique for each case. No specific technique can be considered the best for all patients.

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