The effects of skin closure by using mattress sutures or intracutaneous absorbable sutures after the Karydakis flap surgery because of sacrococcygeal pilonidal sinus.

A comparative analysis

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The effects of skin closure by using mattress sutures or intracutaneous absorbable sutures after the Karydakis flap surgery because of sacrococcygeal pilonidal sinus. A comparative analysis.

OBJECTIVE: *After the pilonidal sinus surgery, the complications such as skin maceration, local wound dehiscence, wound site infection and recurrence may complicate the surgery. We aimed to compare the patients, who had undergone Karydakis flap surgery and the skin closure of whom was made by using intracutaneous or mattress sutures, with respect to wound site complications and recurrence.*
METHODS: *The files of 230 Karydakis flap surgery patients were analyzed retrospectively. The patients were invited for re-examination and the lacking data were collected. The patients were divided into 2 groups in terms of skin closure methods as the mattress suture and the intracutaneous suture groups. In final control, the visual analogue scale (VAS) was used in order to determine their cosmetic satisfaction and it was investigated if any recurrence occurred.*
RESULTS: *No statistically significant difference was observed in terms of skin closure time during surgery (p=0,143), duration of hospitalization (p=0.724), duration of surgery (p=0.3), postoperative wound site complications (p=0.152), time of return-to-work (p=0.498) and recurrence (p=0.89) between the groups. At the end of the follow-up period, no statistically significant difference was found between the groups in terms of patients' subjective assessments regarding the cosmetic appearance of wound site (p=0.981).*
CONCLUSIONS: *Skin closures by using mattress suture or intracutaneous absorbable suture material after the Karydakis flap surgery are reliable methods that can be used, but intracutaneous closure method may reduce infection and maceration rates.*

KEY WORDS: Intracutaneous suture, Mattress, Pilonidal Sinus, Skin Closure, Wound Infection, Karydakis flap

Introduction

Pilonidal sinus is an infective disease that is frequently seen in sacrococcygeal region. It generally influences the young males between the ages of 15 and 30 [1]. Its incidence was reported to be 26/10000 [2]. Despite the theories claiming that this is a congenital condition, this condition is now accepted to be an acquired one [3]. The factors playing role are mainly the keratin plugs, the presence of dermopathy, the hair residuals in natal cleft, and the hair-related foreign body reactions [4]. Even though many methods were defined for the treatment, the most frequently used surgical methods are the Limberg and Karydakis methods, in which the reconstruction is made using flap [5]. After the surgery, the complications such as skin maceration, local wound dehiscence, and wound site infection are frequently seen in early period. In the long-term, even though its inci-

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dence varies depending on the reconstruction method, the recurrence may complicate the surgery. It was reported that the macerations are frequently seen between the needle puncture holes of skin sutures and this might cause wound infection, wound dehiscence, and early recurrence, and that reducing the sutures on the skin by using intracutaneous closure method decreased the infection and maceration [6]. In the present study, it was aimed to compare the patients, who were undergone Karydakis flap surgery because of sacrococcygeal pilonidal sinus and the skin closure of whom was made by using intracutaneous or mattress sutures, in terms of early period wound site complications and recurrence.

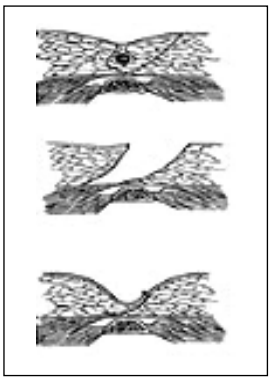

Fig. 1: Example of Karydakis advancement flap.

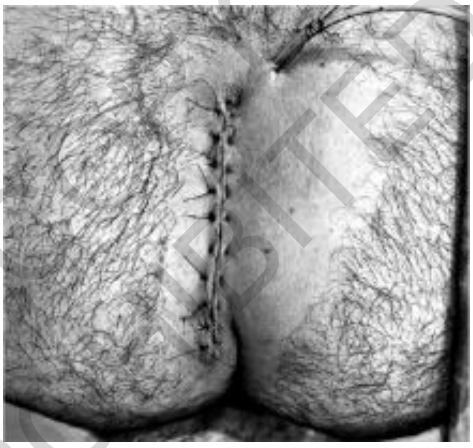

Fig. 2: Example of skin closure using matress suturing method

Fig. 3: Example of skin closure using Intracutaneus suturing method

Material and Method

The patients that were undergone sacrococcygeal pilonidal sinus surgery by Karydakis method by the same surgeon in Malatya State Hospital between 1 January 2015 and 01 May 2016 were retrospectively examined. The patients were invited for re-examination and the lacking data were collected. The files of 230 patients undergone Karydakis flap surgery because of sacrococcygeal pilonidal sinus were analyzed. The patients were divided into 2 groups in terms of skin closure methods: the patients, whose skin lesions were closed using mattress (M) method, and the patients, whose skin lesions were closed using intracutaneous (IC) absorbable material. All the patients were called for a re-examination. 38 patients, who did not respond to the phone calls or come for control examination, were excluded from the study. The demographical data of patients, early period problems in wound site, and recurrence were recorded. In final control, the visual analogue scale (VAS) was used in order to determine their cosmetic satisfaction and it was investigated if any recurrence occurred.

Those with preoperative infection were given an antibiotic treatment, those having abscess were undergone abscess drainage and then given antibiotic treatment, and they were undergone surgery after 7-10 days. The prophylaxis was applied by giving patients 1g Sefazolin perioperatively. All of the patients were undergone surgery under spinal anesthesia.

Surgical Method

The asymmetric and biconcave elliptic incisions incorporating the external orifices of pilonidal sinus were made in Jack-knife position and by retracting the glutei from the sides. The cysts were excised without damaging the sinus and leaving sinus residuals. On the medial edge of wound, a flap that has1cm depth and is 2 cm inwards alongside the incision line was prepared by using a cautery. The absorbable sutures were used for the fatty tissue of flap in the way including both surfaces. Then, 2/0 polyglactine absorbable suture materials were used and a series of sutures were placed alongside the medial line of presacral fascia throughout the flap. A closed drain was placed in the gap. In order to approximate the flap's lower surface to the fatty tissue in lateral, the second line of sutures was applied between these two layers by using 2/0 polyglactine absorbable suture materials (Fig. 1). The skin was closed using either mattress

(Fig. 2) or intracutaneous (Fig. 3) method. 3/0 polyglactine absorbable poly-filament suture material was used for the intracutaneous closure, whereas 3/0 non-absorbable polypropylene monofilament suture materials was used for mattress closure (Fig. 1).
During the surgery, the distance of lower end of suture to the anus, the number of hair follicles per cm^2, and the volume of resected tissue were determined. When the content of drain reduced below the level of 20 cc per day, the drain was removed. The patients' records (5^{th} and 10^{th} days after the discharge from hospital) were analyzed in terms of wound site infection, seroma development, and wound dehiscence. The mattress sutures were removed on 14^{th} day. The redness, temperature increase, and purulent flow were accepted to be positive for wound site infection. The patients found to have infection were given treatment with 1g Amoxicillin + clavulanic acid orally.

Statistical Method

The fitness of data to the normal distribution was tested using the ShapiroWilk test. For numerical values, Student t test was used for normally distributed variables and Mann Whitney U test for non-normallydistributed ones. The relationship of two independent variables at the categorical measurement level was tested using Chi-Square method. As definitive statistics, the mean value ± standard deviation was used for numerical values and number and percentage values for the categorical variables. Statistical analyses were performed on SPSS Windows version 24.0 package software, and the statistical significance was set at $p<0.05$.
The study was carried out in accordance with Helsinki Declaration, and the approval was obtained from the ethics committee of Istanbul Okan University (09.05.2018-94).

Results

One hundred and one of 192 patients involved in the present study were in Group M and 91 were in Group IC. One hundred sixty three (84.9%) of the patients were male and 29 (15.1%) were female. The wound site complication was observed in 18 (9.4%) patients and recurrence in 6(3.1%) patients (Table I).
When the groups were compared in terms of gender, age, Body Mass Index (BMI), time of the onset of dis-

Table I - *Patient Distribution*

		Number	%
Gender	Female	29	15.1
	Male	163	84.9
Abscess drainage history	No	139	72.4
	Yes	53	27.6
Active smoking	Yes	100	52.1
	No	92	47.9
Postoperative wound-site complications	No	174	90.6
	Maceration	11	5.7
	Wound dehiscence	3	1.6
	Abscess/seroma	4	2.1
Use of antibiotics for preoperative infection	No	167	87
	Yes	25	13
Recurrence	No	186	96.9
	Yes	6	3.1

Table II - *Preoperative status by group*

		Mattress (n=101)	Intradermal (n=91)	P
Age Mean ± SD (Min-Max)		24.32 ± 7.57 (16-50)	24.41 ± 6.39(16-49)	0.503 z
Gender n (%)	Male	85 (84.1)	78 (85.7)	0.764x
	Female	16 (15.9)	13 (14.3)	
BMI Mean ± SD (Min-Max)		24.86 ± 2.76 (15.17-44.5)	25.43 ± 3.44 (18.1- 45.1)	0.078t
Duration of disease(months)		18.29 ± 16.24	18.67 ± 15.29	0.065 z
Active smokern (%)	Yes	52 (51.4)	48 (52.7)	0.861 x
	No	49 (49.6)	43 (47.3)	
Preoperativeabscess/infection n(%)	Yes	25 (24.7)	28 (30.7)	0.352x
	No	76 (75.3)	63 (69.3)	

n: number, t: Student t test, z: Mann Whitney U test, x: Chi-Square test

TABLE III - *Perioperative characteristics by group*

	Mattress (n=101)	Intradermal (n=91)	P
Number of hair follicles/cm2Mean ± SD (Min-Max)	12.45 ± 3.74(2-21)	13.13 ± 8.64(1-19)	0.730 z
Volume of resected tissue (ml)Mean ± SD (Min-Max)	43.28 ± 5.99 (25-56)	42.21 ± 4.64 (32-52)	0.061 z
Distance of incision to anus (cm) Mean ± SD (Min-Max)	5.99 ± 0.57 (4.5-8.1)	6.55 ± 6.11 (4.5-7.2)	0.341 z
Number of tracts Mean ± SD (Min-Max)	2.83 ± 1.35 (1-6)	2.75 ± 1.36 (1-6)	0.343 z
Duration of surgery (minutes) Mean ± SD (Min-Max)	34.6 ± 7.74 (25-60)	33.29 ± 6.38 (20-45)	0.300 z
Duration of hospitalization (days)Mean ± SD (Min-Max)	1.04± 0.44 (1-2)	1.06 ± 0.42 (1-2)	0.724 z
Duration of drain usage (days) Mean ± SD (Min-Max)	1.35 ± 0.52 (1-3)	1.34 ± 0.54 (1-3)	0.421 z

n: number, z: Mann Whitney U test,

TABLE IV - *Postoperative condition by group*

		Mattress(n=101)	Intradermal (n=91)	P
Postoperative complications n (%)				0.152x
	No	87 (86.1)	87 (95.6)	
	Maceration	9 (8.9)	2 (2.2)	
	Wound dehiscence	2 (1.9)	1 (1.1)	
	Abscess/seroma	3 (2.9)	1 (1.1)	
Recurrence n (%)	No	98 (97.1)	88 (96.7)	0.897 x
	Yes	3 (2.9)	3 (3.3)	
Duration of follow-up (months) Mean ± SD (Min-Max)		23.28 ± 8.14 (14-43)	21.44 ± 4.54 (13-32)	0.532 z
Time until return to work (days)Mean ± SD (Min-Max)		9.11 ± 2.01(5-15)	9.37 ± 1.97 (6-16)	0.498 z
VAS		6.98 ± 1.37	7.00± 1.26	0.981 z

n: number, z: Mann Whitney U test, x: Chi-Square test

ease, smoking status, and pilonidal sinus infection or abscess before the surgery, no difference was found (Table II).

When the groups were compared in terms of perioperative characteristics, there was no statistically significant difference in terms of duration of surgery, duration of hospitalization, size of mass resected in the surgery, distance of lower end of incision to the anus, number of hair follicle per cm^2 of resected tissue, and the duration of drain usage (Table III)

After the surgery, wound site complication developed in 14(13.8%) patients in Group M and 4 (4%) patients in Group IC. After the follow-up (mean duration of 23.28 days in Group M and 21.44 days in Group IC), the rate of recurrence was 2.9% and 3.3% in Group M and IC, respectively. No statistically significant difference was found in terms of postoperative complication development, recurrence, time of return-to-work, and cosmetic satisfaction measured using VAS after the follow-up period (Table IV).

Discussion

Many surgical and medical methods are used in treating the sacrococcygeal pilonidal sinus. The most important parameters to be considered while selecting the surgical method are to decrease the rates of complication and recurrence, and to choose the method offering acceptable cosmetic results and shorter duration of recovery. However, there is no consensus on this method. Karydakis flap method is one of the methods that are currently used and capable of meeting these needs. In Karydakis method, it is aimed to reduce the pressure by shifting the medial line to lateral. By flattening the natal cleft and thus reducing the hair accumulation and mechanical irritation, it is aimed to reduce the possibility of recurrence through these mechanisms [7,8]. Karydakis, who defined the method, reported the rate of recurrence to be 1% and the rate of complication to be 8% [7]. However, in the studies carried out after the method started to be used widely, the rate of recurrence was reported to be 0-10.2% and the rate of complication to be 6-23% (9-13). In the present study, the rate of recurrence and the rate of wound site complications were found to be 3.1% and 9.4%, respectively.

The complications that are frequently seen after the pilonidal sinus surgery are maceration, wound dehiscence, wound site infection, and seroma accumulation. In the present study, the rates of maceration, wound dehiscence, and abscess or seroma development among all the patients were determined to be 5.7%, 1.6%, and 2.1%, respectively. Keshvari et al. [14] reported the rate of wound site complication after Karydakis flap to be

18.7%. Aslan et al. 15 determined the rate of seroma to be 19.8%, that of partial wound dehiscence to be 15.4%, and that of maceration to be 11%, Arer IM et al.[16] also reported the seroma and infection rate as 10.6%, whereas Yıldız et al. [17] reported the rates of seroma, abscess development, and wound site infection to be 1.5%, 1.1%, and 6.6%, respectively.

After the surgical procedure, the skin is closed using mattress sutures as standard. The possible reason for maceration and wound site infection is the penetration of microorganism into the needle puncture site after the mattress suture [6]. The maceration can be considered as the beginning phase of complications such as wound dehiscence, necrosis, and wound site infection [5]. The secondary wound site infection is shown as the reason of early recurrence [3]. In their study on comparing the mattress and intracutaneous closure among the patients undergone Limberg flap procedure, Çetin et al. reported that the intracutaneous closure might reduce the rates of infection and maceration [6]. In their study, which may on the contrary with the present study since it is related with the present study in terms of creating extra needle puncture sites but it differs because of tie-over compression, Sewefy et al. compared the patients undergone classical Karydakis flap and those undergone tie-over interrupted compression procedure and they reported that fewer complications were observed in tie-over group [18]. Milone et al., however, reported that intradermal sutures were not superior to the interrupted suture method in terms of wound site complications and recurrence in pilonidal sinus treatment and they resulted in similar outcomes [19]. In the present study, the rates of maceration, wound dehiscence, development of abscess or seroma, and recurrence in Group M were 8.9%, 1.9%, 2.9%, and 2.9%, respectively. The same values were found to be 2.2%, 1.1%, 1.1%, and 3.3% in Group IC, respectively.

For the patients undergone Karydakis flap surgery because of sacrococcygeal pilonidal sinus, the distance between last caudal pit and anal verge and the volume of resected tissue were reported to be an indicator of limited superficial skin disruption, infection, and recurrence [14]. The patients with lower amount of tissue resection and longer distance between anal verge and last caudal pit are deemed suitable for Karydakis flap [15]. For the patients involved in the present study, the volume of resected tissue was 43.28 ± 5.99 (25-56) ml in Group M and 42.21 ± 4.64 (32-52) ml in Group IC. The distance between lower end of incision and anal verge was 5.99 ± 0.57 (4.5-8.1) cm in Group M and 6.55 ± 6.11 (4.5-7.2) cm in Group IC.

In selecting the surgical method, the cosmetic look after the surgery is an important criterion. The methods offering effective treatment and cosmetic satisfaction come to the fore in treatment. Although Karydakis flap method offers similar results when compared to the other methods in terms of complications and recurrence, it is seen as superior to the others in terms of offering cosmetically satisfactory outcomes [17,20]. It was reported that using intracutaneous absorbable suture in skin closure generally yields cosmetically successful results [21]. There are studies emphasizing that intracutaneous skin closure after the pilonidal sinus surgery would offer outcomes that cosmetically satisfy the patient [19]. However, in the cosmetic satisfaction analysis performed by using VAS in present study, there were no statistically significant differences between the patient groups (mean scope of Group M was 6.98 ± 1.37 and that of Group IC was 7.00 ± 1.26) (p=0.981).

Since there are few studies in the literature that can be used in comparing the data of present study, the retrospective nature and short follow-up period of present study are the limitations even though the patients were called for control examination. However, it can be seen as an advantage that there is no such study on Karydakis flap method. Involving the cosmetic satisfaction of patients into the analyses positively contributes to the study.

In the present study, when the patients who were undergone Karydakis flap surgery due to sacrococcygeal pilonidal sinus skin incisions of whom were closed using either mattress or intracutaneous absorbable suture were compared, no statistically significant difference was observed in terms of duration of hospitalization (p=0.724), duration of surgery (p=0.3), postoperative wound site complications (p=0.152), time of return-to-work (p=0.498), and recurrence (p=0.89). At the end of the follow-up period, no statistically significant difference was found between the groups in terms of patients' subjective assessments regarding the cosmetic appearance of wound site (p=0.981). However, even though the difference was not statistically significant, the maceration was approx. 4 times more frequently seen in Group M (8.9%- 2.2%).

In conclusion, skin closures by using mattress suture or intracutaneous absorbable suture material after the Karydakis flap surgery are reliable methods that can be used. But intracutaneous closure method may reduce infection and maceration rates. Further studies with larger patient numbers are needed to provide detailed evaluation. Especially in countries sacrococcygeal pilonidal sinus disease is commonly seen.

Riassunto

L'intervento chirurgico per il trattamento del sinus pilonidalis può presentare complicazioni, rappresentate da macerazione della pelle, deiscenza della ferita locale, infezione del sito operatorio e recidive. Abbiamo valutato il confronto nei pazienti sottoposti ad intervento chirurgico con il lembo di Karydakis , con chiusura della cute effettuata suture intracutanee oppure da materassaio, per quanto riguarda le complicanze e le recidive.

La cisistica esaminata retrospettivamente è costituita dalle cartelle cliniche di 230 pazienti sottoposti a questo tipo di intervento, invitando i pazienti per un riesame, raccogliendo e aggiornando i dati mancanti.
I pazienti sono stati divisi in 2 gruppi secondo il metodo di sutura utilizzato, e nel controllo finale, è stata utilizzata la scala analogica visiva (VAS) per determinare la loro soddisfazione cosmetica, rilevando l'eventuale insorgenza di recidiva.
Non è stata osservata nessuna differenza statisticamente significativa tra i due gruppi in termini di tempo per l'esecuzione delle sutura (p = 0,143), durata della degenza ospedaliera (p = 0,724), durata dell'intervento chirurgico (p = 0,3), complicanze postoperatorie del sito della ferita (p = 0,152), tempo di ritorno al lavoro (p = 0,498) e recidive (p = 0,89). Alla fine del periodo di follow-up non è stata trovata nessuna differenza statisticamente significativa tra i due gruppi in termini di valutazione soggettive per l'aspetto estetico del sito della ferita (p = 0.981).
In conclusione la sutura cutanea con tecnica da materassaio o con fili di sutura riassorbibili con tecnica intracutanea dopo tecnica chirurgica con lembo di Karydakis sono entrambi metodi affidabili, ma la sutura intracutanea può ridurre l'incidenza dell'infezione e della macerazione delle ferita.

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