

Modified Primary Closure Method for the Treatment of Pilonidal Sinus

Pilonidal Sinüs Tedavisinde Modifiye Primer Kapama Yöntemi

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Abstract

Objective: Pilonidal sinus (PS) is considered to be the acquired disease of especially in the sacrococcygeal region. Various primary or secondary or flap methods, accompanied by one of local curettage, phenol application, electro-cauterization and total sinus excision methods, are used for the treatment of pilonidal sinus. However, currently there is not a single widely accepted treatment method.

Materials and Methods: Ninety-eight patients who had operation for PS in Atatürk University, Department of General Surgery between January 2012 and August 2014 were included in this study. The patients were categorized into two groups: first, the patients undergone total sinus excision with primary closure (Group 1), and second, patients undergone total sinus excision with modified primary closure (MPC) (Group 2). Among all 98 patients participated in this study, age, sex, type of operation, duration of operation, amount of excised skin, duration of post-operative stay at hospital and complications were evaluated.

Results: Forty-four patients (44.9%) underwent primary closure method, while 54 patients (55.1%) underwent MPC method. Mean duration of operation was 39.1 (30-60) minutes, mean diameter of excised material was 9.3 (8-11) cm² and mean duration of stay at hospital was 1.4 (1-3) days for the patients in the first group. Meanwhile, duration of operation was 52.2 (35-70) minutes, mean diameter of excised material was 2.6 (2-4) cm² and mean duration of stay at hospital was 1.6 (1-3) days for the patients in the second group. There was statistically significant difference between the two groups by means of duration of operation, dehiscence of surgical wound, recurrence and development of general complications ($p<0.001$, $p<0.05$, $p<0.05$ and $p<0.005$, respectively). According to the multivariate analysis, during surgical treatment of pilonidal sinus, primary closure method increases the rate of complication 6.65 times and MPC method increases the duration of operation 1.2 times.

Conclusion: We hereby suggest that MPC method could be a good alternative for surgical treatment of PS, because it causes fewer complications and recurrence.

Keywords: Pilonidal sinus, complication, modified primary closure

Öz

Amaç: Pilonidal sinüs (PS) hastalığı özellikle sakrokoksigeal bölgenin edinsel olduğu kabul edilen bir hastalıdır. Tedavisinde lokal küretaj, fenol tatbiki, elektrokoter, total sinüs eksizyonuna eşlik eden çeşitli primer veya flep yardımıyla kapama veya sekonder iyileşmeye bırakma yöntemlerinden biri kullanılır. Ancak henüz üzerinde fikir birliği sağlanan bir tedavi yöntemi yoktur.

Gereç ve Yöntem: Ocak 2012-Ağustos 2014 tarihleri arasında Atatürk Üniversitesi Genel Cerrahi Kliniğinde pilonidal sinüs hastalığı nedeniyle opere edilen hastalar total sinüs eksizyonu ile beraber primer kapama yapılanlar (Grup 1) ve modifiye primer kapama yapılanlar (MPC, Grup 2) olmak üzere iki gruba ayrıldı. Çalışmaya katılan 98 hastanın yaşı, cinsiyeti, uygulanan operasyonun çeşidi, operasyon süresi, çıkartılan cildin miktarı, postoperatuar hastanede kalış süresi ve komplikasyonları değerlendirildi.

Bulgular: Hastalardan 44'üne (%44,9) primer kapama ameliyatı, 54'üne (%55,1) modifiye primer kapama ameliyatı yapıldı. Birinci gruptaki hastaların ortalama ameliyat süresi 39,1 (30-60) dk, çıkartılan materyalin ortalama çapı 9,3 (8-11) cm², ortalama hastanede kalış süreleri 1,4 (1-3) gün iken ikinci gruptaki hastaların ortalama ameliyat süresi 52,2 (35-70) dk, çıkartılan materyalin ortalama çapı 2,6 (2-4) cm², ortalama hastanede kalış süreleri 1,6 (1-3) gün idi. Operasyon süresi, insizyonda açılma, nüks gelişimi ve genel komplikasyon gelişimi açısından iki grup arasında istatistiksel olarak anlamlı fark olduğu görüldü (sırasıyla $p<0,001$, $p<0,05$, $p<0,05$, $p<0,005$). Multivariate analize göre pilonidal sinüs hastalığı cerrahi tedavisinde primer kapama yönteminin komplikasyon oranını 6,65 kat artırdığı, modifiye primer kapama yönteminin ise operasyon süresini 1,2 kat arttırdığı görüldü.

Sonuç: Modifiye primer kapama yönteminin primer kapama yöntemine göre daha az komplikasyona neden olması ve daha az nüksle sonuçlanması nedeniyle pilonidal sinüs hastalığı cerrahi tedavisinde iyi bir alternatif olabileceğini düşünmekteyiz.

Anahtar Kelimeler: Pilonidal sinüs, komplikasyon, modifiye primer kapama



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Introduction

Pilonidal sinus (PS) is considered an acquired disease, mostly seen in the sacrococcygeal region [1]. The disease is frequently seen in young men, people with hygiene problems and professions spend most of their time sitting such as drivers and students [1]. While many theories were suggested to explain the cause of disease, the most widely accepted one is that ingrown hair at intergluteal sulcus being exposed to micro-trauma and cause inflammation [1, 2]. However, 25-50% of pilonidal disease has been reported to not involve any hair [1].

Various primary or secondary or flap methods, accompanied by one of local curettage, phenol application, electrocauterization and total sinus excision methods, are used for the treatment of pilonidal sinus [3]. The defect observed after total sinus excision could be closed by marsupialization, primary closure or flap methods. The defined flap methods on the literature include Rhomboid, Karydakias, V-Y-Z plasty and Limberg flaps [2, 3]. While many techniques for surgical treatment of pilonidal sinus have been defined, there is no consensus on a single treatment method and various clinical results are still being reported about these methods [2, 3]. The optimal method should have fewer complications, shorter stay at hospital, less recurrence rate, less esthetical concerns after the operation and let the patient return to social life earlier [3].

Following the pilonidal sinus surgery, patients may encounter problems such as esthetical problems, wound infection, hematoma, dehiscence and recurrence [4]. According to the literature, after the surgery, 12-22% of the patients may experience complications and 10% may experience recurrence [4]. While there are studies suggesting that outcomes from repair with flap are better, other studies suggest that primary closure method could have a recurrence rate of 0-42%, although recently this rate have been improved [2, 3].

We are hereby presenting our modified method (MPC) and results, which we think has better outcomes compared to primary closure method, since it causes less tissue loss and closes the dead space better.

Materials and Methods

Patients undergone total sinus excision with primary closure because of pilonidal sinus disease between January 2012 and August 2014 have been retrospectively evaluated. Ethics committee approved our study. The patients were separated into two groups as patients undergone primary closure (Group 1) and patients undergone modified primary closure (MPC, Group 2). Since the follow-up period would be short, patients operated in the last 6 months have been

excluded from the study. Among all 98 patients participated in the study, age, sex, type of operation, duration of operation, amount of excised skin, duration of post-operative stay at hospital and complication variables were evaluated.

Informed consent was taken from all of the patients. All patients received Cefazolin Sodium 1 gr/IV prophylaxis just before the operation. The intergluteal regions of the patients were explored with a plaster. The healthy skin was tried to be reserved as much as possible with a narrow ellipsoid incision including sinus apertures, instead of a standard ellipsoid incision, for the patients in the MPC group (Figure 1, 2). The present pilonidal sinus tissue was totally excised from the surrounding tissues by observing its borders with strict bleeding control to leave no blood at operation field. Thus, we aimed not to remove any healthy soft tissue except the pilonidal sinus tissue. In order to close that dead space better, fascia of both gluteus maximus muscles were separated from the subcutaneous tissue above them in an ellipsoid manner (Figure 1, 2). 2.0 polydioxanone suture was advanced through fascia of gluteus maximus muscle, pre-sacral fascia and fascia of gluteus maximus at the opposite side, then the suture was hanged. The same process was repeated 3-4 times with a few centimetres apart and the sutures were tied. Thus, both gluteus maximus muscles were repositioned to the middle line as flaps and the dead space was filled (Figure 1, 2). Hemovac drain was inserted onto the fascia in every patient. 3.0 polydioxanone or 2.0 polyglactin suture was advanced through the soft tissue separated from fascia of gluteus maximus muscle and returned just at subcutaneous tissue, than advanced into the subcutaneous tissue of the opposite side and returned from the separated soft tissue at that side, suture was hang. The same process was repeated 3-4 times and the sutures were tied so the knot would burry inside. Completely opposed wound edges were sutured with 3.0 polypropylene suture material using interrupted sutures (Figure 1, 2). During the follow-up period, complications and recurrences of both patient groups were noted.

Statistical analysis

The data was presented as standard value for means and percentage for other data. The significant difference of two means was determined by T-test, the significant difference of two percentages was determined by Chi-square test. Logistic Regression Analysis Enter method was used for the independent evaluation of MPC method, which was used at surgical treatment of pilonidal sinus, with primary closure method. Age, sex, development of complication and duration of operation variables were included in the analysis. All data were analysed with the Statistical Package for the Social Sciences (SPSS; Armonk, NY, USA) 20.0 software and $p < 0.05$ was considered statistically significant.

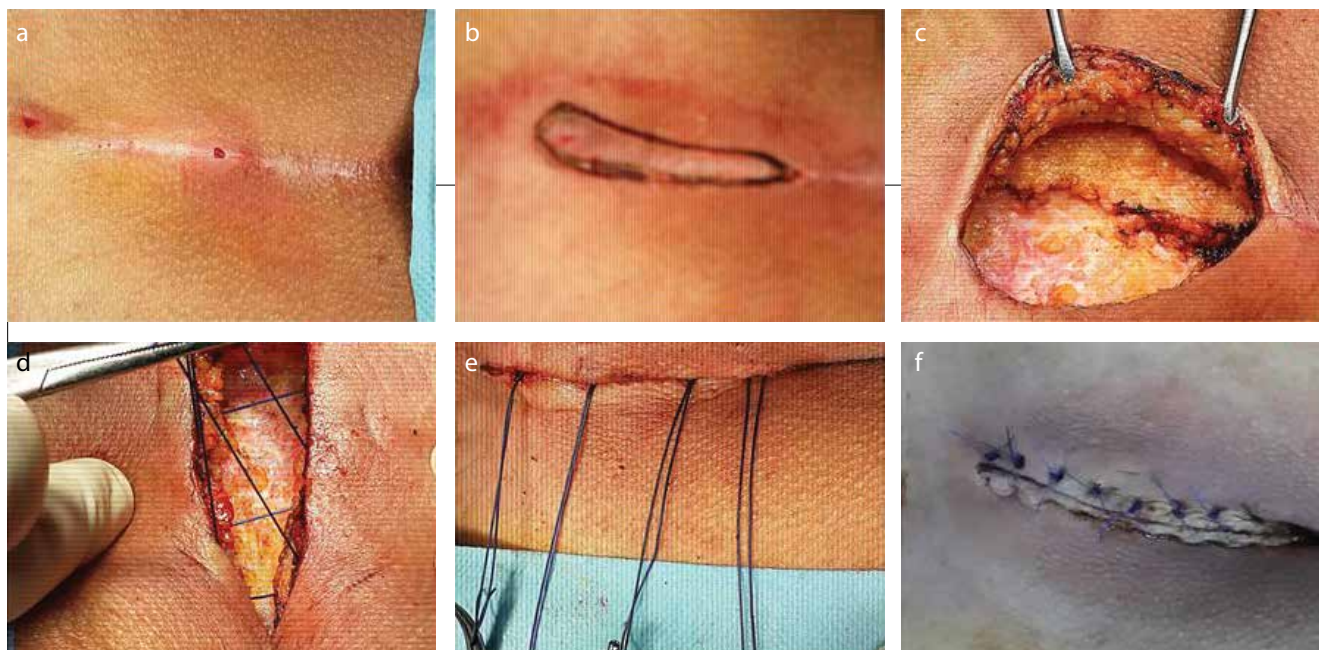


Figure 1. a-f. (a) Apertures of pilonidal sinus; (b) Minimal incision including pilonidal sinus apertures; (c) Separated fascia of gluteus maximus muscle; (d) Fascia of gluteus maximus muscle hanged with sutures; (e) Before tying subcutaneous sutures; (f) After the skin sutures.

Results

Both groups were similar by means of age and sex (Table 1). 44 patients (44.9%) underwent primary closure operation while 54 patients (55.1%) underwent MPC operation. Mean duration of operation was 39.1 (30-60) minutes, mean diameter of excised material was 9.3 (8-11) cm² and mean duration of stay at hospital was 1.4 (1-3) days for the patients in the first group. Meanwhile, duration of operation was 52.2 (35-70) minutes, mean diameter of excised material was 2.6 (2-4) cm² and mean duration of stay at hospital was 1.6 (1-3) days for the patients in the second group.

There was statistically significant difference between the two groups by means of duration of operation, dehiscence of surgical wound, recurrence and development of general complications ($p < 0.001$, $p < 0.05$, $p < 0.05$ and $p < 0.005$, respectively). The amount of excised skin was statistically significantly different between Group 1 and Group 2 ($p < 0.001$). There was statistically significant relationship between the amount of excised skin and the development of complications ($p < 0.001$). According to the multivariate analysis, during surgical treatment of pilonidal sinus, independent from age and sex variables, primary closure method increases the rate of complication 6.65 times (95%CI: 1.86-23.73) and MPC method for treatment increases the duration of operation 1.2 times (95%CI: 1.121-1.312) (Table 2).

Discussion

Pilonidal sinus is a disease of sacrococcygeal region. It is mostly seen in young people. It has a male to female ratio of 4. The disease was thought to have a hereditary etiology, but recently, it is reported to be acquired [5, 6].

While some theories support the idea that fallen hair causes pilonidal sinus, others propose that the hair follicles are responsible for the etiology of pilonidal sinus. Some authors suggest that fallen hair get stuck in skin because of its prominences at sides and cause a foreign body reaction, which results granulation tissue and eventually causes pilonidal sinus. On the contrary, some authors think that apertures of hair follicles plug and these swollen follicles open up to subcutaneous tissue, yielding abscess formation and causing chronic pilonidal sinus [7-11]. Excessively hairy body, micro-trauma of the intergluteal sulcus associated with long periods of sitting, moist and macerated skin because of bad hygiene are risk factors for the disease [7, 12-15].

Pilonidal sinus is especially common in young people [7, 16]. When both groups were evaluated by means of age and sex, there was no significant difference in between. Mean age of the patients was 30.6 ± 9.2 , a little above the literature. 64.3% of the patients were male, which was consistent with the current literature.

When choosing the surgical treatment for the pilonidal sinus, the method with less complication, recurrence and time

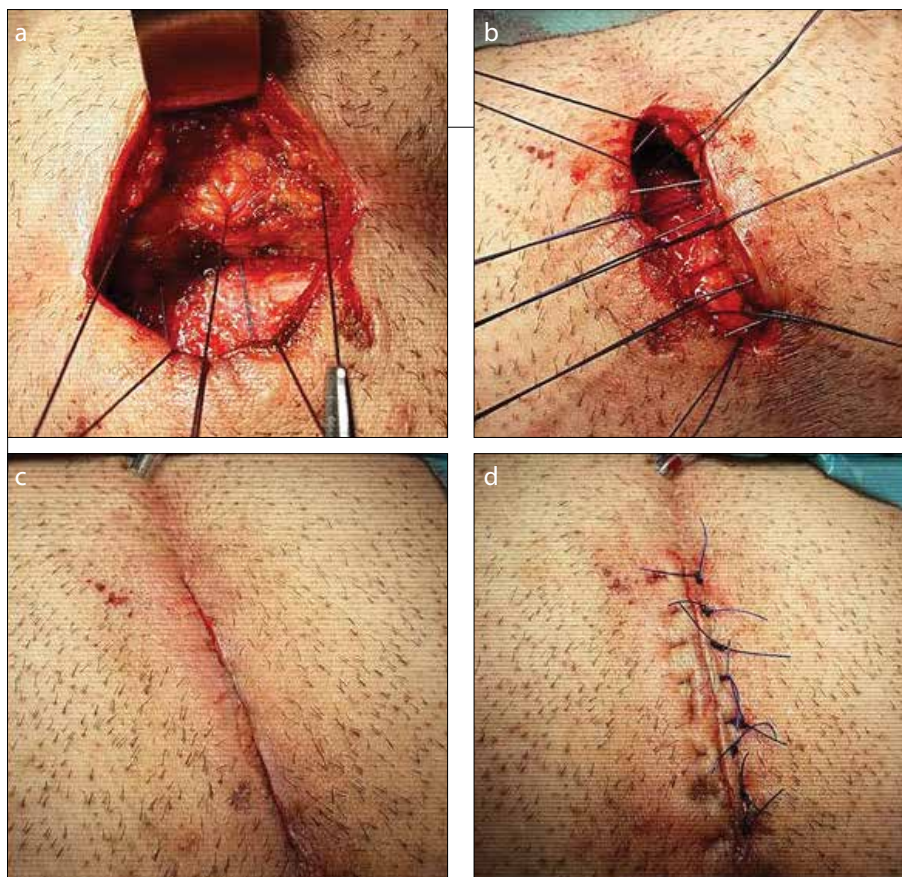


Figure 2. a-d. (a) Separated fascia of gluteus maximus muscle and hung sutures; (b) Sutures on the right are for approximating gluteus maximus muscles, sutures on the left are for subcutaneous suturing; (c) After the subcutaneous suturing; (d) After the skin suturing.

period to return daily activities must be chosen, although, there is no consensus on the surgical treatment of the disease. Pilonidal sinus may recur. According to the current literature, while the methods using flaps are considered better by means of complication and recurrence, recently primary closure methods are reported to have good outcomes, too [17, 18]. In our study, we used primary closure method and MPC method, which we modified to close the dead space better. 44 patients (44.9%) underwent primary closure method, while 54 patients (55.1%) underwent MPC method. Since this study is a retrospective study, we could not plan which patients shall have which operation. According to the multivariate analysis, during the surgical treatment of pilonidal sinus, independent from age and sex variables, primary closure method increases the rate of complication 6.65 times (95%CI: 1.86-23.73) and MPC method increases the duration of operation 1.2 times (95%CI: 1.121-1.312). In addition, a statistically significant difference was observed by means of development of recurrence between the two groups, the MPC group had lesser recur-

rence rate ($p < 0.05$). Especially after flap repositioning operations, when recurrence is observed, re-operation is needed and this causes serious deformities in the gluteal region. Thus, we think that flap repositioning operations for pilonidal sinus treatment should only be used with cases with recurrence; especially if the disease is not causing very large defects, primary closure method should be preferred.

In our study, duration of operation was longer with the MPC group (mean 52.2 minutes) compared to primary closure group (mean 39.1 minutes) and there was statistically significant difference between the two groups ($p < 0.001$). We think that caring to work in a bloodless area, caring for borders of pilonidal sinus tissue in order not to remove unnecessary tissue, using hanging sutures for opposing both gluteus maximus muscles and subcutaneous soft tissues are factors prolonging the duration of operation, but considering the outcomes this difference in time is acceptable.

There are studies in the literature pointing that methods such as Limberg, Karydakias, V-Y advancement flap and ellipti-

Table 1. Comparison of the groups according to their features

Feature	Group 1 % (n)	Group 2 % (n)	p	Total % (n)
Age	31.3±9.0	30±9.5	0.497	30.6±9.2
Male	63.6 (28)	64.8 (35)	1.00	64.3 (63)
Overall complications	45.5 (20)	16.7 (9)	0.003	55.1 (54)
Infection	31.8 (14)	16.7 (9)	0.078	23.5 (23)
Hematoma	20.5 (9)	7.4 (4)	0.058	13.3 (13)
Dehiscence	18.2 (8)	3.7 (2)	0.019	10.2 (10)
Recurrence	9.1 (4)	0 (0)	0.038	4.1 (4)
Duration of operation (min)	39.1±7.0	52.2±10.3	<0.001	46.3±11.1
Duration of stay at hospital (days)	1.4±0.7	1.6±0.6	0.178	1.5±0.7

Table 2. Logistic regression analysis

	Wald	p	OR	95%CI
Complication (yes/no)	8.5	0.004	6.65	1.86-23.73
Age	2.3	0.128	0.951	0.892-1.014
Sex (M/F)	0.08	0.78	0.849	0.269-2.68
Duration of operation	23.1	<0.001	1.213	1.121-1.312

M: male; F: female; OR: odds ratio; CI: confidence interval of the difference

cal excision remove healthy tissues, which has no role in the etiopathogenesis of the disease, instead may aid the wound healing process, and thus flattening the intergluteal sulcus is a more accurate approach [13, 19, 20]. When performing primary closure operations, skin is excised usually with an ellipsoid incision and some healthy soft tissue could be excised proportional to the pilonidal sinus tissue. With the MPC method, only the deceased skin including the sinus apertures are excised and no healthy subcutaneous soft tissue is removed except pilonidal sinus tissue. When the amount of excised skin evaluated, there was statistically significant difference between the two groups ($p<0.001$) and less skin was excised with the MPC method. In addition, when the relationship between the amount of excised skin and development of complications considered, there was a statistical significance ($p<0.001$). Since less skin is excised with MPC method, less healthy soft tissue is excised. Thus, we think that there is less dead space compared to primary closure method and this causes fewer complications with the procedure.

There was no statistically significant difference between the two groups by means of duration of stay at hospital.

The dead space at the operation site and both subcutaneous and skin tension are the major causes of complications such as hematoma, infection and dehiscence after pilonidal

sinus surgery [2, 7]. Moreover, the dehiscence of the incision may occur because of tissue tension after post-operative day 15, when the incision sutures are removed. We observed statistically significant difference between the two groups about the dehiscence of incision ($p<0.05$). During the MPC operation, the operational field is separated into two spaces by the separation of fascia of gluteus maximus muscles. The space deeper to the fascia is closed completely by approximating both gluteus muscles using fascia sutures and the space superficial to the fascia is closed easily by separated mobile tissue above the fascia. Another important factor for comfortable closure of dead space at the operational field is no unnecessary tissue excision. During the subcutaneous suturing, the soft tissue between the gluteus maximus muscle and skin is completely approximated to each other and since the suture is advanced just below the skin, we are trying to reduce the tension of the tissues so the incision sutures would not be needed. In addition, even if the incision sutures are removed on post-operative day 15, present subcutaneous sutures will keep supporting the tissue tension, thus, the patients will experience less dehiscence of the incision. Moreover, there was statistically significant difference between the two groups about the development of general complications. There were fewer complications following MPC method ($p<0.005$).

In conclusion, we obtained better outcomes with the MPC method compared to the primary closure method. The advantages of the management are fewer complications and recurrences; the disadvantage of the management is longer duration of operation. While the flap repositioning pilonidal sinus operations are still popular in the literature, according to the results of our study, we think that MPC method is a good alternative for surgical treatment of pilonidal sinus. In fact, we think the flap repositioning methods should be used for patients with excessive tissue loss or patients with recurrence. However, this study must be supported with studies that are more extensive.

Ethics Committee Approval: Ethics committee approval was received for this study from the local ethics committee of Atatürk University School of Medicine.

Informed Consent: Informed consent was taken from all of the patients.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - S.A.; Design - S.A.; Supervision - S.A.; Materials - S.A., E.K., G.Ö., B.A., S.S.A.; Data Collection and/or Processing - S.A., E.K., M.C.B.; Analysis and/or Interpretation - S.A., E.K., M.C.B.; Literature Search - S.A., E.K., G.Ö., B.A.; Writing Manuscript - S.A.; Critical Review - B.A., S.S.A.; Other - E.K., M.C.B., S.S.A.

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