

A comparison of crystal phenol treatment, midline primary closure and Limberg flap reconstruction methods in female patients with primary pilonidal sinus disease



Ann. Ital. Chir., 2021 92, 2: 196-200
pii: S0003469X21033716

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Pilonidal sinus disease (PSD) is a chronic problem often occurs in healthy hirsute men, however, women may also be affected. A range of conservative techniques to surgical flaps have been used to treat this condition. Currently, midline primary closure (MPC) is considered the standard of therapy; however, no statistically significant difference has been noted between primary versus secondary (Karydakis flap or Limberg flap) closure. Recently, flap reconstruction methods have been applied and superiority of these methods have been shown. Treatment methods should be employed to the individual, taking into account recurrence and complication rates of the method, recovery time, patients' preference and surgeon's skill.

KEY WORDS: Crystal Phenol Treatment, Female Patient, Pilonidal Sinus, Limberg Flap Reconstruction, Primary Midline Closure

Introduction

Pilonidal sinus disease (PSD), which was first described by Hodges in 1880, is an infectious disease seen in the "natal cleft" and sacrococcygeal region ¹. PSD is characterized by a sinus orifice(s) in the sacral midline 5 cm away from the anus ². Although many theories have been proposed concerning the beginning mechanism of PSD, whether PSD is congenital or acquired is controversial. However, it is predominantly thought of as an acquired disease ³.

PSD begins when the pilosebaceous glands in the natal cleft are affected by the sex hormones generated during puberty ⁴. The female/male ratio of PSD is reported approximately 1/5. PSD is found most commonly in young women between 20 and 25 years old. Additionally, it is more common in women with hirsutism, darker skin color, excess weight and oily skin ⁵. Several treatment approaches to PSD exist, including curettage, intralesional phenol therapy, laser therapy and surgery, but surgical procedures are the most accepted treatment. Resection and subsequent primary closure, tension-free primary closure, flap closure or leaving open may be applied during the surgery ^{6,7}. However, because of the rarity of PSD in women, limited studies have evaluated PSD treatment in female patients. A literature review revealed scarce documentation comparing the crystal phenol treatment (CPT), midline primary closure (MPC) and Limberg flap reconstruction (LFR) methods for treating PSD in female patients. Thus, the present study aimed to compare these treatment modalities when applied to female patients with primary PSD.

Pervenuto in Redazione Giugno 2020. Accettato per la pubblicazione e Luglio 2020

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Methods

This multicentre retrospective study included a total of 375 female patients who were treated and followed up with CPT, MPC and LFR in the diagnosis of primary PSD between June 2002 and December 2018. The patients presented with recurrent PSD or abscess at the first admission, and those with co-morbid diseases (e.g., obesity, diabetes) were excluded from the study. The patients were divided into three groups according to the treatment methods (CPT, MPC and LFR). Age, body mass index (BMI), treatment method, post-treatment follow-up period, complication rates, recurrence rates and the recurrence times of the groups were recorded.

In the patients who received CPT, the sinus orifice was expanded under local anesthesia, the sinus content was curetted, and crystalline phenol was injected into the sinus space. The patients were not hospitalized. Crystal phenol administration was repeated five times at one-week intervals (i.e., on the first, eighth, fifteenth, twenty-second and twenty-ninth days from the beginning of treatment). The results were evaluated as successful or not 8 weeks after the last injection. Patients who did not complete five courses of CPT and thus experienced recurrence, whose wound did not close by the eighth week after five courses of CPT or who exhibited the presence of discharge and infection in the sinus space were deemed as receiving unsuccessful CPT. The treatment was deemed successful if no discharge or infection existed in the sinus space and the sinus space closed completely. Surgical treatment was applied to the patients for whom CPT was unsuccessful and to those who selected surgical treatment as their preference. One of the two methods (MPC or LFR) was applied to the patients who

preferred surgery, and the treatment results of these patients were collected during follow-up examinations. Statistical analysis was performed using SPSS 16.0 (Windows Chicago, IL, SPSS® for the USA). A comparison of the results among the groups was performed using the Chi-square and Kruskal-Wallis tests. The value of $p < 0.05$ was considered significant.

Results

The mean age of all patients in this study was 21 ± 7.20 years (13-46 years). No significant difference was found among the groups in terms of demographic data (Table I). Of the 375 patients included in the study, 117 received CPT, and their mean follow-up period was 24.0 ± 14.2 months (2-78 months). The procedure was unsuccessful in 54 (46%) patients and successful in 63 (54%) patients 8 weeks after CPT. Of the 54 patients whose CPT failed, 43 underwent surgical procedures, while 11 patients did not accept surgery. The mean follow-up period of the 43 patients who underwent surgery after CPT failure was 34.9 ± 8.0 months (4-69 months), and a total of 3 (9%) recurrences occurred.

The LFR method was performed in 22 of the 43 patients who accepted surgery, and the MPC method was performed in 21 patients. The mean follow-up period of the 22 patients who underwent LFR was 37.1 ± 9.0 months (7-69 months), and 2 (9%) patients had a recurrence during this period. These recurrences occurred 12 months after the procedure. The mean follow-up period of the 21 patients who underwent surgery using the MPC method was 30.4 ± 6.0 months (4-55 months), and 1 (4.8%) patient had a recurrence during this peri-

TABLE I - *A comparison of all groups*

	CPT group(n = 117)	MPC group(n = 149)	LFR group (n = 109)	p
Age, (y)	21.90 ± 7.20	22.35 ± 4.55	23.15 ± 4.10	NS
BMI, (kg/m ²)	24.22 ± 1.61	24.30 ± 2.50	23.50 ± 2.71	NS
Mean follow-up time, (m)	24.01 ± 14.21	32.05 ± 10.56	30.34 ± 12.82	NS
Recurrence rate (%)	54 (46%)	20 (13%)	6 (5%)	<0.002
Mean recurrence time, (m)	5.52 ± 1.90	9.24 ± 4.12	14.33 ± 7.67	<0.03

CPT: crystal phenol treatment, MPC: midline primary closure, LFR: Limberg flap reconstruction, NS: not significant

TABLE II - *Features of all patients who underwent surgery*

	MPC group (n = 160)	LFR group (n =131)	p
Age (y)	22.35 ± 4.55	23.15 ± 4.10	NS
Mean follow-up time, (m)	31.94 ± 10.24	31.48 ± 12.19	NS
Recurrence rate, (%)	21 (13%)	8 (6%)	<0.003
Wound dehiscence rate, (%)	16 (10%)	5 (3.8%)	<0.01
Wound infection rate, (%)	20 (12.5%)	3 (2.3%)	<0.001
Hospital stay (d)	1.25 ± 0.40	2.05 ± 0.43	NS

MPC: midline primary closure, LFR: Limberg flap reconstruction, NS: not significant

od. The recurrence occurred in the tenth month after the surgical procedure.

The number of patients who directly underwent surgery without CPT was 258. The repair was performed using MPC in 149 of these patients and using LFR in 109 of them. The mean follow-up period of the 149 patients in the MPC group was 32.0 ± 10.5 months (2-83 months), and recurrences occurred in 20 (13%) patients during the follow-up period. The mean recurrence time of these patients was 9.2 ± 4.1 months (3-15 months) after the operation. Recurrence was seen in 6 patients (5%) in the LFR group (109 patients), who were followed for a mean of 30.3 ± 12.8 months (3-75 months). In these patients, the mean recurrence time was 14.3 ± 7.6 months (6-32 months) after the operation. The recurrence rate was significantly higher in the CPT group than in the MPC and LFR groups. Additionally, the LFR group had a lower recurrence rate than other groups (46%, 13% and 5%, respectively; $p < 0.002$). When the Kruskal-Wallis test was used to compare the groups, the recurrence rates were found to be statistically significantly different between the LFR and CPT, LFR and MPC, and MPC and CPT groups ($p < 0.001$, $p = 0.003$ and $p = 0.008$, respectively). When a comparison was made of the recurrence time, the recurrences were found to occur later in the LFR group than in the CPT and MPC groups ($p < 0.03$; Table I).

A total of 291 patients who underwent surgery were evaluated, the MPC method was applied in 160 (55%) patients, and the LFR method was applied in 131 (45%) patients. The mean follow-up time in the MPC group was 31.9 ± 10.2 months (2-83 months), and recurrences occurred in 21 (13%) patients. In the LFR group, recurrences occurred in 8 (6%) patients during the follow-up period, which was 31.4 ± 12.1 months (3-75 months). The recurrence rate was significantly lower in the LFR group than the MPC group (6% vs 13%, respectively; $p < 0.03$; Table II).

Pearson's correlation analysis revealed that BMI, age and length of stay in the hospital had no statistically significant effect on recurrence.

Discussion

PSD occurs at an earlier age in women because of the early onset of sebaceous gland activity due to sex hormones⁵. In the general population, the average age of patients with PSD has been reported as between 20 and 25 years. The mean age of all patients in this study was 21, which was consistent with the literature.

Many studies have shown the effectiveness of CPT in PSD. For example, Yuksel et al. reported that an 88% clinical improvement was achieved in a group of 50 patients as a result of CPT⁸. Dag et al. showed a CPT success rate of 67%⁹. Calikoglu et al. demonstrated that CPT was as effective as the open surgical method¹⁰.

Bayhan et al. and Akan et al. reported no significant difference between the CPT and modified LFR methods in terms of recurrence^{11,12}. Furthermore, Ateş et al. compared the MPC and CPT methods in 117 children with PSD whose mean age was 15.6 years. They reported that CPT produced lower complication and recurrence rates compared to MPC and therefore seemed a useful, minimally invasive method for treating PSD¹³. Aksoy et al. performed CPT for 12 weeks, and the mean follow-up period was 22 months. They reported that 86.5% of the patients benefited from the treatment and that recurrences occurred in 33% of the patients during the follow-up period¹⁴. In contrast, the present study demonstrated that the CPT was less successful compared to the other two methods; the recurrence rate was significantly higher (46%) in the CPT group than in the MPC and LFR groups. These results were contradictory to those of previous studies due to the younger sample and smaller sample size of the previous studies, as well as their differing follow-up periods.

In our previous study, included both male and female patients, we compared the postoperative outcomes of four different methods: LFR, MPC, Karydakias flap reconstruction (KFR) and leaving open¹⁵. We found increased postoperative complications, such as wound dehiscence, and high recurrence rates in the MPC group. Therefore, we did not recommend the MPC method for PSD treatment. We believed that the KFR and LFR methods might be safer than the other methods due to lower recurrence rates and shorter time to return to work¹⁵. Differently, in this study, we compared the post-treatment outcomes of three methods which are surgical or nonsurgical methods (MPC, LFR and CPT), only in female patients. We found that the LFR method was more successful and had a lower recurrence rate than the other methods. In another study including 634 patients, Kartal et al. compared the LFR, KFR and MPC methods and found that the recurrence rate was the highest in the MPC group, while the complication rate (seroma, hematoma, wound dehiscence, infection and recurrence) was the lowest in the KFR group¹⁶. Iesalniaks et al. reported that the treatment success rates of non-surgical and minimally invasive methods were lower than excisional radical surgical methods and that closing with midline sutures would be disadvantageous¹⁷. Hardy et al. also reported that the recurrence rate was significantly higher in cases performed with MPC than in cases without MPC (12% and 6%, respectively) in pediatric PSD patients¹⁸. The present study found that the LFR method was more successful, that the CPT method had a higher recurrence rate and that the MPC method had a higher complication rate. These results were similar to those of Hardy et al.¹⁸. In contrast, Bayhan et al. and Akan et al. reported no significant difference between the CPT and modified LFR methods in terms of recurrence rates^{11,12}. For women, recurrence rates, return to normal daily

activities, and cosmetic results highly affect the treatment method that is chosen. Thus, in the present study, the patients were informed of the success, recurrence and complication rates of all methods, and the LFR method was less preferred by the patients than the MPC and CPT methods. Since the CPT method does not require hospitalization and does not carry any surgical risk, it may be preferred as a first treatment in primary PSD cases. This preference might also have been affected by several other factors, such as the patients' cosmetic anxiety, surgeon's skill and the need for hospitalization.

In a meta-analysis including 17 studies, Berthier et al. reported that sinus tract repair using the flap method in PSD patients was more successful than primary closure in terms of recurrence rate, wound-healing time, duration of the incapacity to work, quality of life, patient satisfaction, postoperative pain, wound infection, bleeding or hematoma, skin wound complications and duration of hospital stay¹⁹. They suggested avoiding primary direct closure in clinical practice because of the superiority of flap repair when compared to direct closure. In a study of 100 patients with PSD, Pronk et al. compared CPT and radical surgical intervention. They evaluated several parameters, such as pain, quality of life and return to normal daily activities. They found that CPT was advantageous, as it produces a quicker return to normal daily activities, less pain and quicker wound epithelialization compared to radical excision²⁰. Therefore, they suggested that surgeons consider CPT in patients with primary PSD. However, their study did not evaluate long-term results, such as the success and recurrence rates of the methods. In contrast, the present study did not examine wound healing time or time to return to activities, and it found that hospitalization time was similar between the MPC and LFR groups. However, the study showed that the LFR method was more successful and had a lower recurrence rate and that recurrences occurred later in the follow-up period. Therefore, this study does not suggest the CPT method for primary PSD patients due to the long-term outcomes of the method.

Milito et al. reported their results in a large series including 216 patients with chronic pilonidal sinus PSD at long term follow up²¹. They concluded that the Limberg's technique was a very effective procedure for chronic or recurrent PSD with a low complications rate, a short hospital stay, a rapid return to normal activities and a low recurrence rate. Although our study included only patients with primary PSD, their results including low complications and low recurrence rates, were similar with ours.

A limitation of the present study was lack of information about some complications such as hematoma and seroma development, time of healing, and duration of return to work. However, this study was a multicentre study that included a large number of patients and investigated the long-term outcomes of the methods in female patients.

Conclusions

LFR method may be recommended instead of the MPC and CPT, because of the higher success and lower recurrence rates of the LFR. However, CPT method may be a choice for primary PSD patients who do not accept hospitalization and surgery.

Riassunto

La malattia del seno pilonidale (PSD) rappresenta un problema cronico che si verifica spesso in uomini sani irsutati, tuttavia, anche le donne possono essere colpite. Per trattare questa condizione è stata utilizzata una serie di tecniche conservative fino all'impiego di lembi chirurgici. Attualmente, la chiusura primaria mediana (MPC) è considerata lo standard della terapia; tuttavia, non è stata osservata alcuna differenza statisticamente significativa tra chiusura primaria e secondaria (lembo di Karydakis o lembo di Limberg). Recentemente sono stati applicati metodi di ricostruzione del lembo e è stata dimostrata la superiorità di questi metodi. I metodi di trattamento dovrebbero essere personalizzati per ciascun individuo, tenendo conto dei tassi di ricorrenza e di complicanze del metodo, dei tempi di recupero, delle preferenze dei pazienti e delle capacità del chirurgo.

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