

Tension-free primary closure for the treatment of pilonidal disease



Ann. Ital. Chir., 2015 86: 459-463
pii: S0003469X15024045

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AIM: Pilonidal disease (PD) is a common disorder that usually affects young population and generally seen in intergluteal region. Conservative and surgical treatment options have been utilized. Many surgical techniques including primary closure, marsupialization and flap procedures have been described. The present study aims to evaluate the optimal surgical method for the treatment of PD.

MATERIAL AND METHODS: A total of 151 patients underwent pilonidal disease surgery between January 2007 and September 2014 were enrolled in this study. Patients were compared according to age, sex, operation time, length of

RESULTS: A total of 151 patients with a mean age of 25.18 years (range 14-66) presented with pilonidal disease were evaluated. Primary closure (PC) and tension-free primary closure (TFPC) were performed in 105 (69.5%) and 46 (30.5%) patients, respectively. There was no statistical difference between groups according to age, sex, operation time and length of hospital stay. Only 9 patients (8.6%) in PC and 3 patients (6.5%) in TFPC have postoperative recurrent disease. of 17 patients (7.9%) dehiscence was seen, 15 (14.3%) were in PC group and 2 (4.3%) were in TFPC group. Postoperative seroma or wound infection was seen in 16 patients (10.6%).

CONCLUSION: Tension-free primary closure is a method that is effective as primary closure.

KEY WORDS: Modified primary closure, Pilonidal disease, Primary closure

Introduction

Pilonidal disease (PD) is a common disorder that usually affects young population and generally seen in intergluteal region. It has an incidence of 26/100.000 and common in males (1.3%) than in females (0.11%)^{1,2}. The etiology remains controversial but it is generally

accepted as an acquired condition. Although numerous surgical and nonsurgical methods have been proposed, there is no clear consensus for optimal treatment of pilonidal disease in the literature³. Conservative and surgical treatment options have been utilized. Some minimally invasive methods such as phenol application, a simple sinotomy and curettage through a lateralized incision have been reported but none of these are widely accepted as the method of choice³⁻⁵. Many surgical techniques including primary closure, marsupialization and flap procedures have been described. Different types of flap techniques such as Limberg flap, Karydakias flap and bilateral gluteus maximus advancing flap have been used in PD treatment^{1,6,7}. But none of these are superior to the other. Recurrence rates of 7-42% have been reported following excision and primary closure⁸. In contrast, the Limberg flap after excision of the pilonidal sinus has been associated with a recurrence rate of 0-5%⁸⁻¹⁰. The present study aims to evaluate the optimal surgical method for the treatment of pilonidal disease.

Pervenuto in redazione Aprile 2015. Accettato per la pubblicazione Giugno 2015.

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Abbreviations

PC	Primary closure
PD	Pilonidal disease
TFPC	Tension-free primary closure

Material and Methods

A total of 151 patients underwent pilonidal disease surgery between January 2007 and September 2014 were enrolled in this study. Patients were evaluated retrospectively. They were divided into 2 groups according to surgical technique; primary closure (PC) (Group 1) and tension-free primary closure (TFPC) (Group 2). Group 1 consists of 105 and group 2 consists of 46 patients. All TFPC was performed by the same surgeon. Patients were compared according to age, sex, operation time, length of hospital stay, complication (dehiscence, wound infection), recurrence and specimen volume. Specimen volume was calculated according to elliptical volume formula; $\text{Volume} = \text{Length} \times \text{Width} \times \text{Depth} \times \pi/4$.

This study was approved by Baskent University Institutional Review Board (Project No: KA14/279) and supported by Baskent University Research Fund.

STATISTICAL ANALYSIS

Statistical analysis was performed using the statistical package *SPSS software* (Version 17.0, SPSS Inc., Chicago, IL, USA). If continuous variables were normal, they were described as the mean \pm standard deviation ($p > 0.05$ in Kolmogorov-Smirnov test or Shapiro-Wilk ($n < 30$)), and if the continuous variables were not normal, they were described as the median. Comparisons between gender or bmi were applied using Student T test or One Way ANOVA for normally distributed data and Mann Whitney U test or Kruskal Wallis test were used for the data not normally distributed. The categorical variables between the groups was analyzed by using the Test or Fisher Exc. test. Values of $p < 0.05$ were considered statistically.

SURGICAL TECHNIQUE

Tension-free primary closure was performed under spinal or general anesthesia and the patient was placed in prone position with the hips slightly flexed. The buttocks were retracted with adhesive tape to expose the natal cleft clearly. The sacral area was shaved just before the operation and disinfected with povidone iodine solution. A small quantity of methylene blue was injected into the sinus openings to fill all the tracks. An elliptical skin

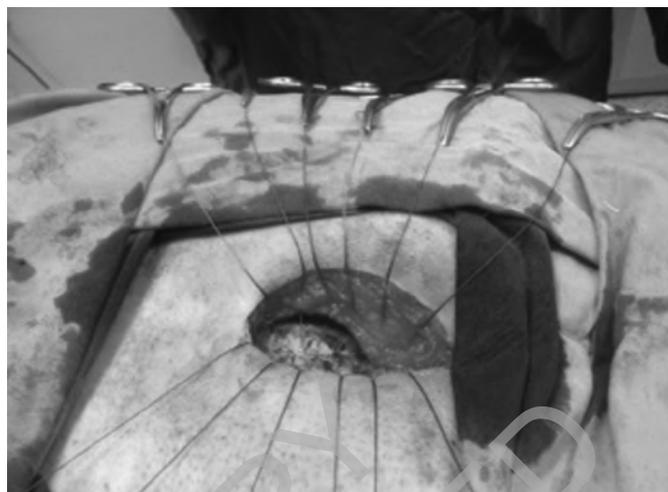


Fig. 1: Mobilization of skin, subcutaneous tissue and fascia of gluteus maximus muscle 2-3 cm away from midline.

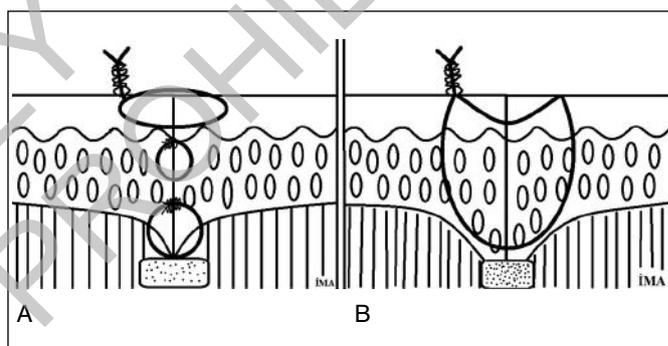


Fig. 2: (A) Tension-free primary closure of skin, subcutaneous tissue and fascia of gluteus maximus muscle (B) Primary closure of skin and subcutaneous tissue.

excision was made longitudinally to remove all the tracks and openings. The excision was elongated to the pre-sacral fascia but not penetrated. After excision is completed the skin, subcutaneous tissue and fascia of gluteus maximus muscle was released laterally 2-3 cm away from the incision line (Fig. 1). The cavity was closed by a double layer of 2/0 polyglactin absorbable interrupted sutures. The skin was closed by 3/0 polypropylene non-absorbable interrupted sutures (Fig. 2). No drainage tube was inserted. The skin sutures were removed on postoperative day 10.

Primary closure was similar to tension-free primary closure till the excision of pilonidal sinus was completed. The cavity was closed together with the skin by 2/0 polypropylene non-absorbable interrupted sutures (Fig. 2). The skin sutures were removed on postoperative day 10.

Results

A total of 151 patients with a mean age of 25.18 years (range 14-66) presented with pilonidal disease were evaluated. Primary closure (Group 1) and tension-free primary closure (Group 2) were performed in 105 (69.5%) and 46 (30.5%) patients, respectively (Table I). Of 151 patients, 110 (72.8%) were male and 41 (27.2%) female. Only 17 (11.3%) patients were smokers and 46 (30.5%) non-smokers. There was no statistical difference between groups according to age, sex, operation time and length of hospital stay. The mean operation time for group 1 and 2 were 55.13 ± 13.66 and 57.83 ± 13.89 minutes respectively ($p > 0.05$). The mean length of hospital stay for PC group was 1.12 (range 1-12) days and for TFPC group 1.26 (range 1-3) days. 9 patients (8.6%) in group 1 and 5 patients (10.9%) in group 2 have preoperative recurrent disease. The mean recurrence for PC and TFPC groups were 1.20 ± 0.41 and 1.29 ± 0.48 times respectively. Only 9 patients (8.6%) in PC and 3 patients (6.5%) in TFPC have postoperative recurrent disease, although this is not statistically significant (Table II). Of 9 patients have postoperative recurrent disease in PC group, 1 patient was treated by Limberg flap reconstruction, 1 patient was treated by primary closure and others (7 patients) did not accept re-operation. 1 patient

with recurrent disease in TFPC group was re-treated by Limberg flap reconstruction and 1 patient with TFPC again. Other patient (1 patient) has recurrent disease in TFPC did not accept re-operation. 1 patient (2.1%) in group 2 has pre and postoperative recurrent disease. Of 17 patients (7.9%) dehiscence was seen, 15 (14.3%) were in PC group and 2 (4.3%) were in TFPC group however no statistical difference was observed ($p = 0.061$). Recurrence was detected between 2-24 months postoperatively.

Postoperative seroma or wound infection was seen in 16 patients (10.6%). Of these patients, 14 (13.3%) were in group 1 and 2 (2.3%) were in group 2 with no significant difference ($p = 0.081$). 9 (60%) of 16 patients need drainage, others treated conservatively.

The mean volume of specimen was 19.84 ± 19.25 cm³ in PC group and 17.64 ± 15.88 cm³ in TFPC group. There was no difference between groups with respect to specimen volume ($p = 0.507$).

Discussion

PD treatment still lack an optimal surgical technique. Many techniques have been administered including excision with primary closure or flap reconstruction and marsupialization. As the pathogenesis of PD has been understood better, flap reconstructions gained popularity worldwide. Generally accepted explanation of PD etiology is made by Karydakakis that includes three factors: 1) the invader; 2) the force and 3) skin vulnerability¹¹. The deep natal cleft creates a moist, hypoxic, anaerobic environment that bears a risk of developing surgical area complications. Hence, the vulnerability of the skin can be reduced by an off-midline closure. "Flattening the natal cleft" is the most significant point for the surgical technique of choice. Tension-free restoration can decrease surgical area-related complications and patient discomfort during the early postoperative period¹². It can also lead to less chance of recurrence in the long term. The main goals of PD surgery are to establish a complete and rapid healing after the operation, prevent early recurrence and eliminate the occurrence of novel pits around the surgical scar, in effect fashioning a safe area that is not anatomically prone to develop a recurrence^{5,6,13}.

Flap techniques have been found superior to primary closure with respect to wound dehiscence, recurrence and infection¹⁴. In meta-analysis of Horwood et al. several recent studies were included and suggested surgeons to use Limberg flap-repair procedure for the management of chronic primary sacrococcygeal PD, consistently demonstrating considerable benefits over other treatment modalities¹⁴. There is also another challenge between flap procedures. There are multiple flap reconstruction methods and modifications of approved techniques, after excision of PD^{1,6,7,10,11,15}. Although flap reconstructions are found to be superior to primary closure, tension-free

TABLE I - Comparison of the demographic features of the subjects in primary closure and tension-free primary closure groups.

	Primary closure (n=105)	Tension-free primary closure (n=46)	P value
Male/Female	76/29	34/12	0.506
Age (years)*	25.38 ± 7.76	24.72 ± 8.62	0.641
OT (Minutes)*	55.13 ± 13.66	57.83 ± 13.89	0.269
LoHS (Days)*	1.12 ± 1.08	1.26 ± 0.53	0.415
Specimen volume (cm ³)*	19.84 ± 19.25	17.64 ± 15.88	0.507

*Values are means \pm standard deviation.

Abbreviations: LoHS: Length of hospital stay, OT: Operation time

TABLE II - Comparison of complications after primary closure and tension-free primary closure.

	Primary closure (n=105)	Tension-free primary closure (n=46)	*P value
Postoperative recurrence, n (%)	9 (8.6%)	3 (6.5%)	0.475
Dehiscence, n (%)	15 (14.3%)	2 (4.3%)	0.061
Seroma or wound infection, n (%)	14 (13.3%)	2 (2.3%)	0.081

*: $p < 0.05$ considered statistically significant

primary closure is a method that is in between both was investigated by only a few studies. The results of these studies are not statistically significant. Muzi et al. found TFPC was superior in terms of cost, postoperative pain and hospital stay¹⁶. In contrast Tavassoli et al. found the Limberg flap was more advantageous in terms of patient satisfaction, painless defecation and early return to work¹⁷. Okus et al. modified tension-free primary closure and described as technically different from other two studies. Okus used twofold subcutaneous tissue suture and released skin and subcutaneous tissue on both sides of the wound to obtain tension-free healing site at the midline. For this reason our technique being applied by one surgeon of our institution is similar to TFPC of Okus et al. With this TFPC technique, flattening the natal cleft and tension-free restoration obtained which are the primary treatment strategies of flap reconstruction methods.

In our study we found mean operation time for TFPC group longer than PC group but not statistically significant. This is longer than average measures in literature. Mean operation time for TFPC was found 30 minutes by Muzi et al. and 43.50 minutes by Dass et al.^{8,19}. In the literature there are only a few studies comparing tension-free primary closure and the Limberg flap. But no study was found comparing TFPC and PC. TFPC is a modified closure of PC and technically different from flap techniques. Thus comparison of TFPC with PC should give us more accurate results. For this reason we aimed to compare them both. Our study is similar to the study of Okus et al. except prospective randomized design. The recurrence rate after 6 months follow-up period was 4.5 % in tension-free primary closure group and 4.1 % in Limberg flap group¹⁸. Recurrence rate of our study seems higher but 1 patient in TFPC group has pre and postoperative recurrent disease if we exclude that patient recurrence rate becomes 4.3% that is similar to literature rates. Recurrence rate of PC group in our study is lower than in literature and thus not statistical significant. Milito et al. also described modified Limberg flap reconstruction technique with no recurrence after modification was applied (20). With the modification applied by Milito et al. necrosis at the edges of the flap is also eliminated. Ciccolo et al. reported low complication (4%) and recurrence (3%) rates and early return to work with a short-stay personal method²¹. These findings should encourage us to make modification of conventional treatment modalities of PD for better results.

Another different feature of the current study is that we use no drain in both groups. In definition of tension-free primary closure done by Okus et al. drain used routinely. Although drainage may seem to decrease seroma or wound infection and recurrency, Milone et al. found use of drain has no statistically significant advantage on these complications²².

Wound dehiscence can be seen 0.6-9.8 % in PC^{6,8}. We

found this complication as 14.3% in PC and 4.3% in TFPC group. Can et al. performed primary midline closure whereas Muzi et al. performed modified primary closure which makes that difference. Can et al. performed primary closure without tension-free fashion explains high 30.3 % complication rate.

Okus et al. observed 0 and 11.1% seroma formation rates in Limberg flap and TFPC group respectively, although this is not statistically significant¹⁸. But the current study with lower seroma formation rates (2.3%) encourages new randomized prospective trials to be performed.

We also want to take attention to a new calculation defined in our study, volume of specimen extracted. Elliptical volume formula is based on; $\text{Volume} = \text{Length} \times \text{Width} \times \text{Depth} \times \pi/4$. Although there was no difference between groups with respect to specimen volume, the mean volume of recurrent disease was found to be 26.23 cm³. This may state as the volume of the specimen enlarges, recurrence rate elevates. However, minimum specimen volume of recurrent disease is 4.72 cm³. Hence, recurrence rate is not only affected by specimen volume, also by other factors like shaving of the natal cleft to reduce the risk of penetration of hair.

One of the limitations of the study is the absence of body mass index (BMI) parameters. In fact this is just because of the retrospective design of this study. We are not able to reach BMI parameters of patients in our data search. The patient follow-up also can not be determined due to missing data.

Conclusion

The lower recurrence and wound site complication rates associated with flap techniques are related to a tension-free healing site. So surgical technique plays an important role in PD complications. Tension-free primary closure is a method that is effective as primary closure.

Riassunto

Il sinus pilonidali (SP) è una patologia comune che colpisce in genere la popolazione giovane e localizzandosi nella regione interglutea. Per la sua cura sono state utilizzate tecniche conservative e descritte diverse tecniche chirurgiche, queste ultime consistenti in chiusura primaria dell'escissione chirurgica, la marsupializzazione e la chiusura con flap della breccia chirurgica.

Il presente studio si propone di valutare l'efficacia di un metodo chirurgico.

La casistica si riferisce a 151 pazienti sottoposti a trattamento chirurgico tra Gennaio 2007 e Settembre 2014, che vengono suddivisi per età, sesso, durata dell'intervento e della degenza postoperatoria, oltre alle complicanze (deiscenze ed infezioni della ferita), recidive e dimensioni del pezzo operatorio.

L'età media dei pazienti affetti da sinus pilonidalis si aggira tra i 14 ed i 66 anni (media 25,18). In 105 pazienti (69,5% del totale) si è proceduto a chiusura primaria della ferita, ed il 46 (30,5% del totale) si è adottata la tecnica tension-free.

Non si sono osservate differenze statistiche tra i gruppi rispetto all'età, al sesso, alla durata dell'intervento ed a quella della degenza postoperatoria. Solo 9 pazienti operati con chiusura primaria (8,6%) e 3 pazienti (6,5%) operati con tecnica tension-free hanno presentato una recidiva postoperatoria.

In 17 pazienti (7,9%) si è osservata la deiscenza della ferita, di cui 15 (14,3%) tra quelli trattati con chiusura primitiva e 2 (4,3%) in quelli trattati con tecnica tension-free.

Il 16 pazienti (10,6%) è stata osservata la formazione postoperatoria di sieroma o di infezione.

In conclusione la tecnica tension free si dimostra metodo altrettanto efficace della chiusura primitiva.

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