

Surgical Treatment of Pilonidal Sinus in Children: Which Method?

Çocuklarda Pilonidal Sinüsün Cerrahi Tedavisi: Hangi Yöntem?

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ABSTRACT

Background: The principal objectives in the treatment of pilonidal sinus are to excised the sinus canal without recurrence, limit morbidity and hospital stay and have low cost. Although there are many reported articles in the literature, pilonidal sinus disease treatment in children is controversial currently. This study's aim was to compare two surgical techniques which is used in the pilonidal sinuses treatment in terms of complications and recurrence.

Methods: This study included 122 pediatric patients with sacrococcygeal pilonidal sinus who are operated by primary repair method (PRM), or Limberg flap method (LFM) on between January 2010 and January 2019. The surgical methods were analyzed and compared in terms of demographic datas, body-mass index, postoperative infection, postoperative bleeding, recurrence, treatment of recurrence, and time between operations.

Results: Sixty two patients (50.8%) were treated with the PRM, and 60 patients (49.2%) were treated with the LFM. In the postoperative period of the PRM, 12 patients had wound infection, seven patients had bleeding and granulation, and eight patients had recurrence. In the LFM group, six patients had wound infection, three patients had bleeding and granulation, and two patients had recurrence. Postoperative complications were less in LFM group. (p = 0.026).

Conclusion: Based on this study, we recommend the LFM because it has fewer complications and lower recurrence rates.

Keywords: pilonidal sinus, children, surgery, Limberg flap method, Primary repair method

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ÖZET

Amaç: Pilonidal sinüs tedavisinde temel amaç, rekürrensiz olarak sinüs kanalını çıkarmak, morbiditeyi ve hastanede yatış süresini düşürmek ve düşük maliyetli olmasıdır. Literatürde bildirilen çok sayıda makale olmasına rağmen, günümüzde pilonidal sinüs hastalığının çocuklarda tedavisi tartışmalıdır. Bu çalışmanın amacı, pilonidal sinüs tedavisinde kullanılan iki cerrahi tekniği komplikasyon ve nüks açısından karşılaştırmaktır.

Yöntem: Bu çalışmaya Ocak 2010-Ocak 2019 tarihleri arasında primer onarım yöntemi (PRM) veya Limberg flep yöntemi (LFM) ile opere edilen sakrokoksigeal pilonidal sinüslü 122 çocuk hasta dahil edildi. Cerrahi yöntemler demografik veriler, vücut kitle indeksi, postoperatif enfeksiyon, postoperatif kanama, rekürrens, rekürrens tedavisi ve operasyonlar arasındaki süre açısından analiz edilerek karşılaştırıldı.

Bulgular: Altmış iki hasta (%50.8) PRM ile tedavi edildi ve 60 hasta (%49.2) LFM ile tedavi edildi. PRM in postoperatif döneminde 12 hastada yara enfeksiyonu, yedi hastada kanama ve granülasyon, sekiz hastada nüks gelişti. LFM grubunda ise altı hastada yara enfeksiyonu, üç hastada kanama ve granülasyon ve iki hastada nüks vardı. Postoperatif komplikasyonlar, LFM grubunda daha az idi. (p = 0.026).

Sonuç: Bu çalışmaya dayanarak, daha az komplikasyona ve daha düşük nüks oranlarına sahip olduğu için LFM'yi öneriyoruz.

Anahtar Sözcükler: Pilonidal sinüs, Çocuklar, Cerrahi, Limberg flep yöntemi, Primer onarım yöntemi

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INTRODUCTION

Pilonidal sinus disease (PSD) is a sinus and abscess-shaped disease in the sacrococcygeal region with midline openings containing hair and debris. The incidence of pilonidal sinus has been reported to be 1.2–2.63 / 10.000 in children, and it is especially common in adolescence (1, 2). PSD is most often seen between the ages of 14 and 25, so pediatric surgeons play a major role in treatment (3).

There is no consensus on the treatment of pilonidal sinuses, but many conservative and surgical procedures have been described. The surgeon's preferences and training are important in the choice of treatment (4). Eliminating the sinus canal, preventing recurrence, limiting morbidity and hospitalization, and providing cost effectiveness are aimed in the pilonidal sinus treatment. The study's aim is to compare the **Limberg flap method (LFM)** and primary repair method (PRM) which used in the pilonidal sinuses surgical treatment in our clinic.

MATERIALS and METHODS

Ethical approval was received from the ethics committee of Ankara Pediatrics Hematology Oncology Training and Research Hospital, dated 27.06.2019 (decision numbered 2019-207). The informed consent was obtained from each patient's parents.

122 pediatric patients who were operated for sacrococcygeal pilonidal sinuses between January 2010 and January 2019 on our clinic, were included the study and were followed for 32.5 months. The surgeries were performed by pediatric surgeons with the primary repair method (PRM) and the rhomboid excision or Limberg flap method (LFM). We treated the pilonidal sinus by PRM from January 2010 to January 2015 in our clinic. By the changing the surgeons' choice, we treated the pilonidal sinus by LFM from January 2015 to January 2019. All patients treated with LFM had more than two sinus holes. The two surgical methods were retrospectively analyzed and compared in terms of demographic data, body mass index (BMI), postoperative infection, postoperative bleeding, recurrence, post-recurrence treatment, and time between the two surgeries by analyzing the records of the patients.

Oral antibiotic treatment was given to patients who applied to the outpatient clinic with sacrococcygeal PSD and inflammation or cellulitis around the sinus. If an abscess was detected on examination, abscess drainage was performed. These patients were called for follow-up examinations 10 days later, and surgery was planned for the cases whose infection findings ameliorated. The surgical area was shaved just before the operation. All operations were performed under spinal anesthesia and sedation in the "prone jackknife" position. Lateral traction was applied to the surgical area of the sacrococcygeal region using adhesive tape, and then 10% povidone-iodine was used to clean the surgical area. A sterile pen was used to determine the location of the surgical incision in cases undergoing LFM. For determining the width of the sinus tract, sinus openings were injected with methylene blue.

Surgical Methods*Excision and Primary Repair Method (PRM)*

In this method, an elliptical incision is made approximately 1 cm from the sinus with the midline sinus mouth. Then, the sinus is totally excised to the presacral fascia by electrocautery. The fascia and surrounding tissues are approximated with 2-0 vicryl sutures. Subcutaneous 3-0 and 4-0 vicryl sutures are used one by one, and the skin is closed by 3-0 prolene sutures primarily (Figure 1).

Rhomboid Excision and Limberg Flap Method (LFM)

Total excision is made up to the presacral fascia of the rhombus-shaped tissue, which is large enough to include the sacrococcygeal sinus mouth or mouths, with its lower and upper corners approximately 60 degrees and the lateral corners approximately 120 degrees (Figure 2).

In LFM technique, all layers of the gluteal muscle prepared to cover the defect. After controlling for bleeding, the base of the flap is sutured to the presacral fascia to avoid dead space, and a Hemovac drain is inserted into the presacral fascia. The deep layers are closed with 2-0 vicryl, subcutaneous layer is closed with 4-0 vicryl, and skin are closed with 3-0 polypropylene. Oral feeding was started three hours after the operation. When the contents from the drain decreased below 10 cc, the drain was taken. If the drain's content persisted, patients were sent home with the drain. The drain was removed at the two days later control examination. Patients are recommended not to sit on their incisions

for two weeks and to use a ring pillow. Sutures are taken after two weeks, and they are advised to avoid heavy sports for three months.

Statistical analysis

Statistical analysis was done by using the Statistical Product and Service Solutions (SPSS) Windows version 24.0 program (IBM). For investigating whether the distribution of continuous variables was compatible with normal, the Shapiro Wilk test was used. Descriptive statistics are mean \pm standard deviation (minimum - maximum) for age; median (minimum - maximum) times of recurrence, start-up, hospitalization and dressing; nominal variables were the case numbers and percentages.

The mean age significance of the difference between the groups in terms of mean age was evaluated by One Way Analysis of Variance (One-Way ANOVA). If a significant difference was found as a result of the Kruskal Wallis test statistics, the groups that caused a significant difference were determined using the non-parametric multiple comparison test. Nominal variables were evaluated by Pearson's Chi-Square or Fisher's Exact-Result Chi-Square test. The results were regarded statistically significant for $P < 0.05$.

RESULTS

In the study, 62 (50.8%) of 122 patients were treated with PRM and 60 (49.2%) of 122 patients were treated with the LFM. The demographic data of the patients according to the applied surgical method are described in the table 1. There was no statistical difference between groups in terms of age, gender, body mass index (BMI) and the length of hospitalization day. In LFM group, the drain was removed in average $3,5 \pm 1,4$ (2-7) days.

The patients were evaluated statistically in terms of postop complications in the follow-up according to the applied surgical method. Data are shown in table 2. The postop complication rate was statistically lower in the LFM group. ($P = 0,005$).

The patients were evaluated statistically in terms of postop complications according to their gender. Data are shown in table 2. There was no difference between post-op complications and gender significantly.

Patients were evaluated for recurrence according to BMI. Whereas the mean BMI was $31,25 \pm 10,7$ (21-40,62) in the patients with recurrence, it was $25,43 \pm 5,5$ (20,8-31) in the non-recurrent patients. The mean of BMI was significant higher in patients with recurrence regardless of technique statistically ($P = 0.03$).

Recurrence was seen in the first year of postoperative follow-up in all patients. The mean of follow-up month in the postoperative period was $32,5 \pm 12,7$ (10-60) month. The applied second surgery to patients with recurrence is shown in the flow chart (Figure 3). The mean time between the surgeries was 8.48 months (2-26 months).

Table 1: The demographics datas of groups

	Excision and Primary Repair Method (n=62)	Rhomboid Excision and Limberg Flap Method (n=60)	Total (n=112)	p
Boy/Girl	38/24	35/25	73/49	0,47
The mean age (year)	14.8± 6,8 (2-18)	15.9± 3,6 (12-18)	15,4 ± 4,8 (2-18)	0,75
The mean BMI	25.9 ± 6,8 (18-32,2)	28.1±11,4(19,3-40,6)	26,9±9,6(18-40.62)	0,58
The length of hospitalization day	1,72 ± 0,7(1-2)	2,06±1,2 (1-4)	1.89±1,7 (1-4)	0,12

Table 2: Comparison of the post op complications with the surgical methods and genders.

	Excision and Primary Repair Method (n=62)	Rhomboid Excision and Limberg Flap Method (n=60)	p
Post-op complications	27	11	0,005
<i>Wound infection</i>	12 (%19,35)	6 (%10)	0,047
<i>Bleeding and granulation</i>	7 (%11,2)	3 (%5)	0,048
<i>Recurrence</i>	8 (%12,9)	2 (%3,33)	0,026
	Boy (n=73)	Girl (n=49)	
<i>Wound infection</i>	11 (%15,06)	7 (%14,28)	0,88
<i>Bleeding and granulation</i>	6 (%8,2)	4 (%8,1)	0,92
<i>Recurrence</i>	6 (%8,2)	4(%8,1)	0,92

DISCUSSION

Pilonidal sinus disease is seen more in young adults, it is seen considerably in childhood, especially in adolescents and have serious impacts on quality of life in teenagers. In our study, accordance to the literature, the majority of our patients were adolescence by the mean age of 15.4 years. One 2 years old boy baby was treated for infected pites in sacrococcygeal area. In the literature, girl: boy ratio of teenagers is 1:1-0,8 (5,6). In our study, the girl: boy ratio was 1:0,7. Although studies reported that the recurrence rate was higher in girls, no statistical difference was found between gender and post-op complications in our study (7).

In treatment of PDS in children, various surgical methods have been described. The appropriate treatment should be more easy and quick to apply, also should have lower complication and recurrence rate. In our study, we compared the PRM and the LFM which were used in our study retrospectively. There are few comparative studies in the literature regarding the treatment of pilonidal sinus in the pediatric age group. PRM have been used for several decades in the treatment of PDS. In the literature, 22,4-87.5% complication rates and 4,5-37.5% recurrence rates were reported for PRM(6,8). In our study, complication rate was 30.6% and recurrence rate was 12, 9% for PRM as similar as literature.

LFM is described by Azab et al., and have been used widely in the last 20 years (9,10). The rhomboid excision and Limberg flap have the advantages of aggressively excising common and severe disease, Makes it easy to with the tension-free rotary vane facilitating close defects with a tension-free rotational flap, flattening the natal cleft with bulky, well-vascularized tissue, and 0-7% less recurrence rates (8,11). In LFM, complication rate was 15 % and recurrence rate was 3,33 %. Post-op complications and recurrence rates were lower in LFM group significant statistically. (P = 0.005, 0.026)

In the literature, wound infections were reported with %3-40 rate (12-14). In the study, wound infection rate was 19.35% in PRM group, was 10% in LFM group. Wound infections resolved with drainage and medical treatment.

The majority of recurrences in pilonidal sinus disease develop within one year after surgery (15, 16). In our study, the mean follow-up period was 38 months (10-60 months) in the PRM group, and the recurrence rate was found to be 12.9%. In the LFM, the average follow-up period was 26 months (12-36 months) and the recurrence rate was 3.33%. Also, recurrence was seen in the first year of postoperative follow-up in all patients of study.

Although obesity have been reported as risk factors in the formation of pilonidal sinus (17), there is no consensus in the literature on whether BMI is a risk factor in terms of complications. It has been reported in studies that post-operative complications increase with the high BMI. (18, 19). They emphasized that local skin care after surgery in the obese children is hard. However, in contrary studies have reported no relationship between obesity and postoperative complications (1, 20). In our study, the mean of BMI was significant higher in patients with recurrence statistically (P = 0.03). The negative effect of obesity on pilonidal sinus recurrence is showed in our study.

CONCLUSION

In comparison of the LFM with the PRM, the complication rate and recurrence rate is less in the LFM. We recommend the LFM, which is an easy-to-learn and safe method in pilonidal sinus surgery in children.

Conflict of interest

No conflict of interest was declared by the authors.

REFERENCES

1. Afşarlar ÇE, Yılmaz E, Karaman A, Karaman İ, Özgüner İF, Erdoğan D. et al. Treatment of adolescent pilonidal disease with a new modification to the Limberg flap: symmetrically rotated rhomboid excision and lateralization of the Limberg flap technique. *Journal of Pediatric Surgery*, 2013; 48: 1744-1749.
2. Ozcan R, Hüseyinov M, Bakır AC, Emre S, Tütüncü C, Celayir S et al. Which treatment modality for pediatric pilonidal sinus: Primary repair or secondary healing? *Asian journal of surgery*, 2018; 41: 506-510.
3. Grabowski J, Oyetunji TA, Goldin AB, Baird R, Gosain A, Lal DR et al. The management of pilonidal disease: A systematic review. *Journal of pediatric surgery*, 2019; 54: 2210-2221.
4. Cevik M, Dorterler ME, Abbasoglu L. Is conservative treatment an effective option for pilonidal sinus disease in children? *International wound journal*, 2018; 15: 840-844.
5. Nasr A, Ein SH. A pediatric surgeon's 35-year experience with pilonidal disease in a Canadian children's hospital. *Can J Surg*, 2011; 54:39-42.
6. Yıldız T, İlce Z, Küçük A. Modified Limberg flap technique in the treatment of pilonidal sinus disease in teenagers. *Journal of pediatric surgery*, 2014; 49:1610-1613.
7. Luedi MM, Schober P, Stauffer VK, Diekmann M, Doll D. Global Gender Differences in Pilonidal Sinus Disease: A Random-Effects Meta-Analysis. *World J Surg* 2020; 44:3702–3709. <https://doi.org/10.1007/s00268-020-05702-z>
8. McCallum IJ, King PM, Bruce J. Healing by primary closure versus open healing after surgery for pilonidal sinus: systematic review and meta-analysis. *BMJ*, 2008; 336:868-71.
9. Kaya B, Eris C, Atalay S, Bat O, Bulut NE, Mantoglu B. Et al. Modified Limberg transposition flap in the treatment of pilonidal sinus disease. *Tech Coloproctol*, 2012;16: 55–9
10. Rabie ME, Al Refeidi AA, Al Haizae A, Hilal S, Al Ajmi H, Al Amri AA. Sacrococcygeal pilonidal disease: sinotomy versus excisional surgery, a retrospective study. *Aust N Z J Surg*, 2007; 77:177–80.
11. Ersoy OF, Karaca S, Kayaoglu HA, Ozkan N, Celik A, Ozum T. Comparison of different surgical options in the treatment of pilonidal disease: retrospective analysis of 175 patients. *Kaohsiung J Med Sci*, 2007; 23:67-70.
12. Hølmekak T, Nesbakken A. Surgery for pilonidal disease. *Scandinavian journal of surgery*, 2005; 94: 43-46.
13. Muzi MG, Milioto G, Cadeddu F, Nigro C, Andreoli F, Amabile D et al. Randomized comparison of Limberg flap versus modified primary closure for the treatment of pilonidal disease. *Am J Surg*. 2010; 200:9-14.
14. Al-Khayat H, Al-Khayat H, Sadeq A, Groof A, Haider HH, Hayati H. et al. Risk factors for wound complication in pilonidal sinus procedures. *Journal of the American College of Surgeons*, 2007; 205:439-444