



Outcomes of Crystallized Phenol Treatment in Sacrococcygeal Pilonidal Sinus Disease and Factors Affecting Recurrence: A Retrospective Study

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ABSTRACT

Aim: This study aimed to evaluate outcomes of crystallized phenol application (CPA) in sacrococcygeal pilonidal sinus disease (PSD) and factors affecting its recurrence.

Method: A total of 125 patients who underwent PSD surgery between February 2021 and March 2023 were analyzed retrospectively. Data including age, sex, body mass index (BMI), grade of hirsutism, daily sitting duration, primary or recurrent PSD, previous abscess drainage, number of sinus pits, operation duration, local anesthetic dose, postoperative complications, number of shaves per month, and recurrence were recorded. A total of 77 patients who were treated with CPA were included.

Results: The patients comprised 68 men and nine women, with a mean age of 22.6±3.1 (range: 14-43) years. The mean operation duration was 13.7±2.6 min, and the mean dose of local anesthetic was 11.6±1.9 mL. Hematoma developed in only one patient after surgery. The median follow-up was 12 (range: 2-21) months. The total success rate of CPA was 75.4% and 96.1% at the first and second sessions, respectively. The recurrence rate was 3.89% at 1 year and was significantly higher in patients who were overweight and obese, had a higher grade of hirsutism (>grade 2), a higher number of sinus pits (>3), and shaved fewer times per month (<2 times/month) (p<0.001). Multivariate logistic regression analysis revealed that BMI, grade of hirsutism, and the number of shaves were significant factors for recurrence (p<0.001).

Conclusion: CPA is a simple, inexpensive, and safe non-invasive method with acceptable recurrence rates. Weight, hair, and hygiene are the significant factors affecting the recurrence.

Keywords: Crystallized phenol application, sacrococcygeal pilonidal sinus disease, pilonidal abscess, pilonidal sinus excision

Introduction

Pilonidal sinus disease (PSD) is an acquired disease originating from distended hair follicles and is commonly seen in the young population, affecting 26 individuals per 100,000.^{1,2} It is more common in men and mostly involves the sacrococcygeal region.^{3,4} It is usually seen in individuals with a high hair ratio, poor hygiene, and who spend long periods in a sitting position.⁵ In a study including 6,000 patients, Karydakis⁶ reported that hair falling from the body induced a foreign body reaction in the follicles and inflammation.

In clinical practice, PSD is characterized by one or more pits with hairs inside the sacrococcygeal region. Swelling, discharge, and pain while sitting are common symptoms, which adversely affect the quality of life of patients. The treatment is challenging due to the recurrent nature of the disease. Although many treatment modalities have been proposed, there is currently no consensus.⁷ Surgical excision is the standard treatment in PSD; however, less invasive methods are used to prevent postoperative pain, infection, wound problems, and delay of the return to daily routine.



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Crystallized phenol application (CPA) -the phenol melts at body temperature- is a minimally invasive method discussed in the literature, and favorable outcomes have been reported.⁸ The main advantages of this method compared with others are the expedition of a return to daily routine with day surgery, shorter operation duration, minimal discomfort, fewer complications, early recovery, similar recurrence rates, and better cosmetic results.⁹ Several studies have examined the effectiveness of CPA in PSD and reported a success rate of 86% in the literature.¹⁰⁻¹²

In the present study, we aimed to evaluate the outcomes of CPA in sacrococcygeal PSD and the factors affecting recurrence.

Materials and Methods

This multi-center, retrospective study was conducted at the general surgery outpatient clinics of three healthcare centers between February 2021 and March 2023. Written informed consent was obtained from the patients. The study was carried out after Erzurum Faculty of Medicine Institutional Review Board approval (approval number: BAEK 2023/01-10) and conducted following the principles of the Declaration of Helsinki. Patients who underwent PSD surgery were reviewed. All surgery was performed by two surgeons, both of whom graduated from their surgical residency training in the same clinic and worked together in the same clinic for 5 years after graduation. Data including age, sex, body mass index (BMI), grade of hirsutism, daily sitting duration, primary or recurrent PSD, previous abscess drainage, number of sinus pits, operation duration, local anesthetic dose, postoperative complications, number of shaves per month, and recurrence were recorded.

The modified Ferriman-Gallwey score was used for the clinical evaluation of hirsutism.¹³ The daily sitting duration was divided into three groups: <3 h/day, 3-6 h/day, and >6 h/day. Patients who had abscesses during the examination were given oral antibiotics (875 mg of amoxicillin and 125 mg of clavulanic acid) after drainage and were operated on 10 days later. The patients who were treated with CPA were discharged on the same day with recommendations to return to their daily routine. During follow-up, hair removal with depilatory creams or shaving from waist to hip once a month for 3 years was instructed. All patients were scheduled for follow-up at week 4. A second dose of CPA was administered to the patients in whom the PSD was not closed after 4 weeks and still had discharge. On postoperative day 50, a third dose of CPA was administered to the sinuses that were not closed. The CPA to the pilonidal sinus is shown in Figure 1.

Recovery was defined as the complete closure of the sinuses and the absence of discharge and pain. Sinuses that did not close after the third dose of CPA were excised. Recurrence was

defined as the reoccurrence of sinuses with discharge and pain after a complete recovery. All patients were questioned about postoperative recurrence during follow-up in the outpatient setting or by phone.

A total of 125 patients who underwent PSD surgery in our center during the study period were analyzed retrospectively. Patients who underwent total sinus excision (n=34) were excluded. Patients who could not be reached by phone during follow-up or who were lost to follow-up (n=14) were also excluded. Finally, a total of 77 patients who met the inclusion criteria were enrolled. The study flowchart is shown in Figure 2.

Crystalline Phenol Application

One day before the operation, all patients were asked to shave their hair from waist to hip. All applications were performed in a completely sterile fashion in the outpatient setting. The patients were placed in a prone position on the table, and local anesthesia was performed with 2% lidocaine around the sinus after povidone-iodine application. With the aid of a thin mosquito clamp, the hairs in the sinus were removed and the sinus pouch was curetted with a biopsy curette. Nitrofurantoin pomade (Furacin, Eczacıbaşı Pharmaceuticals, İstanbul, Turkey) was applied around the sinus to prevent chemical irritation. Crystallized phenol (Botapharma Laboratories, Ankara, Turkey) was then applied in the pouch. After hemostasis was achieved, the procedure was terminated by dressing. The patients were discharged on the same day.

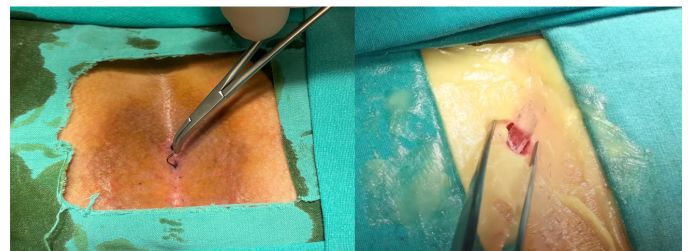


Figure 1. Crystallized phenol application to pilonidal sinus

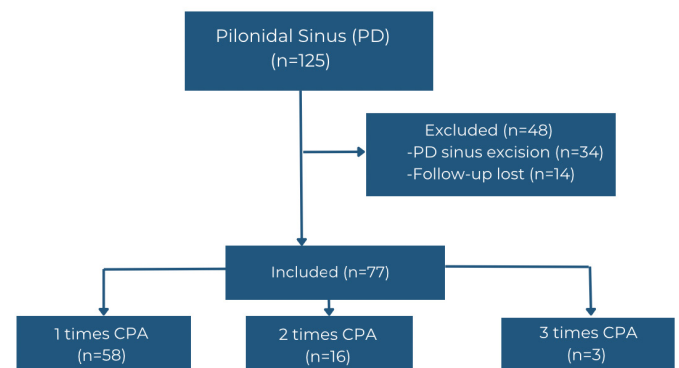


Figure 2. Study flowchart
CPA: Crystalline phenol application

Statistical Analysis

Statistical analysis was performed using SPSS software for Windows version 28.0 (IBM Corp., Armonk, NY, USA). Descriptive data were expressed as mean \pm standard deviation or median (min-max) for continuous variables and in number and frequency for categorical variables. The distribution of variables was analyzed using the Kolmogorov-Smirnov test. Univariate regression analysis of the independent variables and their influence on the dependent variable (recurrence) was used. The chi-squared test was used for the comparison of two categorical variables, and multivariate logistic regression analysis was performed to identify predictors of recurrence. A p-value of <0.050 was considered statistically significant.

Results

A total of 68 (88.3%) of the patients were men and 9 (11.7%) were women, with a mean age of 22.6 ± 3.1 years. The majority of patients had obesity and a high grade of hirsutism. The mean operation duration was 13.7 ± 2.6 min, and the mean dose of local anesthetic was 11.6 ± 1.9 mL. Hematoma developed in only one patient after CPA. The median follow-up was 12 months (range: 2-21). The demographic and clinical characteristics of the patients are shown in Table 1.

Univariate regression analysis was performed to identify factors affecting demographic characteristics, postoperative outcomes, and recurrence. A second dose of CPA was administered to 16 patients in whom PSD was not closed after 4 weeks and who still experienced discharge. Three patients needed additional CPA after the two sessions of CPA because their sinuses were not closed. The total success rate of CPA was 75.4% and 96.1% at the first and second sessions, respectively. Relapse occurred in two patients in the eighth month and one patient in the ninth month after CPA. All these patients underwent total sinus excision later due to recurrence. The recurrence rate was 3.89% at 12 months.

Sex was not found to be a significant factor for recurrence ($p=0.054$). However, the recurrence rate was significantly higher in patients who were overweight and obese, with a higher grade of hirsutism, a higher number of sinus pits, and a lower number of shaves per month ($p<0.001$). Daily sitting duration, recurrent PSD, and abscess were not found to be significant factors for recurrence ($p=0.122$, $p=0.254$, and $p=0.067$, respectively) (Table 2).

The multivariate logistic regression analysis revealed that BMI, grade of hirsutism, and number of shaves per month were significant factors for recurrence ($p<0.001$). The number of pits was not found to be a significant factor ($p<0.093$) (Table 3).

Discussion

PSD is a chronic and difficult-to-treat disease that is most commonly seen in young men.¹⁴ In the present study, we

Table 1. Demographic and clinical characteristics of patients

Variable	Patients, n, %
Age, mean (years)	22.6 \pm 3.1
Sex	
Male	68 (88.3)
Female	9 (11.6)
BMI	
Underweight (<18.5 kg/m ²)	0
Normal weight (18.5-24.9 kg/m ²)	29 (37.6)
Overweight (25-29.9 kg/m ²)	28 (36.3)
Obese (≥ 30 kg/m ²)	20 (25.9)
Modified Ferriman-Gallwey visual analog scale	
1	21 (27.2)
2	32 (41.5)
3	24 (31.1)
Daily sitting (h)	
<3	19 (24.6)
3-6	35 (45.4)
>6	23 (29.8)
Primary sinus	64 (83.1)
Recurrent sinus	13 (16.8)
Presence of abscess at presentation	
Yes	18 (23.3)
No	59 (76.6)
Number of pit openings	
1	12 (15.5)
2	29 (37.6)
3	25 (32.4)
4	11 (14.2)
Mean procedural duration (min)	13.7 \pm 2.6
Mean dose of local anesthetic used (cc)	11.6 \pm 1.9
Follow-up, month, median	12 (2-21)

Values are given as number and range (in brackets). cc: Cubic centimeter, min: Minutes, BMI: Body mass index

evaluated the outcomes of CPA in sacrococcygeal PSD and factors affecting recurrence. In our study, the majority of the patients were young men.

Although total surgical excision is the standard treatment for PSD, CPA is more commonly preferred as it is inexpensive, requires a short operation duration and hospital stay, involves less postoperative pain, and has low complication and recurrence rates.^{5,10,15} It was first applied in 1964.¹⁶ Phenol is a

Table 2. Univariate regression analysis results

Variable	Non-recurrent (%)	Recurrent (%)	95% CI	p-value
Sex			32.01-47.98	0.054
Male	51 (87.9)	17 (89.4)		
Female	7 (12.06)	2 (10.5)		
BMI			45.95-56.04	<0.001
Normal weight (18.5-24.9 kg/m ²)	24 (41.3)	4 (21.05)		
Overweight (25-29.9 kg/m ²)	22 (37.9)	7 (36.8)		
Obese (≥30 kg/m ²)	12 (20.6)	8 (42.1)		
Hirsutism grade			44.82-59.07	<0.001
1	18 (31.03)	3 (15.7)		
2	20 (34.4)	12 (63.1)		
3	20 (34.4)	4 (21.05)		
Daily sitting duration (h)			31.67-46.32	0.122
<3	16 (27.5)	3 (15.7)		
3-6	26 (44.8)	9 (47.3)		
>6	16 (27.5)	7 (36.8)		
Primary/recurrent sinus			8.20-27.8	0.254
Primary	50 (86.2)	14 (73.6)		
Recurrent	8 (13.7)	5 (26.3)		
Abscess			43.45-56.45	0.067
Yes	7 (12.06)	11 (57.8)		
No	51 (87.9)	8 (42.1)		
Pit number			36.21-51.7	<0.001
1	10 (17.2)	0		
2	27 (46.5)	4 (21.05)		
3	17 (29.3)	8 (42.1)		
4	4 (6.8)	7 (36.8)		
Number of shaves				<0.001
Once a month	40 (68.9)	0		
Every 2 months	11 (18.9)	3 (15.7)		
Every 3 months	6 (10.3)	10 (52.6)		
Never	1 (1.7)	6 (31.5)		

BMI: Body mass index, CI: Confidence interval

chemical with antiseptic, anesthetic, and sclerosing properties and is available in crystalline or liquid form. Crystallized phenol melts at body temperature after application and turns into a liquid.¹⁷ The overall success rate varies between 62% and 95% in the literature, regardless of the PSD characteristics and treatment modalities.¹⁸ The Clinical Practice Guidelines for the Management of PSD recommends CPA, with a 67-100% cure rate and <20% recurrence rate.¹⁸ In a study including 209 patients, Sozuer et al.¹⁹ reported that the overall success

Table 3. Multivariate logistic regression analysis results

Variable	95% CI	p-value
BMI	45.95-62.07	<0.001
Hirsutism grade	41.89-68.10	<0.001
Number of shaves	42.54-59.32	<0.001
Number of pits	36.21-51.7	0.093

BMI: Body mass index, CI: Confidence interval

rate of CPA was 93.1% at 12 months. In the present study, the success rate was consistent with the literature.

Following CPA, hospital stays and return to work have been reported to be shorter than for surgical methods.¹² Topuz et al.¹¹ compared CPA with surgical excision and found that patients who underwent CPA had less pain, and children could return to school earlier with a less negative effect on their social life. In the current study, hematoma developed in only one patient after CPA, and all patients were discharged uneventfully on the same day. During the short-term follow-up, no complication was observed and the daily life of the patients was not affected.

In their study, Dogru et al.²⁰ reported a recurrence rate of 4.84% after CPA. Ulusoy and Nikolovski²¹ also reported a recurrence rate of 20.7%, and Tazeoglu and Dag²² reported a recurrence rate of 8.4%. In our study, the recurrence rate was 3.89% at 1 year, which is lower than previous studies. Due to the relatively short follow-up, the recurrence rate is lower than the previous reports.

Although several factors are implicated in the development of a recurrence, the main factors are poor hygiene and a high ratio of hair.^{23,24} Hair falling from various parts of the body to the sacrococcygeal region may cause PSD development and recurrence.^{25,26} Shaving and particular care for hygiene can prevent recurrence by removing the hairs that fall and accumulate in this area.^{27,28} Hair removal with depilatory creams or lasers are the recommended methods. In the current study, a high ratio of hair and number of shaves were found to be significant factors for recurrence. Additionally, all patients were recommended to shave or apply hair removal treatment monthly for 3 years after surgery.

A high BMI has also been shown to be associated with postoperative complications and recurrence.^{29,30} In our study, obesity was also found to be a significant factor for recurrence. As being overweight is associated with poor hygiene, it should be paid special attention.

Although the recurrence rate varies in the literature, the majority of the studies have short-term follow-ups. Therefore, long-term follow-ups are needed to accurately evaluate the recurrence rates (i.e., 5- or 10-year follow-up).^{17,31,32} In the present study, the median follow-up was 12 months, and the results seem to be acceptable. Further long-term studies may provide more reliable conclusions on this subject. Nevertheless, CPA can be used as the first choice in the treatment of PSD, since there is no postoperative incision scar with more favorable cosmetic results.

Study Limitations

The main limitations of this study include its retrospective design, relatively small sample size, and short follow-up.

Further multi-center, large-scale, long-term prospective studies are warranted to establish more robust conclusions.

Conclusion

Our study results suggest that CPA is a simple, inexpensive, and safe non-invasive method with acceptable recurrence rates. Hair, weight, and hygiene are the significant factors affecting the recurrence. It should be considered as the first choice for every patient with PSD, as it provides more favorable postoperative cosmetic results. A high ratio of hair, increased weight, and poor hygiene are the main factors that affect recurrence.

Ethics

Ethics Committee Approval: This study was approved by the Erzurum Faculty of Medicine Ethics Committee (approval number: BAEK 2023/01-10).

Informed Consent: Written informed consent was obtained from the patients.

Authorship Contributions

Concept: N.O., M.K., Design: N.O., M.K., Data Collection or Processing: N.O., M.K., Analysis or Interpretation: N.O., Literature Search: N.O., Writing: N.O.

Conflict of Interest: No conflict of interest was declared by the authors.

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References

1. Sondana K, Andersen E, Nesvik I, Soreide JA. Patient characteristics and symptoms in chronic pilonidal sinus disease. *Int J Colorectal Dis* 1995;10:39-42.
2. da Silva JH. Pilonidal cyst: cause and treatment. *Dis Colon Rectum* 2000;43:1146-1156.
3. Yildar M, Cavdar F. Comparison of the Limberg flap and bilateral gluteus maximus advancing flap following oblique excision for the treatment of pilonidal sinus disease. *Surg Today* 2014;44:1828-1833.
4. Pappas AF, Christodoulou DK. A new minimally invasive treatment of pilonidal sinus disease with the use of a diode laser: a prospective large series of patients. *Colorectal Dis* 2018;20:O207-O214.
5. Grabowski J, Oyetunji TA, Goldin AB, Baird R, Gosain A, Lal DR, Kawaguchi A, Downard C, Sola JE, Arthur LG, Shelton J, Diefenbach KA, Kelley-Quon LI, Williams RF, Ricca RL, Dasgupta R, St Peter SD, Sømme S, Guner YS, Jancelewicz T. The management of pilonidal disease: A systematic review. *J Pediatr Surg* 2019;54:2210-2221.
6. Karydakis GE. Easy and successful treatment of pilonidal sinus after explanation of its causative process. *Aust N Z J Surg* 1992;62:385-389.
7. Lund J, Tou S, Doleman B, Williams JP. Fibrin glue for pilonidal sinus disease. *Cochrane Database Syst Rev* 2017;1:CD011923.
8. Dag A, Colak T, Turkmenoglu O, Sozutek A, Gundogdu R. Phenol procedure for pilonidal sinus disease and risk factors for treatment failure. *Surgery* 2012;151:113-117.
9. Gecim IE, Goktug UU, Celasin H. Endoscopic Pilonidal Sinus Treatment Combined With Crystallized Phenol Application May Prevent Recurrence. *Dis Colon Rectum* 2017;60:405-407.

10. Ates U, Ergun E, Gollu G, Sozduyar S, Kologlu M, Cakmak M, Dindar H, Yagmurlu A. Pilonidal sinus disease surgery in children: the first study to compare crystallized phenol application to primary excision and closure. *J Pediatr Surg* 2018;53:452-455.
11. Topuz O, Sözen S, Tükenmez M, Topuz S, Vurdem UE. Crystallized phenol treatment of pilonidal disease improves quality of life. *Indian J Surg* 2014;76:81-84.
12. Arslan S, Okur MH, Basuguy E, Aydogdu B, Zeytun H, Cal S, Tegin S, Azizoglu M. Crystallized phenol for treatment of pilonidal sinus disease in children: a comparative clinical study. *Pediatr Surg Int* 2021;37:807-813.
13. Yildiz BO, Bolour S, Woods K, Moore A, Azziz R. Visually scoring hirsutism. *Hum Reprod Update* 2010;16:51-64.
14. Geraci G, Almasio PL, Mongitore M, Patti R, Abbate A, Lo Faso S, Cudia BM, Di Vita G. Recurrent sacrococcygeal pilonidal disease: the efficacy of minimal subcutaneous excision of the sinus and unroofing of pseudocystic cavity. *Ann Ital Chir* 2020;91:437-441.
15. Halleran DR, Onwuka AJ, Lawrence AE, Fischer BC, Deans KJ, Minneci PC. Laser Hair Depilation in the Treatment of Pilonidal Disease: A Systematic Review. *Surg Infect (Larchmt)* 2018;19:566-572.
16. Maurice BA, Greenwood RK. A Conservative Treatment Of Pilonidal Sinus. *Br J Surg* 1964;51:510-512.
17. Emiroğlu M, Karaali C, Esin H, Akpınar G, Aydın C. Treatment of pilonidal disease by phenol application. *Turk J Surg* 2017;33:5-9.
18. Johnson EK, Vogel JD, Cowan ML, Feingold DL, Steele SR; Clinical Practice Guidelines Committee of the American Society of Colon and Rectal Surgeons. The American Society of Colon and Rectal Surgeons' Clinical Practice Guidelines for the Management of Pilonidal Disease. *Dis Colon Rectum* 2019;62:146-157.
19. Sozuer EM, Topal U, Dal F, Akyuz M, Talih T. Application of crystalline phenol in pilonidal sinus disease A single-center and single-surgeon experience. *Ann Ital Chir* 2020;91:520-525.
20. Dogru O, Camci C, Aygen E, Girgin M, Topuz O. Pilonidal sinus treated with crystallized phenol: an eight-year experience. *Dis Colon Rectum* 2004;47:1934-1938.
21. Ulusoy C, Nikolovski A. Factors affecting the success of crystallized phenol treatment in sacrococcygeal pilonidal sinus disease. *Medicine (Baltimore)* 2022;101(50):e31934.
22. Tazeoglu D, Dag A. Effect of treatment of pilonidal sinus with phenol on patients' clinical condition and quality of life. *Ann Ital Chir* 2022;93:385-390.
23. Pronk AA, Eppink L, Smakman N, Furnee EJB. The effect of hair removal after surgery for sacrococcygeal pilonidal sinus disease: a systematic review of the literature. *Tech Coloproctol* 2018;22:7-14.
24. Dupuis A, Christou N, Teterycz D, Balaphas A, Robert-Yap J, Zufferey G, Skala K, Alketbi M, Liot E, Buchs NC, Roche B, Ris F. Sacro-coxygial hygiene, a key factor in the outcome of pilonidal sinus surgical treatment? *BMC Surg* 2021;21:197.
25. Patey D. Pilonidal sinus--or 'jeep disease'. *Nurs Times* 1971;67:534-536.
26. Bascom J. Pilonidal disease: origin from follicles of hairs and results of follicle removal as treatment. *Surgery* 1980;87:567-572.
27. Allegranzi B, Bischoff P, de Jonge S, Kubilay NZ, Zayed B, Gomes SM, Abbas M, Atema JJ, Gans S, van Rijen M, Boermeester MA, Egger M, Kluytmans J, Pittet D, Solomkin JS; WHO Guidelines Development Group. New WHO recommendations on preoperative measures for surgical site infection prevention: an evidence-based global perspective. *Lancet Infect Dis* 2016;16:e276-e287.
28. Kargin S, Doğru O, Turan E. Is Hair Removal Necessary after Crystallized Phenol Treatment in Pilonidal Disease? *Med Princ Pract* 2021;30:455-461.
29. Bayhan Z, Zeren S, Duzgun SA, Ucar BI, Alparslan Yumun HN, Mestan M. Crystallized phenol application and modified Limberg flap procedure in treatment of pilonidal sinus disease: A comparative retrospective study. *Asian J Surg* 2016;39:172-177.
30. Iesalnieks I, Deimel S, Zülke C, Schlitt HJ. Smoking increases the risk of pre- and postoperative complications in patients with pilonidal disease. *J Dtsch Dermatol Ges* 2013;11:1001-1005.
31. Doll D. 5- and 10-year recurrence rate is the new gold standard in pilonidal sinus surgery benchmarking. *Med Princ Pract* 2010;19:216-217.
32. Doll D, Krueger CM, Schrank S, Dettmann H, Petersen S, Duesel W. Timeline of recurrence after primary and secondary pilonidal sinus surgery. *Dis Colon Rectum* 2007;50:1928-1934.