Sinusectomy for primary pilonidal sinus: Less is more

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Background. *Wide excision with secondary wound healing is a frequently performed surgical procedure for pilonidal sinus. This intervention requires general anesthesia and has a wound healing time of up to several months with a long time to return to work. Sinusectomy of the track is an alternative operation. We here describe the long-term outcome of 257 patients operated between 2001 and 2010.*
Methods. *Sinusectomy consisted of a selective minimal invasive excision of the sinus after marking the track with methylene blue. Data were collected retrospectively with questionnaires and telephone survey. The main endpoints of the study were recurrence and time off work.*
Results. *With a median follow-up of 3.6 years, the overall recurrence rate was 7%. The median time to return to work was 7 days. The proportion of sinusectomies performed under local anesthesia increased from 59% to 93%. Consistently, the proportion of patients treated in 1-day surgery setting increased from 53% to 93%. One-day surgery had a clear impact on time to return to work in uni- and multivariate analyses (HR 1.959 {1.224, 3.137}, P = .005).*
Conclusion. *Sinusectomy for pilonidal sinus can be performed with a low recurrence rate. An outpatient setting, including operations under local anesthesia, allows a fast return to normal activity. Sinusectomy should become the first choice for primary non-infected symptomatic pilonidal sinus. (Surgery 2011;150:996-1001.)*

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PILONIDAL SINUS (PS) is a common disease affecting predominantly young adult men of working age.[1,2] It may appear as asymptomatic pits in the natal cleft of the saccrococygeal area; but, more often, patients present either with painful acute abscess or suppurative chronic infection.[1]

The surgical management of pilonidal sinus ranges from excochleation[3] to radical excision with or without reconstructive cutaneous flaps.[1,4] Wide excision with secondary wound healing or with primary closure is probably the most often performed procedure.[5] However, this intervention leaves a large and deep wound disabling patients for several weeks.[6-8] It leads to substantial medical resource consumption and to high cost due to long hospitalization and long time off work. Moreover, efficiency of wide excision combined with secondary wound healing must be challenged, because recurrence rates up to 41% have been

reported.[9] Against this background, an alternative treatment of pilonidal sinus is warranted.

Three years ago, our group introduced a novel minimal invasive technique for pilonidal sinus consisting of circumferential incision of the pilonidal orifices avoiding wide cutaneous margins and a selective subcutaneous extirpation of the sinus without closure of the wound (sinusectomy).[10] At short term, recurrence rate was 5%. Here, we report on the long-term outcome of 257 patients with sinusectomy.

METHODS

Patient population. Three-hundred seventy-seven patients with symptomatic pilonidal sinus were treated between January 2001 and June 2010 in our department. Two-hundred fifty-seven (68%) patients with primary pilonidal sinus had sinusectomy, in 57 patients (15%) Limberg's-flap was performed, and 20 patients (5%) had wide excision, 11 patients (3%) were operated according to Lord and Millar's brush technique, and in 32 patients (9%) only an incision of the abscess was performed. Patients with recurrent or complicated PS (more than 4 orifices or 4 orifices with a distance longer than 8 cm between 2 orifices) were not treated by sinusectomy. The medical records
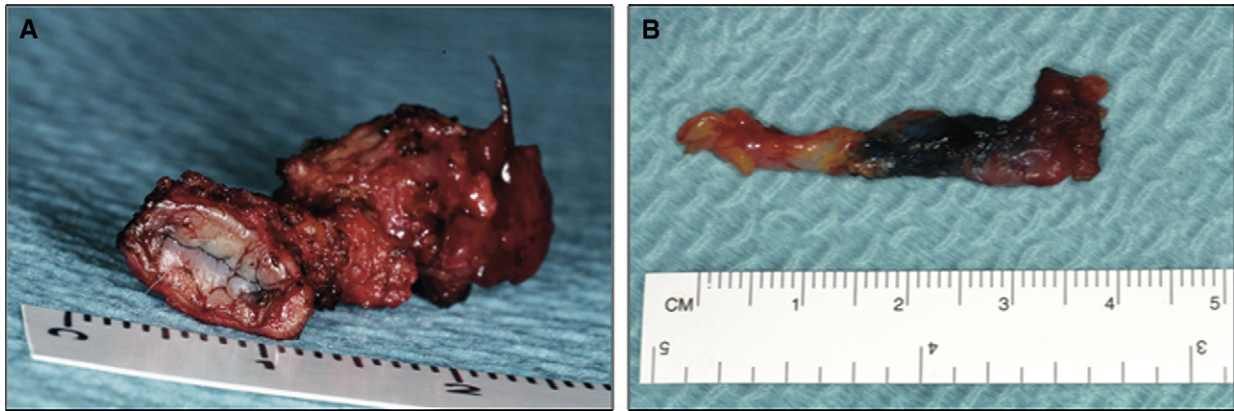
Fig 1. Two specimen examples after sinusectomy (*A* & *B*).

were retrospectively reviewed with reference to operating time, type of anesthesia, and duration of hospitalization. All patients were seen in the outpatient clinic after 1 week and 6 weeks. Time of complete wound healing and time to return to work were assessed. In July 2010, a questionnaire was sent to all patients inquiring long-term recurrence. If patients did not respond to the questionnaire, they were contacted twice by telephone or e-mail. An informed consent was obtained from all patients.

Surgical technique of sinusectomy. Sinusectomy was performed as previously described[10] including a detailed illustration. If acute infection was present, abscess was first drained by small incision under local anesthesia, 3 weeks later sinusectomy was performed.

The patient was placed in prone position and the shaved intergluteal fold was separated by tapes. If surgery was performed under local anesthesia, lidocaine 1% and epinephrine 1:100000 were used. The orifices of the pilonidal sinus were probed, and diluted methylene blue was injected to mark the subcutaneous tract. Next, the orifices and sinus were closely excised with the scalpel or scissor following the methylene-marked track. Two different specimen after sinusectomy are shown in Fig 1. After hemostasis, the wounds were left open to heal. No postoperative antibiotic treatment was given. All patients were instructed to clean the wound in a shower at least twice a day and shave their intergluteal region once a week until complete healing was achieved.

Postoperative complications were graded according to the Clavien-Dindo classification.[11]

Statistical analysis. SPSS 18.0 was used to calculate disease-free probability according Kaplan-Meier estimation. The Mann-Whitney nonparametric test and the Fisher's exact parametric test were used where appropriate to compare values in different groups. Correlation was assessed with the Spearman rho or Pearson correlation. A *P* value less than .05 was considered as significant. Mulitvariate analysis was calculated according the Cox regression model.

RESULTS

Patient demographics. Overall, 257 patients were treated by sinusectomy, 199 men (77%) and 58 women (23%). The median age was 28 years (range, 14–59) with a median body mass index of 25 kg/m^2 (range, 18–40). None of the patients had previous surgery for pilonidal sinus. One-hundred fifty-two patients (59%) presented with chronically infected symptomatic pilonidal sinus. One-hundred five (41%) presented with acute abscess of the pilonidal sinus and underwent a 2-step procedure (as described above).

Surgery under local anesthesia and in an outpatient setting. Between 2001–2005 and 2006–2010 the rate of outpatient surgery (63% vs 87%) and operations performed under local anesthesia (61% vs 88%) increased significantly (Table I) and reached almost 100% during 2008–2010 (Fig 2, *A*). Percentage of 1-day surgery correlated significantly with patients operated under local anesthesia (Fig 2, *B*). The operation time increased from 20 to 30 min between the 2 time periods. The overall median operation time was 25 min (range, 10–90).

Patient outcome. The overall response rate (questionnaire, e-mail contact, and telephone survey) was 72% (*n* = 184). The median follow-up was 3.6 years (range, 0.2–8.8). The median time for complete wound healing (defined as complete closure of the skin) was 5 weeks (range, 1–52). The median time to return to work was 7 days (range, 1–90). The overall complication rate was 5% (12/257). Patients with complications presented

Table I. Patient characteristics and clinical outcome after sinusectomy

| Year of operation	2001–2005	2006–2010	P
Patients, n	120	137	
Median age in years (range)	28 (14–51)	29 (17–59)	**.012**
Male patients % (n)	76 (91)	79 (108)	.65
Median BMI (range)	25 (19–33)	25 (18–40)	.98
Response rate % (n)	72 (86)	72 (98)	1
Median follow-up in years (range)	5.8 (3.9–8.8)	1.6 (0.2–4.2)	**<.0001**
Complication rate % (n)	6 (7)	4 (5)	.56
Median wound healing time in weeks (range)	4 (1–52)	5 (1–24)	.8
Median time off work in days (range)	10 (1–90)	7 (1–90)	.06
Recurrence rate % (n)	9.3 (8)	4.1 (4)	.23
Local anesthesia % (n)	61 (73)	88 (120)	**<.0001**
One-day surgery % (n)	63 (76)	87 (119)	**<.0001**
Operation time in min (range)	20 (10–60)	30 (10–90)	**<.0001**

Bold values indicate $P \leq .05$.
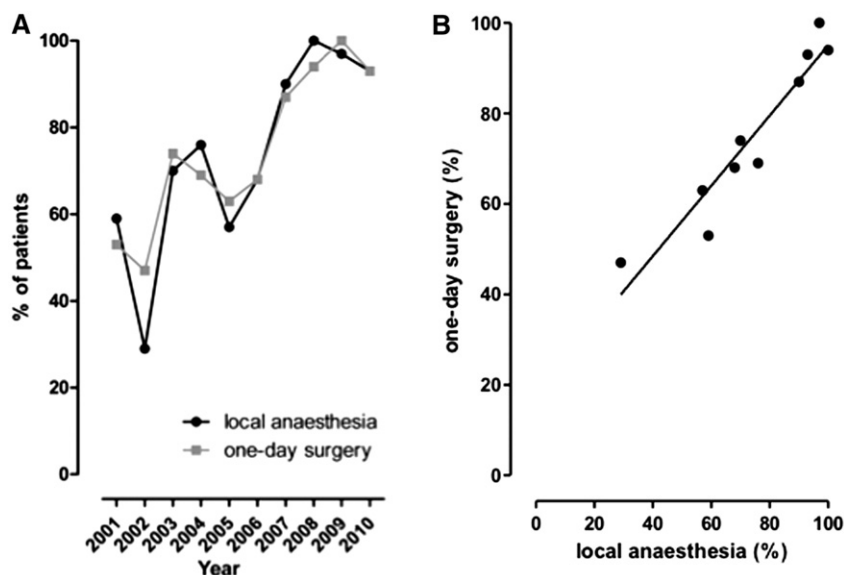
Fig 2. (*A*) Proportion of patients treated in 1-day surgery under local anesthesia between 2001 and 2010. (*B*) Correlation of 1-day surgery and patients operated with local anesthesia (Pearson $r = .9502$, $P < .0001$).

either with postoperative bleeding (5 patients) or infection of the wound (7 patients). All complications were treated conservatively (and were, therefore, grade I or II complications).

Comparing the 2 time periods, the median follow-up was 5.8 years (range, 3.9–8.8) vs 1.6 years (range, 0.2–4.2). Complication rates and wound healing time did not change during these 2 periods. However, a tendency to a shorter time to return to work (10 vs 7 days, $P = .06$) could be found (Table I).

Despite of a longer follow-up with comparable response rates, recurrence rates did not change between 2001–2005 and 2006–2010 (9.3% vs 4.1%, $P = .23$). The Kaplan-Meier estimation revealed

that 75% (9/12) of recurrences occur within the first 2 years and disease-free probability was 98.3% after 1 year and 93.5% after 5 years (Fig 3). The median time to recurrence was 19 months (range, 1–40). The overall recurrence rate was 7% (12/184). Recurrences were treated with radical excision and a reconstructive cutaneous flap (Limberg's flap) in 4 patients or a second limited excision (4 patients). Four other patients were treated surgically after recurrence in another hospital, but the specific procedure is unknown.

Impact of sinusectomy on time to return to work. The management of the patients changed to 1-day surgery as shown in Fig 2. Therefore, we asked whether this management has an impact
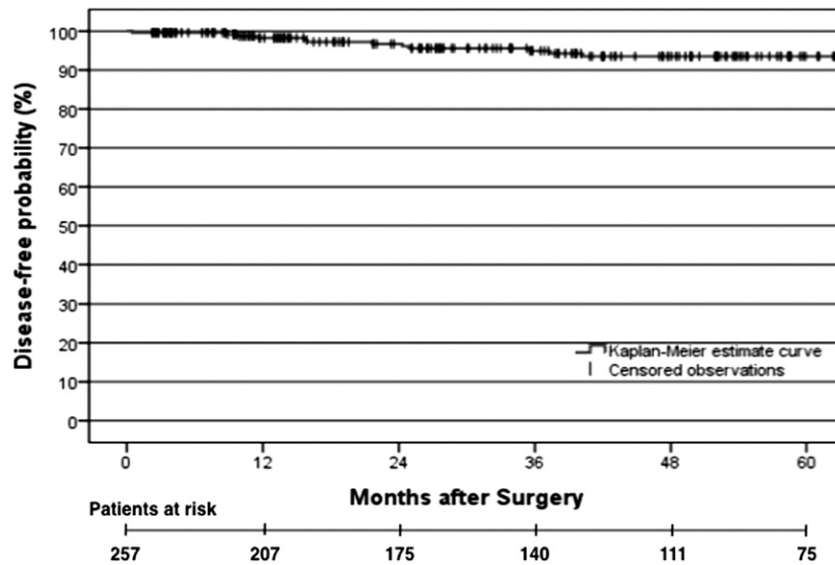
Fig 3. Disease-free probability according to Kaplan-Meier after sinusectomy of pilonidal sinus. Patients at risk are the number of patients that have reached at least the corresponding months of follow-up.

Table II. Crosstabulation of outpatient setting and time to return to work*

	Patients (n)		
	Time off work ≤ 7 days	Time off work > 7 days	P
One-day surgery			
Yes	107	21	**.003**
No	21	15	
Local anesthesia			
Yes	99	22	.057
No	29	14	
Time of operation			
≤20 minutes	62	16	.709
>20 minutes	66	20	
Two-step procedure			
Yes	55	16	1
No	73	20	
BMI			
≤25	68	23	.06
>25	57	13	
Sex			
Male	103	28	.814
Female	25	8	
Years			
2001–2005	52	18	.344
2006–2010	76	18	

*Data about time to return to work were available from 164 patients. Bold values indicate $P \leq .05$.

on time to return to work. Crosstabulation revealed that 1-day surgery was associated with less than 7 days to return to work. Data about time to return to work were available from 164 patients
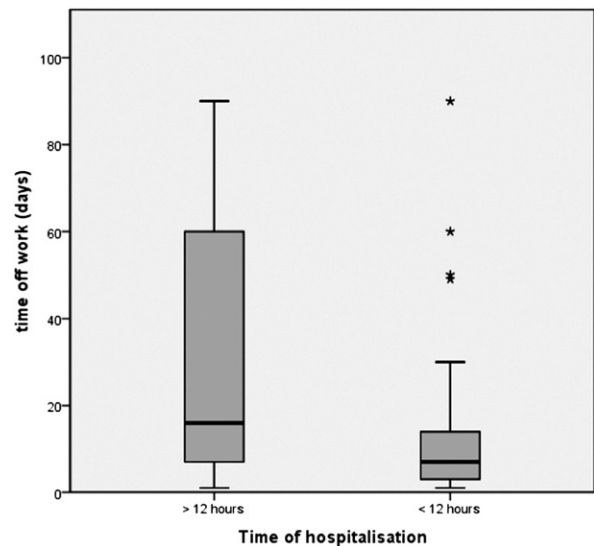

Fig 4. Correlation of time to return to work and time of hospitalization (Spearman rank correlation test: $n = 164$, $r = -0.721$, $P < .0001$; asterisks indicate outliers).

(Table II). A test for correlation confirmed this observation (Fig 4). A multivariate analysis (including time of hospitalization and operation, type of anesthesia, interval of years, 1- or 2-step procedure, BMI, and sex of the patient) revealed that time of hospitalization independently affects time to return to work (Table III).

DISCUSSION

This study shows that sinusectomy for primary pilonidal sinus has excellent long-term results with

Table III. Multivariate analysis for time to return to work within a week after sinusectomy

Variable	Hazard ratio	95% CI	P
One-day surgery	1.959	1.224–3.137	**.005**
Type of anesthesia	1.2	0.737–1.954	.464
Time of operation	0.727	0.486–1.086	.12
Two-step procedure	1.094	0.757–1.582	.632
BMI > 25	0.744	0.51–1.085	.125
Sex	0.843	0.534–1.331	.463
Years	1.124	0.725–1.742	.602

Bold values indicate $P \leq .05$.

7% recurrences at 4 years. Particularly, nearly all patients could be treated by 1-day surgery, which allowed a rapid return to full activity.

The ideal treatment for pilonidal sinus should have a short time to return to work and a low recurrence rate, especially because this disease mainly affects young people. Radical wide excision to the level of sacrococcygeal fascia with secondary wound healing or with primary closure is the standard treatment of care in many centers.[1,2,5,12] However, wound healing times of up to 3 months[8,13] and time to return to work up to 1 month are reported.[6-8] Length of hospital stay varies from 1-day surgery to 3 days[6,14] and complication rates can reach 23%.[6] Recurrence rates are 5% after 1 year,[5] 13% after 3 years,[13] and can increase up to 41% after 6 years.[9] In contrast, sinusectomy avoids large and disabling wounds, allowing patients to return to work within 7 days. The complication rate of 5% is low and during the last 3 years almost 100% of the patients were operated by 1-day surgery. Uni- and multivariate analyses revealed that 1-day surgery had a clear impact on time to return to work. Type of anesthesia was included into the multivariate analysis because it may surrogate for extensive excisions. The 2 time periods (2001–2005 vs 2006–2010) were included to exclude a time dependent bias provoked by increasing practice of sinusectomy itself. The multivariate analysis showed that patients operated in 1-day surgery are twice as often back to work within 1 week as patient operated not in 1-day surgery. This influences economic aspects positively, eg, indirect costs of loss of working hours.

The idea of treating pilonidal sinus less radically is not new and goes back to the Second World War. The high prevalence of pilonidal sinus among U.S. soldiers had led to the nickname "Jeep disease."[15,16] Phillips[17] suggested a less invasive marsupialization of infected PS "to keep the fighting man in a fit condition for combat."[15,17] In 1970, Patey[18] recommended: "Don't take a hammer to

swat a fly!" and discussed a differentiated treatment. Lord and Millar[3,19] introduced an debridement of the pilonidal sinus with a rounded brush. Bascom[20,21] established a narrow excision of pilonidal orifices combined with a laterally placed parallel incision for debridement of the cavity. A second technique established by Bascom[22] is the cleft lift procedure that can be performed in 1-day surgery.[23,24] Recently, a novel technique using skin trephines to excise the pilonidal orifices and sinus tracts has been described in 1358 patients from a military hospital in Israel.[25] Similar to our study, this operation was performed under local anesthesia and in 1-day surgery. Follow-up and recurrence were assessed by telephone interviews. Recurrence rates increased with time from 6.5% at 1 year, to 13.2% at 5 years and 16.2% at 10 years. Comparing the results of the study from Israel with our data we still might slightly underestimate recurrences particularly in the group operated from 2001–2005. However, we could also show that most of our recurrences occurred during the first 2 years with a disease-free probability of more than 90% after 5 years. This is in line with other publications as most recurrences of pilonidal sinus develop within the first 5 years.[25-28] Hence, recurrences of sinusectomy are comparable with the trephination technique and these data demonstrate that less invasive techniques for pilonidal sinus are feasible with good results, probably superior to wide open excision with secondary wound healing.

The response rate of 72% of our survey is high compared to the mean response rate of 54% for mailed surveys.[29] Furthermore, it has been concluded that there is not a direct relationship between response rate and bias. Although telephone or questionnaire surveys are common practice,[5,25] they still have their limitations, as patients with asymptomatic recurrent disease might not be detected. The follow-up of our study may also confound the time of complete wound healing, because it was also assessed by the patients and not solely by a physician. On the other hand, assessment by the patients reflects very well the presence or absence of any discomfort in the intergluteal fold. After 7 days surgical wounds became almost asymptomatic, as most patients returned to work.

Comparing the groups operated between 2001–2005 and 2006–2010, the operation time increased from 20 to 30 minutes. Sinusectomy became a teaching operation for our youngest residents and this may explain the longer operation time.

In conclusion, sinusectomy for pilonidal sinus has a low morbidity rate and low recurrence rate.

Surgery can be performed under local anesthesia and as 1-day surgery. This is essential to allow patients rapidly return to normal activity. For these reasons, wide excision with secondary wound healing has been abandoned as routine treatment in our clinic.

REFERENCES

1. Humphries AE, Duncan JE. Evaluation and management of pilonidal disease. Surg Clin North Am 2010;90:113-24.
2. Sondenaa K, Andersen E, Nesvik I, Soreide JA. Patient characteristics and symptoms in chronic pilonidal sinus disease. Int J Colorectal Dis 1995;10:39-42.
3. Lord PH, Millar DM. Pilonidal sinus: a simple treatment. Br J Surg 1965;52:298-300.
4. Akca T, Colak T, Ustunsoy B, Kanik A, Aydin S. Randomized clinical trial comparing primary closure with the Limberg flap in the treatment of primary sacrococcygeal pilonidal disease. Br J Surg 2005;92:1081-4.
5. 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.
6. al-Hassan HK, Francis IM, Neglén P. Primary closure or secondary granulation after excision of pilonidal sinus? Acta Chir Scand 1990;156:695-9.
7. Füzün M, Bakir H, Soylu M, Tansuǧ T, Kaymak E, Haŕmancioǧlu O. Which technique for treatment of pilonidal sinus–open or closed? Dis Colon Rectum 1994;37: 1148-50.
8. Søndenaa K, Andersen E, Søreide JA. Morbidity and short term results in a randomised trial of open compared with closed treatment of chronic pilonidal sinus. Eur J Surg 1992;158:351-5.
9. Matter I, Kunin J, Schein M, Eldar S. Total excision versus non-resectional methods in the treatment of acute and chronic pilonidal disease. Br J Surg 1995;82:752-3.
10. Soll C, Hahnloser D, Dindo D, Clavien PA, Hetzer F. A novel approach for treatment of sacrococcygeal pilonidal sinus: less is more. Int J Colorectal Dis 2008;23:177-80.
11. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 2004;240:205-13.
12. Chintapatla S, Safarani N, Kumar S, Haboubi N. Sacrococcygeal pilonidal sinus: historical review, pathological insight and surgical options. Tech Coloproctol 2003;7:3-8.
13. Kronborg O, Christensen K, Zimmermann-Nielsen C. Chronic pilonidal disease: a randomized trial with a complete 3-year follow-up. Br J Surg 1985;72:303-4.
14. Testini M, Piccinni G, Miniello S, Di Venere B, Lissidini G, Nicolardi V, et al. Treatment of chronic pilonidal sinus with local anaesthesia: a randomized trial of closed compared with open technique. Colorectal Dis 2001;3: 427-30.
15. Buie LA, Curtiss RK. Pilonidal disease. Surg Clin North Am 1952:1247-59.
16. Casberg MA. Infected pilonidal cysts and sinuses. Bull U S Army Med Dep 1949;9:493-6.
17. Phillips CW. Pilonidal disease in a military hospital. J Natl Med Assoc 1954;46:329-32.
18. Patey DH. The principles of treatment of sacrococcygeal pilonidal sinus. Proc R Soc Med 1970;63:939-40.
19. Millar DM, Lord PH. The treatment of acute postanal pilonidal abscess. Br J Surg 1967;54:598-9.
20. Bascom J. Pilonidal disease: long-term results of follicle removal. Dis Colon Rectum 1983;26:800-7.
21. Bascom J. Pilonidal disease: origin from follicles of hairs and results of follicle removal as treatment. Surgery 1980; 87:567-72.
22. Bascom J, Bascom T. Utility of the cleft lift procedure in refractory pilonidal disease. Am J Surg 2007;193:606-9.
23. Senapati A, Cripps NP, Flashman K, Thompson MR. Cleft closure for the treatment of pilonidal sinus disease. Colorectal Dis 2011;13:333-6.
24. Senapati A, Cripps NP, Thompson MR. Bascom's operation in the day-surgical management of symptomatic pilonidal sinus. Br J Surg 2000;87:1067-70.
25. Gips M, Melki Y, Salem L, Weil R, Sulkes J. Minimal surgery for pilonidal disease using trephines: description of a new technique and long-term outcomes in 1,358 patients. Dis Colon Rectum 2008;51:1656-62.
26. Doll D, Friederichs J, Dettmann H, Boulesteix AL, Duesel W, Petersen S. Time and rate of sinus formation in pilonidal sinus disease. Int J Colorectal Dis 2008;23:359-64.
27. 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: 1928-34.
28. Notaras MJ. A review of three popular methods of treatment of postanal (pilonidal) sinus disease. Br J Surg 1970;57:886-90.
29. Asch DA, Jedrziewski MK, Christakis NA. Response rates to mail surveys published in medical journals. J Clin Epidemiol 1997;50:1129-36.