

# Minimal Surgery for Pilonidal Disease Using Trephines: Description of a New Technique and Long-Term Outcomes in 1,358 Patients

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**PURPOSE:** This study describes and reports the results of a new, minimally-invasive surgical technique for pilonidal disease.

**METHODS:** From March 1993 to January 2003, 1,358 patients (out of a total of 1,435 patients) with symptomatic pilonidal disease underwent treatment in a military surgical clinic dedicated for pilonidal disease. Patients were operated on under local anesthesia, utilizing trephines to excise pilonidal pits and to débride underlying cavities and tracts.

**RESULTS:** One thousand three hundred fifty-eight symptomatic patients participated in the study and were mostly male (84.3 percent) and the mean age  $20.9 \pm 3.6$  years. Rates of postoperative infection, secondary bleeding, and early failure were 1.5, 0.2, and 4.4 percent, respectively. In patients with full postoperative clinical attendance, complete healing was observed within  $3.4 \pm 1.9$  weeks. Phone interview included 1,165 patients (85.8 percent) with a mean follow-up interval of  $6.9 \pm 1.8$  years. Recurrence rates after 1 year was 6.5 percent, 5 years was 13.2 percent, and 10 years was 16.2 percent. Mean time to recurrence was  $2.7 \pm 2.6$  years postoperatively. The disease-free probability estimate was 93.5 percent at one year and 86.5 percent at 5 years.

**CONCLUSIONS:** Compared with frequently used pilonidal operations, the trephine technique is associated with a lower recurrence rate and a low postoperative morbidity rate.

**KEY WORDS:** Pilonidal sinus; Abscess; Lay open; Trephine; Punch; Long-term recurrence rate.

## INTRODUCTION

Presently, many surgeons treat pilonidal disease by wide excision of the pilonidal complex-containing tissue, down to the sacral fascia, leaving a lay open or a primary sutured midline wound. Other surgeons, while still committed to the same wide excisions, use more sophisticated techniques such as various types of skin flaps designed to keep the incision away from the midline or flatten the natal cleft.<sup>1-3</sup> Obviously, such extensive operations often require hospitalization, general or regional anesthesia, and variable use of stitches, drains, and antibiotics. Pilonidal sinus operations are notorious for their associated morbidity, recurrence rate, and poor cosmetic result.<sup>4</sup> Few treatments, however, effectively treat the acquired foreign body pathogenesis of pilonidal disease<sup>5</sup> without resorting to the commonly used wide excisions. In 1965, Lord and Millar<sup>6,7</sup> suggested a minimally-invasive operative approach, consisting of a narrow elliptical excision of pilonidal pits only and debridement and cleaning of the unroofed underlying cavity. Small cylindrical brushes were used to remove hair and clean lateral tracts. In 1980, Bascom<sup>8,9</sup> reported individual excision of midline openings and added a laterally-placed parallel incision to better explore and clean the pilonidal cavity and to facilitate identification of diseased follicles. Bascom also sutured midline operative wounds and excised lateral tracts.

This study describes an ambulatory surgical treatment for pilonidal disease which integrates the principles suggested by both Lord and Millar<sup>6</sup> and Bascom<sup>8</sup> and introduces the use of skin trephines (Fig. 1), for the easy excision of pilonidal pits and debridement of underlying cavities and tracts.

## PATIENTS AND METHODS

### Study Design

From March 1993 to January 2003, a total of 1,435 patients with symptomatic pilonidal disease underwent treatment in a military surgical clinic dedicated for pilonidal disease. This outpatient pilonidal clinic was attended by a senior surgeon (MG).

Reprints are not available.

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Patients suffering from acute or chronic, primary or recurrent disease were offered operative treatment. Patients presenting with pilonidal abscesses were operated on the day of diagnosis. No premedication or antibiotics were given, except for infective endocarditis prophylaxis in one patient. Informed consent was obtained prior to the operation. Clinical, operative, and follow-up data were recorded prospectively. During the study period, 77 patients presented with recurrent or nonhealing large open wounds, mostly after wide excision operations performed elsewhere. These patients were treated by debridement of wound and regular shaving and excluded from the study. No other patients were excluded.

Long-term follow-up and disease recurrence were assessed by telephone interview. Telephone interviews were performed from 1998 through 2006. Patients were considered to have recurrent disease if they required reoperation or reported symptoms of local pain, discharge, or intermittent swelling.

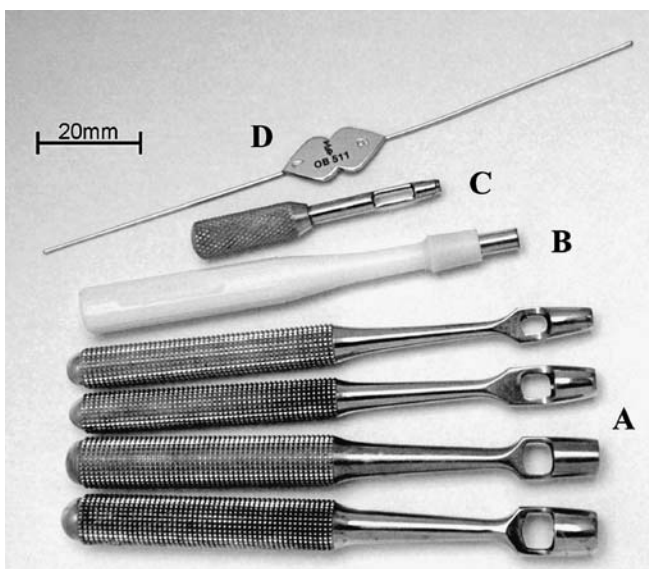
### Surgical Technique

The operation was carried out in the prone position. Local anesthesia was employed using 2 percent lidocaine solution with adrenalin. The natal cleft was explored with a thin 0.5 to 1.0 mm rounded tip probe (Fig. 1) and each visible pit was entered to assess its depth and the direction of underlying tracts. Edema associated with acute infection obscured the pits occasionally, but these could be found by probing the midline skin near the abscess. All openings and tracts were then cored out utilizing Keyes skin trephines, 2.0 to 9.0 mm in diameter. Small pits with short tracts were removed with 2.0 to 3.0 mm trephines. Pits leading to subcutaneous cavities were then excised down to the cavity

with 4.0 to 5.0 mm trephines. Openings of fistulas and drainage openings for acute suppurations were usually excised using 6.0 to 9.0 mm trephines. Groups of 2 or 3 adjacent pits were sometimes removed together, using one 4.0 to 6.0 mm trephine. For each opening, the trephine was first advanced perpendicularly to the skin (Fig. 2). After penetrating the skin, the trephine was aligned in the direction of the tract and excision was continued until the pilonidal cavity was entered, thus removing all epithelized openings and scarred fistulous tracts (Fig. 3). Curved forceps and a bone curette were then introduced through the openings, to thoroughly clean all cavities and tracts from hair, debris, and granulation tissue. Trephines (4.0 mm or wider) were also used as chisels within the cavity, to carve out scar tissue and embedded hair. Cotton applicators dipped in 3 percent hydrogen peroxide solution were used to loosen and expel debris from the pilonidal cavity. Bleeding was minimal throughout the process and no cautery was required. All trephine-made openings were left unpacked and not sutured. Patients were kept supine under an hour-long observation before discharge and were instructed to shower the operated site several times daily, starting 12–24 hours after the operation. The need for continuous occlusive intergluteal dressing was strongly emphasized. Routine everyday activity was otherwise allowed. Postoperatively, patients were followed up in 1 to 2 week intervals until the wounds healed (Fig. 3). On each visit wounds were superficially débrided as necessary and the nearby skin was shaved. If early failure became obvious, an identical complementary operation was performed, with trephine excision of persistent pits and exploration and cleaning of underlying cavity.

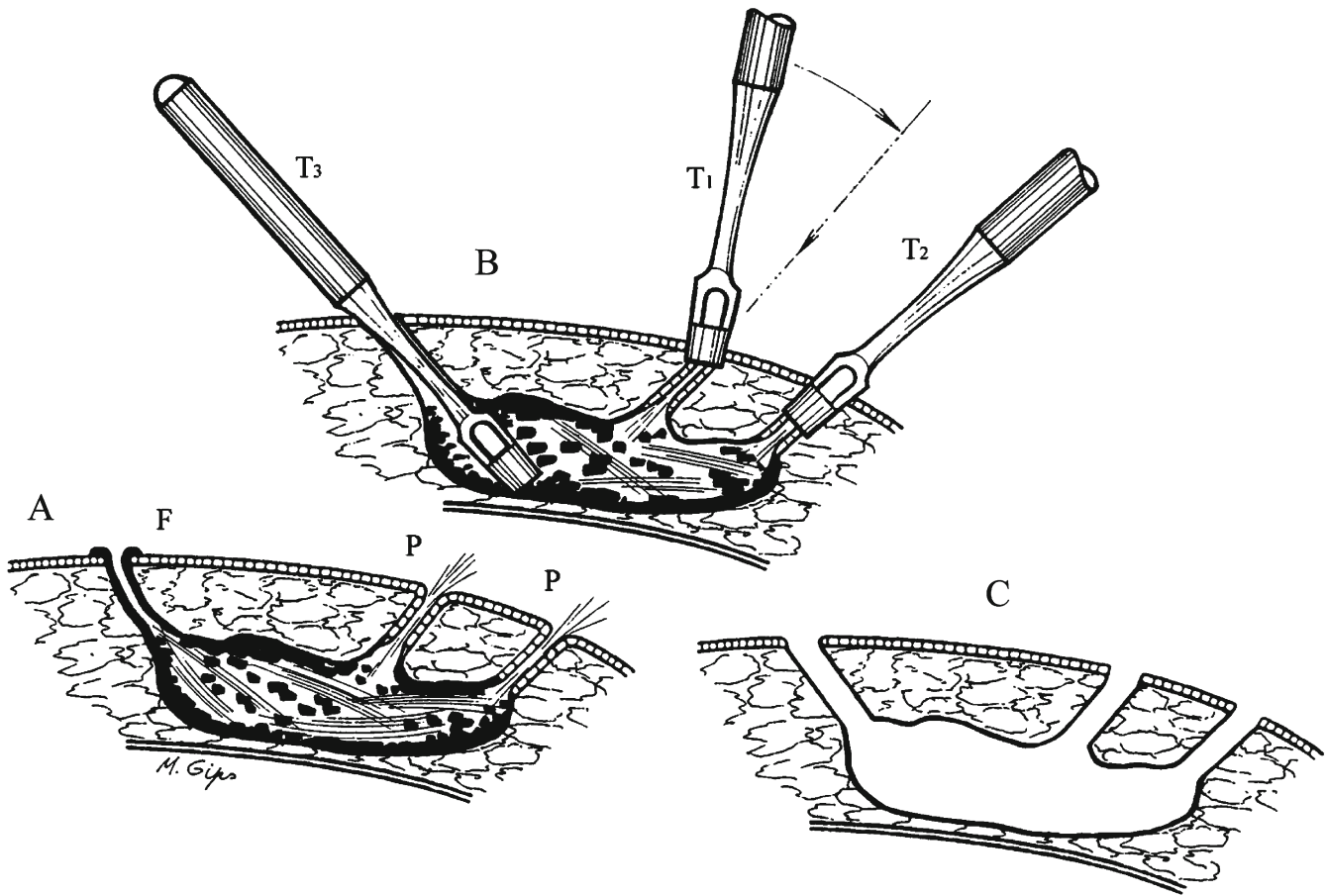
With regard to the type of trephine used, the Keyes type was somewhat uncomfortable when utilizing the 2.0 and 3.0 mm size for the excision of small pits (Fig. 1). Its conical enlarging external contour limited its subdermal penetrating capacity because of the risk of tearing at the skin level. Ophthalmic trephines with straight external contour (Elliot or Searcy type) are preferable for these small pits. Disposable trephines (punches) can also be used for the excision of skin pits. These punches, however, are shelved some 8.0 mm from their cutting edge and are also short and fragile, limiting their use in the excision of deep extending tracts and in the debridement of pilonidal cavities.

**FIGURE 1.** (A) Keyes trephines of various diameters, (B) Disposable punch, (C) Ophthalmic Searcy trephine, (D) Thin lacrimal 0/00 probe.



### Statistical Analysis

Continuous variables were presented as mean and standard deviation (SD). Chi-squared test and Fisher's exact test were used to analyze statistically significant relationships between categorical variables, as appropriate. Kaplan-Meier estimates were used to estimate the disease-free interval. Log-rank test was performed for the comparison of disease-free survival curves. *P* values less or equal to 0.05 were considered statistically significant.



**FIGURE 2.** Schematic sagittal section of a pilonidal complex in the natal cleft. (A) Before treatment, two epithelized pits (P) and a fistula opening (F) lead to a subcutaneous cavity contain hair, debris, and granulation tissue. (B) During surgery, middle trephine (T1) perpendicular to the skin plane excises an opening of a pit, then aligned and is advanced in direction of the tract (T2). Left trephine (T3) débrides the tract of the fistula and pilonidal cavity. (C) After treatment, epithelized pits and tracts are excised and pilonidal cavity cleaned of hair and debris.

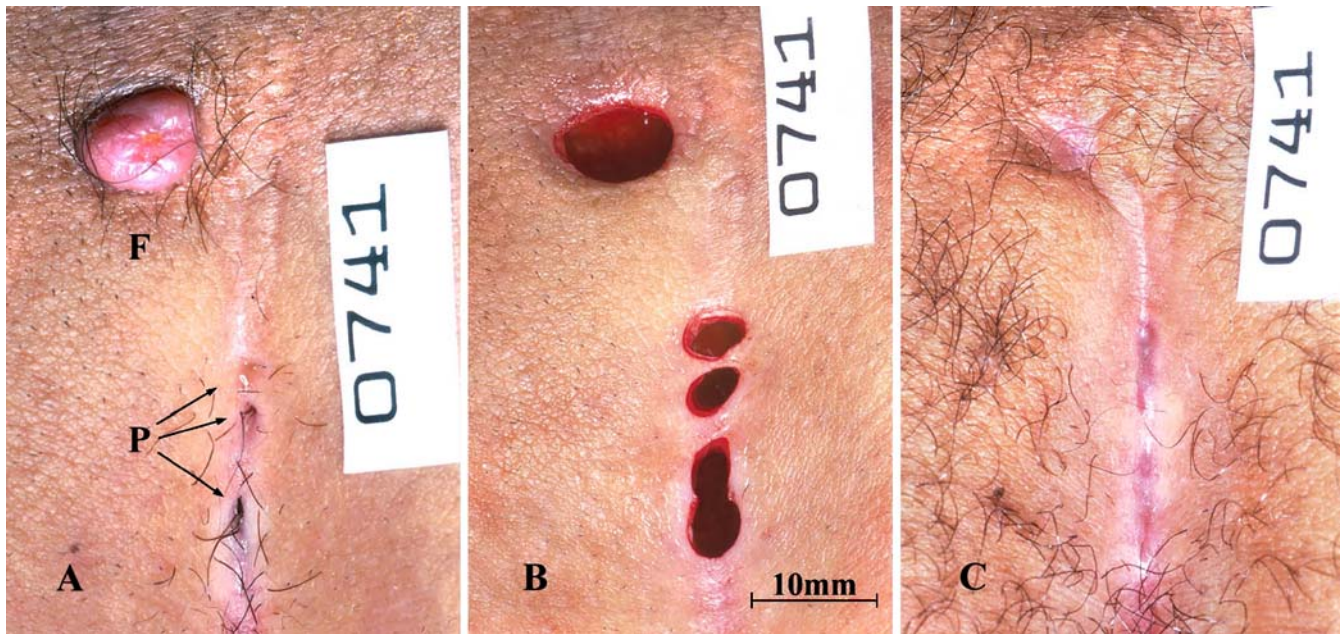
## RESULTS

From March 1993 to January 2003, 1,358 patients with symptomatic pilonidal disease were surgically treated employing the trephine technique. Long-term telephone follow-up interviews were not accomplished with 188 patients (13.8 percent) because of an untraceable address or phone number, the patient was out of the country, or unrelated death.

Patients' characteristics and clinical findings are presented in Table 1. Treatment results are summarized in Table 2 and as a flow diagram in Figure 4. The patient sample was primarily male (84.3 percent) with a mean age of  $20.9 \pm 3.6$  years (range, 18–46). Male patient to female patient ratio was 5.4:1. During surgery, 88.2 percent of the patients were observed to have chronic pilonidal disease, with the rest (11.8 percent) diagnosed with an abscess. The average number of pilonidal pits per patient was  $3.6 \pm 2.3$  (range 0–16). Fistulas complicated the disease in more than

one-third of the patients. Hair was found in the sinuses of most patients (93.3 percent). The size of the largest trephine used was recorded in each operation, mean size being  $4.5 \pm 1.0$  mm (range 2.0–9.0). In 90 percent of procedures, the largest trephine used was 4.0 to 6.0 mm in width. Mean operative time was  $15.3 \pm 6.5$  minutes.

In the immediate postoperative period, 59.1 percent of the patients returned to normal daily activity, unlimited by pain, and 39.1 percent did not require analgesics. Fever ( $38^\circ\text{C}$  or more) was reported by 7.0 percent of the patients. Few patient (1.5 percent) experienced postoperative signs of infection. Three patients experienced postoperative bleeding that required evaluation in the emergency department (0.2 percent). Bleeding was controlled by external packing and application of local pressure and none required surgical hemostasis or blood transfusion. During the early postoperative follow-up period, nonhealing operative wounds (considered as early failure) were observed in 58 patients (4.4 percent). Of these patients, 54 (4.1 percent) underwent



**FIGURE 3.** Patient with midline pilonidal pits (P) and a fistula opening (F) in the left cephalad direction. (A) Before operation (B) Immediately after trephine excision of openings and debridement of underlying cavity. (C) Four weeks postoperatively showing completely epithelized wounds (original magnification times 0.5).

a second procedure: trephine operation was repeated in 76.9 percent of patients and wound debridement repeated in 23.1 percent of patients. Early failures were not included in the overall recurrence rate.

Complete wound healing was confirmed in 1,119 patients (82.4 percent). Mean healing time was  $3.4 \pm 1.9$

**TABLE 1.** Patients' characteristics and operative findings

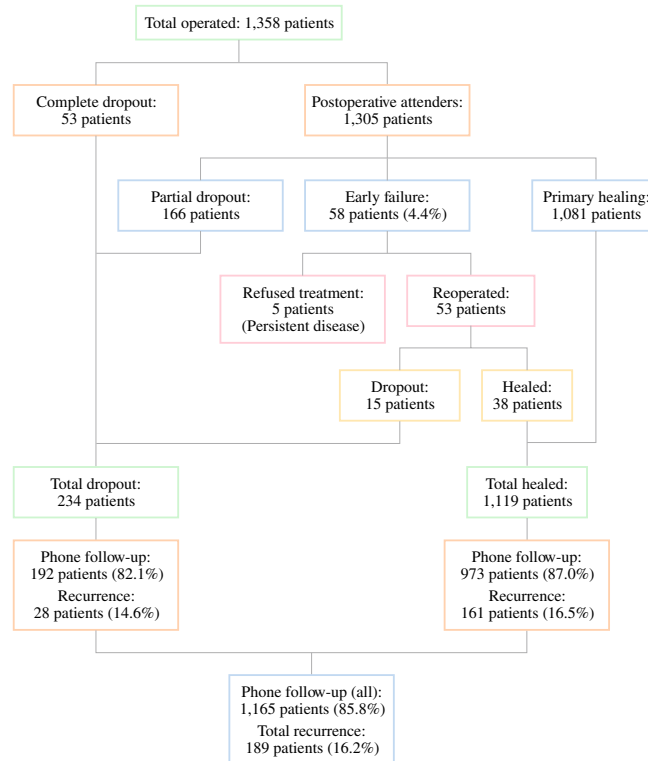
Characteristic	%
Total number of patients	1,358
Male patients	84.3% (1145)
Female patients	15.7% (213)
Age (years)	$20.9 \pm 3.6$ , (18–46)
Duration of symptoms (months)	$10.0 \pm 16.4$
Primary presenting symptoms	
Pain	89.7%
Discharge	61.9%
Swelling	57.3%
Acute suppuration	12.7%
Previous operative management	25.5%
Drainage procedure	83.5%
Excision (various types)	16.5%
Operative findings	
Chronic pilonidal disease	88.2%
Pilonidal abscess	11.8%
Mean number of pits and openings	$3.6 \pm 2.3$ (0–16)
Patients with midline pits only	65.5%
Patients with pits and 1 fistula	33.2%
Patients with pits and $\geq 2$ fistulas	1.3%
Hair presence in the pilonidal complex	93.3%

Continuous variables are expressed as means  $\pm$  standard deviations and ranges in parentheses.

**TABLE 2.** Clinical outcomes of trephine operation for pilonidal disease

Outcome	No. of patients (%)
Total number of patients	1,358
Patients with postoperative attendance	1,305 (96.1)
Postoperative analgesics use	795 (60.9)
Activity during the first two postoperative weeks	
Normal	771 (59.1)
Limited by pain	534 (40.9)
Reported fever ( $38^\circ\text{C}$ or more)	91 (7.0)
Clinically verified infection	19 (1.5)
Postoperative bleeding	3 (0.2)
Number of patients with early failure	58 (4.4)
Reoperated	54 (4.1)
Patients with complete clinical attendance	1,124 (82.8)
Complete healing	1,119 (99.6)
Healing time (weeks)	$3.4 \pm 1.9$
Healing rate within 2 weeks	33.3%
Within 3 weeks	56.0%
Within 4 weeks	89.7%
Failed healing (rejected complementary treatment)	5 (0.4)
Healing not verified (dropout patients)	234 (17.2)
Results of phone long-term follow-up	
Number of patients	1,165 (85.8)
Phone assessed recurrence	189 (16.2)
Phone follow-up interval (years)	$6.9 \pm 1.8$
Time interval to recurrence (years)	$2.7 \pm 2.6$

Results are expressed as variable with percentages in parentheses and means with standard deviations unless otherwise indicated.



**FIGURE 4.** Patient flow during the study.

weeks. In nearly 90 percent of these patients, clinical follow-up was completed within four weeks after 1 or 2 postoperative visits. Five patients with nonhealing wounds refused additional intervention and remained with persistent disease (0.4 percent). Wound healing was not confirmed in 234 (17.2 percent) patients. Of these, 53 patients did not attend the postoperative follow-up clinic at all and 181 patients were lost to follow-up prior to final verification of complete healing.

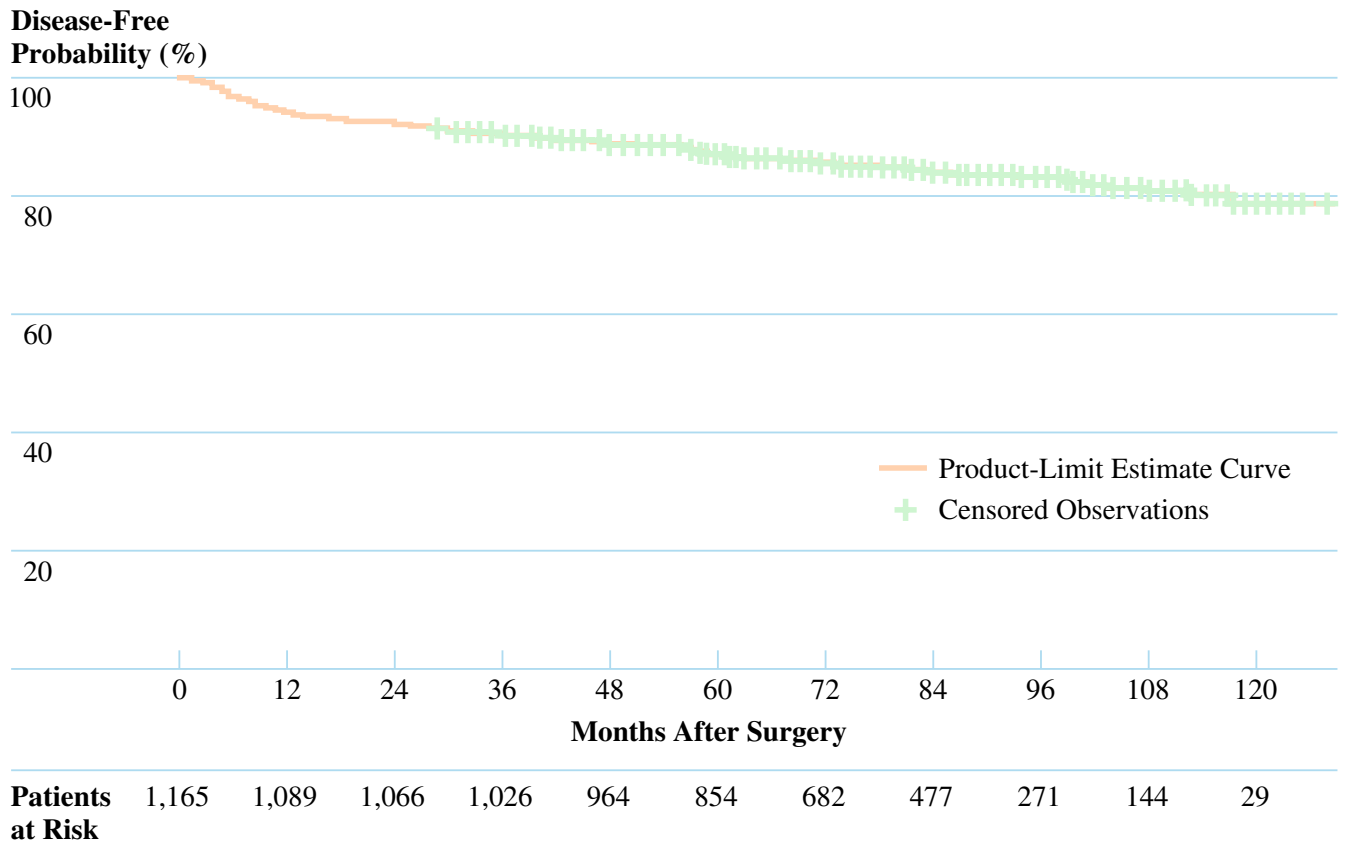
Telephone interviews to assess recurrence rates were conducted with 1,165 (85.8 percent) available patients (excluding the five patients with known persistent disease). Mean follow-up length was  $6.9 \pm 1.8$  years, median 6.6 years, (range, 2.4–11.1). The total recurrence rate in 1,165 patients interviewed by telephone was 16.2 percent (189 patients): 163 patients had undergone another operation, and 26 patients reported symptoms of recurrent disease (pain, discharge, or swelling). Mean interval time for recurrence was  $2.7 \pm 2.6$  years, median 1.8 years, range 1 month to 11.1 years. About 40 percent of the recurrences occurred within the first postoperative year and 81 percent occurred within 5 years postoperatively. The disease-free probability estimate (Fig. 5) at 1 year was 93.5 percent (95 percent CI 92.1–94.9); at 5 years was 86.5 percent (95 percent CI 84.5–88.5, and at 9 years was 80.4 percent (95 percent CI 77.4–83.4).

Differences in long-term recurrence rates and disease-free survival curves were not statistically different between patients with complete clinical attendance and verified

healing ( $n=1,119$ ) and dropout patients with unverified healing ( $n=234$ ). Phone contact was accomplished in 973 (87.0 percent) patients of the complete attendees and in 192 (82.1 percent) of the dropout patients. No statistical difference was observed in the morbidity or recurrence rates between patients presenting with an abscess ( $n=160$ ) and chronic disease ( $n=1,198$ ).

## DISCUSSION

Based on its acquired foreign body pathogenesis, pilonidal sinus disease should in essence be treated by elimination of skin openings and removal of underlying hair and debris.<sup>5,6,8</sup> In accordance with these principles, trephines were convenient when applied to surgical treatment of pilonidal disease. Individual pits can be easily removed with just one hand twist and with minimal rims of tissue not exceeding 1.0 to 2.0 mm. Inserted through pit openings, trephines also serve as excellent sharp debridement tools within pilonidal cavities and along fistulous tracts thus obviating the use of brushes.<sup>6</sup> The round opening produced by the trephine serves as a drainage port, providing undisturbed continued outflow of infected fluid until the pilonidal cavity dries and collapses from within, thus making the use of drains or extensive incisions unnecessary. By individually punching out each pit, gaps of unaffected healthy skin are left to link and hold the opposed sides of the natal cleft. These bridges stabilize the perforated roof of the



**FIGURE 5.** Disease-free probability after trephine surgery.

pilonidal cavity, prevent lateral traction of cavity walls and skin margins, and facilitate undistorted healing of the natal cleft with minimal scarring. As a result, patients experience minimal pain or disruption to daily activity. The trephine technique practically lays open the pilonidal sinus and enables a one-stage treatment for patients presenting with either acute suppuration or chronic disease resulting in equivalent long-term outcomes and negligible postoperative infection rates.

Results of surgical treatments for pilonidal disease differ substantially among publications, even when reporting on similar techniques.<sup>2,3</sup> Rates of postoperative infections or recurrences range between nil and up to 40 percent or higher. Allen-Mersh<sup>2</sup> in 1990 and Petersen *et al.*<sup>3</sup> in 2002 performed a pooled analysis of data published since 1960 on pilonidal sinus disease. Petersen *et al.*<sup>3</sup> evaluated the outcome of different primary closure techniques and found average postoperative infection rates of 12.4 percent for midline closure, 7.9 percent for asymmetric closure, and up to 9.3 percent for flap techniques. Corresponding early treatment failure rates were 8.9 percent for midline closure and 3.4 to 5.5 percent for asymmetric and flap closure. The infection rate (1.5 percent) and early failure rate (4.4 percent) in our series compare favorably with previous studies.

Most recurrences of pilonidal disease present within 5 years, but may occur even decades after treatment.<sup>10,11</sup> Our study confirmed this observation. A follow-up period of at least 5 years is required in order to detect 75 or 80 percent of all possible recurrences, especially when operating on young patients who have another 10 to 20 years of potential pilonidal sinus disease reoccurrence ahead.<sup>11,12</sup> The majority of publications, however, lack an adequate follow-up period, thus limiting the ability to appreciate the true long-term effect of other surgical methods. Allen-Mersh<sup>2</sup> found average recurrence rates of 13 percent at 1 year following open methods such as incision or wide excision, and 15 percent after excision and primary midline closure. In a recent multicenter study with an exceptionally long median follow-up interval of 14.8 years,<sup>11</sup> Doll *et al.* found a 17 percent total recurrence rate following rhomboid excision and lay open and 30 percent following excision and primary suture. In Doll's study, the reported recurrence rate 4 years postoperatively was 12.3 percent after excision and lay open surgery and 20 percent following excision and primary closure. In comparison with these commonly used operations, the recurrence rate in our series was 6.5 percent at 1 year and reached 11.5 percent after 4 years postoperatively (71 percent of all

recurrences). Incomplete debridement during operation can result in early failure and recurrence, particularly in a closed technique such as ours, which in part is performed blindly. Indeed, Bascom added to the excision of midline pits a laterally placed incision, to explore the pilonidal cavity openly and under vision. However no benefit was gained by this additional incision since the reported recurrence rates after Bascom's procedure were 10 percent after 1 year<sup>13</sup> and 16 percent after 3.5 years.<sup>9</sup>

Edwards<sup>14</sup> stressed the importance of appropriate post-operative surveillance in relation to pilonidal sinus disease. Our study supports this ascertainment given the number of patients requiring further treatment during the early postoperative period. Interestingly, long-term recurrence rate in patients who failed to attend the follow-up clinic was not statistically different from patients with complete follow-up attendance.

A limitation of this study is the lack of complete follow-up in 13.8 percent of the patients caused by unavailability for telephone interviews. Although we have no reason to suspect that these patients did worse, it is possible that the overall recurrence rate may be higher. Radical excisions with asymmetric and flap closure methods may offer lower recurrence rates of 3 to 8 percent at one year<sup>2</sup> but seem to be an overtreatment for the vast majority of patients. The one-year recurrence rate in our study of 6.5 percent combined with the ease of the technique and the minimal impact on the patient's well being compared favorably to more extensive treatments.

## CONCLUSIONS

The trephine operation, a simple outpatient procedure for treating pilonidal sinus disease, was associated with quick recovery and appealing aesthetic outcome, for both chronic and acute suppurative pilonidal disease. Long-term cure rate was superior to the average reported for other commonly used surgical methods for pilonidal sinus. In cases of recurrence, the same treatment can be repeated as needed. Further studies comparing this method to others will be required to evaluate how it fares in terms of quality of life and costs.

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## INVITED COMMENTARY

**To the Editor** - As hair pierces the skin, it provokes tract formation with epithelialization and prevents healing. Accordingly, the general assumption has been that hair is the problem in pilonidal sinus. The higher pilonidal sinus incidence rates observed in the Mediterranean population and in obese patients who may sweat excessively have supported this belief. This common sense notion about hair and pilonidal sinus disease has not been challenged in any way during recent years. Meticulous extraction of hair from the tracts has been suggested to heal the sinus,<sup>1</sup> or at least prevent exacerbation. Numerous patients have been shaved and otherwise depilated, although the effectiveness of this approach has never been proven to decrease incidence or recurrence rates.

Now a new technique has been suggested and tested, which not only removes the hair but also excises the tracts as well. Tract excision has been generally deemed unnecessary, although not by everyone.<sup>2</sup> Lord and Millar advocated surgical midline pit excision<sup>3</sup> as did Bascom.<sup>4</sup> Gips *et al.* present a startling simple technique that can be performed under local anesthesia, using hollow drills (trephines) to denude all epithelial tracts. Not only do the authors describe a clever technical approach, they also treated enough patients for a long enough time (n= 1358) to thoroughly evaluate their results (n=1165) for up to 10 years after surgery. Time is an essential factor for valid recurrence rate estimation, and the authors report

astonishingly low recurrence rates of 13.2 percent at 5 years and 16.2 percent at 10 years.

While the authors should be congratulated for their work, a few questions remain. How was recurrence defined? What did the telephone interviewer do if answers were inconclusive on interview? Was there an examination, a referral, or maybe a digital photo sent to the interviewer? Some technical questions remain as well. Will the drill of trephines excise all tract tissue, even if performed blindly? Do residual tracts matter? How well does this method for recurrent disease? Would methylene blue application, which can reduce the recurrence rate by half<sup>5</sup> be beneficial? Would patients benefit from additional flattening of the natal cleft, which remains unchanged by this trephine method?

“Don’t take a hammer to swat a fly,” commented Patey on pilonidal sinus therapy 38 years ago.<sup>6</sup> Gips *et al.* present a new, simple, easy to learn, and cheap method that is minimally invasive compared to flap procedures. More than 1000 patients have been treated, more than 1000 patients interviewed. The 5-year and 10-year recurrence rates are low. Will these results be reproducible? Results from other clinics that apply this new

trephine excision method for primary pilonidal sinus will be awaited eagerly. In the meanwhile, will surgeons buy trephines and drill away at pilonidal sinus?

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