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ORIGINAL ARTICLE

A nationwide snapshot study on outcomes one year after surgery for chronic pilonidal sinus disease

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Abstract

Aim: Managing pilonidal sinus disease (PSD) remains challenging due to high recurrence rates and morbidity associated with treatment. The aim of this study was to evaluate the outcomes one year after surgical treatment for chronic PSD in the Netherlands.

Method: Patients with PSD who underwent surgical treatment between March 1, 2020, and March 1, 2021, at 36 participating hospitals were included in a prospective observational cohort study. For the present study, only patients with chronic PSD were included for analysis.

One-year after surgical treatment for PSD, all patients received questionnaires on wound healing, quality of life (QoL), and patient reported experience measures (PREMs). Primary outcome was recurrence rate. Secondary outcomes included QoL and PREMs.

Results: Of 681 included patients, 405 patients presented with chronic PSD and underwent surgical treatment. One-year questionnaires were completed by 289 out of 405 patients (71.4%). Patients underwent either excision with secondary wound healing (ESW, $n = 73$), excision with midline closure (EMC, $n = 21$), off-midline closure (OMC, $n = 17$), or a minimally invasive technique (MIT, $n = 178$). Patient-reported recurrence rates after ESW, EMC, OMC and MIT were 21.5%, 25%, 6.7% and 30.6%, respectively. Pain/discomfort and anxiety/depression were the most frequently reported problems affecting QoL. Patients that underwent OMC were satisfied the most with the care provided.

Conclusion: This study demonstrates variation in recurrence rates among surgical procedures for PSD. The highest rates were observed in the MIT and EMC group, while the OMC group exhibited the lowest rate. QoL outcomes differed among the surgical techniques. Patient satisfaction appears highest in the OMC group.

KEYWORDS
excision with midline closure, excision with secondary wound healing, minimally invasive technique, off-midline closure, patient reported experience measures, pilonidal sinus disease, quality of life, recurrence rate

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INTRODUCTION

Pilonidal sinus disease (PSD) is a common condition often affecting young adults, with a higher incidence in men than in women [1]. Despite its relatively high prevalence, there is still lack of consensus on the optimal surgical technique. The "ideal" surgical treatment of PSD should be simple, result in rapid return to daily activities, have low recurrence rate and complications, and should be cost-effective.

Minimal invasive techniques (MIT) are associated with some short-term benefits including, fast recovery, a high rate of successful wound healing and low morbidity [2, 3]. However, long-term outcomes are less favourable with recurrences in 8%–26% of patients after 12 and 120 months follow-up [2, 3]. Excision with secondary wound healing (ESW) usually leaves the patient with a large wound that takes a long time to heal completely. Also, recurrence rates are high, making this an unattractive surgical option [2, 4]. At present, off-midline closure (OMC) is a surgical approach that is associated with the lowest risk for recurrence and this may lead to better patient satisfaction [2].

The high recurrence rates after surgery for PSD impact long-term patient satisfaction, influence treatment decisions, and have financial implications for healthcare and society. Overall, a wide range of recurrence rates is observed across various surgical interventions [4]. As variation in the definition of recurrence varies, a valid comparison of recurrence rates across studies is challenging. The objective of this study was to evaluate the outcomes one year after surgical treatments for chronic PSD in the Netherlands, focusing on recurrence rate, quality of life (QoL) and patient reported experience measures (PREMs).

What does this paper add to the literature?

This paper provides a realistic view of PSD recurrence rates, showing the highest rates after minimally invasive techniques in the Netherlands. It underscores the continued use of outdated surgeries and highlights the significant impact on patient's quality of life and returns to normal activities, even one-year post-surgery.

METHODS

The Strengthening of the Reporting of Observational Studies in Epidemiology (STROBE) statement was used in the design and implementation of the study and to prepare the manuscript [5]. The medical ethics committee of the University Medical Centre Utrecht approved the study design (protocol no. 20-671/C).

Study design

All community hospitals and surgical clinics in the Netherlands that provide surgical care for patients with PSD were invited to participate in this prospective observational study. All patients aged 16 years or older with PSD that were operated at the participating hospitals were included during a three-month inclusion period between March 1, 2020, and March 1, 2021. The inclusion period commenced at each participating hospital upon receiving study approval from the local ethics committee. Therefore, not all hospitals started simultaneously. The inclusion period could be extended by one month if elective surgical care capacity was scaled down in participating hospitals due to the COVID-19 pandemic. Patients who were already on the waiting list for elective PSD surgery were also contacted to participate in the study. All patients were treated according to local hospital protocols. To standardize classification of PSD, the Dutch classification system was used (Table 1) [6]. Based on this classification, a distinction can be made between acute/chronic and simple/complex PSD. Acute PSD is identified by type II, and chronic PSD is identified by all other types. Simple PSD is identified by type I or type II, while complex PSD is identified by type III and type IV. Type V is not classified as either simple of complex but as a separate entity as this often requires a different treatment from the previous types. For this study, only patients with chronic PSD were included for analysis.

TABLE 1 The Dutch classification system.

Stage	Definition
Simple PSD	
Type Ia	One or more pits in the midline of the intergluteal cleft without symptoms
Type Ib	One or more pits in the midline of the intergluteal cleft with symptoms
Type II	Acute pilonidal abscess
Complex PSD	
Type III	Type 1b + one or more sinus openings lateral to the intergluteal cleft. These sinus openings usually contain granulation tissue, blood, and/or pus. They are usually unilateral but can also present bilaterally.
Recurrent pilonidal sinus	
Type IV	Recurrence of PSD after previous surgical treatment (excluding abscess drainage)
Chronic nonhealing wound	
Type V:	Chronic (usually hypergranulating) nonhealing wound in the midline of the intergluteal cleft after previous surgery

Abbreviation: PSD, pilonidal sinus disease.

Data collection

In each participating hospital one surgeon and a surgical resident were responsible for the data collection and for entering these in an anonymized fashion in a web-based database Castor electronic data capture (EDC). After recruitment and signed informed consent, a patient electronic case report form (eCRF) was created in Castor EDC. One year after surgical treatment for PSD, all included patients in this study were invited to fill out a questionnaire automatically sent by email through the electronic database Castor EDC using the day of surgery as the reference date. When patients had not completed the questionnaires within 2 weeks, a single reminder email was sent. The questionnaires inquired the following: new midline pits/sinus or secondary sinus tracts in the intergluteal cleft, persistent PSD-related symptoms, resumption of daily activities, new open wounds, reoperation, QoL and PREMs. PSD-related symptoms included pain, itching, fluid- and blood discharge at the intergluteal cleft.

Quality of life was evaluated by the EQ-5D-5L [7]. It contains five questions about five dimensions of QoL: mobility, self-care, daily activities, pain/discomfort and anxiety/depression. The EQ-5D levels were dichotomized into "no problems" (level 1) and "any problems" (levels 2, 3, 4 and 5). PREMs were assessed by five study-designed questions: (1) I am satisfied with the outcome of my surgery (yes/no). (2) I would recommend this surgery to other patients (yes/no). (3) I had no problems with my wound after the surgery (yes/no). (4) I was happy with the follow-up given after my surgery (yes/no). (5) I would choose the same surgical procedure again (yes/no).

Definition of patient-reported and clinically relevant recurrence

Patient-reported recurrence of PSD was defined as the presence of de novo midline pits/sinus or secondary sinus tracts in the intergluteal cleft. Clinically relevant (symptomatic) recurrence was defined as recurrence for which patients had undergone surgery after the index operation.

Statistical analysis

Statistical analysis was performed using SPSS version 24.0 or higher (SPSS Inc., Chicago, IL, USA). Continuous variables were evaluated for normal distribution using visual inspection. For continuous variables, normally distributed data are reported as means ± standard deviation (SD), and medians with interquartile range (IQR) were used in skewed data. Categorical data are reported as frequencies with percentages. Differences per type of treatment were not statistically tested as the group sizes were small due to the many different surgical treatment options for PSD. Multivariable logistic regression analysis was conducted on risk factors and variables considered to be associated with recurrent PSD within one year for all patients, including gender, sedentary profession, BMI, smoking, classification system, and type of surgical treatment. The number of independent variables included in the analyses was no more than 10% of the total number of recurrences.

RESULTS

A total of 36 (out of 66) hospitals participated in the study and 681 patients were included. However, 68 patients did not undergo surgery for various reasons including resolved symptoms and waiting list issues caused by COVID-19 pandemic. This resulted in a cohort of 405 patients with chronic PSD and 208 patients with acute PSD (Figure 1). One year after surgery, questionnaires from 289 of 405 patients (71.4%) were available for analyses. The remaining 116 patients did not complete the questionnaire after a single reminder, resulting in loss to follow-up.

Surgical treatment and patient characteristics

Patients underwent either excision with secondary wound healing (ESW, $n = 73$), excision with midline closure (EMC, $n = 21$), off-midline closure (OMC, $n = 17$), or a minimal invasive technique (MIT, $n = 178$). MIT were performed for both simple and complex PSD. OMC was mainly utilized for complex PSD (Figure 2). The baseline characteristics are reported in Table 2.

Outcomes at one year after surgery

Outcomes one year after surgery are shown in Table 3. Highest recurrence rates were seen in the MIT group, while the OMC group had the lowest recurrence rate. A multivariable regression analysis for all patients found that smoking was associated with patient-reported recurrence of PSD within one year (Table S1).

The clinically relevant recurrence rate was higher following ESW/MIT treatment for complex PSD than simple PSD (Table 4). The remaining recurrences were observed in the type V group.

Of the five domains regarding QoL, pain/discomfort and anxiety/depression regarding recurrence were the most frequently reported

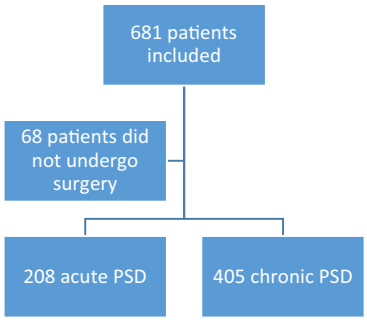

FIGURE 1 Study population.

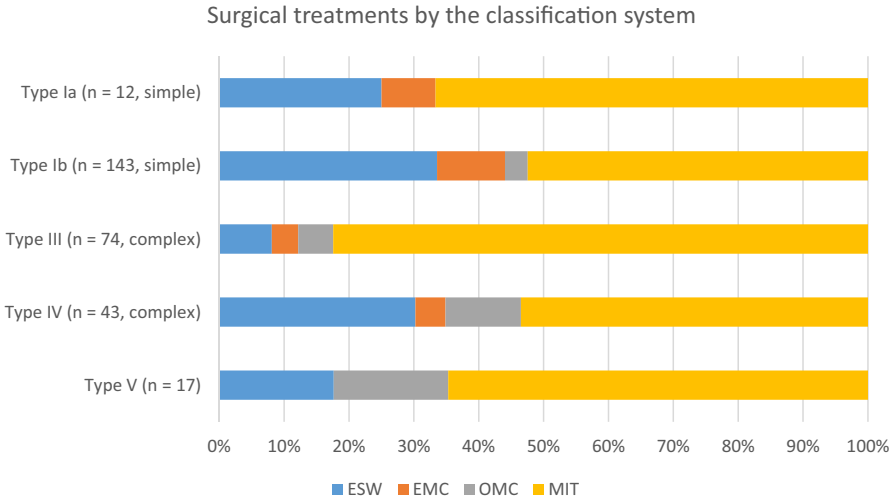

FIGURE 2 Surgical treatments by the classification system. EMC, excision with midline closure; ESW, excision with secondary wound healing; MIT, minimal invasive techniques; OMC, off-midline closure.

TABLE 2 Patient characteristics.

	ESW (*n* = 73)	EMC (*n* = 21)	OMC (*n* = 17)	MIT (*n* = 178)
Mean age (SD)	28 (7.7)	27 (9.7)	26 (8.3)	29 (11.3)
Male, *n* (%)	60 (82.2)	17 (81)	14 (82.4)	150 (84.3)
Mean BMI (SD)	27 (4.3)	26 (4.0)	26 (3.7)	26 (4.3)
Prior surgical treatment, *n* (including abscess) (%)	40 (54.8)	7 (33.3)	12 (70.6)	81 (45.5)
Abscess history, *n* (%)	24 (32.9)	4 (19)	8 (47.1)	47 (26.4)
Diabetes mellitus, *n* (%)	0 (0)	0 (0)	0 (0)	5 (2.8)
Immunosuppressant use, *n* (%)	0 (0)	0 (0)	0 (0)	4 (2.2)
Smoking, *n* (%)	24 (32.9)	7 (33.3)	6 (35.3)	54 (30.9)
Family history, *n* (%)	17 (23.9)	3 (16.7)	4 (23.5)	25 (14.5)
Sedentary occupation, *n* (%)	34 (46.6)	6 (31.6)	13 (76.5)	83 (48.3)

Abbreviations: BMI, body mass index; EMC, excision with midline closure; ESW, excision with secondary wound healing; MIT, minimal invasive techniques; OMC, off-midline closure; PSD, pilonidal sinus disease; SD; standard deviation.

TABLE 3 Outcomes one year after surgery for chronic PSD.

	ESW (*n* = 73)	EMC (*n* = 21)	OMC (*n* = 17)	MIT (*n* = 178)
PSD-related symptoms, *n* (%)	21/65 (32.3)	4/21 (19)	3/15 (20)	52/158 (32.9)
Resume daily activities, *n* (%)	50/64 (78.1)	19/19 (100)	13/15 (86.7)	132/158 (83.5)
New open wound at a different location, *n* (%)	0/64 (0)	3/20 (15)	0/14 (0)	5/156 (3.2)
Recurrent abscess, *n* (%)	2/65 (3.1)	–	–	3/157 (1.9)
Patient-reported recurrence, *n* (%)	14/65 (21.5)	5/20 (25)	1/15 (6.7)	48/157 (30.6)
Clinically relevant recurrence, *n* (%)	8/73 (11)	1/21 (4.8)	0/17 (0)	28/178 (15.7)
Type of reoperation, *n* (%)				
Debridement				1 (3.6)
BCL	1 (12.5)	1 (100)		3 (10.7)
Pit picking + hydrogen peroxide				3 (10.7)
Pit picking + laser	1 (12.5)			9 (32.1)
Pit picking + phenol				3 (10.7)
Incision and drainage	2 (25)			3 (10.7)
ESW	3 (37.5)			1 (3.6)
Not reported	1 (12.5)			5 (17.9)

Abbreviations: BCL, Bascom cleft lift; EMC, excision with midline closure; ESW, excision with secondary wound healing; MIT, minimal invasive techniques; OMC, off-midline closure; PSD, pilonidal sinus disease.

problems in patients with PSD at one-year post surgery. Quality of life outcomes differed among the surgical techniques (Figure 3). The OMC group exhibited the highest percentage of satisfaction with the care provided at one-year post surgery, while the other groups showed lower percentages (Figure 4).

DISCUSSION

This national snapshot study demonstrates that recurrence rates vary between surgical procedures for PSD. A relative high patient-reported recurrence rate of 30.6% within one year following MIT for chronic PSD was observed. With respect to the recurrence rates of more traditional excision techniques, this snapshot study found a patient-reported recurrence rate of 21.5% following ESW and 25% following EMC. This study shows that OMC had the lowest patient-reported recurrence rate (6.7%). For clinically relevant recurrences, MIT also had the highest recurrence rate (15.7%).

Other studies acknowledge the high recurrence rates following MIT, especially with longer follow-up [3, 4, 8]. A study by Sluckin et al. [8] reported a comparable recurrence rate of 26.4% following pit picking with laser, with a median follow-up of 10 months. These early high recurrence rates may be explained by the fact that MIT does not address some of the risk factors for recurring PSD, such as a deep intergluteal cleft. The Bascom cleft lift (BCL) is an OMC technique that flattens the gluteal cleft, which may explain the lower recurrence rate [9–12]. Additionally, even small midline wounds are a known risk factor for recurring PSD due to poor wound healing [2, 4]. Among patients with a recurrence after MIT ($N = 45$), one third underwent a second MIT, potentially contributing to the higher success percentage in this group [8–10]. High recurrence rates as seen in the present study are observed already within one year post surgery. According to Doll et al. [11] the majority of recurrences probably occur after more than one year after surgery. Hence, the recurrence rates seen in our study may be even higher after longer term follow up. However, the potential higher recurrence rate after MIT is counterbalanced by advantages such as fast recovery, a high rate of successful wound healing and low morbidity [2, 3].

TABLE 4 Clinically relevant recurrence one year after surgery.

Clinically relevant recurrence, *n* (%)	ESW ($n = 70$)	MIT ($n = 167$)
Classification		
Simple, *n* (%)	4/51 (7.8)	8/83 (9.6)
Complex, *n* (%)	3/19 (15.8)	13/84 (15.5)

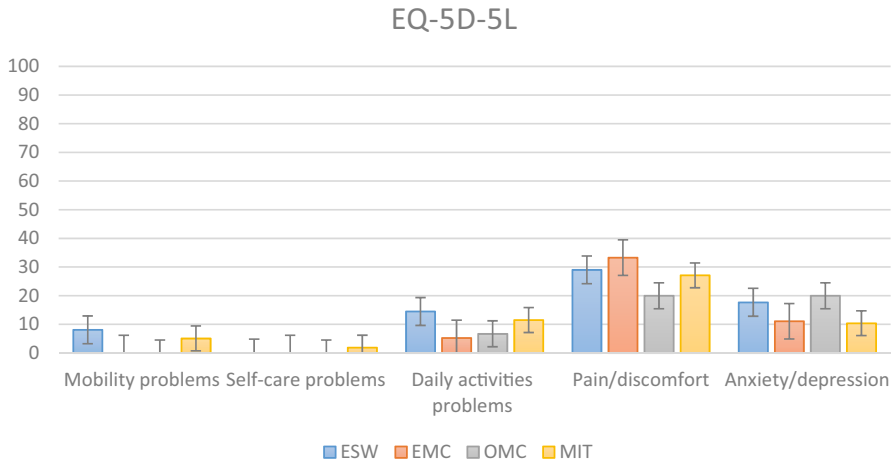

FIGURE 3 Quality of life one-year after surgery for chronic PSD. EMC, excision with midline closure; ESW, excision with secondary wound healing; MIT, minimal invasive techniques; OMC, off-midline closure; PSD; pilonidal sinus disease.

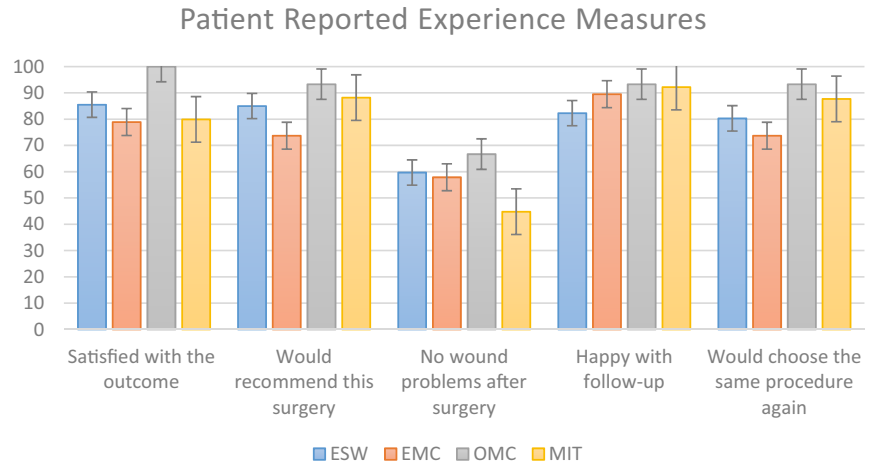

FIGURE 4 PREMs one-year after surgery for chronic PSD. EMC, excision with midline closure; ESW, excision with secondary wound healing; MIT, minimal invasive techniques; OMC, off-midline closure; PSD; pilonidal sinus disease.

The early high recurrence rate of traditional excision techniques (ESW and EMC) in this study may be explained by the prolonged wound healing after midline wounds and the fact that they do not flatten the gluteal cleft. The recurrence rate seen in our study is higher than previously reported in the literature [4]. However, there is large variability in reported recurrence rates in literature, ranging from 2% to 35% for ESW [12]. Recurrence rates as high as 22%–41% after EMC have been reported [13]. This may be due to nonspecific patient selection, the absence of a standardized definition of recurrence and especially because of varying time to follow-up.

Off-midline closure has been reported to have the lowest recurrence rate among all procedures for PSD during various follow-up periods [4, 14], which is consistent with the rate observed in this study. One study with a large series of BCL's reported an overall success rate of 96.6%, with revision rate of only 3.4% (including failures and recurrences) with follow-up ranging from two to 228 months.

In this study, smoking was significantly associated with patient-reported recurrent PSD. This factor is also mentioned in the literature, along with a sedentary occupation, obesity, poor personal hygiene, hair removal by shaving, and a deep intergluteal cleft [15–29]. Nevertheless, the evidence supporting these factors is not conclusive.

In this study, a significant number of patients with complex PSD were also treated with MIT, showing a higher clinically relevant recurrence rate. Based on these results, MIT may be less effective for complex PSD compared to simple PSD. The implementation of the guideline advocating OMC for complex or recurrent PSD is expected to reduce the use of MIT for these cases in the future. Perhaps this is already reflected in the patient characteristics in this study. In the OMC group, 70% had undergone previous surgery, and half had a history of an abscess. Thus, proper patient selection and education are essential for making informed decisions. Short- and long-term outcomes should be considered when deciding on treatment options. Off-midline closure was only conducted to a limited extent in the Netherlands, especially compared to surgical practices for PSD in the United Kingdom [30]. Unfamiliarity, insufficient training during residency and extended learning curve may be the reason for the infrequent use of OMC in our country. We hope this is changing due to the implementation of the guideline as well as initiatives throughout the country for implementing OMC procedures.

When examining QoL one year after surgery, 10%–20% of patients reported anxiety/depression regarding recurrence. This is concerning, especially among such a young group of patients. Additionally, 16% had not resumed daily activities, indicating the significant impact of the disease, even one year after surgery. Patients that underwent OMC had the highest satisfaction (PREMs) one-year after surgery. This finding confirms previously reported results from Immerman et al., who reported a high level of patient satisfaction after BCL [31]. This is likely related to the lower recurrence rate, but perhaps also faster wound closure. Patients who do not require any kind of care for their disease anymore are understandably satisfied. Only one study in the literature reported on QoL, as measured by short-form 36, between pit excision with phenolization and OMC, and no significant difference was found [32]. Data on the QoL, measured by the EQ-5D-5L as in our study has not previously been reported. This indicates a notable gap in existing studies and underscores the need for further investigation. Researchers should consider and explore the development of a specific QoL questionnaire for this patient group because one might question whether a standard questionnaire such as the EQ-5D-5L is suitable for this patient group. In this study it was chosen for its simplicity, with less questions than the SF-36, to ascertain a higher response rate.

This study had several limitations. First, the short follow-up period of one year may not accurately capture true recurrence rates; extended follow-up may be able to provide more insight. Second, almost 30% of patients did not complete all postoperative questionnaires, which impaired our ability to assess recurrence in those patients. Moreover, relying solely on patient-reported recurrence exacerbates these limitations. Perhaps we should differentiate between true recurrence and treatment failure. Third, the small sample size in the (off) midline closure groups made it challenging to draw definitive conclusions regarding the different cohorts. Finally, the experience of the surgeons was unclear and may have influenced the likelihood of recurrence.

In conclusion, this national snapshot study demonstrates variation in recurrence rates among surgical procedures for PSD. The highest patient-reported recurrences were observed in the MIT and EMC group, while the OMC group exhibited the lowest recurrence rate. QoL outcomes differed among the surgical techniques. Patient satisfaction appears highest in the OMC group.

Future prospective studies with a clear definition of recurrence are necessary to accurately investigate long-term recurrence rates and to enable comparisons between studies and different surgical techniques. It would be interesting to repeat this survey five years after surgery to observe any potential increase in recurrence rates.

AUTHOR CONTRIBUTIONS

Eleonora A. Huurman: Conceptualization; investigation; writing – original draft; methodology; writing – review and editing; formal analysis; data curation. **C. A. L. de Raaff:** Conceptualization; investigation; methodology; writing – review and editing; supervision. **Rosaline van den Berg:** Conceptualization; methodology; writing – review and editing; formal analysis. **S. J. Baart:** Formal analysis; methodology; conceptualization; writing – review and editing. **B. P. L. Wijnhoven:** Investigation; writing – review and editing; supervision. **R. Schouten:** Conceptualization; investigation; writing – review and editing. **E. J. B. Furnée:** Writing – review and editing; investigation; conceptualization. **R. M. Smeenk:** Conceptualization; investigation; methodology; writing – review and editing; supervision. **B. R. Toorenvliet:** Supervision; methodology; writing – review and editing; investigation; conceptualization.

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CONFLICT OF INTEREST STATEMENT

There are no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

There is no material from other sources.

ETHICS STATEMENT

The medical ethics committee of the University Medical Centre Utrecht approved the study design (protocol no. 20-671/C).

PATIENT CONSENT

Patients signed informed consent.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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