



Minimally Invasive Pilonidal Sinus Treatment: A Brief Review

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Abstract

With a prevalence of 26/100,000, pilonidal sinus disease is a frequent natal cleft condition that primarily affects young males. The disease site is often uncomfortable and the disease can result in problems such as abscess formation and recurrent acute or chronic infections. Minimally invasive treatment aims to form a small elliptical wedge of subcutaneous tissue containing all the inflammatory tissue. The sinus and its lateral tracks are removed while keeping the overlying skin intact. Following the notion of "less is more," novel least invasive treatments such as sinotomy, sinusectomy, trephining, and video-assisted and endoscopic pilonidal sinus surgery have recently been proposed. We look at minimally invasive treatments to explain how research into modern techniques has revealed a low rate of short-term problems.

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Introduction

In 1883, Mayo *et al.* first described the pathology of a pilonidal sinus as a deep cavity in front of the sacrococcygeal fascia containing hair or hair [1]. A pilonidal sinus is a common disease involving the sacrococcygeal region in the midline natal cleft with an incidence of 26/100,000, reaching 70,000 patients per year in the United States. The pathogenesis is not yet fully understood. It appears that the body hair retained by the sebaceous gland produces an initial foreign body abscess that digs a cave and often comes out with external orifices and abscesses [2], [3], [4]. It is more common in young males, with a male-to-female ratio of 3:1 [2]. The sinus can be caused by several risk factors: Age between 18 and 30 years, male sex, obesity, deep intergluteal fissure, lack of hygiene and sedentary occupation, and hairiness [5], [6]. The currently most used techniques are the complete excision of the sinus and its debridement and the complete removal of the foreign body (90% of cases: Hairs) and its direct or non-direct closure of the wound. However, due to the patients' repeated and long dressings and the substantial impact on hospital costs, this technique's therapeutic impact poses the questions of using different and minimally invasive techniques [7], [8], [9], [10]. Pilonidal sinus surgery is known for its high morbidity, high recurrence rate, and poor aesthetic outcome. In the literature, over the years, many surgical techniques have been proposed. However,

there is no clear consensus on optimal treatment [11]. To date, most surgeons have used a complete excision of the sinus up to the sacral region, treating the wound with direct suturing or secondary healing. Others also add the use of skin flaps to sinus resection, for example, Limberg flap or Z-plasty which is why this pathology is disabling due to post-operative pain, wound infection, lengthening of the return-to-work time, and the patients' need for repeated and long outpatient dressings [8]. In 1965, Lord and Millar performed a complete sinus excision but with minimal incision and brushing. Subsequently, in 1983, Bascom modified the operation, adding to the minimal incision on the sinus a lateral incision that was left unsutured, unlike the central one that was sutured. Subsequently, in 2008, Gips *et al.* [8] carried out the drilling technique with minimal incisions and brushing of the sinus's cutaneous holes. Endoscopic procedures were associated with these, making the treatment of this pathology less invasive. The study's objective is to verify the feasibility, safety, and results of the minimally invasive technique.

Materials and Methods

We have retrospectively evaluated PubMed databases, Embase, and the Cochrane Library by

applying various combinations of the subject-related terms. The search terms identified with the medical subject heading were “pilonidal sinus disease,” “minimally invasive surgery,” “recurrence rate,” “infection rate,” “patients’ pain and satisfaction,” “time off work,” and “hospital stay.” The databases were used to collect the literature published up to 2010. Inclusion criteria were reports that included the following: “Pilonidal sinus disease” and “minimally invasive surgery.” Exclusion criteria were as follows: Case reports, letters, comments, and abstracts. Duplicate reports and studies that contained non-cancer patients were also excluded from the study. No language restriction was applied in the search strategy. Two independent researchers (DC and SL) performed the review. After excluding repetitive reports, 12 manuscripts comprised the relevant literature for this review article.

Results

During the literature review, we researched the following points in the minimally invasive surgery for pilonidal sinus treatment: The year of the studies, the number of patients for each study, research type, techniques, recurrence rate, infection rate, patients’ pain and satisfaction, wound healing, time off work, complete wound healing, and median operation time (MOT) [8], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22].

Healing rate

Healing is defined as the achievement of complete reepithelialization of the wound. About

80–94% of patients were declared healed in 4–5 weeks (range 15 days–5 weeks) (Table 1) [8], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22].

Recurrence rate

The relapse rate varies from 1% to 14%, with follow-up inferior of 2 years. Only two studies demonstrated a follow-up between 2 and 4 years. In these studies, we found a significant recurrence rate of 4–16% [8], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22].

Time to pain relief

All patients seemed to have resolving of painful symptoms within 7 days, demonstrating a VAS score of 1–3 after 1–3 days (range 1–7). About 39% did not require analgesics. About 78% had a complete post-operative satisfaction rate (Table 1) [8], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22].

Operative time

The average duration of the procedure was 18–63 min (range 5–63 min). All procedures were conducted as outpatient surgeries (Table 1) [8], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22].

Time off work

Patients returned home autonomously after being under observation for a few hours. The time off work was brief for 59% of patients (range 1–53 days) (Table 1) [8], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22].

Table 1: Results of minimally invasive surgery for a pilonidal sinus

Author (year)	Number of patient	Research type	Technique	Recurrence rate	Infection rate	Patients’ pain and satisfaction	Wound healing	Time off work	Complete wound healing	Median operation time
Soll <i>et al.</i> (2007) [12]	93 patients	Retrospective	Trephines	5% (2 y of follow-up)	2/93	81%	2/93	2 weeks	5 weeks	20 min
Gips <i>et al.</i> (2008) [8]	1,435 patients	Retrospective	Trephines	4%–16% (from 1-year to 4-year follow-up)	1.5%	39% did not require analgesics	3.4+1.9 weeks	59% immediate return to work	82%	(range = 20–60) 15.3 ± 6.5 min
Levinson <i>et al.</i> (2016) [13]	3,407 patients	Retrospective	Trephines	7.87%	N/A	N/A	N/A	N/A	N/A	N/A
Elbanna <i>et al.</i> (2016) [14]	50 patients	Retrospective	Trephines + gelatin matrix sealant	4%	2%	Mild pain (VAS 1–3)	2 weeks	2 days	94%	18 min (range 15–35 min)
Neola <i>et al.</i> (2014) [15]	31 patients	Retrospective	Trephines	14%	N/A	1–7 days	15 days (21/31)	0–53 days	>30 days (27/31)	5–21 min
Milone <i>et al.</i> (2013) [16]	27 patients	Pilot study	Endoscopic	1/27	None	VAS<3	All patients	Immediately	15 days	63 ± 12 min–34 ± 10 min
Meinero <i>et al.</i> (2013) [17]	11 patients	Retrospective	Endoscopic	None	None	VAS 1.9	N/A	3.5 days (range 1–5)	1 month	40 ± 10 min
Chia <i>et al.</i> (2015) [18]	Nine patients	Retrospective	Endoscopic	N/A	1/9 patients	78% (7/9)	8/9 patients	N/A	6 weeks (range, 2–7 weeks)	36 min (range 26–85 min)
Gecim <i>et al.</i> (2016) [19]	23 patients	Retrospective	Endoscopic + phenol	None	N/A	2/23 patients	None	2.00 days (mean, 3.03 ± 2.95 d).	N/A	15.00 and 35.00 min (mean 20.43 ± 6.19 min)
Javed <i>et al.</i> (2016) [20]	20 patients	Observational study	Endoscopic	None	0%	VAS 1	14 days’ packing	2.5 (2–4)	16 (14–24) days	38.5 min (29–47)
Jain <i>et al.</i> (2016) [21]	19 patients	Prospective	Endoscopic	1/19 patients	N/A	VAS 7	N/A	Immediate	2 weeks	36 min (29–47 min)
Giarratano G. <i>et al.</i> (2017) [22]	77 patients	Prospective	Endoscopic	6/77 patients	None	97% satisfaction	15–45 days	5 days.	26 (range, 15–45) days	18 (range 12–30) min

N/A: not available. VAS: visual acuity scale.

Complications

The most severe complication seems to be wound infection, which stood at 1.5% (Table 1) [8], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22].

Discussion

The techniques used can be classified as wounds by secondary intention or wounds by primary closure, which is, in turn, further subdivided to the techniques of the midline closure and asymmetrical closure, that is, outside the midline [9], [23]. However, the primary closure has a high rate of recurrence and infection. The closed and humid environment leads to infection. In fact, the infection rate varies from 6% to 14% in these techniques [23], [24], [25], [26]. The present literature fails to delineate the ideal treatment. However, the minimally invasive technique does not seem inferior in results compared to the traditional technique [12], [27], [28], [29], [30], [31]. In fact, despite follow-up periods that are not always long-term, disease recurrence values were found from 0% to 40% in the conventional technique and even from 6% to 16% in the data of the minimally invasive technique [8], [16], [31], [32]. Morbidity appears to vary from 5% to 50% in the conventional technique compared to the minimally invasive technique where the values tested are below 20% [14], [16], [31], [32], [33]. Over the years, several minimally invasive technical studies have been conducted in the literature. In 2002, Lavelle suggested laser hair removal. In 2009, a study using phenol showed a cure rate of more than 60%. In 2013, endoscopic treatment was published (video-assisted ablation of the pilonidal sinus). Although it allows quick recovery, it requires adequate equipment, and the results are to be validated [16], [34], [35]. Enriquez-Navascues *et al.* [28] analyzed results from four randomized controlled trials (RCTs) comparing conservative sinusectomy and radical/*en bloc* excision with an open wound in a total of 153 randomized patients: There were no significant differences in the recurrence rate between the two treatments, but the conservative approach resulted in a significantly earlier return to work and lower pain scores. The literature results regarding the minimally invasive treatment of a pilonidal sinus remain discordant about the number of infections and relapses, going from zero to values above 40%. Another bias in the literature is that it is difficult to find studies with at least 5 years of follow-up. Most studies have a follow-up of 2 years or less [36], [37]. The variability of reinfections and relapses is probably due to incorrect exeresis or incorrect sinus cleaning as can happen in the Gips technique, but also the Bascom technique, while adding an incision and lateral cleaning of the sinus, highlights a similar failure. The endoscopic pilonidal sinus treatment,

described by Milone *et al.* [11], [16], [12], is a procedure that allows direct visualization of the pilonidal sinus, but also any possible fistulous tracts or cavities, and allows seeing with certainty the complete removal of the infected area and controlling hemostasis.

Conclusions

It is interesting to note that pilonidal sinus disease treatment has followed the overall trend of surgery using minimally invasive techniques. We have tried to compare the traditional technique with the innovative minimally invasive techniques that have proved feasible and safe. However, we could not find in the literature clear evidence of the advantages and disadvantages of recurrence rate, infection rate, patients' pain and satisfaction, time off work, and hospital stay as yet. The treatment of a pilonidal sinus would represent an optimal technique that is easy to perform; has short operative times and same-day discharge of the patient, limited complications and relapses, low cost, less pain possible for the patient; and, finally, provides a fast return to the patient's daily activities. Minimally invasive techniques are very close to the optimal technique. However, more RCTs and 5-year follow-ups are needed to better identify the actual effectiveness and long-term adverse effects of these procedures [38], [39].

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Ethical Approval

All procedures were in accordance with the ethical standards of the Institutional and National Research Committee and with the Helsinki Declaration and its later amendments or comparable ethical standards.

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