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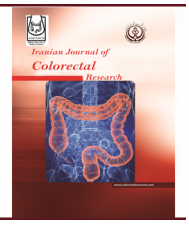

A Modified Sinus Laser Therapy (mSiLaT) for Pilonidal Sinus: Personal Experience

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Abstract

Background: Pilonidal sinus disease is frequently seen among adolescents, affecting the sacrococcygeal region. Surgical management of sacrococcygeal pilonidal disease remains debatable. This study introduces the modified sinus laser therapy (mSiLaT) technique and presents our experience in the surgical management of pilonidal sinus disease using this novel approach.
Methods: From September 2018 to June 2019, a total of 17 patients presenting with symptoms attributed to sacrococcygeal pilonidal sinus disease underwent the mSiLaT procedure at our center. Patients were admitted to the same day care surgery unit 2 hours prior to surgery. They were discharged 6 hours after surgery. Preoperative antibiotics were given intravenously 30 minutes prior to incision. A single surgeon completed all the operations, with no change in the surgical technique. The patients were followed up for at least one year.
Results: All patients returned to normal daily activities without pain-induced limitations on the first postoperative day. All patients returned to work two days after surgery. None of the patients experienced necrosis of the sinus roof. No hematoma or seroma was documented. The mean complete wound healing time was 15 days. After one year of follow-up, no recurrence was documented.
Conclusion: The mSiLaT procedure provides promising results as an emerging minimally invasive procedure that can conclude the everlasting debate on the optimal surgical management of pilonidal disease. Randomized studies are needed to better define the future role of this procedure in comparison with other techniques.

Keywords: Coccygeal sinus, Pilonidal sinus, Pilonidal cyst

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Introduction

Sacrococcygeal pilonidal disease is a chronic inflammatory process with presentations of various severity, ranging from incidental discovery to acute abscess formation, chronic presentation with continuous drainage, or recurrent boots of pain resolving after spontaneous drainage of pus. It is considered a disabling disease, substantially affecting one's quality of life. It is more prevalent among young males. Diagnosis solely depends on history taking and physical exam. Controversies

still surround the debate of its origin, with some supporting the hypothesis that pilonidal disease is acquired, whereas others supporting the hypothesis that it is congenital. Multiple risk factors have been identified in both cases, including a family history of pilonidal disease, being obese, overweight, or hirsute, a deep anatomy of the intergluteal cleft, jobs and lifestyles with prolonged sitting or profuse sweating, and relatively poor hygiene (1, 2).

A wide range of surgical options are available to treat pilonidal disease, grossly divided into two main subdivisions: traditional surgery, which includes open and closed techniques with various forms of flaps, and the minimally invasive approach. Among the minimally invasive options are the endoscopic approach (known as the EPSiT technique) and the SiLaT laser ablation approach. Herein, we present our experience with the SiLaT technique and introduce some modifications, detailing the preoperative phase, the surgical technique, care in the postoperative period, follow-up, and outcomes. The main advantages of this modified SiLaT (mSiLaT) technique are that it is done purely under local anesthesia and features a short hospital stay, tolerable postoperative pain, early return to normal daily activity, and an extremely low recurrence rate.

Materials and Methods

From September 2018 to June 2019, a total of 17 patients presenting with symptoms attributed to sacrococcygeal pilonidal sinus disease underwent the mSiLaT procedure at our center. Patients displaying symptoms attributed to sacrococcygeal pilonidal sinus disease were included in the study. All patients contributing to the paper by their data provided informed consent. The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

We defined symptomatic pilonidal disease as either chronic discharge or a history of abscess formation requiring drainage or draining spontaneously. Patients presenting with recurrent pilonidal sinus (i.e., those with a previous surgical intervention for definitive treatment of pilonidal sinus) were excluded from the study and referred for either traditional surgery or the endoscopic approach. Immunosuppressed patients or patients currently on chemotherapy were also excluded from the study.

Patients were admitted to the same day care surgery unit 2 hours prior to surgery. They were discharged 6 hours after surgery. Intravenous (IV) preoperative antibiotics were given 30 minutes prior to incision. The surgical technique is described below. A single surgeon completed all the operations, with no change in the surgical technique.

Preoperative preparation and management were unified for all patients and are discussed below. The same anesthesia protocol was followed throughout the study, and all patients were followed by the same surgeon who did the surgery and monitored the wound healing.

Prior to Surgery

The goal at this stage was to educate the patient about the disease itself, explore all the surgical options, and prepare the patient for definitive surgery. The aim at this stage was to optimize the local conditions in the sacrococcygeal region. Hence, patients were divided grossly into those presenting with a chronic inflammatory complaint but no pain and those presenting with an acute inflammatory complaint (mainly abscess formation). The first group did not require antibiotic therapy prior to surgery, whereas the second group required either antibiotic therapy prior to surgery or antibiotic therapy with abscess drainage. Antibiotics and abscess drainage are believed to improve the local conditions so that a better result will be attained after surgery.

Patients presenting with tenderness over the sacrococcygeal region with cellulitis but no abscess formation (thus no drainage indicated) were given a seven-day course of per os antibiotics. Patients in this category received a phone call within 48 to 72 hours after initiation of antibiotics; those with improving symptoms continued the seven-day course, and those with stable or worsening symptoms were scheduled for an early follow-up visit. Responders were scheduled for the mSiLaT procedure 4 to 6 weeks later.

Patients presenting with sacrococcygeal abscess formation underwent abscess drainage and were discharged on a seven-day course of per os antibiotics. They were also scheduled for the mSiLaT procedure 4 to 6 weeks after abscess drainage. The 4 to 6 week period is given for the inflammatory reaction at the site of abscess drainage to cool down as we believe that improving the local conditions will result in a better outcome.

Post-surgery

All patients were followed up using a standardized approach. All patients were seen prior to discharge from the hospital and were informed about the red flags for possible complications and the expected postoperative pain. Follow-up visits were scheduled on the 3rd and 6th days post-surgery and weekly thereafter until complete healing. Then, follow-up for at least one year was recorded.

The primary endpoint was complete wound healing. Incomplete wound healing was considered when patients were still experiencing discharge from the surgery site or an open wound was documented 45 days after surgery, which was also defined as early recurrence.

Disease recurrence was also reported if patients presented with complaints of discharge, swelling, or local pain within one year of wound healing.

Surgical Technique

Prophylactic antibiotics were administered 30 minutes prior to surgery.

Prone position was used, with the patient's legs slightly apart. The patient's buttocks were retracted laterally by two big plasters; this facilitated adequate exposure, such that any midline pits requiring surgical management would not be avoided. Local anesthesia was injected 2 cm away from the largest midline pit to avoid the cooling effect on the laser heat from the injected local anesthetic, which we call the laser sink effect. The surgeon stood on the patient's left side. The mSiLaT procedure is divided into two major steps, the diagnostic step and the operative step.

Diagnostic Step

This phase aids in identifying the anatomy of the sinus and is mainly used to determine the lateral extension of the sinus. In particular, blind ending tracts 4 cm or more away from the midline are identified and marked using a surgical marker pen. These marks are used at a later stage in the draining phase. A metallic probe is used to define the anatomy and the dimensions of the pilonidal sinus cavity.

Operative Step

After probing the pilonidal sinus cavity, a small curette is used to debride the cavity wall and remove any hair or hair follicles that are present. Following the debridement, washing of the cavity is done using normal saline to remove all retained debris. We believe that this step is essential for optimal wound healing and cavity obliteration at a later stage.

Excision of the midline pit (usually the one with the largest dimensions) is achieved by a 0.5-cm elliptical incision. The incision is drifted away from the midline. Once debridement and cleaning are achieved, the laser probe is inserted into the site of the excised pit. To facilitate the probing of the sinus, the direction of the laser probe should be perpendicular initially and then horizontal towards the predefined borders during the diagnostic step. It might occasionally be difficult to insert the laser probe; however, holding and retracting the edge of the excised pit using Kelly forceps will facilitate the insertion of the laser probe. If the sinus cavity is more than 4 cm away, usually superiorly or superolateral, another incision is made at the distal end, which we define as the counter incision. This is done to facilitate draining of the obliterated cavity in case a collection, seroma, or hematoma is encountered in the early postoperative period. The 4 cm length is chosen arbitrarily, as this is believed to create a bridge of skin between the two incisions that is not subject to necrosis due to laser heat or a compromised blood supply.

The laser probe, connected to a diode laser set at a wavelength of 1470 nm, is then introduced into the tracts. Continuous mode is used in the settings. The laser probe is withdrawn 1 mm per second; one can feel the cavity being obliterated as the probe is being withdrawn by the need of a slightly bigger force to withdraw the probe. The relatively slow withdrawal rate ensures that the cavity is obliterated and hemostasis is achieved. This step is followed by gentle washing with normal saline using a 10 ml syringe. If resistance is encountered, then the cavity has been obliterated. Besides, a second attempt is made to intubate the cavity by the laser probe; failure to re-intubate due to resistance indicates a satisfactory obliteration.

For cavities larger than 4 cm, where we believe that a counter incision is needed, satisfactory obliteration of the tract is noted by the failure of the injected saline from the midline excision site to reach the counter incision.

The laser probe insertion and slow withdrawal maneuver must be repeated if a non-satisfactory obliteration is encountered. On the other hand, if incomplete obliteration is encountered after the second attempt, we suggest inserting the laser probe, relaxing the big plasters placed at the beginning of the procedure, and repeating the withdrawal.

All smaller midline pits are debrided. Vertical ablation using the laser probe is done to all midline pits, as well as to the counter incisions that are made. Skin edges at the site of the incision are cauterized by cautery, as this will delay the early closure of skin and hence, facilitate drainage of any collection (seroma or hematoma) if encountered in the postoperative period. A light dressing is applied.

Results

Seventeen patients were determined to be eligible for our study. Table 1 summarizes the patient characteristics and clinical findings. The mean number of openings per patient was 1.4. In 60 percent of cases, isolated midline openings were found. In 40 percent of cases, there were openings in the midline as well as a lateral opening.

All patients returned to normal daily activities without pain-induced limitations on the first postoperative day. All patients returned to work two days after surgery. None of the patients experienced necrosis of the sinus roof. No hematoma or seroma was documented.

One patient had a wound infection, diagnosed one week after surgery. This was managed by outpatient drainage through the counter incision made during surgery, followed by a negative pressure wound therapy dressing for six days.

Patients were followed up for one year after complete wound healing was documented. Complete wound healing was achieved in all 17 patients within 31 days (Table 2). The mean complete wound healing time was 15 days. After one year, no recurrences were documented, and no patients were lost to follow-up.

Table 1: Patient characteristics and antibiotics administration

Patient	Gender	Midline pit	Paramedian opening	Preoperative antibiotics	Postoperative antibiotics
1	Male	Present	Present	Yes	No
2	Male	Present	Present	Yes	No
3	Female	Present	Absent	Yes	No
4	Male	Present	Absent	Yes	No
5	Female	Present	Present	Yes	No
6	Male	Present	Absent	Yes	No
7	Male	Present	Absent	Yes	No
8	Female	Present	Present	Yes	No
9	Male	Present	Absent	Yes	No
10	Male	Present	Present	Yes	No
11	Male	Present	Absent	Yes	Yes
12	Female	Present	Absent	Yes	No
13	Male	Present	Absent	Yes	No
14	Male	Present	Present	Yes	No
15	Male	Present	Absent	Yes	No
16	Male	Present	Absent	Yes	No
17	Female	Present	Present	Yes	No

Table 2: Days taken to achieve complete wound healing

Patient	Days for complete healing
1	14
2	11
3	8
4	17
5	21
6	17
7	10
8	10
9	20
10	27
11	31
12	10
13	13
14	12
15	15
16	15
17	16

Discussion

Pilonidal disease is an inflammatory disease affecting the natal cleft area. It can result in abscess formation and recurrent acute and chronic infections at the level of the natal cleft (3). Multiple surgical approaches have been described, yet there is no gold standard approach. These approaches can be broadly divided into two major branches: traditional and minimally invasive surgery. Remarkable pain and significant risk of recurrence are the main drawbacks of the traditional approach.

The mSiLaT technique seems to be an attractive option as it can meet patients' expectations with low postoperative pain and an excellent result in terms of of local recurrence. This technique takes advantage of the thermal effect of the laser to obliterate the pilonidal sinus cavity. The penetration of the laser energy is controlled and limited to 2–3 mm around the laser probe. We also inject the local anesthetic 2 to 3 cm away from the laser area in order to avoid what we call the "laser sink effect". As a result of the destruction of the epithelial lining and the granulation tissue, a shrinking and sealing effect on the sinus is elicited (4). The two main superior points of this technique is that it is done using local anesthesia and as a one-day surgery, reducing the length of hospital stay. The weakness of the procedure is the blind identification of the tracts and hence blind identification of the anatomy. The absence of direct vision and the blind nature of this technique may result in retained hair and parts of the sinus not being treated. For this reason, in order to reduce the risk of recurrence, careful debridment and cleaning of the sinus cavity is mandatory prior to laser treatment (5). To our knowledge, the modification that we did through adding the incisions over the blind cavity or blind tracts, the use of normal saline to make sure the tract is completely obliterated, and relaxing the big plasters to facilitate the obliteration has not been described previously. From our point of view, these modifications will aid in the development of a novel technique for treating pilonidal disease.

The optimal treatment for recurrent pilonidal disease remains an area of debate. Traditional surgery has its own pros and cons. The open technique is time-consuming, and the wound is left open for secondary closure, involving a relatively long healing time (6). However, it is associated with significantly lower recurrence rates than closed healing. On the other hand, primary closure including flaps is associated with a faster healing rate and fewer days off work (3, 7-9). However, this potential advantage is neutralized by the increased risk of wound dehiscence and infection. Added to this are the risk of recurrence and the higher costs if a reconstructive flap is used (10). Recurrence rates of up to 13 percent have been reported by Allen-Mersh (11) one year following the use of open methods, and 15% after excision

and closure. From this perspective, the traditional surgical techniques with the associated morbidity are becoming less and less popular. It is expected that the near future will witness an increase in the use of minimally invasive procedures to treat pilonidal sinus disease, especially since the condition is more common among adolescents who have a relatively intense lifestyle and are overloaded with work. For instance, Nordon and Senapati (12) reported a median of two weeks away from work following the Bascom procedure. Furthermore, another study stated a rate of surgical infection of 9.24%, an average of 5 days of in-hospital care, and an average of 20 days for return to normal daily activity including return to work (13).

In the present study, the mSiLaT procedure was introduced as a novel surgical approach in treating pilonidal disease. Despite our small sample size, using the mSiLaT procedure resulted in excellent results in terms of wound healing and postoperative complications (wound infection, bleeding, and dehiscence). Furthermore, excellent results regarding recurrence at one-year follow-up were observed. Overall, patients undergoing the mSiLaT procedure for pilonidal disease seemed to have a high satisfaction rate. This was attributed to low postoperative pain and the rapid return to work and daily activities. Moreover, during the follow-up session, patients stated that they would prefer the same treatment if the disease recurred.

Despite these promising results, the present study presents several limitations. Firstly, the sample size was small, which may lead to complications being underrated. Furthermore, randomized studies are needed to better define the future role of this procedure compared with other procedures in treating pilonidal sinus disease.

Conclusion

Although pilonidal sinus disease is frequently observed, the optimal surgical approach is yet to be determined. The approach varies depending on the surgeon's preference, the extent and anatomy of the disease, and the patient's request and expectations. From this perspective, the mSiLaT procedure provides promising results as an emerging minimally invasive procedure that can conclude the everlasting debate on the optimal surgical management of pilonidal disease.

Statement of Ethics

This research complied with the guidelines for human studies and was conducted ethically in accordance with the World Medical Association Declaration of Helsinki. Ethical approval was not required.

Author Contributions

All authors contributed equally to the writing and preparation of the article.

Data Availability: All data are available upon request.

Conflicts of interest: None declared.

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