NEW TECHNOLOGY REPORT

Laser Ablation of Pilonidal Sinus Disease: A Pilot Study

Michael D. Williams, M.D., M.S.
Gwyneth A. Sullivan, M.D., M.S. • Neha Nimmagadda, M.D.
Brian C. Gulack, M.D., M.H.S. • Mary Beth Madonna, M.D.
Dana M. Hayden, M.D., M.P.H. • Henry Govekar, M.D. • Ami N. Shah, M.D.

Department of Surgery, Rush University Medical Center, Chicago, Illinois

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BACKGROUND: Pilonidal disease is classically treated with wide local excision, although a number of minimally invasive approaches are currently under investigation. We aimed to determine the safety and feasibility of laser ablation of pilonidal sinus disease.

IMPACT OF INNOVATION: Laser ablation provides a minimally invasive means of obliterating pilonidal sinus tracts without a need for excessive tract dilation. Laser ablation can be performed more than once on the same patient if necessary.

TECHNOLOGY MATERIALS AND METHODS: This technique uses the NeoV V1470 Diode Laser (neoLaser Ltd, Caesarea, Israel) with a 2-mm probe. We performed laser ablation in adults and pediatric patients.

PRELIMINARY RESULTS: We performed 27 laser ablation procedures in 25 patients, with a median operative time of 30 minutes. Eighty percent of patients reported either no pain or mild pain at the 2-week postoperative visit. The median time to return to work or school was 3 days. Eighty-eight percent of patients reported being satisfied or very satisfied with the procedure at their most recent follow-up (median, 6 mo). Eighty-two percent of patients were healed at 6 months.

CONCLUSIONS AND FUTURE DIRECTIONS: Laser ablation of pilonidal disease is safe and feasible. Patients experienced short recovery time and reported low levels of pain and high levels of satisfaction.

KEY WORDS: Adult; Laser; Minimally invasive; New technology; Pediatric; Pilonidal disease.

Pilonidal disease (PD) is a common problem affecting young people, typically between the age of 15 and 30.[1] PD is historically treated with a wide local excision (WLE), with or without flap coverage.[2] However, the morbidity, risk of recurrence, and long-term wound care associated with WLE can be unappealing to patients and surgeons alike.[3] As a result, a number of less-invasive approaches have emerged, which typically offer lower morbidity at the expense of higher recurrence rates.[4] Minimally invasive approaches are worthwhile options to consider, particularly in patients who desire a rapid return to work or school.[5] Despite the momentum away from wide excisions, there is still debate over the best minimally invasive alternative.[6]

Although surgical lasers have become commonplace in a number fields, such as cardiology and urology,[7] there are limited data to support the use of lasers for the management of PD. Early results from Europe appear promising, with success rates up to 94% and a mean complication rate of 10%[8]; however, no published studies have been conducted in North America. Therefore, we designed a prospective pilot study to determine the safety and feasibility of laser ablation of PD. The laser ablation was performed in conjunction with trephination, also known as the Gips procedure.[9]

IMPACT OF INNOVATION

Despite the advances in minimally invasive management of PD, there remains room for improvement. Techniques

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Correspondence: Ami N. Shah, M.D., Department of Surgery, Division of Pediatric Surgery, Rush University Medical Center, 1750 W. Harrison St, Chicago, IL 60612. E-mail: ami_n_shah@rush.edu

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such as unroofing, curettage, and endoscopic ablation typically require significant enlargement of pilonidal tracts, which may contribute to prolonged healing time via decreased tissue apposition. In contrast, laser therapy aims to obliterate tracts by causing an inflammatory reaction. Thus, the laser may be particularly useful in patients with narrow-diameter sinuses, which would otherwise need to be dilated or completely excised. Given its unique applications in PD, the potential benefits of the laser ablation technique should be explored.

TECHNOLOGY MATERIALS AND METHODS

The Technology

We used the NeoV V1470 diode laser (Neolaser Ltd, Caesarea, Israel). The system uses a 1470-nm wavelength laser, which is emitted radially from the tip of an optical fiber. Light at this wavelength is absorbed rapidly by water in tissue, which causes coagulation to a depth of just 2.5 mm, minimizing thermal spread and collateral damage. The optical fiber lies within a long, thin probe <2 mm in diameter. Thus, the probe can easily be inserted deep into pilonidal cyst cavities and their associated tracts. As the probe is removed, the laser is fired and circumferentially desiccates the walls of the tracts.[10] The cost of the NeoV V1470 diode laser unit is $25,000 (USD) and each fiber unit is $325. Our institution uses the laser for other procedures, including the treatment of perianal fistulas.

Operative Procedure

Patients are placed in a prone position with their hips flexed. After hair is trimmed and skin is prepared, a close examination identifies the number of pits with associated sinuses to be addressed. The majority of these sinuses tracked laterally, often to an area that had previously spontaneously drained or had an incision or drainage performed. The pits are then explored with a lacrimal duct probe to determine the direction and length of any associated sinus tracts. Diluted hydrogen peroxide or saline solution can also be injected via a small venous catheter to identify connections between pits. Similar to the Gips pit-picking procedure, a 3- or 5-mm punch biopsy is used directly over the associated pits to access the underlying cavities. The cavity is cleaned out with a curette, and hemostasis is achieved with manual pressure.

After ensuring that all operating room personnel are wearing safety goggles, the laser probe is inserted through the punch biopsy site and into the sinus tracts to the appropriate depth determined by probe exploration. The assistant (or the surgeon's opposite hand) should provide external compression to collapse the tract entirely around the probe. At this point, the laser is fired continuously while the probe is extracted slowly from the tract. As the tract lining is desiccated, a crackling sensation can be observed, as well as increased tension while pulling the probe against coagulated tissue. This process is repeated for any sinus tracts that were identified. Many patients had more than 1 sinus tract, requiring the laser to be inserted and fired multiple times. At the end of the procedure, the punch biopsy sites are packed with iodoform-impregnated gauze.

Study Design and Patient Selection

We performed a prospective observational study at 2 centers. The study was approved by the Rush University Medical Center and Edward Hospital institutional review boards. Patients over the age of 14 with PD were eligible for inclusion. If, upon exploration, any patients were found to have PD with large subcutaneous cavities and no sinus tracts laterally, the laser was not used. These patients were treated using other previously described techniques,[11] such as a WLE or incision and drainage with curettage, and were not included in this study. The exclusion criteria for laser ablation of the tracts were pits with active infection needing incision and drainage and pilonidal pits without lateral sinus tracts.

After laser treatment, patients were seen in the clinic within 2 weeks. Subsequent follow-up was conducted by phone at 1, 2, 3, 6, and 12 months. At each time point, patients were asked to describe their pain using a 4-point scale (severe, moderate, mild, or none). They were also asked to rate their satisfaction on a 5-point scale (very satisfied, satisfied, neutral, unsatisfied, or very unsatisfied). Finally, patients were asked to describe any drainage, open wounds, or recurrent symptoms if present.

PRELIMINARY RESULTS

Twenty-five patients underwent 27 laser ablations during the study period (52% male, median age 17.9 years; Table 1). Seventy percent of procedures were performed under general anesthesia, and 30% used monitored anesthesia care and/or local anesthesia. The median operative time was 30 minutes (range, 14–85 minutes). There were no adverse events. All cases were outpatient procedures. Patients were discharged with iodoform gauze packing in place, with instructions to remove it after 24 hours. Eighty-eight percent of patients reported either no pain or mild pain at the time of discharge.

All patients were seen in the clinic within 2 weeks (Table 2). Eighty percent of patients reported either no pain or mild pain at that time. Most wounds were healed within 2 weeks; 1 patient experienced persistent wound drainage at a 2-week follow-up, and another patient developed a wound infection that was successfully treated with 1 week of oral antibiotics (amoxicillin–clavulanate). The median time to return to work or school was 3 days, and 80% of patients returned within 1 week.

TABLE 1. Laser ablation of pilonidal sinus disease: patient and operative characteristics

Variable	*N (%)*
Age, y, median (IQR)	17.9 (15.8–27.3)
Race	
Non-hispanic White	11 (44)
Hispanic	9 (36)
Black	2 (8)
Asian	1 (4)
More than 1 race	2 (8)
Duration of disease before treatment (d)	97 (60–380)
Anesthesia	
General	19 (70)
MAC/local	8 (30)
Operative time (min, IQR)	30 (25–40)

Categorical variables are listed as count (percentage). Continuous variables are listed as median (IQR).
IQR = interquartile range; MAC = monitored anesthesia care; min = minutes; y = years.

TABLE 2. Outcomes at 2-wk postprocedure in 27 laser treatments

Variable	*N (%)*
Pain at 2-wk follow-up	
No pain	11 (40.7)
Mild pain	11 (40.7)
Moderate pain	4 (15.8)
Severe pain	1 (3.8)
Persistent drainage at 2-wk follow-up	1 (3.8)
Wound infection	1 (3.8)
Time to return to work/school, d, median (IQR)	3 (2–6)

Categorical variables are listed as count (percentage). Continuous variables are listed as median (IQR).
IQR = interquartile range; d = day; wk = week.

TABLE 3. Outcomes at 6 mo postprocedure for 25 patients

Median total follow-up (d, IQR)	*175 (172.5–178)*
Patients with at least 6 mo follow-up	22
Healed	18 (82)
Persistent drainage at 6 mo	1 (4)
Recurrent disease within 6 mo	3 (12)
Satisfaction at a most recent follow-up	
Very satisfied	19 (76)
Satisfied	3 (12)
Neutral	1 (4)
Dissatisfied	1 (4)
Very dissatisfied	1 (4)

Categorical variables are listed as count (percentage). Continuous variables are listed as median (IQR).
IQR = interquartile range; d = day; mo = months.

A total of 22 patients were followed-up for 6 months. Of these, 18 patients (81.8%) were healed at 6 months. One patient experienced persistent drainage for 6 months after the procedure, and 3 patients, who healed initially, developed recurrent disease. These patients had a repeat Gips procedure with laser sinus tract ablation. Seventy-six percent of patients reported feeling very satisfied with the procedure at their latest follow-up (Table 3).

CONCLUSIONS

Laser ablation of PD can be performed safely in adult and pediatric populations, with minimal operative time and a quick recovery. Postoperative wound care is minimal; wounds are small, and most heal within 2 weeks. Patient-reported outcomes are promising, with low rates of postoperative pain and high levels of satisfaction for at least 6 months.

A few patients experienced persistent drainage or developed recurrent disease within 6 months; however, a second laser procedure can be performed safely and is well tolerated. It is unknown at this time whether the procedure can be repeated if the patient has a recurrence of a WLE. However, the laser ablation can be performed safely multiple times with recurrence from the Gips procedure. WLE can always be offered as a more definitive procedure; however, the associated postoperative pain and wound care can negatively affect the quality of life. The laser ablation technique provides a safe alternative for patients with sinus disease who wish to avoid WLE, particularly pediatric patients, in whom the postoperative pain and wound care can be challenging.

FUTURE DIRECTIONS

Laser therapy provides a new PD treatment option with high patient satisfaction. Our results with the laser device are also similar to those published in initial European trials.[8] Future comparative studies can better determine how this treatment compares to other minimally invasive techniques.

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