Medical Policy

Blue Cross Blue Shield Blue Care Network of Michigan

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***Current Policy Effective Date: 3/1/24**
(See policy history boxes for previous effective dates)

Title: Nd: YAG Laser Treatment for Hidradenitis Suppurativa

Description/Background

Hidradenitis suppurativa (HS), also known as Acne Inversa, is a chronic skin infection that involves apocrine sweat glands in the axillas and groin areas primarily, but can also involve perianal and breast skin tissues. Symptoms consist of blackheads, painful cysts and abscesses that form in body fold areas, like underarms and groin, where there are hair follicles and apocrine sweat glands. It may affect one or multiple areas of the body. It causes chronic purulent drainage and scarring. Due to recurrent, draining, pus-filled boils and abscesses, hidradenitis is a physically, socially and psychologically disabling disease.

HS affects approximately 1-4% of the population of the world. Women are more likely than men to be affected. Hidradenitis suppurativa usually occurs between puberty and age 40. It rarely affects children, but can occur in adults older than 40. Having a family history of hidradenitis suppurativa increases the risk of developing the disease. The underlying cause is unknown.

Early diagnosis and treatment of hidradenitis suppurativa can help manage the symptoms and prevent new lesions from developing.

According to the criteria of the international symposium of the Hidradenitis Suppurativa Foundation of March 2009, to make a diagnosis of hidradenitis suppurativa, the following must be present:

- Blackheads, deep-seated painful nodules and boils early on, then abscesses, draining sinuses and bridged scars in later stages of disease
- Location in the underarms, groin, perianal region, buttocks, skin under and between breasts. The neck and area behind the ears can also be affected. Pilonidal sinuses are quite common.
- The condition is chronic and recurrent.

Hidradenitis suppurativa often causes complications when the disease is persistent and severe. These complications include:

- Sinus tracts or tunnels that connect and form a network under the skin: The tracts prevent the sores from healing and cause more sores to develop.
- Scars and skin changes: Severe hidradenitis suppurativa may leave thick, raised scars, pitted skin or patches of skin that are darker than normal (hyperpigmentation).
- Restricted movement: The disease may cause limited or painful movement, especially when it affects the armpits or thighs.
- Cellulitis: This potentially serious bacterial infection appears as an area of swollen, red skin that feels hot and tender and that may spread rapidly. Although the initial infection may be superficial, it eventually can affect the tissues underlying the skin or spread to the lymph nodes and bloodstream.
- Pyoderma gangrenosum, necrotizing inflammation at a site separate from the hidradenitis, usually on the lower extremity, has also been described.

There is no medical cure for hidradenitis suppurativa but mild or questionable cases can be treated with self-care measures including warm compresses and regular washings with antibacterial soap. Moderate cases may require topical or oral medications. Treatments depend on the extent of the affected areas, the amount of pain and state of infection. Possible medications include:

- Antibiotics to treat infection. Antibiotics taken for a long time early in the disease may prevent future outbreaks or prevent the disease from worsening.
- Oral retinoid medications to stop oil gland functions and to prevent the plugging of hair follicles.
- Nonsteroidal anti-inflammatory drugs to reduce pain and swelling.
- Corticosteroids or immunosuppressant drugs.

For severe or persistent cases or for deep lesions, surgery is necessary, with removal of all involved skin and can be curative. Surgical excision of involved areas can eradicate the disease and may prevent new lesions from developing. Obesity, incomplete removal of the affected glands and ongoing skin infections can increase the chances that the hidradenitis suppurativa will return.

Almost all surgeons agree that the only chance for a lasting cure is complete removal of the hair-bearing area and the underlying diseased deep dermal tissue in the axilla. After excision of the diseased tissue, a number of surgical techniques have been recommended for wound closure. Primary closure is recommended by some surgeons. Split-thickness skin grafts have also been advocated to resurface large defects resulting from excision of the skin. Satisfactory results have also been obtained using local flaps. An anteriorly based Limberg flap has been used with HS in women, whereas a posteriorly based flap has been used in men.

Treatment of HS with lasers and other energy devices hold the most future potential for effective treatment of this condition. Laser therapy for HS first began in the 1990s and 2000s, using various types of devices and wavelengths, including the use of the long-pulsed Nd: YAG laser 1064 nm. Nd: YAG (neodymium-doped yttrium aluminum garnet; Nd:$Y_3Al_5O_{12}$) is a crystal that is used as a lasing medium for solid-state lasers. In oncology, Nd:YAG lasers can be used to remove skin cancers. They are also used to reduce benign thyroid nodules, and to destroy primary and secondary malignant liver lesions.

Though generally used for hair removal, the neodymium: yttrium-aluminium-garnet (Nd: YAG) laser has recently shown promise for the treatment of HS lesions. The possible mechanism of action is thought to be follicular ablation and the destruction of inflammatory lesions through photothermolysis.

Regulatory Status:

The long-pulsed Nd:YAG laser has an US FDA-approved indication for laser hair removal for darker skin types.

- The FriendlyLight® Nd:YAG Lasers received 510K FDA approval March 2, 2004. The FriendlyLight® Nd:YAG Laser systems are intended for the coagulation and hemostasis of benign vascular lesions such as, but not limited to, port wine stains, hemangiomas, warts, telangiectasia, rosacea, venus lake, leg veins, spider veins and poikiloderma of civatte; and treatment of benign cutaneous lesions, such as warts, scars, striae and psoriasis. The lasers are also intended for the treatment of benign pigmented lesions such as, but not limited to, lentigos (age spots), solar lentigos (sun spots), café au lait macules, seborrheic keratoses, nevi, chloasma, verrucae, skin tags, keratoses, tattoos (significant reduction in the intensity of black and/or blue/black tattoos) and plaques. Additionally, the lasers are indicated for pigmented lesions to reduce lesion size, for patients with lesions that would potentially benefit from aggressive treatment, and for patients with lesions that have not responded to other laser treatments. They are also indicated for the treatment of wrinkles, such as, but not limited to, periocular and perioral wrinkles, for the removal of unwanted hair (stable long term, or permanent, hair reduction through selective targeting of melanin in hair follicles, and for the treatment for pseudofolliculitis barbae (PFB), and for the reduction of red pigmentation in hypertrophic and keloid scars where vascularity is an integral part of the scar.
- The Microruptor V is for noninvasive tissue membrane dissection (photodisruption) in the eye. Indications for use include posterior capsulotomy, peripheral iridotomy and pupillary membranotomy.

There are no lasers specifically FDA-approved for the treatment of hidradenitis suppurativa. Treatment of HS with lasers is considered to be an off-label use of these devices.

Medical Policy Statement

The use of the Nd:YAG laser for the treatment of hidradenitis suppurativa is experimental/ investigational. It has not been scientifically demonstrated to improve patient clinical outcomes.

Inclusionary and Exclusionary Guidelines

N/A

CPT/HCPCS Level II Codes *(Note: The inclusion of a code in this list is not a guarantee of coverage. Please refer to the medical policy statement to determine the status of a given procedure)*

Established codes:

N/A

Other codes (investigational, not medically necessary, etc.):

96999

Rationale

The published literature related to laser treatment for hidradenitis is scant. Nine abstracts were reviewed, including one retrospective study (n=34); two clinical studies focusing on the presence of serum and topical bacteria in patients with hidradenitis (n=21 and 25); two individual case reports; and four review articles. One abstract mentioned a specific device, the Smoothbeam™ laser system (Candela Corporation). There is some overlap of authors and institutions.

There have been no randomized, controlled clinical trials to determine the safety and effectiveness of this procedure. It is unclear whether there would be any long-term improvement in the patient's symptoms following this therapy. In November, 2008, there was a clinical trial on the effect of Nd:YAG laser for the treatment of hidradenitis suppurativa at Henry Ford Hospital in Detroit. The study was completed in 2009, but no study results have been posted.

A 2004 article by Downs discussed the treatment of one patient with hidradenitis suppurativa.[2] This patient achieved partial improvement after 4 treatments and sweating was noticeably reduced. It was postulated that intermittent laser treatment might be needed to maintain or build upon the improvements gained. However, the author states for patients with long-standing HS with established sinuses and thick scar tissue are unlikely to be helped by this form of laser treatment. There was no subjective or objective improvement seen in the patient with HHD. The only notable beneficial effect was a marked reduction in sweating and elimination of the body odor.

In 2006, Krasner et al reported on the use of the 1064 nm for treatment of dissecting cellulitis.[8] It has been postulated that the use of long-pulsed Nd:YAG laser for HS could potentially work since HS evolves from primary follicular hyperkeratosis and occlusion.

A clinical trial, NCT00494351, "Study on the Effect of ND: Yag Laser for the Treatment of Hidradenitis Suppurativa," was initiated in 2007. The purpose of the study included:

- Determination of the short and long-term efficacy of ND: YAG laser for treatment of Hidradenitis suppurativa, which is an inflamed, deeper follicular disorder.
- Determination of patient tolerance of discomfort associated with ND: Yag laser treatment for Hidradenitis suppurativa.
- Determination of the impact of this condition on quality of life and if there is any impact of therapy in the dermatology quality of life index.
- Evaluate the histopathologic changes of YAG therapy on affected skin

Patient selection included the following criteria:

- Be at least 18 years old
- Be otherwise healthy
- Have a diagnosis of HS
- Patients with Hurley stage II, with one or more widely separated recurrent abscesses, with a tract and scarring, bilateral and symmetrical, will be eligible for inclusion in the study.
- Agree to abide by the Investigator's guidelines regarding photosensitizing drugs
- Be able to understand the requirements of the study, the risks involved, and be able to sign the informed consent form
- Agree to follow and undergo all study-related procedures.

A second phase of the trial was a prospective, controlled clinical and histologic study of patients with Hurley Stage II HS disease. Nineteen patients of skin types II to VI with Hurley Stage II hidradenitis suppurativa lesions of the axilla and groin were treated. This is a different set of patients than those treated in the first phase of the study above. This study primarily focused on and further characterized the histologic changes after laser treatment.

The study was completed in May of 2009; however, at this time, no study results have been posted.

In 2009, Tierney et al. reported on the treatment of 22 patients with Stage 2–3 HS using the long-pulsed Nd: YAG laser with a 65.3% decrease in HS severity after a three-month treatment course using the modified HS Lesion, Area and Severity Index (HS-LASI).[17] They also found greater improvement in anatomical areas with dark, coarse terminal hairs such as the inguinal area and axilla. Areas with vellus hairs, which include the inframammary area, had less improvement than the groin and axilla. This response supported the mechanism of laser-induced hair removal, and subsequent deep heating of inflammatory lesions.

Another study carried out by the same group focused on patients with Hurley Stage 2 disease as the laser was found to treat individual abscesses more effectively than the deep interconnected sinus tracts of Stage 3 disease. Histologic examination on four patients showed 72.7% improvement based on the modified HS-LASI after four monthly treatments with the long-pulsed Nd:YAG laser. Histologic examination showed an acute inflammatory infiltrate, predominantly neutrophils, 1 week after laser treatment. After 4 weeks following the four monthly laser treatments, granulomatous infiltrate was seen surrounding the hair shaft remnants, showing destruction of hair follicles. The authors postulated that de-occlusion of the follicular unit results in drainage of the inflammatory lesion and follicular ablation.

In 2010, Xu et al conducted a histopathologic study of hidradenitis suppurativa following long-pulsed 1064-nm Nd: YAG laser treatment.[18] It was a prospective, controlled clinical and histologic study of patients with Hurley stage II HS disease. Nineteen patients with Fitzpatrick skin types II to VI with Hurley stage II HS lesions of the axilla and groin. Interventions Two monthly laser sessions were performed using the long-pulsed 1064-nm Nd:YAG laser. Main Outcome Measure Clinical response was scored using the modified Sartorius scale for HS reflecting Lesion Area and Severity Index (LASI). Histologic changes were examined before treatment and 1 week, 1 month, and 2 months after treatment. Results: The percentage change in HS severity after 2 sessions of laser treatment was -31.6 over all anatomic sites ($P<.005$), -24.4 for the axillary site ($P = .008$), and -36.8 for the inguinal site ($P = .001$). Histologic changes corresponded to clinical response. Findings from serial biopsy specimens showed increased inflammation at 1 week after treatment and decreased inflammation with

resulting fibrosis and scarring at 1 month and 2 months after treatment. Conclusions: The long-pulsed 1064-nm Nd:YAG laser is a novel effective treatment option for HS. The histopathologic data suggested that HS is primarily a follicular disorder. The Nd:YAG laser penetrates for selective photothermolysis of the follicular unit and destruction of organized inflammatory lesions in the superficial to mid dermis. The study offered insight into the pathogenesis of HS and the mechanism of the Nd:YAG laser in treatment of patients with this chronic, debilitating disease.

An article by Jemec in the New England Journal of Medicine, published in 2012, states that "…there is a need for a systematic comparison of surgical techniques (e.g., laser vs. conventional surgery) and approaches to post-procedure management (open healing vs. primary closure or skin grafting)" in patients with hidradenitis suppurativa.

In 2013, the Canadian Agency for Drugs and Technologies in Health provided a Rapid Response Report: Summary with Critical Appraisal entitled, "Nd:YAG Laser for the Treatment of Patients with Hidradenitis Suppurativa: A Review of the Clinical Effectiveness, Cost-Effectiveness, and Safety."[1] A limited literature search was conducted on key resources including PubMed, The Cochrane Library (2013, Issue 7), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. Studies were excluded if they did not fit the selection criteria, were duplicate publications, were examined in an included systematic review, or were published prior to 2008.

One systematic review and three randomized controlled trials met the inclusion criteria. The systematic review examined all treatments for HS and included one RCT pertaining to the Nd:YAG laser. In all of the included randomized trials, the patients acted as their own controls, as randomization occurred either by body part affected by HS, or by side of the body. One of the included randomized trials reported 6-month outcomes for the patients who participated in the RCT included in the systematic review (which reported 3-month outcomes).

All of the included studies used monthly long-pulse Nd:YAG laser treatment for patients with HS. Topical co-treatments were also part of the treatment protocols for all of the included studies. One study did not specify the co-treatment, one study treated with 1% clindamycin gel, and the patient population examined in both the SR7 and one of the included RCTs was treated with benzoyl peroxide wash 10% and 1% clindamycin lotion. In all of the studies, both the Nd:YAG-treated body parts and the control parts were treated with the topical interventions. The main efficacy outcome of interest in the included studies was disease severity based on either the Modified Hidradenitis Suppurativa Lesion Area and Severity Index (HS-LASI) or a modified version of the modified HS-LASI. Patient satisfaction and patient-rated improvements were examined in two studies and adverse events such as pain, swelling, and thermal injury were examined in three studies. One of the RCTs presented outcomes only for the Nd:YAG laser-treated sites and not control sites.

In a prospective randomized right-left intra-individual controlled study by Azim et al in 2018, studied the safety and efficacy of combined treatment with fractional CO_2 laser and long pulsed Nd: YAG (1064 nm) laser in treatment of HS. Twenty adult patients with HS were randomized into this study. The patients were randomly allocated to receive four laser sessions with 2 weeks interval. Control side received long pulsed Nd : YAG laser (1064 nm) only, and the other side (combined treatment side) received combined fractional CO laser and long pulsed Nd : YAG (1064 nm) laser. Patients were clinically and histopathologically

evaluated 2 weeks post treatment. Recurrence was evaluated 3 months post treatment. Outcome was clinically evaluated by physician global assessment (PGA), 10-point visual analog scale for patient's satisfaction, and side effects.

Statistically significant higher improvement and patient's satisfaction was observed in combined treatment side compared with control side (P = 0.011, 0.048 respectively). Absence of recurrence was achieved by 55% of sides receiving combined treatment and 35% of control sides. Combination of fractional CO laser and long pulsed Nd : YAG (1064 nm) laser in treatment of HS had higher improvement and patient's satisfaction together with lower recurrence compared with long pulsed Nd : YAG (1064 nm) laser alone. Better results could be achieved with low PGA, non-obese populations, and absence of surgeries for the lesions.

SUMMARY OF EVIDENCE
After reviewing the evidence regarding many treatments for HS, including one RCT examining the Nd:YAG laser, the authors of the systematic review recommended a multidisciplinary approach that comprises both medical and surgical treatments. They found that for patients with stage I disease, Nd:YAG was considered appropriate, for patients with stage II disease monthly treatment with Nd:YAG, for at least three to four months, was recommended, and that a shift to biological agents would be appropriate if the laser treatment is not successful. They concluded that there was not enough strong evidence to make a recommendation for stage III disease.

The conclusions made by the authors of the systematic review based on an RCT with a three-month follow-up were similar to the results found in the additional RCTs included in this review. Based on studies with a limited number of patients, with a maximum of six-months of follow-up, Nd:YAG was found to be a promising treatment option for patients with HS. Only the study with the fewest number of subjects, which was not powered to detect differences, found no effect of the Nd:YAG laser on HS lesions. Patients were also generally satisfied with Nd:YAG treatment.

As long-pulsed Nd: YAG laser treatment is non-invasive, and was found to be both well tolerated and satisfactory to patients; it is likely a reasonable treatment option for patients with HS. Studies with longer follow-up are needed in order to determine its long-term effectiveness and economic studies are needed in order to determine its cost-effectiveness.

Government Regulations
National:
There is no Medicare national coverage determination on this topic. Cases reviewed on an individual consideration basis.

Local:
There is no Medicare local coverage determination on this topic. Cases reviewed on an individual consideration basis.

(The above Medicare information is current as of the review date for this policy. However, the coverage issues and policies maintained by the Centers for Medicare & Medicare Service BCBSMCMS, formerly HCFA] are updated and/or revised periodically. Therefore, the most recent CMS information may not be contained in this document. For the most current information, the reader should contact an official Medicare source.)

Related Policies

N/A

References

1. Canadian Agency for Drugs AMD Technologies in Health. Rapid Response Report: Summary and Critical Appraisal. Nd: YAG Laser for the Treatment of Patients with Review of the Clinical Effectiveness, Cost-Effectiveness, and Safety. Available at http://www.cadth.ca/media/pdf/htis/aug-2013/RC0473%20NdYAG%20laser%20Final.pdf (accessed 8/21/14).
2. Downs, A., Smoothbeam laser treatment may help improve hidradenitis suppurativa but not Hailey-Hailey disease. J Cosmet Laser Ther. Volume 6, Number 3, November 2004, pp. 163-164.
3. El-Rifaie KM, El-Wakil T, Sobhi A, El Saket, H. Hidrandenitis Suppurative: Evaluation of Treatment Modalities and Patients' Satisfaction. Egypt. J Plast Reconstr Surg 2003 July Volume 27, Number 2. 231-237.
4. Gregor B.E. Jemec, M.D., D.M.Sc. Hidradenitis Suppurativa. N Engl J Med 2012; 366:158-164. January 12, 2012.
5. Highton L, Chan W, Khawaia N, Laitung JK. Treatment of hidradenitis suppurativa with intense pulsed light: a prospective study. Plast Reconstr Surg. 2011 Aug; 128(2):459-65.
6. Jain V and Jain A. Use of Lasers for the Management of Refractory Cases of Hidradenitis Suppurativa and Pilonidal Sinus. J Cutan Aesthet Surg. 2012 Jul-Sep; 5(3): 190–192.
7. Jemec, Gregor B. E., Hidradenitis Suppurativa, Journal of Cutaneous Medicine and Surgery, Volume 7, Number 1, January 2001, pp. 47-56.
8. Krasner BD, Hamzavi FH, Murakawa GJ et al. Dissecting cellulitis treated with the long-pulsed Nd:YAG laser. Dermatol. Surg. 32(8), 1039–1044 (2006).
9. Lapins, Jan, MD, et al., Scanner-assisted carbon dioxide laser surgery: A retrospective follow-up study of patients with hidradenitis suppurativa. Journal of the American Academy of Dermatology, Volume 47, Issue 2, August 2002, pp. 1-8.
10. Mahmoud BH, Tierney E, Hexsel CL, Pui J, Ozog DM, Hamzavi IH. Prospective controlled clinical and histopathologic study of hidradenitis suppurativa treated with the long-pulsed neodymium: yttrium-aluminium-garnet laser. J Am Acad Dermatol. 2010 Apr; 62(4):637-45.
11. Mortimer PS, Lunniss PJ. Hidradenitis suppurativa. J R Soc Med 2000; 93:420-422.
12. Rambhatla PV, Lim HW, Hamzavi I. A Systematic Review of Treatments for Hidradenitis Suppurativa. Arch Dermatol. 148:4 April 2012.
13. Sartorius K., et al., Bacteraemia in patients with hidradenitis suppurativa undergoing carbon dioxide laser surgery: Detection and quantification of bacteria by lysis-filtration. Dermatology, Volume 213, Number 4, November 2006, pp. 305-312.
14. Shah, Nipa, MD, Hidradenitis Suppurativa: A Treatment Challenge. American Family Physician, Volume 72, Number 8, pp. 1547-1552.
15. Slade, D. E., Hidradenitis suppurativa: pathogenesis and management. Br J Plast Surg, Volume 56, Number 5, July 1, 2003, pp.451-461.
16. Study of the Effect of Nd:YAG Laser for the Treatment of Hidradenitis Suppurativa. Henry Ford Health System, Identifier NCT00494351, http://clinicaltrials.gov/ct2/show/NCT00494351?term=hidradenitis&rank=2 (accessed 4/18/12).

17. Tierney E, Mahmoud BH, Hexsel C, Ozog D, Hamzavi I. Randomized controlled trial for the treatment of hidradenitis suppurativa with a neodymium-doped yttrium aluminium garnet laser. Dermatol Surg 2009; 35:1188-98.
18. Xu LY, Wright, DR, Mahmoud BH, Ozog DM, Mehregan DA, Hamzavi, IH. Histopathologic Study of Hidradenitis Suppurativa Following Long-Pulsed 1064-nm Nd:YAG Laser Treatment. Arch Dermatol. 2011; 147(1):21-28.
19. Yang MF, Xu LY. Laser and Light-based Treatments of Hidradenitis Suppurativa. Exper Review of Dermatology. Available at http://www.medscape.org/viewarticle/760562 (accessed 4/22/13).
20. John H, Manoloudakis N, Stephen Sinclair J. A systematic review of the use of lasers for the treatment of Hidradenitis Suppurativa. J Plast Reconstr Aesthet Surg. 2016;69(10):1374-1381.
21. Azim A, Salem RT, Abdelghani R. Combined fractional carbon dioxide laser and long-pulsed neodymium: yttrium-aluminium-garnet laser in treatment of hidradenitis suppurativa; a prospective randomized intra-individual controlled study. Int J Dermatol. Sep 2018;57(9):1135-1144.

The articles reviewed in this research include those obtained in an Internet based literature search for relevant medical references through September 2023, the date the research was completed

BCBSM/BCN Medical Policy History

Policy Effective Date	BCBSM Signature Date	BCN Signature Date	Comments
3/1/09	1/9/09	12/9/08	Joint policy established
9/1/12	6/12/12	6/19/12	Routine maintenance. No change in policy status.
9/1/13	6/19/13	6/26/13	Routine review.
1/1/15	10/24/14	11/3/14	Routine review of non-established service.
3/1/16	12/10/15	12/10/15	Routine review, no change in policy status
3/1/17	12/13/16	12/13/16	Routine policy maintenance. Added reference #20. No change in policy status.
3/1/18	12/12/17	12/12/17	Routine policy maintenance. No change in policy status.
3/1/19	12/11/18		Routine policy maintenance. No change in policy status.
3/1/20	12/17/19		Routine policy maintenance. Reference # 21 added. No change in policy status.
3/1/21	12/15/20		Routine policy maintenance. No change in policy status.
3/1/22	12/14/21		Routine policy maintenance. No change in policy status.
3/1/23	12/20/22		Routine policy maintenance. No change in policy status. (ky)
3/1/24	12/19/23		Routine policy maintenance. No change in policy status. Vendor: N/A (ky)

Next review: 4th Qtr. 2024

BLUE CARE NETWORK BENEFIT COVERAGE
POLICY: ND: YAG LASER TREATMENT FOR HIDRADENITIS SUPPURATIVA

I. Coverage Determination:

Commercial HMO (includes Self-Funded groups unless otherwise specified)	Not covered.
BCNA (Medicare Advantage)	See government section
BCN65 (Medicare Complementary)	Coinsurance covered if primary Medicare covers the service.

II. Administrative Guidelines:

N/A