ORIGINAL ARTICLE

North American clinical management guidelines for hidradenitis suppurativa: A publication from the United States and Canadian Hidradenitis Suppurativa Foundations

Part I: Diagnosis, evaluation, and the use of complementary and procedural management

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Hidradenitis suppurativa is a chronic inflammatory disorder affecting hair follicles, with profoundly negative impact on patient quality of life. Evidence informing ideal evaluation and management of patients with hidradenitis suppurativa is still sparse in many areas, but it has grown substantially in the last decade. Part I of this evidence-based guideline is presented to support health care practitioners as they select optimal management strategies, including diagnostic testing, comorbidity screening, and both complementary and procedural treatment options. Recommendations and evidence grading based on the evidence available at the time of the review are provided. (J Am Acad Dermatol https://doi.org/10.1016/j.jaad.2019.02.067.)

Key words: acne inversa; adalimumab; biomarkers; carbon dioxide laser; clindamycin; comorbidities; ertapenem; finasteride; guidelines; hidradenitis suppurativa; infliximab; laser; lifestyle modification; microbiome; Nd:YAG; oral contraceptive pills; rifampin; spironolactone.

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DISCLAIMER

The purpose of these guidelines is to summarize the available data at the time of preparation. It is possible that certain treatments or procedures are not included, as the primary literature review concluded on March 16, 2017, with only selected updates of high clinical impact through December 1, 2018. Given the difficulty in treating hidradenitis suppurativa (HS), there is no guarantee that following the guidelines will result in successful treatment. Moreover, the guidelines are not meant to set a standard of care. Care of a patient with HS is ultimately guided by the physician and patient, with an emphasis on factors unique to individual patients.

CAPSULE SUMMARY

- Evidence regarding the epidemiology, diagnosis, surgical treatment, and complementary management strategies of hidradenitis suppurativa is increasing but no management guidelines currently exist in North America.
- Grading of the available evidence is reviewed in this article and recommendations for optimal disease management are provided.

SCOPE

The guidelines address management of patients presenting with HS and discuss various treatments and procedures available at the time of preparation. In Part I of the guidelines the evidence available to guide screening for comorbidities, grading/classification of disease, procedural management, and alternative/complementary treatments are reviewed and graded as outlined in Table I.

METHODS

Details on the methods used are available online (www.hs-foundation.org).

DEFINITION AND DIAGNOSIS

HS/acne inversa is a chronic, inflammatory, recurrent, debilitating skin disease of the hair follicle that usually develops after puberty and presents with painful inflammatory nodules, abscesses, comedones, scarring, and tunneling sinus tracts, with predilection for intertriginous areas of the body (most commonly the axillae and inguinal and anogenital regions). Diagnosis relies on clinical findings of (1) typical HS lesions, (2) predilection for intertriginous sites, and (3) recurrence.

INTRODUCTION

HS has received growing attention in recent years. The prevalence of HS ranges from 0.1% to 2%,[153-155] with predilection for patients who are in the third and fourth decades of life,[153-158] female,[38,153,155,157] of African descent,[156,159-161] and of lower socioeconomic status.[162,163] HS significantly reduces quality of life as a result of physical, emotional, and psychologic consequences.[164] Furthermore, in part because of hospitalization and emergency department costs, HS potentially presents a significant financial burden to society.[165]

Our understanding of HS is changing, and new studies suggest genetic susceptibility (eg, γ-secretase/Notch pathway mutations) and dysregulation in the innate and adaptive (eg, type 1 and type 17 helper T cells) immune pathways.[166-168] Treatment of HS is similarly evolving, with emphasis on combining both medical and surgical approaches

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Abbreviations used:

DLQI: Dermatology Life Quality Index
HS: hidradenitis suppurativa
IL: interleukin

when appropriate. The widely variable activity and outcome measures used in the available evidence on HS management make drawing comparisons between treatment options challenging.[169]

SYSTEMS FOR THE GRADING AND CLASSIFICATION OF HS

Numerous tools for assessment of patients with HS have been described (Table II). Most severity measurements include lesion counts of inflammatory nodules, noninflammatory nodules, sinuses/fistulas (draining or otherwise), scarring, and surface area affected. Pain is a particularly important outcome measure.

In the clinical setting, Hurley staging is recommended, as it is simple and helps determine therapeutic needs. Hurley stage I is characterized by recurrent nodules and abscesses with minimal scar, Hurley stage II is characterized by 1 or a limited number of sinuses and/or scarring within a body region, and Hurley stage III is characterized by multiple or extensive sinuses and/or scarring.[170] Inflammatory lesion counts (abscesses and inflammatory nodules) are the underlying basis of several validated measures, are feasible to perform, and may facilitate therapeutic decisions and assessment of clinical response.[1] Pain visual analog scale scores and Dermatology Life Quality Index (DLQI) are valuable adjuncts and straightforward to perform in clinical settings.[1-6]

In research settings, the Hidradenitis Suppurativa Clinical Response is the most validated dynamic physical measure for assessing treatment response,[2] but like the Hidradenitis Suppurativa Physician's Global Assessment and Sartorius score, it may have lower utility in the clinical setting. Patient-reported outcomes to consider include the DLQI score, pain visual analog scale, and HS-specific patient-reported outcomes (Hidradenitis Suppurativa Impact Assessment and Hidradenitis Suppurativa Symptom Assessment).[6] A multinational effort developing a core outcome set in HS clinical trials is currently under way.[171]

ROLE OF DIAGNOSTIC TESTING IN EVALUATING PATIENTS WITH HS

At present, microbiologic screening has limited utility in HS. Mixed normal flora and skin commensals are the main bacteria cultured from suppurative discharge, though specific culture techniques have characterized an abundance of gram-negative organisms in some HS lesions.[8,12,172,173] Biofilms, which are aggregates of bacteria in a protective extracelluluar polymeric substance, have been described in most HS skin samples, especially in sinus tracts, particularly when compared with control skin of healthy volunteers.[8,174] Although their role in HS pathogenesis is not yet elucidated, biofilms may offer a therapeutic target for HS in the future. A negative culture may support a diagnosis of HS based on consensus-derived diagnostic criteria, but culture is not recommended in clinical practice unless signs of secondary infection such as surrounding cellulitis or fever are present.[7]

Small cohort studies have linked HS to biomarkers such as erythrocyte sedimentation rate,[22] C-reactive protein,[20,22] tumor necrosis factor,[23] interleukin 6 (IL-6),[33] IL-17A,[25] and others,[24,29,31,32,175] whereas levels of leukotriene A4 hydrolase, follicle-stimulating hormone, human chorionic gonadotropin, and luteinizing hormone were decreased in HS.[16] Similarly, small cohorts have linked mutations in the γ-secretase complex,[17] higher β-defensin copy numbers,[18] and infrequent single nucleotide polymorphisms in tumor necrosis factor[28] and IL-12RB1[19] to HS, but there is no current role for genetic or biomarker testing in diagnosis.

ROLE OF SCREENING FOR COMORBIDITIES IN HS

HS comorbidities for which to screen routinely include smoking,[153] diabetes,[39,40] metabolic syndrome,[41] depression/anxiety,[44] follicular occlusion tetrad, and squamous cell carcinoma of HS-affected skin.[176] Thorough review of systems, smoking history, glycosylated hemoglobin type A1c and/or fasting glucose level in patients with signs and/or symptoms of diabetes, and periodic skin examination (particularly of chronic lesions on the perineum and buttocks, where squamous cell carcinoma is most common) are recommended.

A recent high-quality cross-sectional study of more than 40,000 patients[40] and meta-analysis of prior studies[39] suggest a 1.5- to 3-fold risk of type 2 diabetes in patients with HS, with a prevalence up to 30%. Patients with physical signs of diabetes, hypertension, obesity, and/or hyperlipidemia are at highest risk and should be screened. Similarly, a large-cross sectional study demonstrated more than a 3-fold risk of polycystic ovarian syndrome, with up to 9% of this group affected.[47] Menstrual irregularity and/or physical signs of androgen excess should

Table I. Strength of recommendations for the management and treatment of HS

Recommendations	Strength of recommendation	Level of evidence	References
Grading/classification system			
Hurley staging	B	II	1
HiSCR	A	I	2
HS-PGA	B	II	2
Sartorius	B	II	1
DLQI	A	I	1,3,4
Pain VAS	A	I	1,2,4,5
HSIA	B	II	6
HSSA	B	II	6
Microbiologic testing	C*	III	7-15
Biomarker/genetic testing	Not recommended	III	7,16-33
Comorbidity screening			
Smoking	A	I, II	34-38
Metabolic syndrome	A	I, II	34-38
Type II diabetes	A	I, II	34,35,38-41
Follicular occlusion tetrad	A	II	42
Acne	A	I	43
Depression/anxiety	A	I, II	34,35,37,38,44
Squamous cell carcinoma (of HS-affected skin)	C	II	45
Inflammatory bowel disease	A	II	42,46
Pyoderma gangrenosum and autoinflammatory syndromes†	B	II	37,42
Arthropathies†	B	II	42,45
Polycystic ovarian syndrome†	A	I, II	35,47,48
Impaired sexual health	A	I, II	49-51
Down syndrome	A	I, II	52,53
Laser/light therapies			
Intense pulsed light	C	III	54,55
Nd:YAG	B	II	56-58
Alexandrite	C	III	59
Diode	C	III	60
CO_2	C	II, III	61-67
Fractionated CO_2 (for scars)	C	III	68,69
Photodynamic therapy	C	II, III	70-77
External beam radiation therapy	C	III	78,79
Electrosurgery/radiofrequency	C	III	80,81
Surgical interventions			
Wide excision	B	II	82-87
• Wound closure, secondary intention	C	II	87-92
• Wound closure, delayed primary closure)	C	II	93
• Wound closure, skin graft	C	II	89,92,94-96
• Wound closure, flaps	C	II	89,94,95,97,98
• Wound closure, skin substitutes	C	II	99
Unroofing/deroofing	B	II	84,87,89,100-102
Laser evaporation	C	II	66,67,103
CO_2 laser excision	C	II	63,65
Electrosurgical peeling	C	II	81,104
Cryosurgery	C	III	105,106
Abscess drainage	C	II	84,89,100,107,108
Combined medical and surgical treatment	C	II	109,110
Alternative interventions			
Smoking cessation	C	III	111,112
Zinc	C	II	113-119
Vitamin D	C	II	120
Brewer's yeast avoidance	C	II	121

Continued

Table I. Cont'd

Recommendations	Strength of recommendation	Level of evidence	References
Dairy avoidance	C	III	122
Weight loss	C	II	111,119,123-125
Mechanical irritation (friction, rubbing, compression)	C	III	126-130
Close shaving avoidance	C	II	131,132
Wound care			
Gentamycin sulfate	C	III	133
Manuka honey	C	III	134,135
NPWT	C	III	93,136-145
PRP	C	III	146,147
Hydrofiber	C	III	62,64
Silastic dressing	C	III	148
Pain management			
Disease control improves pain	B	II	149,150
Cautious use of short-acting opiates for acute pain	C	III	151
Management of chronic pain by using WHO pain ladder	C	III	151

Strength of Recommendation Taxonomy recommendation level: I, good-quality patient-oriented evidence; II, limited-quality patient oriented evidence; and III, other evidence, including consensus guidelines, opinion, case studies, or disease-oriented evidence. Evidence grading level: A, recommendation based on consistent and good-quality patient-oriented evidence; B, recommendation based on inconsistent or limited-quality patient-oriented evidence; and C, recommendation based on consensus, opinion, case studies, or disease-oriented evidence.[152]

DLQI, Dermatology Life Quality Index; *HiSCR*, hidradenitis suppurativa clinical response; *HS*, hidradenitis suppurativa; *HSIA*, Hidradenitis Suppurativa Impact Assessment; *HS-PGA*, Hidradenitis Suppurativa Physician's Global Assessment; *HSSA*, Hidradenitis Suppurativa Symptom Assessment; *Nd:YAG*, neodymium-doped yttrium-aluminum-garnet; *NPWT*, negative-pressure wound therapy; *PRP*, platelet-rich plasma; *VAS*, visual analog scale; *WHO*, World Health Organization.

*Recommended only when infection is in differential or secondary infection is suspected, not in routine care.

†Screen only if signs and symptoms present.

prompt further evaluation for polycystic ovarian syndrome.

Screening for hyperlipidemia and metabolic syndrome are supported by lower-level evidence.[38,41] Additional large-scale cross-sectional and case-control studies of varying quality demonstrate an association of HS with acne,[43] inflammatory arthropathies,[177] sexual dysfunction,[51] psychiatric conditions,[44,178,179] lymphoma,[35] thyroid disease,[35] substance abuse,[35,154,180] Down syndrome,[52,53] pyoderma gangrenosum, inflammatory bowel disease,[21,34,46,181-183] and autoinflammatory syndromes. Screening for these conditions is recommended when triggered by pertinent examination findings or review of systems (Table III).[35-38,42,44,52]

LIFESTYLE FACTORS AND ALTERNATIVE TREATMENTS IN HS

Recommendations on lifestyle modifications are based on limited-quality evidence (Table IV). Approximately 70% to 75% of patients with HS smoke and 10% to 15% are past smokers.[153,158,184,185] Some data suggest an association between smoking status and HS severity, duration, and failure of treatment response[158,184,186]; however, other studies have not found an association with HS activity[187] or quality of life.[184] In 2 cases, women with HS stopped smoking and had complete remission.[112] Smoking cessation is recommended, as it potentially improves HS as well as other health outcomes.[188]

The prevalence of being overweight or obese may be higher than 75% in patients with HS.[132,154,187] Some data link higher body mass index and HS severity[187]; however, another study was contradictory.[153,187] Case reports and commentaries suggest that substantial weight loss may improve or resolve disease.[123,125] Surveys of 35 patients with HS who underwent bariatric surgery at a single center found that 35% had a decrease in self-reported symptoms after surgery.[124] With more than a 15% weight reduction, 48.6% of patients reported complete remission, 20% reported improvement, and 20% reported no improvement.[124] Although there are limited data on effects of weight loss, screening for obesity is important for improving health outcomes.[189]

The effects of specific dietary restrictions are unclear. Dairy avoidance was described in surveys of 47 patients, with 83% reporting some improvement and none reporting worsening, but response

Table II. Recommendations for grading and classification

Clinical performance, Hurley staging, and inflammatory lesion counts (abscesses and inflammatory lesions) are recommended.
Consider clinically following pain VAS and DLQI.
The recommended grading systems in research studies are the HiSCR, HS-PGA, Sartorius score, DLQI, and pain VAS; the HSIA and HSSA can also be considered.

DLQI, Dermatology Life Quality Index; *HiSCR*, Hidradenitis Suppurativa Clinical Response; *HSIA*, Hidradenitis Suppurativa Impact Assessment; *HS-PGA*, Hidradenitis Suppurativa Physician's Global Assessment; *HSSA*, Hidradenitis Suppurativa Symptom Assessment; *VAS*, visual analog scale.

Table III. Recommendations for screening for comorbidities

Perform a review of systems and a physical examination to screen for metabolic syndrome, depression, anxiety, diabetes, PCOS, and tobacco abuse.
Refer patients with additional risk factors for diabetes such as obesity, hypertension, hyperlipidemia, and acanthosis nigricans for HbA1c and/or fasting glucose testing.
Screen for depression, inflammatory bowel disease, autoinflammatory syndromes, and inflammatory arthropathy based on review of systems.

HbA1c, Glycosylated hemoglobin type A1c; *PCOS*, polycystic ovarian syndrome.

bias likely influenced the results.[122] Avoidance of brewer's yeast (*Saccharomyces cerevisiae*) in addition to HS surgery was investigated in 12 subjects. All improved over 12 months and reported recurrence only after consuming brewer's yeast, but the effects of surgery confound the results.[121]

Zinc has been recommended for patients with Hurley stage I or II disease as a modulator of innate immunity.[185] A retrospective study of 54 patients with Hurley stage I or II disease who were treated with zinc gluconate, 90 mg daily, *and* topical triclosan 2% for 3 months demonstrated improvement in mean DLQI score ($P = .039$).[118] Another prospective study of 22 patients receiving 90 mg daily reported improvement in all patients, with 8 complete responses and 14 partial responses.[114] Guillet et al[120] found that of 22 vitamin D–deficient patients with HS who received supplements to achieve normal levels, 63% achieved a 20% decrease in inflammatory nodules.[120] The evidence is insufficient to support routine use of vitamin D or zinc supplementation.

Table IV. Recommendations for lifestyle modifications and alternative treatments

Counsel smoking cessation.
Screen for obesity and counsel weight loss.
May recommend oral zinc supplements (weak evidence).
Insufficient evidence exists to recommend avoidance of dairy or brewer's yeast, vitamin D supplementation, avoidance of friction, deodorant, and depilation/shaving.

It has been hypothesized that friction may stimulate epidermal hyperplasia contributing to development of HS lesions, but the evidence is limited to patient surveys and anecdotes.[126,127,129,130,185] Of 110 patients surveyed, 16% reported worsening from "tight clothing/friction" whereas 11% reported relief from "loose/cotton clothing/cleanliness/drying/cold."[128] Overall, there is insufficient evidence supporting clothing recommendations.

Two studies investigated shaving and use of chemical depilatories, deodorants, and antiperspirants in HS.[131,132] HS was not linked to daily shaving or use of depilatories, deodorants, or antiperspirants in 1 small study.[131] In a separate chart review of 11 patients, 6 reported adverse reaction to antiperspirant or deodorant use around the time of HS onset, but the potential for recall bias is high.[132] Weak evidence limits recommendations regarding this kind of personal care in HS.

SURGICAL MODALITIES IN HS

Recommendations for the surgical management of acute HS lesions relies on low-quality, uncontrolled, retrospective reports (Table V). In 2010, van der Zee et al described the deroofing technique, in which abscesses and associated sinuses are probed and the skin overlying the sinus or abscess cavity is removed stepwise with the base left untreated. In the uncontrolled study of 73 lesions, 17% recurred, but 90% patient satisfaction was achieved.[102] In 2012, Van Hattem et al reviewed a variation using electrosurgy to excise the overlying skin, with a 4% recurrence rate.[101] No controlled, prospective studies exist, but deroofing appears to be effective for acute and chronic lesions, with utility in a variety of outpatient settings.[7,84,101,102,190-192]

In contrast to deroofing, incision and drainage has been associated with recurrence rates approaching 100%, although it provides acute relief when other methods are not feasible.[84,89,107,192,193] In general, deroofing small lesions with a punch tool or by other

Table V. Recommendations for surgical modalities

Recurrent nodules and tunnels may be best treated with deroofing or excision.
Incision and drainage is recommended only for acute abscesses to relieve pain.
Wide local scalpel, CO_2, or electrosurgical excision (with or without reconstruction) is appropriate for extensive chronic lesions.
Wound healing following surgery may be through secondary intention, primary closure, delayed primary closure, flaps, grafts, and/or skin substitutes.
Experience suggests that continuing medical therapy in the perioperative period is likely to be beneficial and poses minimal risk of increased postoperative complications.

Table VI. Recommendations for pain management

Pain management in HS starts with disease control.
The multidimensional aspects of pain should be considered when dealing with pain management.
In select cases of severe pain, use of individualized, carefully prescribed short-acting opioid analgesics may be needed.
Recommend that chronic pain be managed according to the World Health Organization pain ladder.[202]

HS, Hidradenitis suppurativa.

methods is preferred to simple drainage. For large nonrecurrent abscesses, incision and drainage procedures can provide acute relief and allow for a smaller definitive procedure to be performed at a future date once the inflammation and size of the affected tissue have been reduced. Electrosurgical destruction using a loop electrode to remove lesions to the subcutaneous layer and cryosurgery for acute/subacute lesions have been characterized in few studies, with inadequate evidence to recommend use.[81,106]

Moderate-quality evidence for surgical management of chronic lesions has consisted of uncontrolled, retrospective reports. In a series of 590 patients treated with excision, deroofing, or drainage, drainage was associated with the highest recurrence, whereas deroofing and wide excision were about equal in effectiveness. There was a 24.4% overall recurrence rate, with younger age and operation at multiple sites associated with increased risk.[84,192] Another series of 31 patients treated with drainage, limited surgery, or radical excision reported 100%, 42.8%, and 27% recurrence rates, respectively, with a mean follow-up of 72 months.[193] Carbon dioxide (CO_2) laser excision and marsupialization (laser vaporization of the wound base and edges to create a pocket-like defect with smooth, rounded edges) with secondary intention healing, in particular, seem to be associated with low recurrence rates, though they can have prolonged healing times.[65,66]

Wide local excision has been the mainstay of traditional surgery and can result in a disease-free state where the excision was performed. Excision can typically be limited to a superficial subcutaneous plane, with deeper excision based on visible disease extension. Because surgery alone does not alter disease biology, understanding the trade-offs between extent of excision, surgical morbidity, and reducing the risk of future lesions is an important surgical judgment.

In addition to surgical technique, cure rates may depend on the location treated with perianal, vulvar, and inferior breast having higher recurrence rates.[84,87,89,107,193] Reconstruction methods such as primary closure, grafts, and flaps can speed healing but may be associated with higher recurrence rates than secondary intention healing. Variation in surgical technique within and among studies makes recommendations regarding reconstruction methods uncertain.*

Excision with delayed closure following days to weeks of secondary intention healing has been frequently reported.[86,93,95,141,195-199] This requires prolonged recoveries and can be complicated by infection, joint contractures, and scarring. Immediate reconstruction may allow faster healing, though recovery can still be prolonged. Grafts are generally split-thickness with a technique similar to that for treating large burns.[200] Additional reports describe using "recycled skin" grafts[145,201] or dermal scaffolds before grafting,[97,99] though contour irregularities in reconstructed and donor sites are typical. Regional or free flaps provide thicker coverage with a more natural, less scar-like appearance, but they can be bulky and require thinning as a secondary procedure.[81,96,98,107,110] Discussing the drawbacks and benefits of various forms of reconstruction with patients can help determine individualized approaches.

Surgical intervention is typically reserved for disease that is uncontrolled by pharmacologic care. When procedures are indicated, medical therapy may be initiated or continued without interruption,

*[82-84,86-90,92,95,96,107,141,192-196]

Table VII. Recommendations for wound care

Local wound care for surgical and nonsurgical wounds in HS follows the principles of best-practice individualized wound care.
Choice of dressing is based on the amount of drainage, location, periwound skin condition, cost, and patient preference.
Use of antiseptic washes is generally supported by expert opinion, though it carries low risk of contact dermatitis.
Use of negative-pressure therapy for selected large open wounds for a short period (1-4 weeks) followed by delayed reconstruction may be beneficial.

HS, Hidradenitis suppurativa.

Table VIII. Recommendations for light, laser, and energy sources

An Nd:YAG laser is recommended in patients with Hurley stage II or /III disease on the basis RCT and case series data and in patients with Hurley stage I disease on the basis of expert consensus.
Other wavelengths that are used for follicular destruction are recommended on the basis of lower-quality evidence.
CO_2 laser excision is recommended in patients with Hurley stage II or III disease with fibrotic sinus tracts.
External beam radiation and PDT have a limited role in the management of patients with HS.

HS, Hidradenitis suppurativa; *Nd:YAG*, neodymium-doped yttrium-aluminum-garnet; CO_2, carbon dioxide; RCT, randomized controlled trial; PDT, photodynamic therapy.

as risk for surgical complications is likely higher from poorly controlled disease than from medications.

PAIN MANAGEMENT IN HS

Pain is a significant independent contributor to quality of life in HS, and reducing inflammation improves pain.[150] There are no specific HS pain studies in the literature; treatment is based on pain guidelines, expert opinion, and patient preferences (Table VI).[149] Nociceptive, stimulant-dependent, and neuropathic pain all contribute, and psychologic comorbidities should be considered during management.[203]

For management of acute pain, topical analgesics such as lidocaine, oral acetaminophen, and oral nonsteroidal anti-inflammatory drugs are preferred.[203]

A multidisciplinary approach to chronic pain management, at times in collaboration with pain specialists, is most effective. Because of the opioid crisis, use of opioids must be considered judiciously, but they are sometimes necessary.[204] Tramadol should be considered as an alternative to conventional opioids in patients with cardiopulmonary compromise,[205] and it permits a nonsteroidal anti-inflammatory drug–sparing effect. Codeine, hydrocodone, morphine, and other opioids can manage pain that does not respond to first-line agents.[204] Anticonvulsants, including pregabalin and gabapentin, can improve neuropathic pain but should be used with caution.[149]

WOUND CARE IN HS

Recommendations for postsurgical and nonsurgical HS wound care are based on limited evidence (Table VII).[206,207]

Although there are studies on the use of absorptive dressings in HS, no data favor a specific type. Atraumatic and absorptive dressings are important, but they can be costly.[208] Most data focus on postsurgical wounds with use of simple foam dressings, whereas advanced dressings are used for more complex wounds.

A prospective randomized study of 200 patients found lower complication rates in 124 treated with primary closure over a gentamycin-collagen sponge than in 76 treated with primary closure alone in the first month, though at 3 months the rates of recurrence and complications were similar.[133] Manuka honey with silver alginate dressings, hydrofiber dressings (Aquacel, ConvaTec, Deeside, United Kingdom), and silastic foam dressings have all been used in small series of postsurgical wounds with good patient satisfaction, but comparator groups have been lacking.[134,135] An approach using platelet-rich plasma on a surgical wound bed and injected at the edges with Hyalomatrix PA dressing (Anika Therapeutics, Bedford, MA) has been reported in a single case with adequate healing.[163]

Negative-pressure wound therapy has been shown to shorten the duration between excision and delayed closure or grafting, but comparisons of various approaches using negative-pressure wound therapy alone versus with silver dressings or dermal regeneration templates (Integra, Integra LifeSciences, Plainsboro, NJ) are limited.[136,137,146]

LIGHT, LASER AND ENERGY SOURCES IN HS

A number of energy sources have been evaluated in HS (Table VIII). The neodymium-doped

yttrium-aluminum-garnet laser has the largest number of controlled trials and case reports showing consistently effective results, though mostly at 1 center.[56-58] Patients had mostly Hurley stage II or III disease. The entire affected body region is treated with the active nodules double-pulsed in a stacked fashion. In the randomized controlled trial, typical settings generally used a 10-mm spot size with a 10-ms pulse duration and 35 to 50 J/cm^2 in patients with Fitzpatrick skin type I to III and a 20-ms pulse duration and 25 to 40 J/cm^2 in patients with skin types IV to VI.[56] In general, settings may vary by specific device and selected spot size and their use should be guided by operator experience with an end point of delayed post-treatment perifollicular erythema and/or edema for follicular destruction.[209] In most studies, 3 or 4 treatment sessions were performed, though additional treatment to further reduce follicular units may provide more lasting benefit.

CO_2 lasers were the first to be used for HS, and they are used for excision, marsupialization, and vaporization of affected skin. A large number of uncontrolled retrospective series in patients with Hurley stage II or III disease show consistently positive outcomes.[61-67]

Photodynamic therapy has been evaluated in several series. Variations in outcome measures, light sources, photosensitizers, and topical versus intralesional treatment make interpreting study results difficult. The results with topical sensitizers are equivocal, and intralesional photodynamic therapy offers promise based on only small, uncontrolled studies.[70,71,210]

Use of long-pulsed alexandrite and diode lasers and intense pulsed light is supported by case reports, likely owing to follicular destruction and anti-inflammatory effects similar to those with the use of a neodymium-doped yttrium-aluminum-garnet laser.[54,55,59,60,211] Electrosurgery and radiofrequency are ablative and supported only by case reports.[80,81] Use of a fractionated CO_2 laser has been reported in cases to help with postsurgical scar contraction and delayed wound healing.[69,78]

External beam radiation has been examined in many case reports. However, disease severity has not been stratified, results are equivocal, and no randomized controlled trials have been published.[78,79] Appropriate use is limited to severe cases that were recalcitrant to most other treatment modalities and not suitable for excision.

CONCLUSION

HS management is often complex and requires balancing medical and surgical treatment options in addition to addressing associated pain, psychiatric, and medical comorbidities. These guidelines aim to help clinicians make optimal treatment decisions, but standard of care management requires an individualized approach because rigorous evidence is unavailable for most interventions. The need for stronger evidence highlighted by the guidelines should direct future research to fill gaps in current evidence.

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