

Update on hidradenitis suppurativa: connecting the tracts

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Abstract

Hidradenitis suppurativa (HS) is a debilitating skin disease characterized by recurrent abscesses, sinus tract formation, and scarring. Prevalence estimates range from 0.053% to 4.1%, although HS is likely an underdiagnosed disease. Although the first reports of HS date back to the mid-19th century, the disease continues to plague patients and physicians desperate for a definitive treatment. Advances in the understanding of the disease process include the possibility of a defective basement membrane at the sebafollicular junction of the folliculopilosebaceous unit (FPSU; that is, where the sebaceous gland empties into the hair follicle) as an initiating event followed by secondary bacterial colonization. New evidence suggests that bacteria living in a community, known as a biofilm, rather than single planktonic bacteria in HS lesions may explain why HS can be resistant to current antibiotic treatment regimens. Available treatment options have expanded to include triple-antibiotic therapy, tumor necrosis factor (TNF- α) and interleukin-1 (IL-1) inhibitors (biologics), laser therapy, and surgical excision, including the skin tissue-sparing excision with electrosurgical peeling procedure. Despite the array of treatments available, many patients continue to struggle with the embarrassment, pain, odor, and frustration that accompany this often isolating disease. Physicians should address comorbidities in HS, including the psychosocial issues patients with HS frequently encounter. Patients can be directed to HS support groups, where they can openly discuss their frustrations, share their experiences in dealing with HS, and band together to advocate for themselves. HS is misunderstood by both patients and physicians, often resulting in a delay in clinical presentation and diagnosis. Patients and physicians across multiple specialties must work together to expand awareness of and interest in HS, so that one day, individuals with HS can be freed from this crippling disease.

Introduction

HS is a debilitating skin disease characterized by recurrent abscesses and sinus tract formation. It is also known as acne inversa since it affects the inverse areas, most commonly the axillae, groin, buttocks, and inframammary areas [1]. HS causes significant physical and psychosocial distress to both men and women with a peak onset in the early 20s, a formative period of adulthood [2–4]. The prevalence of HS has been reported to be between 0.053% and 4.1% of the general population, but this number is likely an underestimate as there is both a delay in presentation to physicians and a delay in diagnosis [5–7]. In addition,

mild cases of HS may not be reported, contributing to a lower estimate of disease burden.

HS has plagued both patients and physicians for many years. Some believe that Karl Marx was afflicted with HS from 1862 to 1874, causing self-loathing and alienation that may have influenced his political works [8]. The first reports of HS were published in France in 1839 by Velpeau [9]. Although the understanding of HS has improved since the first published report in the 19th century, HS remains a frustrating disease for suffering patients and physicians desperate for a cure.

Pathophysiology

Genetics

HS can present as sporadic or familial cases, with up to 34% of individuals with HS having at least one affected first-degree relative, suggesting a genetic etiology. Familial cases may be due to autosomal dominant inheritance of a single gene, whereas sporadic cases are thought to have defects in several genes [10,11]. Several genetic loci have been identified, but a single causative gene remains elusive [12,13]. Mutations in the γ -secretase genes *PSENEN*, *PSEN1*, and *NCSTN* have been identified in families with multiple family members who have HS, in whom typical as well as atypical sites (back, face, nape, and waist) were affected [14].

Follicular occlusion

HS was originally thought to be a disorder of the sweat glands because it occurs primarily in the axillae, groin, buttocks, and inframammary areas [15]. In 1922, Schiefferdecker classified sweat glands into eccrine and apocrine glands and further noted that HS occurs in apocrine gland-bearing areas [16]. Over a decade later, Brunsting linked HS with dissecting cellulitis and acne conglobata, citing follicular hyperkeratinization as the initial event with bacterial infection occurring secondarily [17]. By the 1990s, follicular occlusion was widely accepted as the primary cause of HS [18].

Recently, Danby and colleagues [19] took the follicular etiology a step further and identified a defect of the follicular support system. They stained 65 surgical HS specimens with periodic acid-Schiff (PAS) to identify the basement membrane zone. Early and advanced HS lesions had almost no PAS positivity at the sebofollicular junction of the FPSU. There was also an increase in inflammatory cells at the gaps in PAS positivity, implying that the defective basement membrane of the FPSU in HS lesions could be a primary event in the pathogenesis [19]. Alternatively, the defective basement membrane of the FPSU may be an epiphenomenon of the pathogenesis of HS rather than a primary event.

Bacterial infection

Bacterial infection has long been implicated in the secondary pathogenesis of HS. *Staphylococcus* and *streptococcus* species are the most commonly isolated pathogens from HS lesions [20]. Although a short course of appropriate antibiotics will clear an infection in healthy people, patients with HS often require long courses of antibiotics only to see partial improvement in their skin. Biofilms are specialized communities of bacteria commonly found in nature. The idea that bacteria grow as a community instead of free-floating planktonic bacteria

could help us understand why the bacterial infections in HS can be so difficult to treat with standard antibiotics.

Biofilms

Biofilms are a relatively new topic in dermatology but have been studied for many years in other disciplines, in both medicine and industry. Perhaps the most common clinical examples of biofilms are dental plaques. Dentists have been studying the biofilms that constitute dental plaques for many years and have discovered that the artificial sweetener, xylitol, can help degrade the biofilm, resulting in fewer dental caries [21,22]. A biofilm is first formed by the reversible binding of bacteria to a substrate [23]. Then, irreversible binding occurs when the bacteria secrete a sticky, polysaccharide matrix that surrounds and protects the community from outside insults, including antibiotics [24]. Microcolonies form [25] and varying phenotypes within the biofilm allow the community of bacteria to quickly adapt to stressors, increasing its overall chances of survival [26]. As the biofilm expands, the central bacteria lose some access to nutrients and oxygen, which are more abundant in the periphery of the biofilm. The net result is a slower metabolism and thus lower efficacy of antibiotics, which work on rapidly dividing cells [27].

Because the skin lesions in HS are chronic and recurring and require long courses of antibiotics for treatment, it seems likely that HS is a biofilm disease. Two studies have reported biofilms adherent to sinus tract epithelium [28,29] and hair follicles [29] in HS. These two reports support the hypothesis that biofilms may play a secondary role in the pathogenesis of HS, thereby making bacterial eradication more difficult. Although this concept is promising, more evidence is needed.

Aberrant immunity

Aberrant immunity has also been suspected in the pathogenesis of HS. Studies on immunological markers of inflammation in HS lesions show that levels of several inflammatory and anti-inflammatory cytokines are elevated. Upregulated cytokines include IL-1 β , TNF- α , IL-10, CXCL9 (monokine induced by interferon- γ), IL-11, B lymphocyte chemoattractant, and IL-17; on the other hand, IL-2, IL-4, IL-5, and interferon- γ are hardly detectable in HS lesions [30,31]. These data provide a rationale for use of biologics targeting inflammatory cytokines, such as TNF- α and IL-1 β in the treatment of HS. In the lesional dermis of patients with HS, IL-12 and IL-23 have been found to be abundantly expressed by macrophages, and an infiltrate of IL-17-producing T helper (Th) cells has been observed [32]. These findings may be a reflection of an active IL-23/Th17 pathway,

which is also involved in various autoinflammatory diseases, including psoriasis and Crohn's disease. An active IL-23/Th17 pathway could imply a role for modern antibodies against IL-12/IL-23, such as ustekinumab and briakinumab [32]. In addition, lower levels of IL-22 and IL-20 have been noted in HS lesions, leading to decreased antimicrobial protein levels, causing the skin to be prone to bacterial infection [33]. Though promising, the data on immunological markers are limited, and more research is needed to elucidate the immunological pathways involved in the pathogenesis of HS.

Classification systems

The most widely used clinical classification system for HS is the Hurley staging system and this is because of its ease of use [34]. In the Hurley classification, there are three stages: stage I (Figure 1a) is characterized by recurrent abscesses without sinus tract formation, stage II (Figure 1b) is described as one or more sinus tracts separated by normal skin, and stage III (Figure 1c) is defined as multiple interconnected sinus tracts without normal skin in between [34].

Unfortunately, HS is not as simple as the Hurley staging system. HS can present in many different forms. For example, some patients have only axillary involvement. Some seem to have a genetic predisposition to develop HS. Some patients are obese whereas others are thin. To address this issue, Canoui-Poitrine and colleagues [35] used a latent classification to identify three different phenotypes in HS (Table 1). The most common type, axillary-mammary, has characteristic lesions in the axilla and inframammary areas and is associated with hypertrophic scarring (Figure 2a). The other two types, follicular and gluteal, are more atypical forms of HS. The follicular type can affect atypical

areas, including the ears, chest, and back (Figure 2b). It is associated with a history of severe acne and pilonidal sinuses and tends to be a more severe variant with earlier onset and a longer duration. The gluteal type occurs predominantly in the gluteal area and is associated with a lower body mass index (BMI) and a less severe but chronic duration [35] (Figure 2c). In our experience, HS patients with the axillary-mammary phenotype have higher BMIs. Improved classification systems, like the latent analysis, are needed to classify the heterogeneous types of HS in order to develop better studies and treatment plans tailored to the individual phenotypes of HS.

Several other scoring systems have been developed for a more detailed analysis of disease severity, but many of these are too cumbersome for clinical use. Some examples are the modified HS Lesion, Area, and Severity Index (LASI) [36], Sartorius score [37], and HS Severity Index [38]. These indices are used mainly for research purposes and give point values to individual HS lesions, resulting in an overall severity score that can be used over time to monitor therapy. However, with so many different scoring systems being used, it is difficult to compare treatment efficacy between studies. Reaching a consensus for HS scoring would improve our analysis of treatment efficacy between studies.

Associated and exacerbating factors

Many exacerbating factors have been identified in HS, although the triggers differ among patients. Obesity and nicotine smoking [6,39] are two of the most well-known associations in HS, although sweating, shaving, depilation, deodorant use, and friction have also been implicated [40]. In the past several years, a different trigger has been identified: diet.

Figure 1. Hurley stages I to III



(a) Hurley stage I, right groin and labia majora: recurrent abscesses without sinus tract formation. **(b)** Hurley stage II, right axilla: multiple sinus tracts separated by normal skin. **(c)** Hurley stage III, left axilla: multiple interconnected sinus tracts without normal skin in between.

Table 1. Latent classification of three hidradenitis suppurativa phenotypes

Latent classification (LC)	Phenotype	Commonly affected areas	Associations (compared with LC 1)
LC 1	Axillary-mammary	Axilla, breast, genito-femoral	• Reference group
LC 2	Follicular	Ears, chest, back, legs, axillary, breast	• Epidermal cysts, pilonidal sinus, comedones, severe acne • Men • Smokers • Greater disease severity, earlier disease onset, longer disease duration
LC 3	Gluteal	Gluteal fold	• Follicular papules, folliculitis • Smokers • Lower body mass index • Less severe disease, longer disease duration

Derived from Canoui-Poitrine and colleagues [35] (2013).

In 2010, Melnik proposed a link between high glycemic foods and worsening acne. He noted that many of the proposed triggers in acne and HS (high carbohydrate diet, milk consumption, stress, and nicotine use) converge into one pathway, the phosphoinositol-3 kinase/Akt/FoxO1 pathway, which may play a role in the disease [41].

In 2013, Tara Grant, an HS sufferer, wrote a book entitled "The Hidden Plague: A Field Guide for Surviving and Overcoming Hidradenitis Suppurativa" [42]. In this book, Tara details her 20-year experience with HS and how she overcame the disease by modifying her diet. This book has led many patients and researchers to take a closer look at the role of diet as a possible trigger. Although it is certainly plausible that diet may contribute to the severity of HS, it is important to acknowledge that a decrease in BMI may be a confounding factor in patients who have had success through modification of their diet. Overall, the link between diet and HS exacerbations is not well established. Further prospective, controlled studies are needed to evaluate the role of diet in HS.

Comorbidities

The link between HS and acne has been well established since the early 1900s [17]. Strong associations with acne conglobata, pilonidal disease, and dissecting cellulitis were also identified before the 21st century [43,44]. In 2010 and 2013, comprehensive literature reviews on comorbid diseases in HS were published [44,45]. Among the most frequently cited comorbid diseases in these reviews are inflammatory bowel disease (particularly Crohn's disease), Spondyloarthropathy, genetic keratin

disorders (such as pachyonychia congenita), and squamous cell carcinoma (SCC) [45].

In our opinion, SCC is a serious threat and something that should always be included on the differential in patients with severe HS. Death has been reported in several case reports of HS patients with metastatic SCC [45–47]. The chronic inflammation in HS likely leads to metaplasia of the cells, and the subsequent SCC development goes largely unnoticed against the background of scarred, draining fistulous tracts. In the age of biologics for treatment of HS, the prevalence of SCC may also rise.

Recently, a multicenter, prospective study of 640 patients with HS also showed a higher prevalence of spondyloarthritis (3.7%) compared with the general French population (0.3%) [48]. The presence of HS preceded arthritis symptoms by an average of 3.6 years in 90% of patients. Most HS patients with associated spondyloarthritis were Hurley stage II (39%) or III (44%) [48].

In 2012, Sabat and colleagues [49] found an increased prevalence of metabolic syndrome in a hospital-based case-control study. After this study, a retrospective chart review of 243 patients with HS also showed a higher prevalence of metabolic syndrome in patients with HS compared with controls matched for age, sex, and race [50]. Specifically, patients with HS had a statistically significant higher prevalence of obesity, hypertriglyceridemia, and glucose intolerance, whereas the prevalence of low high-density lipoprotein levels or hypertension was not found to be significantly different. The increased prevalence of metabolic syndrome was not associated with increased disease severity as evaluated by Hurley staging [50].

Figure 2. Images of latent classifications 1 to 3

(a) Latent class 1 (axillary-mammary), bilateral inframammary areas: recurrent abscesses and comedones with post-inflammatory hyperpigmentation in an obese patient with axillary, mammary, and groin involvement. **(b)** Latent class 2 (follicular), right posterior helix: multiple open and closed comedones occurring in an atypical location. **(c)** Latent classification 3 (gluteal), bilateral buttocks: follicular papules and abscesses with post-inflammatory hyperpigmentation in a patient with normal body mass index.

The recent identification of new comorbidities demonstrates that HS may be more than a skin disease. A common pathophysiological mechanism for all of the comorbidities has not been elucidated, yet inflammation, deficient innate immunity, and genetics have all been postulated to play a role [45]. Nonetheless, screening of patients with HS for comorbidities is warranted,

especially for SCC, spondyloarthritis, and metabolic syndrome, as we have convincing evidence that these diseases may be associated with HS.

Medical treatments

HS can be treated medically in several ways and is most often controlled with a combination of treatments rather

than monotherapy. Goals of therapy can include decreasing the bacterial load, reducing follicular occlusion, decreasing the immune response, altering the hormonal balance, improving wound healing, reducing pain, and improving the patient's quality of life. Traditional medical treatments for HS have included antibacterial washes (for example, benzoyl peroxide wash), topical clindamycin with or without adjuvant azelaic acid, various systemic antibiotics, hormonal therapies, systemic retinoids, and intralesional steroid injections (usually as an adjuvant to antibiotics) [51]. Many of these treatments have been shown to be effective in preventing or treating flares of HS.

Unfortunately, patients cannot take oral antibiotics indefinitely because of the risk of developing resistance and the risk of numerous adverse effects. The use of topical preparations twice daily is also difficult for patients to use consistently for the prevention of flares. Acitretin, a systemic retinoid, has been used with some success in the treatment of HS [52–54]. Theoretically, it should be beneficial since follicular occlusion is a contributing factor in the pathogenesis of HS and acitretin's mechanism of action includes normalization of epithelial cell proliferation and differentiation [55]. However, its common adverse effects and high rate of relapse after discontinuation of therapy limit its long-term use. In our experience, it has not been efficacious. Acitretin should be avoided in women of child-bearing age because of its teratogenic effects, which can last for up to 3 years after discontinuation. Isotretinoin, another systemic retinoid, appears to be ineffective for HS [51,55,56], likely because this agent primarily decreases the size and sebum output of the sebaceous glands, which appear to already have significantly reduced volume in clinically uninvolved skin in HS patients compared with healthy controls [55,57–59]. Those patients who do respond are likely benefitting from isotretinoin's immunomodulatory effect [55,60]. Topical retinoids, such as tretinoin, isotretinoin, adapalene, and tazarotene, have not been studied in HS.

Anti-androgen therapy, including ethinylestradiol/cyproterone acetate, ethinylestradiol/norgestrel, cyproterone acetate alone, and finasteride, has been used in the treatment of HS. Cyproterone acetate is not available in the US, where spironolactone is the most commonly prescribed anti-androgen therapy. Although a retrospective chart review of 64 females with HS found that the response to anti-hormonal therapy was superior to the response to antibiotics, prospective studies should be done prior to drawing any conclusions [56].

Metformin may be a new medical treatment option for HS. It was reported in one study to improve symptoms

and quality of life in patients with HS unresponsive to conventional treatments [61]. Of note, the vast majority of the patients in this study were overweight females. Metformin improves glucose utilization by lowering glucose production, enhancing peripheral glucose uptake, and increasing insulin sensitivity. It also has anti-androgenic properties. Since diabetes and androgen imbalance are contributory factors in HS, efficacy of metformin in HS is certainly plausible. Larger trials are needed to validate its benefits.

Because current medical treatment options provide only temporary relief, the medical treatment of HS has escalated to more aggressive therapies in an attempt to provide longer periods of remission. The use of biologics is expanding for numerous inflammatory diseases, including HS. Combination antibiotic therapy and intravenous broad-spectrum antibiotics are also being used. With the possible associations of HS with deficient immune responses or diet, more holistic approaches to treatment, including diet modification and oral supplementation of zinc, are also being tested [62].

Of the TNF inhibitors, infliximab has the most data to support its efficacy in HS from multiple case series [63–68] and one randomized, double-blinded, placebo-controlled study [38]. The typical dosing regimen for HS is 5 mg/kg intravenously at 0, 2, and 6 weeks, followed by infusions every 8 weeks [38]. However, Moriarty and colleagues [69] recently noted that many patients experience flares between infusions. When the dosing frequency was increased to every 4 weeks, 9 out of 11 patients had sustained improvement in their quality-of-life scores, physician assessments, and visual analog scores with a median of 49.1 months of treatment [69]. The most common side effects were secondary infections of HS lesions, upper respiratory infections, and tonsillitis, which were treated with oral antibiotics. One patient developed Hodgkin lymphoma, currently responding to chemotherapy, 36 months after infliximab treatment was switched to adalimumab [69].

To date, two randomized controlled trials (RCTs) have been performed to evaluate the efficacy of adalimumab in the treatment of HS. One RCT showed a statistically significant difference between placebo and dosing of adalimumab at 40 mg weekly; however, only 17.6% of patients in the treatment group achieved a clinical response. Every-other-week dosing was not found to result in a statistically significant improvement over placebo in this trial [70] or in an open-label study by Amano and colleagues [71]. In the other RCT, every-other-week dosing showed a statistically significant decrease in the Sartorius score at 6 weeks but not at

the end of the 12-week treatment period [72]. Neither of these controlled studies discussed average time to relapse, but in an open-label study of weekly adalimumab for 24 weeks, the mean time to relapse was 11 weeks [73].

A few small-scale studies are available for anakinra (an IL-1 receptor antagonist) [74–76] and ustekinumab (an inhibitor of the IL-12/IL-23 pathway) [77,78], but more studies are needed to draw any meaningful conclusions. There are very few data from patients treated with ustekinumab, cyclosporine, dapsone, methotrexate, and colchicine [55]. Although early results from use of ustekinumab and cyclosporine appear to be promising, dapsone, methotrexate, and colchicine do not seem to be effective; however, these treatment options need to be studied more extensively for confirmation.

There is no convincing evidence of therapeutic benefit with etanercept in the treatment of HS. The RCT for etanercept failed to show a statistically significant difference between placebo and treatment groups [79]. Long-term studies evaluating safety profiles in the biologic treatment of HS are also needed.

In addition to biologic therapy, combination antibiotics and intravenous broad-spectrum antibiotics have shown promise in the medical treatment of HS. Reported antibiotic combinations for the treatment of HS are clindamycin-rifampin bi-therapy [80,81] and rifampin-moxifloxacin-metronidazole tri-therapy [82]. Although both have proven efficacy in the literature and in our own experience, gastrointestinal distress is a common and often limiting side effect [80,82]. Physicians prescribing clindamycin-rifampin bi-therapy should be aware that rifampin, among many other drug-drug interactions, reduces clindamycin plasma concentration [83].

A recent Polish study of 69 patients with HS demonstrated that the highest effectiveness against isolates from HS lesions was observed for carbapenems, penicillins with β -lactamase inhibitors, and fluoroquinolones, suggesting that these antibiotics could serve as better treatment options than the current clindamycin-rifampin bi-therapy [84]. Treatment of HS with intravenous ertapenem was presented by Nassif and colleagues [85] in 2012 at the 70th annual meeting of the American Academy of Dermatology. Dramatic improvements in patient scores of pain and drainage were seen after 6 weeks of 1 gram intravenous ertapenem given daily [85,86]. Although intravenous infusions are not an ideal long-term therapy, they are

effective as induction therapy for rapid improvement or clearance.

Laser treatments

The use of lasers in medicine and dermatology has increased dramatically over the past decade; the use of lasers in HS is no exception. In 2009, Tierney and colleagues [36] published an RCT on the use of the 1,064-nm neodymium-doped yttrium aluminium garnet (Nd:YAG) laser in Hurley stage II and III HS patients. Anatomic sites treated with monthly Nd:YAG laser for 3 months showed a 65.3% decrease in the modified Sartorius score from baseline to 3 months [36]. A subsequent study demonstrated similar efficacy of Nd:YAG laser treatments in HS with corresponding decreased inflammation with resulting fibrosis and scarring at 1 month and 2 months after treatment [87]. Adverse effects following Nd:YAG laser are minimal and are localized to the treated area. In our experience, this is an effective option for stage I and II disease but not for stage III.

Since excision is the only definitive treatment for the fistulous, scarred tracts in hidradenitis, the carbon dioxide (CO₂) laser has been used in lieu of traditional excision methods. Multiple studies have shown CO₂ laser to be an effective treatment option for HS lesions with minimal risk of recurrence [88–91]. CO₂ laser can be performed under local or general anesthesia [88,89]. Both primary closure and healing by secondary intention have been reported, without any direct comparisons of the two methods [88–91]. In one study of 185 treated areas, the average secondary intention healing time was 8.8 weeks [88]. The most common adverse effects were hypertrophic granulation tissue in 33 of 185 treated areas, postoperative cellulitis in 3 of 61 patients, and recurrence at the margin in 2 of 61 patients [88]. In another study, the main complication was axillary scar contracture [89]. Still, CO₂ laser excision is a cost-effective treatment option, when compared with inpatient surgical techniques, and offers minimal risk of local recurrence.

Surgical treatments

The surgical de-roofing or wide excision procedures have long been the definitive treatment for severe HS. Even so, there is no guarantee that HS will not recur in the previously excised areas. An alternative to the traditional surgical procedures was described by Blok and colleagues [92]. This technique, known as the skin tissue-sparing excision with electrosurgical peeling (STEEP), involves probing and electrosurgically incising the sinus roof with a wire loop tip, similar to the de-roofing technique. Affected tissue is then removed in successive tangential electrosurgical transections until the whole area is clear of lesions and fibrotic tissue.

The epithelialized sinus floors and subcutaneous fat are spared, and wounds are left to heal by secondary intention. This novel technique spares healthy tissue in severe HS, resulting in shorter healing times and fewer contractures after surgery, which are known complications of traditional surgical techniques [92]. However, it is our experience that the mucinous contents of the sinus tract, the shiny, translucent substance seen when the surgeon incises the sinus roof, must be removed for successful treatment of these lesions. Although we have not used the STEEP procedure in our patients, we expect it to be a cost-effective surgical treatment option for cases of severe HS, with some similarities to the CO₂ laser surgery, which we have experience using.

Imaging with ultrasound could be beneficial in assessing the extent of HS lesions prior to making the first incision on a patient undergoing surgical treatment. Ultrasound has been used in a series of 34 patients with HS to provide key anatomic information that is often clinically unavailable [93]. Direct visualization of the sinus tracts in HS could allow the surgeon to calculate the extent of area that would need to be excised.

When a patient is unable or unwilling to undergo the above-mentioned medical or surgical treatments for Hurley stage II or III disease, cryoinsufflation, a modified spray cryotherapy performed by injecting liquid nitrogen through a needle directly into HS tracts, might be of value. This technique has been tried in two patients as monotherapy with successful symptom control and scarring of sinus tracts [94]. Both patients experienced pain and a vagal reaction with nausea, sweating, and weakness. Cryoinsufflation may be considered as a monotherapy in women who are planning to become pregnant or as an adjunct for patients who are advised to avoid systemic therapies.

Psychosocial impact

Several studies have addressed the psychosocial impact of HS [2,95–98], yet this is infrequently discussed at length during physician visits. HS affects every aspect of peoples' lives, including assessments of self-worth, ability to have meaningful or intimate relationships, and ability to find or maintain employment [98]. Unfortunately, the psychological burden of the disease is often overshadowed by its physical manifestations. Not managing psychological stress in these patients could lead to a continuous cycle whereby stress triggers a flare, leading to worsening disease, and thereby more psychological stress.

A German survey study recently found that 38.6% of patients with HS experienced depression compared with only 2.4% of controls matched for age, sex, and BMI [99]. The Hospital and Anxiety Depression Scale (HADS) scores

were also significantly higher in the HS group compared with controls (6.4 versus 2.6). Interestingly, the HADS depression score also correlated significantly with sexuality score and disease severity as measured by the Sartorius score ($P < 0.001$ and $P < 0.01$, respectively) [99].

A conscious effort by physicians should be made to address the psychosocial burden of HS and the lack of awareness of this disease. Our patients frequently note that they were tested for sexually transmitted diseases numerous times over many years before being diagnosed with HS. An accusation of promiscuity, on top of the embarrassment of malodorous, draining lesions, further contributes to the psychological burden. Interested patients should be directed to HS support groups, where they can openly discuss their frustrations, share their experiences in dealing with HS, and band together to advocate for themselves.

The future of hidradenitis suppurativa

The field of HS has come a long way since Velpeau first described it in 1839. Much of the advancement has resulted from recent studies in all areas of HS, from epidemiology to pathophysiology to comorbid disease associations and novel treatment options. Still, HS is largely misunderstood by much of the medical community and the general population, leading to unacceptable delays in diagnosis and treatment. In the future, further awareness of HS should be one of the primary goals. This will lead to an earlier diagnosis, better patient outcomes, improved psychosocial support, and ultimately increased funding for research to find a cure for this devastating and frustrating disease.

Abbreviations

BMI, body mass index; CO₂, carbon dioxide; FPSU, folliculopilosebaceous unit; HADS, Hospital and Anxiety Depression Scale; HS, hidradenitis suppurativa; IL, interleukin; Nd:YAG, neodymium-doped yttrium aluminium garnet; PAS, periodic acid-Schiff; RCT, randomized controlled trial; SCC, squamous cell carcinoma; STEEP, skin-tissue-sparing excision with electrosurgical peeling; Th, T helper; TNF- α , tumor necrosis factor-alpha.

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