ORIGINAL ARTICLE

Ultrasonography in the pathway to an optimal standard of care of hidradenitis suppurativa: the Italian Ultrasound Working Group experience

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Abstract

Background Ultrasound (US) is a real-time non-invasive technique that has been demonstrated to support an early diagnosis and a more precise assessment of hidradenitis suppurativa (HS).

Objectives To compare the clinical and US evaluation of a series of HS patients.

Methods 434 HS patients (259 F, 175 M; mean age 33.82 ±13.31 years) observed across 19 Italian dermatology centres [members of the Italian Ultrasound Working Group (IUWG)] were enrolled in a retrospective study. Clinical staging was obtained by the Hidradenitis Suppurativa Physician's Global Assessment score (HS-PGA), while the ultrasonographic staging was determined by the US HS-PGA, based on the same scores as clinical HS-PGA but performed with the aid of US.

Results At the end of the study, the mean clinical and US HS-PGA scores were 2.70 and 2.92, respectively. Direct comparison of clinical and ultrasonographic assessment revealed that a higher proportion of patients was classified as having moderate and very severe disease by US. In particular, 117 patients (26.96%) had a worse classification by US HS-PGA compared to clinical assessment.

Conclusion Our findings confirm that the use of clinical grading only to assess HS severity may underestimate the real disease severity. US examination can be considered an essential non-invasive imaging tool available to dermatologists for a more accurate diagnosis, staging, treatment planning and monitoring of HS and should be included in the pathway to an optimal standard of care of HS.

Received: 8 April 2019; Accepted: 24 July 2019

Conflict of interest

None.

Funding source

None.

Introduction

The current classifications and staging systems of HS are based on the clinical recognition, count and localization of the cutaneous lesions.[1] Although additional clinical information has been suggested,[2,3] overall simple clinical evaluation may underestimate the real extent and severity of the disease.[4,5]

Ultrasound (US) is a real-time non-invasive technique that has expanding uses in dermatology and that in the last few years has been applied in the study of HS, being useful for a better and clearer identification of clinical and subclinical lesions.[6–13]

The Italian Ultrasound Working Group (IUWG) includes a series of dermatologists specifically trained in the use of US for skin disorders who are in charge of enhancing and diffusing the use of US in HS.

[†]See Appendix for Italian Ultrasound Working Group.

Ultrasound in hidradenitis suppurativa

Different studies have suggested that US may help in HS management by enhancing the visualization and the extension of different cutaneous lesions, so to support an early diagnosis and a more precise assessment of disease severity.[8,14–16]

A series of US criteria for the diagnosis of HS have been proposed in 2013 by Wortsman *et al.*[6] that include the presence of hair follicles widening, dermal alterations, pseudocysts, fluid collections and fistulae. The authors suggested that the positivity for three or more of these findings is diagnostic for HS. They also proposed a 3-point sonographic scoring system for HS (SOS-HS) to define disease severity that is based on the number and distribution of fluid collections, fistulous tracts, pseudocystic nodules, widening of the hair follicles and alterations in the dermal thickness/echogenicity.[6,7] In their experience, the use of the SOS-HS scoring system in the staging of HS patients resulted in a management modification in 82% of cases; in particular, in 24% of cases it changed from medical to surgical.[6]

More recently, a consensus of international experts validated five key lesions detectable by US: pseudocyst, fluid collection, fistulous tract, connected fistulous tracts and hair tracts, and recommended the routine use of the colour Doppler function during US examination.[12] Doppler activity in the elementary lesions indicates the presence of inflammation that may be crucial in choosing the correct therapeutic approach.[10,17,18]

US is also useful in treatment monitoring and follow-up[13,19,20] with the first sign of treatment response being represented by the decrease of inflammatory activity at colour Doppler. Other US signs of disease improvement include reduction/disappearance of fluid collections and fistulous tracts, and the likely presence of residual scarring appearing as epidermal and dermal parallel hyperechoic areas.[8,13,19] A study on 40 HS patients evaluating the treatment response in different subtypes of fistulae, highlighted the importance of US in therapeutic planning: dermal and dermoepidermal fistulae showed a complete resolution after 6 months of different medical therapies in up to 95% and 65% of cases, respectively, whereas complex and subcutaneous fistulae showed no significant response after a medical intervention.[21]

In a recent study, the IUWG collected retrospective data comparing clinical and US evaluation of 124 HS patients (53 M, 71 F; 33.6 ± 13.6 years).[22] Clinically, disease severity was assessed by two validated scores: the Hurley staging system, graded using a 3-point scale (I-III), and the Hidradenitis Suppurativa Physician's Global Assessment score (HS-PGA), based on a 6-point scale[22] (Table 1). Similarly, US evaluation was performed using the aforementioned SOS-HS and a new proposed scoring system, the US HS-PGA, based on the same scores as clinical HS-PGA but performed with the aid of US. At the end of the study, 28.7% of patients were classified as more severe using SOS-HS compared to Hurley scoring. Concordantly, US HS-PGA compared to clinical HS-PGA classified 13.7% patients as being more severe. These results confirmed US as a complementary but very useful test to clinical assessment, particularly in severe patients, and indicated for the first time US HS-PGA as a new staging system that allows an easy comparison with its clinical counterpart, the validated HS-PGA.[22]

Italian ultrasound working group: retrospective study

Introduction

Based on the preliminary results of the aforementioned study by Napolitano *et al.*,[22] the IUWG has encouraged and supported the use of US in HS in several Italian centres. Herein, we report the results of the extension of the previous IUWG study. The aim was to compare clinical HS-PGA with US HS-PGA in the evaluation of HS patients in a large cohort of patients.

Methods

In this retrospective study, data from 434 HS patients observed across 19 Italian dermatology centres members of the IUWG were analysed. For this purpose, a specific digital platform was implemented by 'The System Academy' agency (Florence, Italy), whose support was restricted to data collection only. Patients provided informed consent and, in order to ensure anonymity, each has been assigned a code number. Data of the aforementioned IUWG study by Napolitano *et al.*[22] are part of the present study. Disease severity was assessed clinically by HS-PGA and ultrasonographically by the US HS-PGA. All US operators were dermatologists experienced with HS that followed the same

Table 1 Hidradenitis suppurativa physician global assessment (HS-PGA)

HS-PGA	Definition
Clear (score = 0)	No abscesses, no draining fistulae, no inflammatory nodules, no non-inflammatory nodules
Minimal (score = 1)	No abscesses, no draining fistulae, no inflammatory nodules but presence of non-inflammatory nodules
Mild (score = 2)	No abscesses, no draining fistulae, and 1–4 inflammatory nodules, or 1 abscess or draining fistula and no inflammatory nodules
Moderate (score = 3)	No abscesses, no draining fistulae, and ≥5 inflammatory nodules, or 1 abscess or draining fistula and ≥1 inflammatory nodules, or 2–5 abscesses or draining fistulae and <10 inflammatory nodules
Severe (score = 4)	2–5 abscesses or draining fistulae and ≥10 inflammatory nodules
Very severe (score = 5)	>5 abscesses or draining fistulae

training and used a 14–20 MHz US transducer equipped with power and colour Doppler (MyLab™ One, Esaote, Genoa, Italy). US examination focused on the recognition of those features that contribute to build-up the HS-PGA grading: pseudocyst (round or oval shaped hypoechoic or anechoic nodular dermal and/or hypodermal structure < 1 cm), fluid collection (hypoechoic or anechoic fluid dermal and/or hypodermal saclike structure connected to the base of widened hair follicles), fistulous tract (hypoechoic or anechoic dermal and/or hypodermal bandlike structure connected to the base of widened hair follicles) and connected fistulous tracts (two or more connected fistulous tracts in the same region) (Fig. 1). The use of power/colour Doppler allowed the recognition of inflammatory *vs* non-inflammatory lesions (Fig. 2). The study was conducted in accordance with the latest version of the Declaration of Helsinki

Results

Among 434 patients, the majority were female (259; 59.7%) and the mean age was 33.82 ± 13.31 years. Patients presented an average of 1.6 affected regions (range: 1–6), thereof most affected regions were armpit (226/694 = 32.56%) and groin (223/694 = 32.13%). The most frequent comorbidities were acne (129/353 = 36.54%) and diabetes (26/434 = 6.22%). The mean clinical and US HS-PGA scores were 2.70 and 2.92, respectively. Direct comparison of clinical and ultrasonographic assessment revealed that a higher proportion of patients was classified as having from moderate to very severe disease by US (Fig. 3). In particular, 117 patients (26.96%) had a worse classification by US HS-PGA compared to clinical assessment.

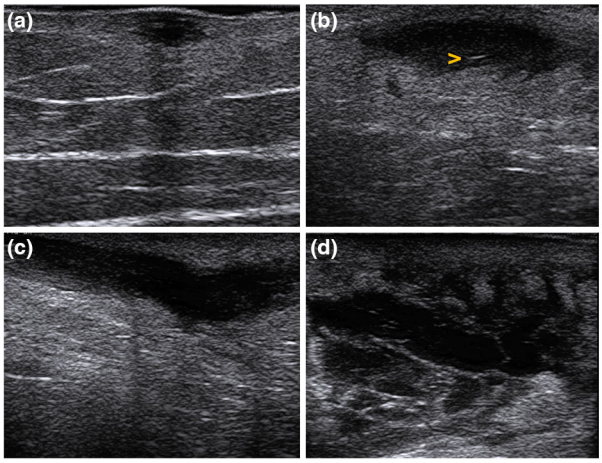

Figure 1 Ultrasound aspect of different HS lesions: (a) pseudocyst (b) fluid collection with hair tract (arrow) (c) fistulous tract (d) connected fistulous tracts.

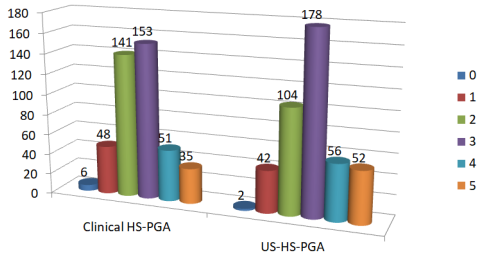

Figure 3 Results: clinical and US HS-PGA scores of 434 HS patients.

Discussion

Our study represents to date the largest data collection evaluating the concordance between clinical and US examination in determining HS staging. The results confirm that the use of clinical grading only to assess HS severity may underestimate the real disease severity. In particular, US revealed more severe HS cases than clinical examination by allowing a better categorization of clinical manifestations (e.g. nodules vs. abscesses vs. fistulae) and/or the detection of clinically undetected lesions. Unlike the previous study by Wortsman *et al.*,[6] which used different clinical and US scores (Hurley vs. SOS-HS), our study compared two similar clinical and US scores (clinical HS-PGA vs. US HS-PGA), thus reducing possible bias. Although several other clinical scores are available for HS staging, such as refined Hurley score, modified Sartorius score, international HS severity

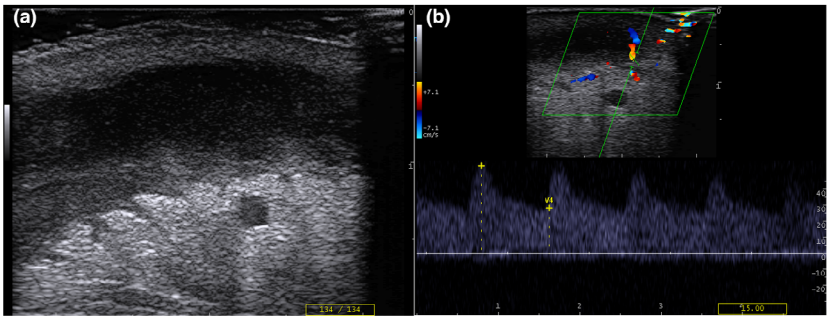

Figure 2 Ultrasound aspect of a fluid collection (a) and colour Doppler evaluation (b).

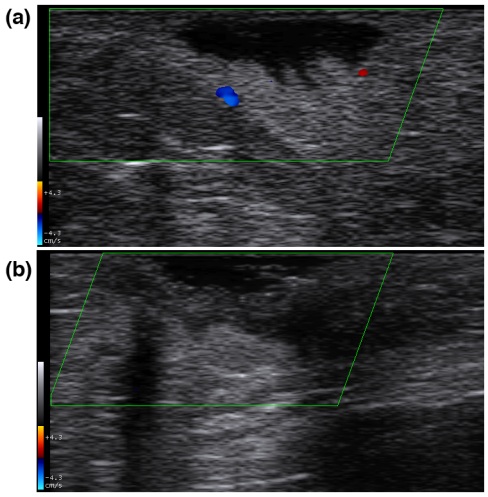

Figure 4 Ultrasound aspect of a fluid collection at baseline (a) and after 1 month of treatment with adalimumab (b).

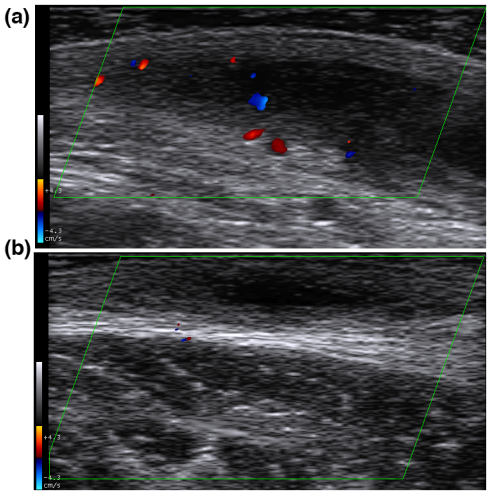

Figure 5 Ultrasound aspect of a fistolous tract at baseline (a) and after 3 months of treatment with systemic clindamycin (b).

score system (IHS4), HS clinical response (HiSCR) and severity assessment of HS (SAHS), HS-PGA represents a simple but detailed score that stratifies patients in six groups (from clear to very severe), allowing an easy comparison between clinical and US data.

Our results are similar to that obtained by a recent Spanish multicentre study comparing clinical vs. US assessment of Hurley staging system in 143 HS patients.[23] With the aid of US, the staging changed to a more severe stage in 44.7% of patients who were diagnosed as having Hurley stage I through clinical examination. In particular, on clinical examinations 26.6% of patients had Hurley stage I, 49% stage II and 24.5% stage III; conversely, US examination classified 14.7% of patients as Hurley stage I, 55.9% as stage II and 29.4% as stage III.

Conclusions

US examination can be considered an essential non-invasive imaging tool available to dermatologists for more accurate diagnosis, staging, treatment planning and monitoring of HS (Figs 4 and 5) and should be included in the pathway to an optimal standard of care of HS. From our study, it emerges how essential it is to combine routine clinical assessment with US evaluation, particularly in patients with more severe disease that often harbour underlying lesions that may go undetected by simple palpation.

The correct use of US in HS requires specific training, but the recognition of the key lesions (pseudocyst, fluid collection, fistulous tract, connected fistulous tracts and hair tracts) is quite simple, as is the use of power or colour Doppler for the evaluation of inflammatory lesions. Undoubtedly, the use of US in HS requires a longer time than simple clinical examination, but it has the advantage of provinding the physician with a more accurate and complete evaluation. The recent introduction of standardized US nomenclature and reporting in HS[12] could support US integration in clinical practice.

We finally suggest to consider the use of the novel scoring system US HS-PGA, in order to objectively compare, reproduce and analyse data between different study centres.

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Appendix

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