Real-Time Compound Imaging Ultrasound of Hidradenitis Suppurativa

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BACKGROUND Hidradenitis suppurativa (HS) is a difficult disease to treat. Surgery may be curative, but just like cancer surgery, it must be complete to effect a cure. Preoperative imaging of hidradenitis lesions is therefore of interest.

OBJECTIVE The objective was to study the ultrasound characteristics of hidradenitis and compare these to the clinical findings.

MATERIALS AND METHODS Real-time compound imaging ultrasound systems were used (Philips HDI 5000 and iU22) to visualize HS lesions in seven patients and regional controls images from eight healthy volunteers.

RESULTS Hidradenitis-related features were identified: various fluid collections, increased dermal thickness (mean $\pm$ SD, 3.3 $\pm$ 1.0 mm vs. 1.4 $\pm$ 0.3 mm for controls) and lower echogenicity of the skin. In comparison with clinical examination, we were able to identify both subclinical lesions and subclinical extension of lesions into clinically normal looking paralesional skin. Hair follicles appeared distended.

CONCLUSION A number of HS features can be identified by ultrasound. These features include both actual lesions and possible predisposing factors such as skin thickness and hair follicle morphology. Ultrasonography can identify the true extent of lesions in HS, which may be of use in the preoperative planning.

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H idradenitis suppurativa (HS) is often a difficult disease to treat. Early or mild lesions may, however, respond to medical treatment. Three treatments have been described as potentially effective in small randomized controlled trials: topical clindamycin, tetracycline, and estrogens.1–3 Often a number of other drugs are used off-label, however, in an effort to stem the progression of the disease. These include antibiotics and immunosuppressants.4 As the disease becomes more established and scarring occurs, however, medical treatment is no longer potentially curative and lesions require surgery. Experience suggests that the extent of the surgery is related to the cure rate; i.e., radical surgeries involving larger areas of skin are more likely to produce a cure than localized excisions.5–7 The tissue may be removed using either CO2 laser or cold steel surgery.8 In either case it is of benefit to the surgeon to establish an accurate estimate of the size of the lesions before embarking on the operation. The use of ultrasound may therefore be of benefit to the preoperative assessment of patients with HS if lesions can be visualized.

Materials and Methods
Patients (7 patients, 6 women and 1 man; age, 17–47 years; mean age, 31.7 years) with an established diagnosis of HS were compared with healthy controls (8 persons, 7 women and 1 man; age, 23–65 years; mean age, 39.3 years) after informed consent. Standard real-time compound imaging ultrasound systems were used (HDI 5000 and iU22, Philips, Andover, MA) to visualize HS lesions. These systems have a computerized beam steering technology,
which allows the ultrasound beams to sweep through the tissue at different angles. The acquired images are then electronically integrated into real-time compound images for improved image quality. These devices are not specifically developed for dermatologic applications and are generally available in ultrasound departments. The patients and the healthy controls were studied with compact linear 15.7-MHz or linear 17.5-MHz probes and using a pad of gel over the skin.

The axillae and groin of the patients were clinically examined, and the sizes of the lesions were estimated. After this, the area was scanned, and the images were compared to the clinical findings. The skin dermal thickness was measured in millimeters at the anterior border of the right axillae for both patients and controls.

**Results**

Real-time spatial compound ultrasound imaging of HS lesions showed a variety of changes: Overall imaging revealed that HS is associated with dermal fluid collections of different sizes, numbers, and locations (Figure 1). Subclinical lesions could also be identified in clinically unaffected regions (Figure 2).

Examining the more detailed imaging, an increase of skin dermal thickness was seen (mean ± SD, 3.3 ± 1.0 mm for hidradenitis patients and 1.4 ± 0.3 mm for controls; \( p = .007, t \)-test) accompanied by an apparent decrease of echogenicity in the affected regions. Finally, the hair follicles appeared enlarged in nonaffected skin. When clinical assessment of lesion size was compared with ultrasound imaging, the latter found that the lesions extended beyond the clinical demarcation in all cases.

**Discussion**

By describing the ultrasound imaging of HS, this study may contribute to both the understanding of
the disease and its management. Ultrasound imaging allows the in vivo visualization of changes in the tissue and, as seen in Figure 1, it appears that the changes in HS are more widespread than expected from clinical examination. The echolucent areas seen reflect edema and inflamed tissue and these changes appear to affect not only the skin but also reach deep into the subcuc-taneous tissue. This may reflect the clinically invasive behavior of the disease. These changes are not apparent on clinical examination, and it was found that the changes visible in ultrasound always extended beyond the clinically identified borders of the lesions. Subclinical lesions can also be identified in patients (Figure 2).

Examining specifically the structures in the skin, it was seen that the skin thickness was increased compared with regional controls from healthy individuals. This occurred in association with lesions, and when seen in conjunction with the apparent decrease in echogenicity, suggests dermal edema surrounding the inflamed lesions. Similarly, hair follicles appeared abnormal in HS patients. This has been suggested as a possible ultrasonographic hallmark of the disease previously. The ultrasound scanner used in this study is less well adapted to the study of hair follicles, but appears to support the concept of hair follicle abnormalities in HS. More detailed studies using different imaging techniques are necessary to decide if the widening of hair follicles is a primary or a secondary event in HS. Surgery is an important element in the management of HS patients. It currently offers the best chances of cure for patients suffering from more extensive, scarring disease. It is of the utmost importance that excisions of HS lesions are sufficiently large. Small localized excisions are often associated with recurrences or de novo lesions arising in the affected region and therefore frequently offer only temporary relief. At the same time it is of importance that the preoperative assessment of patients is accurate. Imaging is possible with magnetic resonance imaging, but our results suggest that real-time spatial compound imaging may be helpful in establishing the true extent of disease preoperatively and thereby aid the planning of the surgery and postoperative documentation in a similar manner to, for example, vein surgery or laser therapy.

References


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