Update on Dermoscopy and Infectious Skin Diseases

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ABSTRACT Nowadays, dermoscopy is a global worldwide diffuse diagnostic tool supporting clinicians in their daily hard task of correct orientation among dermatological diseases. Born to be an instrument for early diagnosis of skin cancer, the dermatoscope is now considered the dermatologist’s stethoscope, as it can be routinely used to support diagnosis in general dermatology, so spreading its utility in cutaneous inflammatory and infectious diseases, as adjuvant and not substitute to histology and potassium hydroxide examination. As concerns the latter, plenty of papers have been published since the first description of dermoscopic findings of scabies. The aim of this review is to give the clinician a practical approach to dermoscopic parameters of cutaneous infectious diseases with a focus on the latest updates in this topic.

Introduction

Nowadays, dermoscopy is a global worldwide diffuse diagnostic tool supporting clinicians in their daily hard task of correct orientation among dermatological diseases [1]. Born to be an instrument for early diagnosis of skin cancer, the dermatoscope is now considered the dermatologist’s stethoscope [2], as it can be routinely used to support diagnosis in general dermatology, so spreading its utility in cutaneous inflammatory and infectious diseases. As concerns the latter, plenty of papers have been published since the first description of dermoscopic findings of scabies [3].

A galloping enthusiasm toward dermoscopy in recent years induced dermatologists all over the world to describe everyday novel dermoscopic signs in almost every dermatological disease, thus sometimes generating confusion in terminology. A recent consensus by the International Dermoscopy Society tried to put order in that confusion by redefining the most accepted dermoscopic criteria and terminology in inflammatory and infectious diseases of skin [4].

As a general consideration, when approaching cutaneous infectious diseases (entomodermoscopy), a risk of spreading the infection through the dermatoscope does exist [5,6], but a few recommendations can limit or avoid the issue. First, noncontact dermoscopy should be preferred as the diagnostic approach and nowadays it is easier because of growing diffusion of polarized handled dermatoscopes, which avoid skin contact. Second, the use of antiseptics and instrument disinfection after each use is mandatory. The use of disposable transparent devices has been abandoned because of interference with the correct visualization of the skin.
The aim of this review is to give the clinician a practical approach to dermoscopic parameters of cutaneous infectious diseases with a focus on the latest updates in this topic.

**Human Papillomavirus Infections**

Human papillomavirus infections are among the most common cutaneous infections in human beings, as the human papillomavirus is ubiquitous and its clinical expression can be extremely variable. From this clinical variability, a variegated presentation of dermoscopic findings derives. There is a constant feature that can often be observed in warts, ie, dotted vessels and/or hemorrhagic points that can be variably found in different kinds of viral warts.

*Common warts.* Common warts are the most frequent type of warts. They can appear on any part of the body, although hands represent the most affected area. Common warts usually show at dermoscopy as grouped papillae, with dotted or loop vessels, and/or hemorrhagic points and lines often surrounded by a whitish halo (Figure 1), assuming a "frogspawn appearance" [7].

*Filiform warts.* Filiform warts often appear in periorificial areas, mostly in children or in the beard area of men. Dermoscopy shows the same features as common warts, with more prevalent papillae [7] (Figure 2).

*Flat warts.* Flat warts present as plane-topped papules, often spread on the face or dorsa of hands. Dermoscopy observation may be difficult because of lack of striking findings, although small dotted vessels on a yellowish background may be seen (Figure 3). These features may be helpful to distinguish flat warts from folliculitis or acne, usually showing follicular findings [7].

*Plantar warts.* Among the most common type of warts, plantar warts show at dermoscopy as small dotted hemorrhagic structures corresponding to thrombosed vessels, visible in the context of whitish or yellowish papillae which interrupt cutaneous dermatoglyphics (Figure 4). Easy to recognize, plantar warts are sometimes misdiagnosed as tylomas.
The presence of a central pore on a white-yellowish amorphous area, often surrounded by thin crown vessels [7] (Figure 6).

A large variation in dermoscopic findings of MC has been reported [9], regarding both central structures and vessels. Central pore may be absent (Figure 7), with the only central amorphous area detectable at dermoscopic examination. On the other hand, vessels may be visible or not and, when present, they can show different patterns, such as crown, radial, or dotted [9].

**What’s New?**

With handled dermatoscope, the correct detection of vessels is not always easy because of pressure induced by the dermatoscope itself on the lesion. An interesting paper by Ku et al [10] has correlated features of white structures in MC to histopathology. The authors have recognized 3 types of central white structures in relation to the size, duration, and histopathology of MC. Classic MC presents with a central roundish white (hyperkeratosis without interruption of dermatoglyphics) and must be distinguished from acral melanoma, sometimes unfortunately misinterpreted as wart [7].

**Genital warts.** The sexually transmitted disease of our century, genital warts or condylomata, are quite easy to diagnose, although in early stages dermoscopy could be very useful to avoid overdiagnosis and distinction from noninfectious genital lesions often misdiagnosed as warts, ie, hirsuties penis, vestibular papillomatosis, Fordyce granules, and genital angiookeratomas.

The most common dermoscopic finding is the so-called mosaic pattern, ie, the presence of grouped dotted or glomerular vessels at center surrounded by a whitish network (Figure 5). The papillae can sometimes project outward. Pigmented genital warts can be occasionally observed, and they usually show at dermoscopy a cerebriform or seborrheic keratosis-like appearance [7].

**What’s New?**

A recent study has investigated dermoscopic features of urethral condylomata [8], showing as expected a predominance of vessels that can vary in morphology from more common dotted to polymorphous vessels, but the authors recommend biopsy to confirm the diagnosis.

**Molluscum Contagiosum**

Molluscum contagiosum (MC) is a very common infection caused by poxvirus, potentially occurring at any age and body location, more frequent in atopic children or in adults as sexually transmitted disease. It typically appears with single or multiple variably-sized translucent papules, sometimes umbilicated. Clinical diagnosis is quite easy, mostly in multiple lesions. In MC presenting as a single lesion, differential diagnosis may be challenging. Dermoscopy usually shows the presence of a central pore on a white-yellowish amorphous area, often surrounded by thin crown vessels [7] (Figure 6). A large variation in dermoscopic findings of MC has been reported [9], regarding both central structures and vessels. Central pore may be absent (Figure 7), with the only central amorphous area detectable at dermoscopic examination. On the other hand, vessels may be visible or not and, when present, they can show different patterns, such as crown, radial, or dotted [9].

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other common causes of hair loss, especially in children, such as alopecia areata and trichotillomania. The most common and first described trichoscopic finding in TC is the so called “comma hair,” ie, a shortened, curved hair resulting from the fungal invasion of the shaft [11] (Figure 9). Other nonspecific dermoscopic findings have been reported in TC, namely black dots, dystrophic hairs, and hair casts [11] (Figure 10).

**Dermatophytic Infections**

Among dermatophytic infections, tinea capitis (TC) is the one that took most diagnostic advantage from the use of dermoscopy over time. TC is a common dermatophytosis of the scalp of children and rarely adults. Several agents have been isolated in patients with TC, with *Microsporum canis* being the most common in Europe, accounting for 80% of cases, followed by *Trichophyton spp*, progressively increasing as etiological agent of TC. Single or multiple alopecic scaly patches of the scalp are the usual clinical presentation of TC, whose diagnosis should be confirmed by potassium hydroxide examination and microbiological culture [11]. Although it can be easily recognized on the basis of clinical findings, dermoscopy may find a great role in differential diagnosis with other common causes of hair loss, especially in children, such as alopecia areata and trichotillomania. The most common and first described trichoscopic finding in TC is the so called “comma hair,” ie, a shortened, curved hair resulting from the fungal invasion of the shaft [11] (Figure 9). Other nonspecific dermoscopic findings have been reported in TC, namely black dots, dystrophic hairs, and hair casts [11] (Figure 10).

**What’s New?**

*Tinea capitis.* Recently, plenty of novel dermoscopic findings have been detected in TC, in particular zig-zag hair [12] (ie, hair with multiple breakage bands provoking bending of the hair shaft in different areas), corkscrew hair [12] (the equivalent finding of comma hair in patients with curly hair) (Figure 11), and the highly specific Morse code-like or barcode hairs [13], visible at high magnification with multiple horizontal transparent bands along the hair shaft. Another piece of news comes from the potential correlation between etiology and dermoscopy in TC. Indeed, a preliminary observation...
for most fungal nail infections. In recent years several studies have shown the utility of onychoscopy in the diagnosis of onychomycosis. In a recent clinical overview in the Journal of the American Academy of Dermatology, onychoscopy was recognized as a supportive tool for the diagnosis of onychomycosis [19,20] and its differential diagnosis [21]. The most common dermoscopic finding is the fringed proximal onycholytic border, associated with longitudinal striae with fading resembling “aurora borealis” (Figure 14), and ruin-like appearance of the subungual hyperkeratosis and debris (Figure 15). Recently, onychoscopy of fungal melanonychia has been described with different colors in nail discoloration including black, white, yellow, and orange, allowing a differential diagnosis with malignant melanonychia [20,22,23].

**Pediculosis**

*Head lice.* Pediculosis capitis (or head lice) is a worldwide diffuse infestation due to Pediculus humanus capitis that
Pthirus pubis. Unlike head lice, Pthirus pubis is predominantly a sexually transmitted disease among adults that usually appears with itch in the pubic and genital area. Dermoscopy confirms the clinical suspicion by direct detection of the Pthirus, whose body is more flattened and larger than pediculus capitis, adherent to pubic hairs and blood-feeding. The blood-filled intestine of Pthirus resembles the body of a scorpion (personal observation) (Figure 18). Nits can be detected in Pthirus pubis as well. Pthirus could potentially affect children as well, whose infection is transmitted by adults. Pediatric Pthirus usually occurs on the eyelashes, and less frequently eyebrows, and hair with dermoscopy playing a key role for the detection of the parasite (Figure 19), its prompt treatment and follow-up [7].

What’s New?
No great news is available about dermoscopy of pediculosis, except a paper about the use of the dermatoscope for the diagnosis of pediculosis corporis [24].
Tinea Nigra

Tinea nigra is a relatively uncommon dematiaceous fungal infection, usually caused by Phaeoannellomyces werneckii. Tinea nigra is diffuse in the tropical and subtropical areas of Central and South America, Africa, and Asia. It often occurs as occasional infection after traveling in these areas of the world. It usually affects young people and presents as an irregular acral pigmentation that may mimic a melanocytic lesion. Dermoscopy typically shows a weak pigmentation composed of thin bundles of spicules, arranged in parallel lines mainly in some peripheral areas (Figure 23) [28-31]. The pigmentation usually does not follow the dermatoglyphic furrow and ridges, although in some cases the parallel ridge pattern could be hard to distinguish from acral melanoma [28-31].

Tungiasis

Tungiasis is a parasitic infection due to Tunga penetrans, which is endemic in Africa, Central America, Asia, and Carib-
hyperkeratosis, central erosion or ulceration, and “white starburst-like pattern” may be observed. Vascular structures are often detectable with variable morphology (dotted, linear, polymorphous, hairpin, mixed) [33]. A recent larger study published in *Dermatology: Practical and Conceptual* has confirmed these findings [34].

Cutaneous Larva Migrans

Cutaneous larva migrans is a tropical infection due to *Ancylostoma*, whose reservoir is dogs’ and cats’ intestine. The most common nematode provoking the so-called creeping eruption is the *Ancylostoma braziliense*, diffuse in North, Central, and South America and Caribbean. It usually presents as a quite typical serpiginous, linear, slightly elevated, itchy erythema occurring on the feet, web spaces, arms, or buttocks [35]. Dermoscopy shows multiple translucent yellow-brown structureless areas arranged in a segmental fashion (Figure 26),
which represent the body of the worm, with dotted vessels detectable where the burrow is empty [35].

Other Diseases

With the spread of dermoscopy in dermatology, numerous novel findings in different infectious diseases have been described.

What's New?
Pseudomonas onychopathy may be quickly detected through dermoscopy for the green nail discoloration provoked by the production of the pigment pyocyanin [36] (Figure 27). Trichomycosis axillaris has been found to show at dermoscopy yellowish hair casts around axillary hairs [37] (Figure 28). Differential diagnosis through dermoscopy of different types of folliculitis has been proposed [38].

Conclusions and Future Perspectives

One of the most fascinating aspects of dermoscopy is that it looks like a never-ending science, with news published frequently. Diagnostic approach to infectious diseases is different nowadays also thanks to the dermatoscope, which has progressively increased diagnostic confidence with rarer diseases, such as leishmaniasis, tungiasis, and larva migrans. It is important to state that dermoscopy is not the unique diagnostic tool for most infectious diseases of the skin and should be considered supportive and not a substitute for the other well-known diagnostic techniques, such as potassium hydroxide examination and histology. The low cost of the handheld instrument and the spread of the technique among dermatologists all over the world will probably provide more details about less common tropical infectious diseases whose diagnosis is still challenging for most dermatologists.

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