

Dermoscopy in the Diagnosis of Hair and Scalp Disorders

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Abstract. Dermoscopy is a non-invasive, *in vivo* technique that has been recently utilized for the diagnosis and management of hair and scalp disorders. In the last few years many studies have been published in this field; this review will describe the dermoscopic patterns observed in the most common hair and scalp disorders and discuss their diagnostic relevance.

Keywords: alopecia, videodermoscopy, hair loss, hair diseases, scalp diseases, trichoscopy.

DERMATOSCOPIA PARA EL DIAGNÓSTICO DE ENFERMEDADES DEL PELO Y EL CUERO CABELLUDO

Resumen. La dermatoscopia es una técnica *in vivo*, no invasiva, que se ha utilizado recientemente para el diagnóstico de los trastornos del pelo y el cuero cabelludo. En los últimos años se han publicado varios estudios en este campo; en esta revisión se describen los patrones dermatoscópicos que se observan en los trastornos más frecuentes del pelo y el cuero cabelludo, y se discute su relevancia diagnóstica.

Palabras clave: alopecia, vídeo-dermatoscopia, caída de cabello, enfermedades del pelo, enfermedades del cuero cabelludo, tricoscopia.

Introduction

Many studies on dermoscopy of hair and scalp disorders have been published in the last few years and the term trichoscopy has specifically been coined to describe this novel application of the technique¹⁻³. Trichoscopy is very useful for *in vivo* diagnosis of scalp and hair disorders and can greatly improve clinical management. Both handheld dermoscope and videodermoscope can be utilized, the former however providing the possibility of a fast storage of images for future comparison and follow-up studies. This article reviews the dermoscopic patterns observed in normal scalp, in inflammatory and infectious scalp disorders, hair shaft alterations, and the dermoscopic features described in non-scarring and scarring alopecia.

Methods

A review of the literature was carried out using PubMed-Medline and hair and scalp disorders books. Key search terms included: hair, scalp, dermoscopy, videodermoscopy, trichoscopy, alopecia, and hair loss. In addition, references of relevant articles and reviews were manually searched for additional sources. References of retrieved publications were reviewed to identify sources not obtained in our search.

Normal Scalp

Dermoscopy of the scalp can be performed with or without an interface solution, which is referred as "dry dermoscopy"⁴. Dry dermoscopy is useful to observe tertiary structures of skin surface, such as hairs⁵. We utilize dry dermoscopy to evaluate scaling and follicular hyperkeratosis while we use an interface solution (thermal water) to analyze follicular and vascular patterns.

Dermoscopy of the normal scalp shows interfollicular simple red loops, and arborizing red lines, which represents the normal vascular patterns, and honeycomb pigment in sun-exposed areas or in subjects with high phototypes^{6,7}. Follicular units are easily recognized and usually contain 1 to 4 hairs⁶. In children, dermoscopy often

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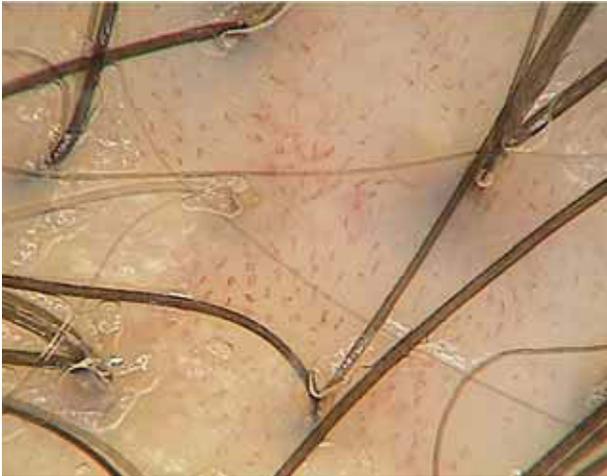


Figure 1. Interfollicular twisted loops in scalp psoriasis.

shows “dirty dots” corresponding to dust particles retained in the scalp⁸. This feature is not observed in adolescents or adults as sebaceous secretion avoids particle deposition.

Inflammatory and Infectious Scalp Disorders

Psoriasis

Dermoscopy is very useful for diagnosing psoriasis limited to the scalp⁶. Interfollicular twisted red loops are very suggestive of scalp psoriasis, and represent tortuous capillaries in the dermal papilla⁶ (fig. 1). This feature can be found in involved as well as clinically uninvolved psoriatic scalp, which supports the notion that a microcirculation defect plays an integral role in the evolution of this disease^{9,10}. Dermoscopy is also useful in the follow-up of scalp psoriasis, as it shows decreased numbers of twisted red loops after effective treatment⁶. Since scales, which may be white or yellow in colour, often hide this vascular pattern, it is important to perform a careful examination of the whole scalp.

Seborrheic Dermatitis

Scales of seborrheic dermatitis are similar to those of psoriasis even though they are more commonly yellow in colour. In seborrheic dermatitis-like forms of seborrheic dermatitis diffuse interfollicular twisted red loops can be seen, which could reflect a true overlap between both diseases⁶.

Pediculosis Capitis

In this infectious disease, presence of the parasite can be seen with the naked eye, but dermoscopy is very useful in the follow-up, as it shows if the nits are empty or not after treatment¹¹ (fig. 2).



Figure 2. Detail of a “live nit” anchored to the hair shaft (Videodermoscopy, 70× magnification).

Piedra

Diagnosis of white or black piedra can be done with dermoscopy, which shows white or black concretions in the hair shaft, differentiating them from lice infestation.

Tinea Capitis

Slowinska has recently described comma hairs as a dermoscopic marker of tinea capitis. Comma hairs appear as slightly curved, fractured hair shafts that can be found in active lesions¹².

Hair Shaft Disorders

Monilethrix and Pseudomonilethrix

Monilethrix is an inherited autosomal dominant condition with variable expression due to a mutation in the keratin hair basic 6. The hair shaft has a beaded appearance due to the presence of elliptical nodes, which have the diameter of normal hair and are medullated, regularly separated by internodes, which are narrow, devoid of medulla and are the site of fracture. Before dermoscopy, the diagnosis of monilethrix required microscopic examination of the hair shafts, which is not always available. With the dermoscope, diagnosis is very easy and fast. Dermoscopy of the hair reveals uniform small elliptical nodes of normal thickness separated by regular, multiple, and dystrophic constrictions^{13,14} (fig. 3).

Under the microscope monilethrix can be confused with pseudomonilethrix, which is caused by overlapping hairs pressed under the cover slide prepared for microscopic examination, and thus dermoscopy prevents misdiagnosing these two conditions^{13,15}.



Figure 3. Monilethrix: note hair beading and fractures (Videodermoscopy, 70× magnification).



Figure 4. Androgenetic Alopecia: note diversity in the hair diameter greater than 20% (Videodermoscopy, 40× magnification).

Trichorrhesis Invaginata (Netherton Syndrome)

Netherton syndrome is a rare autosomal recessive disease caused by a mutation in the SPINK5 gene that is characterized by trichorrhesis invaginata, erythroderma, ichthyosis, atopy, and failure to thrive¹⁶. Trichorrhesis invaginata is a constant feature of this syndrome: the hair shaft shows multiple knots along its length. The knots consists of a proximal cup-shaped portion and a distal ball-shaped portion resembling the ball and cup joint of bamboo, which is easily detected by dermoscopy¹⁶. Thus, this technique allows early diagnosis of this syndrome, decreasing the need for the expensive SPINK5 testing.

Trichorrhesis Nodosa

This condition is the most common defect of the hair shaft¹⁷. It can be congenital or acquired, and although it is

not specific for a disease, it can represent an important clue to a possible metabolic disorder. Dermoscopy shows broken hair shafts with a brushed tip.

Pili Torti

In pili torti, the hairs are flattened and present twisting of the shaft through 180 degrees at irregular intervals¹⁷. A small number of these hairs can be frequently found in normal scalp and in association with other hair shaft abnormalities. Pili torti are also a feature of several rare genetic syndromes¹⁷. Dermoscopy shows irregular twisting and flattening of the hair shaft.

Non-Scarring Alopecia

Androgenetic Alopecia (AGA), including Female Pattern of Hair Loss

It is the most common form of hair loss in adults, which is usually easily diagnosed by clinical examination. Dermoscopy is very useful to diagnose the disease in early stages and then to establish if a patient complaining of hair loss requires a specific treatment. The dermoscopic sign of AGA is a diversity in the hair diameter more than 20%^{6,18,19} (fig. 4). Peripilar signs are observed in early AGA as a brown depressed halo at the follicular opening. Yellow dots can be seen in advanced cases, as a consequence of sebum and keratin accumulation within dilated follicular infundibula. Honeycomb pigmented network can be seen in sun-exposed areas as the disease progresses. Dermoscopy is also very useful to diagnose AGA in prepubertal children²⁰.

Alopecia Areata (AA)

Dermoscopy of AA has been widely discussed, and several studies have been published^{6,21,22}. Characteristic dermoscopic features include numerous yellow dots, black dots, broken hairs, and clustered short vellus hairs (shorter than 10 mm). A pathognomonic finding are the exclamation mark hairs (or tapering hairs), which are mainly present at the periphery of the lesions and indicate disease activity⁶ (fig. 5).

In alopecia areata incognita (AAI), dermoscopy shows diffusely distributed yellow dots, affecting up to 70% of the hair follicles, and a large number of short regrowing hairs (2-4 mm dystrophic hairs, exclamation mark hairs, and cadaverized hairs can be seen in some cases)²³.

Inui et al had demonstrated that some dermoscopic features of AA could correlate with disease severity, such as black dots, yellow dots, and short vellus hairs; or with disease activity such as black dots, tapering hairs, broken hairs, and short vellus hairs. For the diagnosis, yellow dots and short vellus hairs were the most sensitive markers, and

black dots, tapering hairs, and broken hairs were the most specific markers²¹.

Trichotillomania

Few studies reported dermoscopic findings of trichotillomania^{6,21,24}. Special attention must be given by dermatologists to the dermoscopy of this condition, as it can be very similar to AA, which can lead to misdiagnose. Dermoscopic features include black dots, broken hairs, hair shafts of different lengths, coiled hairs, and few yellow dots in some cases^{6,21,24}.

Traction Alopecia

Dermoscopic findings are similar to those found in trichotillomania. In black patients, dermoscopy shows elongation and linearization of follicular ostia in the frontal area, reflecting the traction process (Torres, unpublished data) (fig. 6). This technique can also be useful to detect signs of traction in patients wearing hair extensions²⁵.

Telogen Effluvium

In telogen effluvium, dermoscopy shows empty follicles, short regrowing hairs and less than 20% hair diameter diversity⁶. This technique is therefore very useful to rule out androgenetic alopecia in patients experiencing increased hair loss. However, it is important to keep in mind that in some cases both conditions can be associated. In doubtful cases, it is important to compare the dermoscopic patterns of the top of the scalp with the occipital area, as AGA mainly produces alterations in androgen dependent scalp.

Congenital Triangular Alopecia

Despite its name, this condition is usually diagnosed in children between 3 and 6 years of age, and less commonly in adults. It is not uncommon for triangular alopecia to be misdiagnosed as alopecia areata, especially when the lesion is not located in the typical fronto-temporal region. Dermoscopy permits to distinguish these entities and to avoid unnecessary treatment or a scalp biopsy. Dermoscopic features of triangular alopecia include normal follicular openings with vellus hairs surrounded by normal terminal hair²⁶.

Acute Diffuse and Total Alopecia of the Female Scalp (ADTAFS)

This condition, which has been described in Asian women, is characterized by an acute reversible diffuse alopecia associated with pronounced eosinophilic infiltrate. Dermoscopy shows features of alopecia areata such as cadaverized hairs, exclamation mark hairs, broken hairs, and yellow dots²⁷.

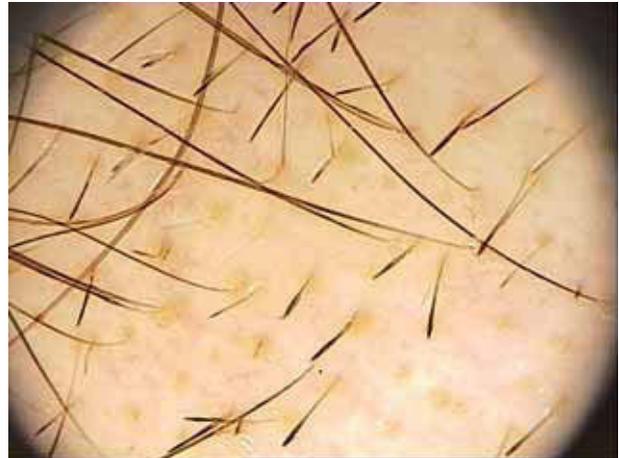


Figure 5. Exclamation mark hairs are markers of Alopecia Areata activity (Videodermoscopy, 40x magnification).

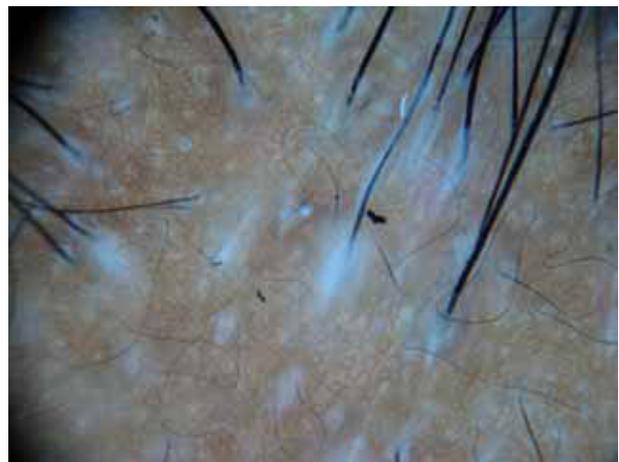


Figure 6. Elongation and linearization of follicular ostia in the frontal area, reflecting the traction process: traction alopecia (Dermoscopy, 30x magnification).

Scarring Alopecia

Dermoscopy of all primary or secondary scarring alopecia shows decreased hair density and loss of follicle openings. Honeycomb pigment can be seen in sun-exposed areas, especially in dark-skinned patients.

Lichen Planopilaris/Frontal Fibrosing Alopecia

Lichen planopilaris (LPP) and its clinical variants (frontal fibrosing alopecia) have the same dermoscopic features consisting of hyperkeratotic perifollicular white scales, variable perifollicular erythema, and peripilar white dots^{6,28}. Blue-grey dots with a “target” distribution around follicular ostia can be observed, which correspond to pigmentary incontinence restricted to the follicular unit²⁹.



Figure 7. The red dots are markers of Discoid Lupus Erythematosus of the Scalp (Videodermoscopy, 50× magnification).

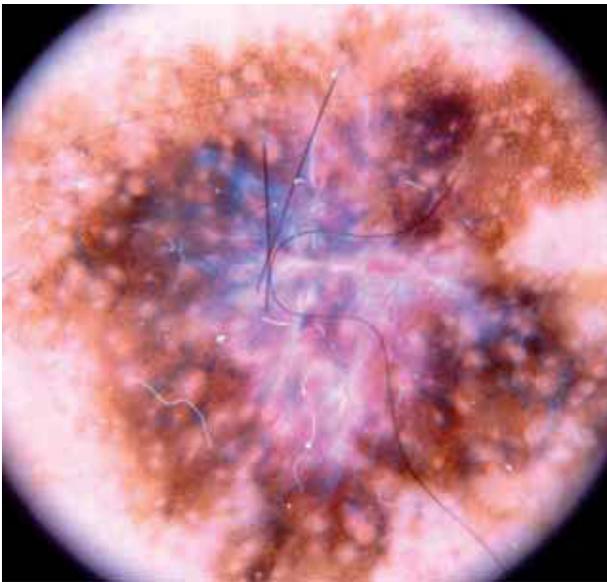


Figure 8. Scalp melanoma in the parietal area showing a multicomponent global pattern typified by an atypical, asymmetrical pigment network and a blue-grey veil in the center (this lesion had an incisional biopsy in the center) (Dermoscopy, 30× magnification).

Discoid Lupus Erythematosus of the Scalp (DLES)

Dermoscopy of this condition shows mottled dyschromia, follicular plugs, telangiectasias, white central plaque, and blue-grey dots in a “speckled” pattern, irregularly distributed between hair follicles, corresponding to pigmentary incontinence that affects the interfollicular region. No loops can be seen as this disease is characterized by marked epidermal atrophy. Few cases can show hyperkeratotic perifollicular white scaling, similar to those of LPP^{6,29}.

Tosti et al recently described the red dots, a dermoscopic feature that is helpful in differentiating active DLES from LPP. Red dots are erythematous polycyclic, concentric structures, regularly distributed around follicular ostia. These findings correspond to widened infundibula plugged by keratin and surrounded by dilated vessels and extravasated erythrocytes³⁰ (fig. 7).

Cicatricial Marginal Alopecia

This condition had been recently described as a scarring alopecia of the scalp margin, which can be misdiagnosed as AA and traction alopecia³¹. Dermoscopy is very useful as it shows evident loss of follicular units, but no signs of traction³².

Keratosis Follicularis Spinulosa Decalvans

This inherited condition causes follicular keratotic papules and pustules producing progressive cicatricial alopecia. Dermoscopic features are very similar to those of LPP, showing decreased hair density with loss of follicular openings, hyperkeratotic perifollicular white scales, perifollicular erythema, and occasionally perifollicular pustules.

Folliculitis Decalvans

Characteristic dermoscopic findings include tufted hairs, which are usually observed in advanced cases, and perifollicular pustules. The interfollicular scalp often shows twisted red loops, similar to those observed in scalp psoriasis. Peripilar white dots corresponding to fibrous tracts can be seen in advanced cases, associated with a honeycomb pigment pattern⁶.

Miscellaneous

Scalp Melanoma

Although scalp melanoma is a rare condition, representing 2% of all melanomas, it is associated with a poor prognosis due to diagnostic delay. Considering its major importance, we recommend that all dermatologists perform a full scalp examination in order to exclude suspected lesions. Dermoscopy of scalp melanoma can present as a lentigo maligna melanoma pattern or as a common trunk melanoma pattern³³ (fig. 8).

Pseudofolliculitis Barbae

Dermoscopy of this condition shows U-shaped ingrowing hairs corresponding to the sites of individual papules³⁴.

Dyes and Cosmetic Camouflage

Artificial blackish particles and staining of the follicular opening can be seen in patients that use hair dye or cosmetic camouflage.

Chemical Hair Damage due to Hair Straightening

Chemical hair damage can lead to hair shaft fracture, and hair fragments can be detected in the scalp with dermoscopy (Torres, unpublished data).

Conflict of interests

Authors have no conflict of interests to declare.

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