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Dermoscopic Findings of Hair and Scalp Diseases

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Abstract

Background: Hair and scalp dermoscopy, known as trichoscopy, has recently been used frequently in order to both diagnose and distinguish in various hair and scalp disorders as well as melanocytic lesions. This non-invasive, modern and comfortable method enables us for evaluating hair shafts such as broken hairs, tapering hairs, short vellus hairs, comma hairs, corkscrew hairs, and congenital hair shaft abnormalities; follicular and interfollicular epidermal changes such as yellow dots, black dots, white dots, peripilar sign, follicular openings; and vascular structures such as red dots and globules, twisted red loops, glomerular vessels, arborizing vessels and atypical red vessels. While yellow dots are more important features for alopecia areata, hair diameter variability is very specific for androgenetic alopecia. Comma hairs and corkscrew hairs were reported in patients with tinea capitis. Red dots and globules and twisted red loops are frequently seen in patients with scalp psoriasis, but not seborrheic dermatitis. Thanks to these dermoscopic features, as we can increase our likelihood of correct diagnosis, we can reduce the number of unnecessary scalp biopsies. Furthermore, we can use dermoscopy to evaluate follow-up treatment in diseases such as pediculosis capitis and tinea capitis. Consequently, hair and scalp dermoscopy is very simple, useful and timesaving method that can be easily used in daily practice.

Introduction

Physical examination (simple inspection and pull test), and even scalp biopsy, may always not be sufficient in the diagnosis of various hair and scalp diseases such as early cicatricial alopecia, alopecia areata incognita, and telogen effluvium. In recent years, hair and scalp dermoscopy, known as trichoscopy, has been used as a new diagnostic tool to improve diagnostic capability of inflammatory diseases such as scalp psoriasis and seborrheic dermatitis; non-scarring alopecias such as androgenetic alopecia, alopecia areata, trichotillomania, and telogen effluvium; scarring alopecias such as lichen planopilaris, discoid lupus erythematosus, central centrifugal cicatricial alopecia, traction alopecia and folliculitis decalvans; and hair shaft abnormalities [**1, 2, 3**]. In addition to these diseases, skills of dermoscopy have been showed in infectious conditions and infestations of the scalp and hair [**4, 5, 6, 7, 8, 9, 10**].

Trichoscopy is a new method for diagnosis of hair loss. This method that has been used since early 1990s has become popular in recent years. It enables to assessment and measure hair at high magnification and also contributes to distinguish scalp abnormalities. The usual working magnificitions are 20-fold to 70-fold. This technique is modern,

non-invasive and quite comfortable for both patients and dermatologists. While trichoscopy allows examining hair shafts, hair follicle openings (dots), perifollicular epidermis and cutaneous microvessels, it is not used to detect or evaluate scalp tumors [**11, 12**].

Herein, we aimed to review dermoscopic findings in various hair and scalp disorders.

Non-scarring Alopecias

Alopecia Areata

Alopecia areata (AA) is a common, non-scarring, autoimmune, chronic, inflammatory disease involving hair follicules, characterized by hair loss on the scalp and/or body. There are various clinical subtypes such as patchy alopecia, diffuse alopecia, reticulate alopecia, ophiasis, ophiasis inversus, alopecia totalis and universalis and may be seen nail changes in 3-30% of patients [**13**].

The dermoscopic features in alopecia areata are yellow dots, black dots, broken hairs, coudability hairs, and clustered short vellus hairs (<10 mm) [**2**]. Yellow dots, especially, are very important clues to differentiate from trichotillomania and telogen effluvium to alopecia areata. They are thought to be represent degenerated follicular keratinocytes and sebum within the affected follicles [**14**]. Black dots are remnants of exclamation mark hairs or broken hairs and are important indicator for disease activity and severity of alopecia areata [**13**]. But according to Kowalska-*Oledzka* et al., black dots seen under trichoscopy are not specific for alopecia areata and may be present in other hair and scalp diseases [**15**].

Mane et al. analysed in 66 patients with AA and observed yellow dots, black dots, broken hairs, short vellus hair and tapering hairs in 81.8%, 66.6%, 55.4%, 40.9% and 12.1% of patients, respectively. And they also reported that dermoscopic findings were not affected by the type of AA or the severity of the disease [**13**].

Inui et al. analysed 300 Asian patients with AA and reported dermoscopic findings and their relationship with disease activity and severity. According to the authors, yellow dots, short vellus hairs, black dots, tapering hairs, and broken hairs were seen by dermoscopy in only 63.7%, 72.7%, 44.3%, 31.7%, and 45.7% of AA patients, respectively. They were reported that the black dots and yellow dots correlated positively with the severity of AA, but short vellus hairs correlated negatively. The incidence of tapering hairs and broken hairs showed no correlation with the severity of AA. Furthermore, black dots, tapering hairs, and broken hairs correlated positively with the disease activity, but short vellus hairs correlated negatively. Although correlation between the incidence of yellow dots and disease activity was reported, it was not statistically significant [**16**].

Hegde et al. reported that the most common dermoscopic findings were black dots in 84% of patients, followed by short vellus hairs in 68% of patients, yellow dots in 57.33% of patients, broken hairs in 37.33% of patients, and tapering hairs in 18.67% of patients with AA [**17**].

Androgenetic Alopecia

Androgenetic alopecia (AGA) is characterized by androgen-dependent hair loss. It is supposed that the genetically predisposed hair follicles are the target for androgen-stimulated hair follicle miniaturization. Thus, large and pigmented terminal hairs be gradually thinner and is replaced by vellus hairs in affected areas [**18**]. The most important distinguishing dermoscopic feature is hair diameter variability greater than 20% in dermoscopy of AGA. Another findings observed in AGA are the peripilar brown halo in diameter roughly 1mm and yellow dots in advanced stages [**2, 14**].

Rakowska et al. proposed major and minor dermoscopic criteria for diagnosing female androgenetic alopecia [**19**]. These criterias are shown in **Table 1**.

Fullfilment of two major criteria or one major and two minor criteria is required to diagnose female androgenetic alopecia based on trichoscopy.

Zhang et al. observed brown peripilar sign, white peripilar sign, pinpoint white dots, yellow dots, scalp pigmentation and focal atrichia in 31.7%, 26.7%, 21.7%, 1.67%, 61.7%

Table 1. Major and Minor Dermoscopic Criteria For Diagnosing Female Androgenetic Alopecia

Major Criteria	Minor Criteria
1. More than four yellow dots in four images at a 70-fold magnification in the frontal area	1. Ratio of single-hair unit percentage, frontal area to occiput >2:1
2. Lower average hair thickness in the frontal area in comparison with the occiput (calculated from not less than 50 hairs from each area)	2. Ratio of number of vellus hairs, frontal area to occiput >1.5:1
3. More the 10% of thin hairs (below 0.03 mm) in the frontal area	3. Ratio of hair follicules with perifollicular discoloration, frontal area to occiput >3:1

and 56.7% of Chinese patients with female pattern hair loss, respectively. They reported that all dermoscopic features, except yellow dots, were higher in the female pattern hair loss group compared to control group [**20**]. *Inui* et al. examined 60 patients with AGA (50 male and 10 female) by dermoscopy and investigated the dermoscopic features such as hair diameter density, peripilar sign, and yellow dots and their incidence of AGA in Asian people. Hair diameter density, known as hair follicle miniaturization, was reported as an essential feature to diagnose AGA. Peripilar sign were seen in 66% of male AGA and 20% of female AGA and yellow dots were seen in 26% of male AGA and 10% of female AGA [**21**].

Telogen Effluvium

This disease is characterized by decreased hair density with presence of empty follicles. There are no specific dermoscopic features and the diagnosis is introduced by the elimination of other scalp disorders. It is clinically similar to androgenetic alopecia. But unlike androgenetic alopecia, hair shaft diameter variation and peripilar halo are not seen by dermoscopy [**22**].

Alopecia Areata Incognita

Alopecia areata incognita was first described by *Rebora* in 1987. The disease, which is a form of alopecia areata without typical patchy alopecic plaques, is characterized by acute diffuse shedding of telogen hairs. It is clinically similar to telogen effluvium. Scalp biopsy often requires for accurate diagnosis. But recently, some dermoscopic features can help in the diagnosis [**23**].

According to the *Tosti* et al., the essential dermoscopic features in alopecia areata incognita are yellow dots and regrowing terminal hairs. Many diffuse, round or polycyclic yellow dots, which varied in size and were uniform in color and distribution were showed by authors at video dermoscopy at all magnifications (x20-x70). They also observed a large number of regrowing, tapered, terminal hairs (2-4 mm long) in the entire scalp. In only 20 patients, dystrophic hairs, exclamation point hairs, and cadaverized hair were present [**23**]. *Inui* et al. reported that cadaverized hairs, exclamation mark hairs, broken hairs, and yellow dots were seen 80%, 65%, 95%, 85% of patients with alopecia areata incognita, respectively. Authors emphasized that cadaverized hairs, exclamation mark hairs and broken hairs were the specific diagnostic markers for alopecia areata incognita to rule out female pattern hair loss and telogen effluvium [**24**].

Traction Alopecia

Traction alopecia is clinically characterized by loss and thinning of hair in the affected area and may progress to cicatricial alopecia in case of constant traction action. *Tosti* et al. reported that hair casts which are small freely movable cylindrical structures that envelope the proximal hair shaft are very important sign for persistant hair traction in patients with traction alopecia. Interestingly, this dermoscopic feature is not showed by dermoscopy in patients with trichotillomania [**25**].

Trichotillomania

Trichotillomania, which usually affects children, presents with patches of alopecia with irregular and bizarre border. Broken hair shafts are the primary dermoscopic features and also, yellow dots, short vellus hairs, perifollicular erythema, pigmentation and hemorrhages may be seen [**22**].

Rakowska et al. firstly reported new dermoscopic terms such as flame hairs, v-sign, hook hairs, tulip hairs, and hair powder in patients with trichotillomania. In this study, they observed irregularly broken hairs in all patients. V-sign, flame hairs, hair powder, and coiled hairs were also seen in 57%, 25%, 16%, and 39% of patients, respectively [**26**].

Scarring AlopeciasScarring Alopecias

The common findings on dermoscopy of both primary and secondary scarring alopecia are decreased hair density and loss of follicular opening [**2**]. In addition to these dermoscopic-findings, erythema, scaling, perifollicular hyperkeratosis, atrophy, dyspigmentation, pustules or crusting can be seen by dermoscopy in cicatricial alopecia [**14**].

Discoid Lupus Erythematosus (DLE)

While specific dermoscopic features for DLE include keratotic plugs, red dots, and enlarged branching vessels, absence of follicular openings and cicatricial white patches, which may also be seen in lichen planopilaris and frontal fibrosing alopecia, are non-specific dermoscopic features shown in DLE [**2**].

Follicular plugging relates to keratin material occluding the dilated infundibular openings [**2**]. Follicular red dots were observed as a novel dermoscopic pattern in scalp DLE by *Tosti* et al. [**27**]. *Lanuti* et al. reported follicular keratotic plugs in three patients with DLE and suggested as a marker of DLE. In addition to follicular plugs, they observed follicular red dots, blue-grey dots, white patches, reduced follicular ostia and absence of pinpoint white dots [**28**]. *Lallas* et al. reported that the most common dermoscopic features were perifollicular whitish halo, follicular keratotic plugs and telengiectatic vessels in 69.1%, 67.3% and 52.7% of fifty-five lesions of 37 patients with DLE, respectively. White scales, pigmentation, structureless whitish area and follicular red dots were also seen [**29**].

Lichen Planopilaris

Lichen planopilaris (LPP), which is the most common cause of cicatricial alopecia, demonstrates peripilar casts, blue-grey dots, and white dots by trichoscopy [**22**]. According to *Estrada* et al., perifollicular scales, diminished follicular ostia and white dots were the principal dermoscopic findings in patients with LPP [**30**].

Folliculitis Decalvans

Characteristic dermoscopic features include tufted hairs, perifollicular pustules in active lesions, and scaling in the interfollicular area [**2**]. Tufted hairs are typically characterized by presence of multiple upright hairs (>5) emerging from a single ostium known as polytrichia. In long-lasting lesions, ivory-white and milky-red areas without follicular orifices are predominantly seen [**22, 31**].

Central Centrifugal Cicatricial Alopecia

Central centrifugal cicatricial alopecia (CCCA) is the most common cause of scarring alopecia among African American women. The disease is characterized by perpetual cicatricial hair loss that affects crown and vertex and spreads centrifugally in the course of time [**32**].

Miteva and *Tosti* reported various dermoscopic findings in 51 patients with CCCA with different stage. Honeycomb pigmented network was shown by authors in all images. Peripilar white/gray halo was reported in 94% of patients. The specificity and sensitivity of this dermoscopic finding were reported 100% and 94,12%, respectively. Another findings were reported as erythema, white patches, pin-point white dots, broken hairs, asterisk-like brown blotches, hair shaft variability and presence of scales, terminal hairs, vellus hairs and dark peripilar halo [**32**].

Dissecting Cellulitis

Trichoscopy shows yellow, structureless areas and yellow dots with “3D” structure imposed over dystrophic hair shafts as most characteristic findings [**12**].

Inflammatory Diseases of Scalp

Psoriasis

The distinctive feature is vascular pattern between scalp psoriasis and seborrheic dermatitis. The main feature of scalp psoriasis is twisted loops. Red dots and globules and glomerular vessels may also be seen [**2**]. *Kim* et al. reported that red dots and globules, twisted red loops and glomerular vessels were observed in 87%, 53% and 65% of patients with scalp psoriasis, respectively. All these dermoscopic features were reported higher than patients with seborrheic dermatitis. In addition to these vascular structures, scales were also commonly seen (78% of patients) by dermoscopy in patients with scalp psoriasis [**33**].

Seborrheic Dermatitis

The most common patterns are arborizing vessels and atypical red vessels without red dots and globules [**2**]. *Kim* et al. were reported featureless area as another vascular pattern in addition to arborizing vessels and atypical red vessels in patients with seborrheic dermatitis. Arborizing vessels and atypical red vessels were observed in 49% and 71% of patients with seborrheic dermatitis, respectively. Featureless areas were observed in 24% of patients with seborrheic dermatitis [**33**].

Infections and Infestations of Scalp

Pediculosis Capitis

By trichoscopy, diagnosis and treatment monitoring of pediculosis capitis is easy, quick and dependable. Nits are definitively visualized through the dermoscopy and also empty cases can be simply and quickly differentiated from nymph-containing viable eggs [**9, 10**].

Tinea Capitis

The comma hairs and the corkscrew hairs were reported as dermoscopic features in patients with tinea capitis. Broken and dystrophic hairs, black dots and tufted folliculitis may also be seen [**2, 34**]. If there is an inflammatory condition, blotchy pigmentation, erythema, scaling, pustules and follicular scale-crust formation may be seen [**22**].

The term of corkscrew hair was first described by *Hughes* et al. as a new diagnostic dermoscopic sign in black children with tinea capitis [**7**]. *Mapelli* et al. described comma hairs and some dystrophic hairs associated with T. violaceum tinea capitis in three black patients without corkscrew hairs [**4**]. *Neri* et al. also reported a case with tinea capitis in an adult Italian white male and observed both comma hairs and corkscrew hairs [**5**].

Hair Shaft Abnormalities

Monilethrix

Monilethrix is a congenital hair shaft disorder characterized by hair fragility and alopecia. Dermoscopic features of hairs in monilethrix include hair shaft beading and multiple constrictions. It is caused by the presence of elliptical nodes regularly separated by narrow internodes [**3, 35**].

Trichorrhexis Invaginata

Trichorrexis invaginata (TI) is usually part of the Netherton syndrome that is a rare autosomal recessive genodermatosis. Multiple nodes are seen on dermoscopy of hair shafts in TI seems to the ball-in-cup rings of bamboo. These are caused by invagination of the distal portion of the hair shaft into its proximal portion. In addition to the bamboo hairs, golf-tree hairs and matchstick hairs are also seen [**3, 36**].

Trichorrhexis Nodosa

In trichorrhexis nodosa, nodular thickening along the hair shaft is specifically seen by dermoscopy [**34**].

Pili Torti

Trichoscopy of pili torti shows flattened sections at irregular intervals along the length of the hair shafts [**34**].

Pili Annulati

Trichoscopy of piliannulati shows white and dark bands along the hair shaft [**12, 34**].

Other Scalp Diseases

Congenital Triangular Alopecia

Congenital triangular alopecia (CTA) is usually seen in children between 3 and 6 years of age. It may clinically resemble to alopecia areata. Dermoscopy may be useful to distinguish from congenital triangular alopecia to alopecia areata. Normal follicular openings with vellus hairs surrounded by normal terminal hairs are revealed by dermoscopy in patient with congenital triangular alopecia without yellow dots, dystrophic hairs, exclamation point hairs, and cadaverized hairs [**37**].

As a result, dermoscopy offers very fast and highly instructive clues to the diagnosis of hair and scalp disorders such as scarring alopecias, non-scarring alopecias, and inflammatory and infectious hair and scalp diseases.

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