Dermoscopic features in 12 cats with dermatophytosis and in 12 cats with self-induced alopecia due to other causes: An observational descriptive study

Dermoscopic features in 24 cats with patchy alopecia: an observational descriptive study

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Abstract

Background - Dermoscopy is a non invasive technique allowing rapid and magnified *in vivo* observation of the skin and structures that lie beneath the skin surface. Various congenital and acquired hair shaft abnormalities may be also evaluated by dermoscopy and characteristic features of *Microsporum canis*-induced *tinea capitis* and trichotillomania in people have also been reported.
Objectives - To describe the dermoscopic findings observed in cats with patchy alopecia due to *Microsporum canis* infection and in cats with self-inflicted hair loss.
Animals - Twenty-four client-owned cats presented to a private veterinary referral practice.
Methods - Dermoscopy was performed with both an handheld non-polarized light dermoscope at 10-fold magnification and a videodermoscope at 40-fold magnification.
Results - At 10-fold magnification, the most characteristic findings observed in circumscribed lesions of cats with dermatophytosis were opaque, broken hairs slightly curved with an homogeneous thickness (comma-like structures) and a variable amount of brown-to-yellow greasy scales. In cats with self-induced alopecia, multiple hairs with a normal shaft suddenly and cleanly broken at different lengths, short tufts of hairs broken at equal level , hook-like and coiled hairs were observed. By videodermoscopy, hair shaft thickness was also measured.
Conclusions - This observational descriptive study suggests that dermoscopy may represent an *in vivo* non-invasive technique helpful in differential diagnosis of patchy alopecia in cats.

Introduction

Dermoscopy is a non invasive diagnostic technique allowing rapid and magnified *in vivo* observation of the skin with the visualization of morphologic features often imperceptible to the naked eye.[1] Recently, scalp dermoscopy has been shown to increase diagnostic accuracy of alopecia as well as hair infections and infestations in humans.[2] For example, although microscopic examination of infected hairs and fungal culture are considered the gold standard for diagnosis of *tinea capitis* in humans, dermoscopy of hair has been demonstrated to assist in the initial clinical diagnosis.[3] Indeed, slightly curved, fractured hair shafts, that resemble a comma at dermoscopic examination have been reported as a characteristic feature of both endothrix and ectothrix *tinea capitis* due to *Microsporum canis* and *Trichopyton tonsurans* infection.[4]

Moreover, corkscrew hairs have been reported together with comma hairs in *tinea capitis* in blacks.[5]
Trichotillomania is a form of traction alopecia in people resulting from habitual, repetitive removal of one's own hair. Clinically, patients present with patches of irregular-length hair or hairless areas. Common dermoscopic features reported in those cases are hairs broken at different lengths, hook like and coiled hairs, semi-transparent, wavy and cone-shaped hair residues (flame hairs), oblique fractured hairs (tulip hairs) and hairs, in number of two, broken at equal level and emerging from one follicular opening (V-sign).[6,7]
Except for a study regarding the application of dermoscopy in feline healthy skin,[8] the there are not studies reporting dermoscopic findings in cats affected by multiple patchy alopecia.
The purpose of this observational descriptive study was to report the findings observed in 24 cats with patchy alopecia by using a conventional non-polarized dermoscope.

Materials and Methods

Twenty-four client-owned cats were included and cat owners agreed to have their cats placed in this study giving full consent before proceeding.
Study population: All cats were presented with multiple patches of alopecia and variable amount of scales (Fig.1); sixteen were Domestic short-haired, three Persian, two Abyssinian, and the others were one British short-hair, one Siamese and one Chertreaux**.** This group included six intact males, seven neutered males, five intact female and six spayed females ranging in age from 2 to 192 months (mean 60 months). Except for dermatologic problems, all cats showed no abnormalities on physical examination and have not been treated with any local or systemic antifungal agent before the visit.
Diagnostic procedures: Each patchy lesion was evaluated both with Wood's lamp and dermoscopy, independently, by two veterinary dermatologists. Dermoscopy of skin lesions was performed without immersion fluid at 10-fold magnification with a non-polarized dermoscope (Heine Delta 20, Heine Optotechnik GmbH & Co. KG 82211 Herrsching, Germany) connected with a digital camera (Nikon D3100, Europe BV) and, in one cat with dermatophytosis, by a videodermoscope (FotoFinder Systems GmbH, Bad. Birnbach, Germany) at 40-fold magnification.
Microscopic examination of the hairs and fungal culture were performed in all cats.
Statistical analysis:
Appropriate descriptive statistics are calculated for each variable (frequency table, mean and standard deviation, median and range) separately for both groups (*Microsporum canis*-positive and negative cats). The two groups had been compared with suitable statistical test: test t di Student for normal quantitative variables, U di Mann-Whitney test for the scores, Chi square test for categorical variables. All tests were two-tailed tests and for each one, a probability less than 0,05 was considered statistically significant. Statistical analisis was performed with the Intercooled Stata 9.2 software for Windows.

Results

Wood's lamp examination was positive in eight out twelve cats with dermatophytosis and was negative in all cats with self-induced alopecia.
The main dermoscopic features observed in both groups are listed in Table 1. In cats with dermatophytosis the most common findings observed with dermoscopy were opaque, broken hairs slightly curved with an homogeneous thickness (comma-like structures) (9/12 animals) and a variable amount of brown to yellow scales (12/12 animals) (Fig. 2). Hair shaft thickness was measured in one cat with dermatophytosis and the diameter of the opaque, slightly curved hairs was greater than that of surrounding hairs (Fig. 3).

Chi-squared analysis revealed a statistically significant association between dermatophytosis and comma-like structures ($p = < 0.001$), hair casts ($p = 0.041$) and brown to yellow scales ($p = < 0.001$).
In cats with self-induced alopecia the finding observed was the presence of sharp broken hairs (12/12 animals,), hook-like and coiled hairs (3/12), short tufts of hairs broken at equal level and emerging from the same follicular opening (V-sign-like) (3/12) and diagonal fractured hairs (1/12) (Fig.4). Chi-squared analysis revealed a statistically significant association between self-induced alopecia and sharp broken hairs ($p = 0.012$).
Microscopic examination of the fluorescent hairs seen at Wood lamp examination allowed the visualization of fungal hyphae and spores along the hair shafts in eight cats with dermatophytosis. Microscopic examination of the broken thickened hairs seen with the dermoscope confirmed the presence of hyphae and spores along hair shafts even in those three infected cats that were negative to the Wood's lamp.
Broken hairs were collected from the patchy lesions in all cats; where present, glowing hairs and comma-like structures were selected. *Microsporum canis* infection was confirmed by fungal culture in twelve out twenty-four cats. Fungal cultures was negative in cats with self-induced alopecia.

Discussion

In this study, dermoscopy was used to observe hair and skin features in cats affected by multiple patchy lesions due to dermatophytosis and self-induced alopecia.
The most prevalent findings observed in cats affected by dermatophytosis, were brown to yellow scales and opaque, broken hairs slightly curved and characterized by an homogeneous thickness (comma-like structures). These comma-like structures were present in nine out twelve cats with dermatophytosis and were not observed in cats with self-induced alopecia. These features were very similar to those reported in humans as a result of cracking and bending of hair shaft filled with the hyphae.[9] Indeed it is known that the infection occurs by penetration of arthrospores into the hair follicle and the cortex, just above the keratogenous zone (Adamson's fringe). The hyphae then spread towards the upper part of the hair shaft and perforate the hair cuticle inducing breakage of damaged hairs.[10,11]
Brown to yellow scales were also observed only in cats with dermatophytosis. However this finding is probably non specific and may only suggest a follicular and sebaceous inflammation that can be caused by an infectious or parasitic agent or by mechanical trauma.
The cause of self-induced alopecia in *Microsporum canis*-negative cats was considered an hypersensitivity disorder in nine cats and a psychogenic alopecia in the remaining three was suspected. The prevalent dermoscopic features observed in this group were normal hairs shaft that were suddenly and cleanly broken at different lengths suggesting a mechanical trauma. However this finding could not be considered specific as was also observed in more than half of cats with dermatophytosis. Other peculiar findings in this group were hook-like and coiled hairs, which differ from comma hairs as they are thin and have a pointed tip, oblique fractured hairs and tufts of broken hairs of same length emerging from one follicular opening (V-sign-like). These features, which were only observed in cats with self-inflicted alopecia, were possibly caused by hair pulling and, in case of short tufts of hairs, by hair chewing.
Patchy alopecia with or without scales is a dermatological problem commonly associated with *Microsporum canis* infection in cats and all the conditions that may drive to self-induced alopecia are the main differentials diagnosis for this clinical presentation.

Hair and scalp dermoscopy (trichoscopy) is a very useful tool for the diagnosis and follow up of hair and scalp disorders; this technique had replaced microscopic hair examination for diagnosis of congenital and acquired hair shaft abnormalities in people.[12] In humans, characteristic dermoscopic patterns have been described in multiple hair disorders. For example, trichotillomania is a form of traction alopecia in people resulting from habitual, repetitive removal of one's own hair. Clinically patients present with irregular patches of hair-loss . Dermoscopic features include hairs broken at different lengths, coiled hairs and, as more recently described, semi-transparent, wavy and cone-shaped hair residues (flame hairs), oblique fractured hairs (tulip hairs) and hairs, in number of two, broken at equal level and emerging from the same follicular opening (V-sign).[6,7]

In this study some of dermoscopic features observed in cats with self-induced alopecia were similar to those seen by microscopic examination; furthermore hook-like and coiled hairs and short tufts of hairs trimmed at equal level and emerging from the same follicular opening (V-sign-like) were a kind of *in vivo* features unreported before in feline self-induced hair loss and that are probably due to hair pulling and chewing.

In *tinea capitis* fractured and slightly curved hair shafts, that resemble a comma at dermoscopic examination, zig-zag-hairs and corkscrew hairs (in patients of African descent) are characteristic feature of dermatophyte infection.[3,4,5] Furthermore in a recent case report the authors showed that hair trichoscopy features of *tinea capitis* in a patient disappeared with successful therapy and hair regrowth.[13]

In veterinary dermatology, screening tests for dermatophytosis include Wood's-lamp examination and direct microscopic examination of the fluorescent hairs.[11] In this study the comma-like structures observed with the dermoscope in cats with dermatophytosis were confirmed as infected hairs at microscopic examination also in three cats that were negative to Wood's lamp examination.

These preliminary observations suggest that dermoscopy could be a useful tool in differential diagnosis of hair loss in cats. Indeed in *Microsporum canis*-induced dermatophytosis this method may help in selecting the infected hairs that should be examined under the microscope, particularly in those cases that are Wood's lamp negative.

Nevertheless, further studies are needed to confirm this hypothesis and assess the sensitivity, specificity and reproducibility of this diagnostic method in feline skin disorders.

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Fig.1 Clinical aspects of patchy alopecia in cats with *M. Canis*-induced dermatophytosis (A,C,E) and in cats with self-induced alopecia (B,D, F)

Fig. 2 Common dermoscopic findings in cats with *Micosporum canis*-induced dermatophytosis at 10-fold magnification. Comma-like structures: opaque, broken hairs slightly curved with an homogeneous thickness (arrows) and whitish and brown-yellowish scales (A,B)

Fig.3 Dermoscopic (A) and videodermoscopic (B) findings in a two months DSH cat with *Microsporum canis*-induced dermatofitosis In the image B (40X) the diameter of three comma-like structures and three normal guard hairs are reported

Fig.4 Common dermoscopic findings (10X) in cats with self induced alopecia: cleanly broken hairs (A), thin regrowing colied hairs with tip end (B) and V-sign-like (C). Also note diagonal fractured hairs (arrows) and follicular plugs (D)

Table 1. Dermoscopic findings in cats with *Microsporum canis*-induced dermatophytosis and in cats with self-inflicted hair loss

Dermoscopic features	**Dermatophytosis n = 12**	**Self-induced alopecia n = 12**	**Chi square test**
Hair casts	9	3	p = 0.041
Follicular plugs	1	1	p = 1.000
Brown/yelow scales	12	0	p = < 0.001
White scales	6	3	p = 0.206
Comma-like hairs	9	0	p = < 0.001
Sharp broken hairs	7	12	p = 0.012
Oblique fractured hairs (tulip-like hairs)	0	1	p = 0.307
V-sign-like	0	3	p = 0.064
Coiled/hock-like hairs	0	3	p = 0.064