

Establishing Clinical, Histopathological, and Trichoscopic Features of Hypotrichosis with Keratosis Pilaris: A Case Study

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ABSTRACT

The evaluation of hair loss is a diagnostic challenge to both dermatologist and pathologist. A good clinicopathological correlation is very much essential. Furthermore, trichoscopy is considered a simple, rapid, and non-invasive diagnostic tool, which has become a standard procedure in differential diagnosis of hair loss. Here, we describe the clinical, histopathological, and trichoscopic features of four cases of an extremely rare inborn skin disorder of unknown etiology; hypotrichosis with keratosis pilaris (HTKP). It is characterized by sparse, short, and brittle hair with keratosis pilaris on the scalp and sometimes on other areas. To the best of our knowledge, few cases of HTKP were reported to date. However, trichoscopic features were not yet described. Four patients with HTKP were included in the study. Clinical, histopathological, and trichoscopic features of all patients were studied. A punch biopsy of the scalp from each patient was preserved in formalin solution (10%) for 24 h. Then, the samples were washed by tap water and dehydrated using increasing concentrations of ethanol. Specimens were purified in xylene and embedded in paraffin at 56°C in a hot air oven for 24 h. Paraffin blocks were sectioned (4 µm thickness) and stained by hematoxylin and eosin stain, then examined by light microscope. Trichoscopic assessment of the patients was done using polarized dermatoscope (DermLite 4) using the contact method. Several photographs were taken by the attached camera (digital Canon IXUF). The study was approved by the Ethics' Committee, Faculty of Medicine, Assiut University. Informed consent was obtained from patient's guardians. HTKP is a very rare skin disorder characterized clinically by sparse, short brittle, and poorly pigmented hair dating since birth with gradual development of keratosis pilaris on the scalp and other sites. Histopathologically, it is characterized by reduced hair follicles numbers with keratosis pilaris with no inflammatory or fibrotic changes. We describe for the 1st time in literature the consistent trichoscopic features favoring the diagnosis of HTKP which are reduced hair density and perifollicular white keratotic plugs.

Key words: Congenital hypotrichosis, hypotrichosis with keratosis pilaris, trichoscopy

INTRODUCTION

Congenital atrichia and hypotrichia are among the most complex areas of hair growth disorders, with several apparently distinctive entities. Numerous individuals have so far been described with decreased numbers of hair follicles, smaller follicles, and/or fragile abnormal hairs. This may occur as an isolated defect or as a feature of a hereditary syndrome usually in association with other ectodermal defects.^[1]

Hypotrichosis with keratosis pilaris (HTKP) is a rare inborn skin disorder of unknown etiology. The patient presents with sparse, short, and brittle hair, in association with keratosis pilaris.^[2] The hair is apparently normal at birth, but after shedding of the birth coat, (between the 2nd and 6th months), it fails to grow and becomes sparse, short, brittle, and poorly pigmented. Eyebrows and eyelashes may be normal or sparse. The hair shows no beading or other distinctive abnormality. Keratosis pilaris is present on the occipital region and neck and sometimes

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on the trunk and limbs. Affected patients show normal nails, teeth, and general physical development.^[3]

Trichoscopy is gaining popularity as a valuable tool in the diagnosis of hair loss and has almost become inevitable in trichology practice. Hair shafts of different types, hair follicles, and abnormalities of scalp skin can be visualized by trichoscopy.^[4]

CASE REPORT

Case 1

A 7-year-old male child, born of consanguineous marriage, presented to our clinic with the absence of scalp hair, eyebrows, and eyelashes since birth. He also showed multiple asymptomatic papular skin lesions all over the scalp. His mother claimed that her child was born almost normal and the hair has started falling when he reached 3 months of age. However, the eyebrows and eyelashes had never grown. The papular skin lesions were small and unnoticeable at birth but progressively increased in size and number overtime. Otherwise, he had no other cutaneous or systemic complaints. No family history of similar conditions or other skin diseases, also medical history was unremarkable.

Dermatological examination revealed hypotrichosis with multiple hyperkeratotic skin-colored papular lesions (keratosis pilaris) distributed all over the scalp. Few short, brittle hairs were present over the vertex, but no scarring was noticed. The eyebrows and eyelashes showed complete absence of hair; also, no hair was detected all over the body [Figure 1]. Otherwise, the child was completely normal including teeth and nails. Furthermore, he had normal physical and mental development. General examination was also completely normal. Complete blood count and serum chemistry profile were normal.

Microscopic examination of the scalp biopsy specimen showed that the number of hair follicles was reduced. No



Figure 1: Dermatological examination showing sparse short brittle hair over the scalp without scarring. The hair of the eyebrows was completely absent. The papular eruption was also noted on the scalp

perifollicular inflammation or fibrosis was found with evidence of keratosis pilaris [Figure 2].

Trichoscopic examination revealed reduced hair density and perifollicular white keratotic plugs [Figure 3].

Case 2

A 3-year old girl, who was born of consanguineous marriage. Her family history was positive for the same condition (her cousin). Pregnancy and labor were uneventful. The patient was presented with the absence of scalp hair, eyebrows, and eyelashes with multiple asymptomatic papular skin lesions all over the scalp. Her mother claimed that the scalp hair was sparse at birth, and then at the age of 6 months, it started progressive falling. The eyebrows and eyelashes were sparse. Scalp papular lesions progressively increased in size and number overtime. No other cutaneous lesions or systemic complaints were noted, and the medical history was negative.

Dermatological examination revealed sparse hair over the scalp without scarring. The hair covering the vertex was

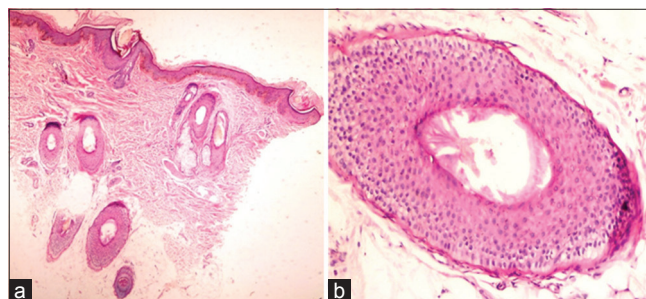


Figure 2: Histopathological examination: (a) Reduction of the hair follicles (x40) and keratosis pilaris. (b) No perifollicular inflammation or fibrosis (x400)

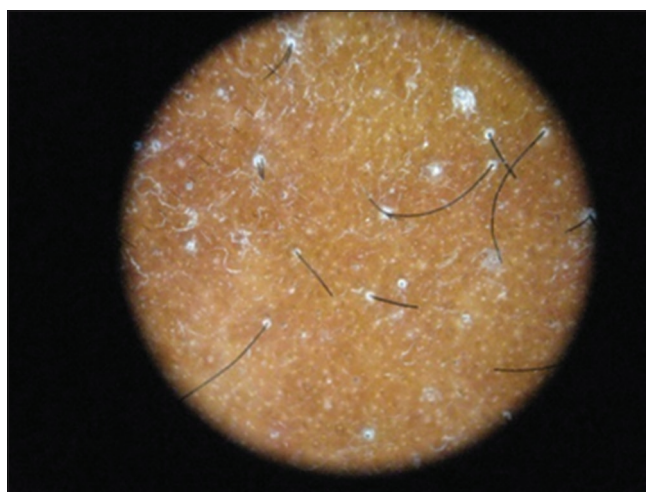


Figure 3: Trichoscopic examination revealed reduced hair density and perifollicular white keratotic plugs (low magnification)

longer than the remaining while that of the eyebrows was absent. The eyelashes were sparse. Multiple skin-colored papular lesions (keratosis pilaris) were noted all over the scalp [Figure 4]. Otherwise, she was completely normal including teeth and nails. Furthermore, she had normal physical and mental development. General examination was also completely normal. Complete blood count and serum chemistry profile were normal [Figure 5].

Histopathology revealed that the total number of the hair follicles is reduced with evident keratosis pilaris. No perifollicular inflammation or fibrosis was noted.

Trichoscopic examination revealed reduced hair density, perifollicular white keratotic plugs, and some broken hair with black dots [Figure 6].

Case 3 and 4

Two sisters born of consanguineous marriage, the older one aged 5 years and the younger aged 2 years, presented with the absence of scalp hair, eyebrows, and eyelashes, as well as multiple asymptomatic papular skin lesions all over the scalp. Scalp hair was sparse at birth but started progressive falling at the age of 6 months. The eyebrows and eyelashes have never grown. Papular lesions over

the scalp were present at birth and increased in size and number overtime. No other cutaneous abnormalities were found. Otherwise, the two sisters had no other cutaneous or systemic complaints. No family history of other skin diseases, also medical history was negative.

Dermatological examination revealed hypotrichosis with multiple hyperkeratotic skin-colored papular lesions distributed all over the scalp. Few short, brittle hairs were present over the vertex, but no scarring was noticed. The eyebrows and eyelashes showed marked sparsity of hair; also, no hair was detected all over the body [Figures 7 and 8]. Otherwise, both were completely normal including teeth and nails. Both of them had normal physical and mental development. General examination was also completely normal. The general physical and mental assessments of the patients were done by the pediatrician. The older sister had atrial septal defect (ASD) 16 mm in diameter with left to right shunt, and tricuspid regurgitation Grade 3. Otherwise, no other systemic disorder could be identified. Complete blood count and serum chemistry profile were normal.



Figure 4: Dermatological examination revealed sparse hair and keratosis pilaris over the scalp. Absent eyebrows

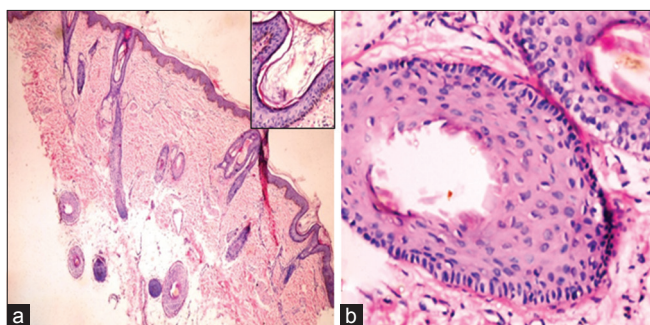


Figure 5: Histopathology: (a) Reduction of the number of hair follicles ($\times 40$) and keratosis pilaris (inset $\times 200$). (b) No perifollicular inflammation or fibrosis ($\times 400$)



Figure 6: Trichoscopic examination showing reduced hair density, perifollicular white keratotic plugs, and broken hair with black dots (low magnification)



Figure 7: Dermatological examination revealed sparse short brittle hair all over the scalp without scarring and with keratosis pilaris and sparse eyebrows and eyelashes

Microscopic examination of both sisters showed that the number of hair follicles is markedly reduced with evident keratosis pilaris. No perifollicular inflammation or fibrosis was found [Figures 9 and 10].

Trichoscopic examination revealed reduced hair density and perifollicular white keratotic plugs [Figure 11a-b].

The diagnosis of HTKP in all cases was established on the basis of the clinicopathological correlations. Trichoscopic features were almost consistent.

DISCUSSION

Total or partial absence of hair of developmental origin occurs in a bewildering variety of clinical forms, either as an apparently isolated defect or in association with a wide range of other anomalies. In the majority, the hair is not only sparse but is structurally abnormal.^[1] In addition, abnormal hair cycling and defective follicle number and function may be responsible.^[5]

We present the clinical, histopathological, and trichoscopic features of four cases of HTKP. To the best of our knowledge,



Figure 8: Dermatological examination revealed sparse short brittle hair all over the scalp without scarring, sparse eyebrows, and eyelashes. The papular eruption was also noted on the scalp

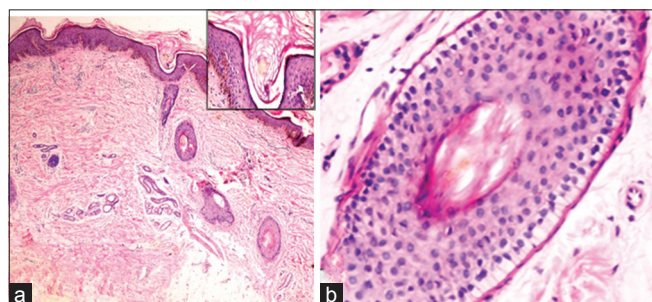


Figure 9: Histopathological examination showing: (a) Marked reduction of the hair follicles ($\times 40$) and keratosis pilaris (inset $\times 200$). (b) No perifollicular inflammation or fibrosis ($\times 400$)

few cases of HTKP were reported to date.^[2,5] However, trichoscopic features of this rare condition have never been described.

As regards the clinical presentation of this rare disorder, we can propose that the disease begins since birth by sparse, short, brittle, and poorly pigmented hair which appears after shedding of the birth coat. Keratosis pilaris begins as small papular lesions over the scalp and then increases gradually in number and size overtime. The eyebrows and eyelashes may be sparse or absent completely from the start, also the body hair. No scarring or other cutaneous lesions were present. General physical state and mental development of three patients were unremarkable. However, we detected ASD in one of our cases. Hence, meticulous cardiologic evaluation of suspected cases with HTKP is mandatory. Moreover, positive consanguineous marriage was present in all cases, and the family history was positive in two patients, which may suggest an autosomal recessive mode of inheritance to this extremely rare case. These clinical features are almost in accordance with the case of Mahran *et al.* (2017) who also found a positive consanguineous marriage in their reported case.^[6]

The differential diagnosis in our cases revolves around HTKP, atrichia with papular lesions (APL), hereditary hypotrichosis simplex of the scalp (HSS), HTKP and lentiginosis, and keratosis follicularis spinulosa decalvans (KFSD).

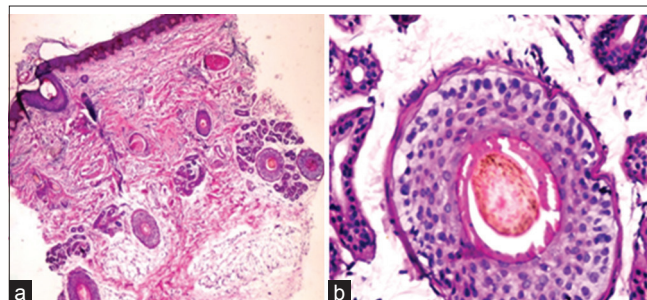


Figure 10: Histopathological examination showing: (a) Marked reduction of the hair follicles ($\times 40$) and keratosis pilaris (inset $\times 200$). (b) No perifollicular inflammation or fibrosis ($\times 400$)

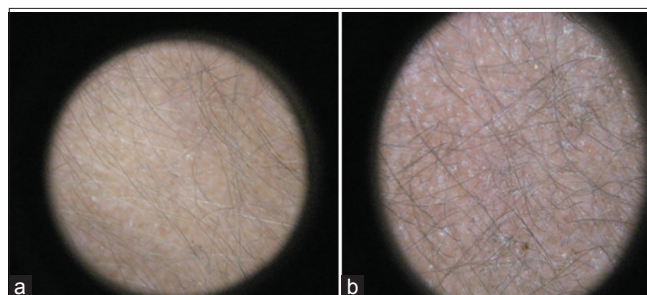


Figure 11: (a and b) Trichoscopic examination revealed reduced hair density and perifollicular white keratotic plugs (low magnification)

APL is an autosomal recessive disorder characterized by alopecia of the scalp and body with papular keratin cysts on the body with no systemic manifestations. It is caused by mutation of the human hairless gene. Histopathological examination shows mid-dermal keratin cysts with sparse perifollicular lymphocytic infiltrate.^[7,8]

HSS is an autosomal dominant genotrichosis. The hair is normal at birth and in the 1st year of life. It starts as a progressive loss that is limited to the scalp, at the middle of the first decade, leading to almost complete loss of scalp hair by the third decade. The body hair, beard, eyebrows, axillary hair, teeth, and nails are not affected. Mental development and intelligence are normal and there are no reported other cutaneous or systemic abnormalities.^[9,10]

HTKP and lentiginosis is characterized by hypotrichosis at or just after puberty, which progresses until the menopause, absence of axillary and pubic hair, keratosis pilaris of the scalp and axillae, brittleness, and longitudinal striation of the nails and centrofacial lentiginosis.^[3]

KFSD is a rare genetic disorder with X-linked and autosomal dominant patterns of inheritance that is associated with mutations of membrane-bound transcription factor peptidase, site 2 (MBTPS2) gene.^[11,12] Clinically, the condition is characterized by follicular hyperkeratosis and scarring alopecia. Follicular hyperkeratosis begins during infancy or early childhood, first on the face, affecting the eyebrows, cheeks, forehead, and nose. Scarring alopecia of scalp and eyebrows begins in early childhood and progresses further. Other associated features include palmoplantar keratoderma, corneal dystrophy with photophobia, and high periungual cuticles.^[13]

In fact, there are many genetic syndromes that may present with HTKP or follicular hyperkeratosis, but their additional distinctive cutaneous and systemic features were enough to rule them out from the differential diagnosis of our cases, for example, pachyonychia congenita, keratitis ichthyosis deafness syndrome, Down's syndrome, Conradi–Hunermann syndrome, trichodental syndrome, and monilethrix.

After histopathological examination of the scalp skin of our patients, we found that reduced hair follicle's numbers with absent inflammatory and fibrotic changes with evident keratosis pilaris are the consistent features favoring the diagnosis of HTKP. These features are in contradiction with the case of Mahran *et al.* (2017) who also reported that basal vasculopathy, destruction of the hair follicle, fibrosis, folliculitis with lymphoid aggregate, and destruction of outer root sheath are suggested features. They also suggested that the histopathological presence of dermal fibrosis may, in part, explain the hypotrichosis in HTKP to be of a microscopic cicatricial nature. In addition, and as in alopecia areata, they

offer an immunological theory as an explanation due to the presence of the lymphocytic infiltrate, especially around hair follicles.^[6] Our explanation of this controversy is that there might be histopathological stages or different pathological varieties of HTKP. Hence, future studies might clarify this issue.

We also report the characteristic trichoscopic features favoring the diagnosis of HTKP, which include reduced hair density and perifollicular white keratotic plugs.

The exact genetic background of HTKP has not yet been determined. However, in 1989, Dekio *et al.* reported alterations of S-carboxymethylated fibrous proteins in the scalp hair of HTKP. The authors proposed that these alterations are responsible for the brittleness of the HTKP hair.^[2] They suggested that in the hair of patients with HTKP, the abnormal fibrous protein composition caused the lack of structural cortex uniformity which may lead to brittleness.

We do recommend meticulous cardiac evaluation, in particular, of all patients with HTKP to search for possible associated cardiac comorbidities which may accompany this rare disorder. Furthermore, we recommend future detailed genetic and hair ultrastructural studies on this rare disorder to give the dermatologic community more detailed clues about the etiology and, hence, the management of such an extremely rare condition.

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