

Familial Hypotrichosis of the Scalp

Autosomal Dominant Inheritance in Four Generations

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We describe a Danish family of four generations suffering from hypotrichosis of the scalp. Age at onset was 6–17 years and almost total scalp alopecia was reached by the age of 14–21 years. No associated ectodermal defects were present. Nine of 22 persons covering four generations were affected. Growth of the scalp hair slowly decreased and was accompanied by a gradual, diffuse hair loss without regional variation. A scalp biopsy was performed, revealing a non-scarring alopecia with features of androgenetic alopecia. The pedigree was compatible with autosomal dominant inheritance. Key words: Hair loss; Childhood.

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Several clinical entities of hereditary alopecia/hypotrichosis of all body hair without other associated defects have been described. These show an autosomal dominant or recessive inheritance (1). In 1974, Toribio & Quinones (2) described a unique hypotrichosis limited to the scalp, which appeared during the first decade of life in a family of eight generations. The abnormality was transmitted by an autosomal dominant mode of inheritance. In the present report we describe a Danish family of four generations with similar hypotrichosis, which became manifest during the age interval 6–17 years, progressing to an almost total scalp alopecia a few years later. No other developmental abnormalities were found.

MATERIAL AND METHODS

The proband was a girl aged 6 years, she and 8 family members covering three generations were examined clinically. Information on the status of other family members was collected, based on interviews with the examined individuals, including the proband's grandfather's aunt. A pedigree including 22 persons covering four generations was subsequently constructed.

Light microscopic examination of plucked scalp hairs was

performed on 6 affected individuals. In addition, histopathological examination of a scalp biopsy from the proband's mother was carried out. A 4-mm punch biopsy was bisected and embedded in paraffin wax. One-half was cut vertically, the other transversely, into serial sections as described by Headington (3).

Blood samples for haematological, renal, hepatic and thyroid function tests were examined from 2 affected persons, and, in addition, serum values of androgenic hormones and zinc were measured. One patient, the proband's mother, was treated with topical application of minoxidil (Regaine®).

RESULTS

Men and women were equally affected. The scalp hair was normal at birth, but the growth slowed down accompanied by a gradual, diffuse hair loss without regional variation from the age of 6–17 years. The affected individuals experienced a progressive loss of scalp hair within a few years with the end stage being reached at 14–21 years. This comprised an almost complete alopecia, but with preservation of a few diffusely scattered, terminal hairs of various lengths and diameters (Fig. 1). No sign of a cicatricial alopecia was found clinically. Further, there was no reduction in the follicular number, and the distribution on the scalp was normal, except in the proband's grandfather's aunt, in whom a glabrous scalp with a reduced number of follicles was found. Body hair, eyebrows and eyelashes were unaffected and the teeth and nails were normal. All blood samples were normal.

The pedigree showed that 9 of 22 persons of four generations were affected (Fig. 2). There was no sex difference.

Substantial information was obtained from the proband's grandfather's aunt, aged 84 years, who had been affected since the age of nine, and who had worn a wig since the age of 18. She stated that her 5 children and her grandchildren were unaffected. However, 4 of 5 siblings in her mother's generation and 5 of her own 9 siblings including I1 in the present pedigree (Fig. 2) had been affected. No further information regarding their offspring was obtainable.

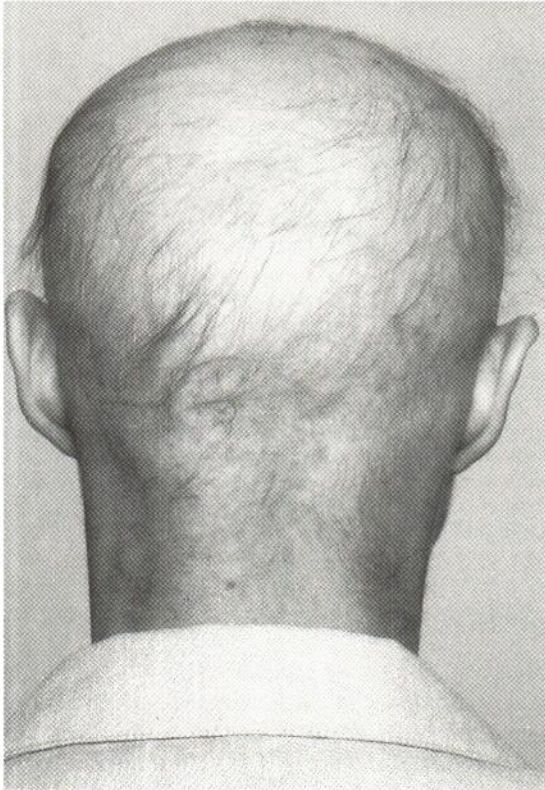


Fig. 1. Back of the head of a female patient (III 2) showing fine, short hairs scattered over the scalp.

ble. The pedigree is consistent with an autosomal dominant trait.

The proband's mother aged 29 was treated with minoxidil (Regaine®) topically. A modest but cosmetically inadequate effect was observed during the

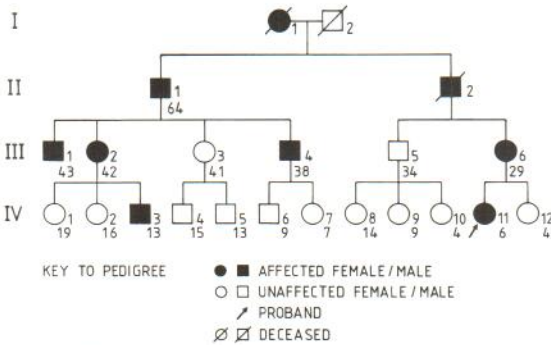


Fig. 2. Pedigree covering hereditary hypotrichosis of the scalp in four generations. Position in the genealogy is given by roman and arabic numerals. The ages of the persons at the time of investigation are also shown. II,1 - III,2,4,6 - IV,1,2,3,11,12 were personally examined.

first months, but no further remission was obtained, and the treatment was stopped after 11 months.

Histopathological findings

Vertical and horizontal serial sections showed a moderate decrease in the total number of follicles, but with a relative increase in the ratio of vellus follicles to terminal follicles of approximately 4:1. The ratio of telogen to anagen follicles was increased also. Islands of sebaceous glands were found in the upper dermis. There was no vertical scarring along former follicles and only occasionally could a sparse inflammatory cell infiltrate be seen around the infundibular portion of follicles. Streamers (4), i.e. the collapsed connective tissue sheath left behind in the reticular dermis by the retracted telogen follicle, were demonstrated in the biopsy (Fig. 3). Focally a dull, greyish 'amorphous' material, staining positively with elastic stains (Verhoeff) along persistent streamers, characteristically seen in, but not pathognomonic for androgenetic alopecia, Arao bodies, was observed (Fig. 3). Examination of plucked hairs from 6 patients showed identical features with a preponderance of telogen hairs and varyingly reduced shaft diameters. No structural abnormalities were found.

DISCUSSION

In the present family, hypotrichosis of the scalp was recorded during the first and second decades, progressing to almost total scalp alopecia within a few years. Body hair, eyebrows and eyelashes were unaffected. The pattern of hair loss was so characteristic that a diagnosis based on the case history seems reliable. Even more cases may be manifest later in life, as some of the unaffected individuals in generation IV were young children. However, the transmission of hypotrichosis in the present pedigree is entirely compatible with an autosomal dominant inheritance.

The hereditary hypotrichosis described by Toribio & Quinones (2) in a Spanish family is very similar to the one presented here. In 1915, Petersen (5) published his findings concerning a Danish family with a hypotrichosis limited to the scalp. Nine of 15 family members were affected in four generations. Petersen thought that the alopecia might be secondary to some thyroid dysfunction. He was able to show some effect of treatment with thyroid gland extracts in 3 boys after a short observation period. However, nei-

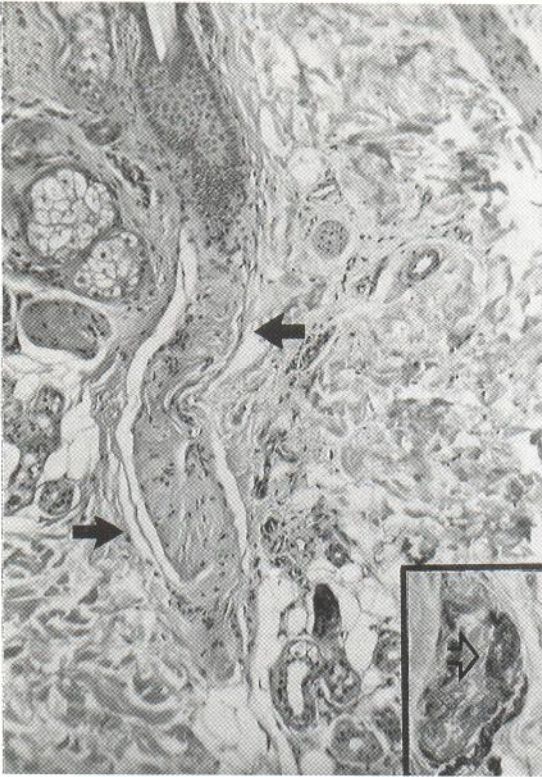


Fig. 3. Vertical section of a scalp biopsy, showing a follicle in telogen with its associated streamer (filled arrows). The inset (Verhoeff's elastic stain) shows part of a streamer with an Arao body (open arrow).

ther clinical signs of myxedema nor cretinism were described and thyroid function tests were not carried out. We find it reasonably well documented that Petersen's family was suffering from the same disease as that in our family, but we have not been able to trace a possible genetic link between the two Danish families as we have not had access to Petersen's old family records.

The histologic pattern of the biopsy was characterized by miniaturized follicles of the vellus type, preponderantly in the telogen phase, by Arao bodies, islands of sebaceous glands, and an absence of scarring. This histologic picture has many features of androgenetic alopecia. Although a reduced number of follicles is not a usual finding in typical androgenetic alopecia, it has been reported in cases of long duration (4) and the condition had been present for

approximately 20 years in this patient. We were unable to examine more than one biopsy from one patient. This does not permit of any conclusions regarding the histology in general of this familial alopecia. The histologic changes were not those of discoid LE, lichen planopilaris, pseudopelade or alopecia areata. The clinical recognition of a preserved follicular pattern of the scalp surface, as seen in alopecia areata or androgenetic alopecia further supports the assumption that this is not a scarring type of hair loss. The effect of minoxidil on hair regrowth is not specific for androgenetic alopecia (6) and the slight, but unsatisfactory, response in our patient does not help to clarify the type of her alopecia.

The results of the research into common androgenetic alopecia might, however, contribute to a better understanding of the peculiar scalp hair disease in this family. One might speculate as to whether a deficiency of an androgen receptor or an androgen receptor inhibitor protein (6, 7, 8) on a genetic background might be responsible for the hair loss.

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