A Synopsis of Hereditary Hair Loss Disorders

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The role f heredity in hair growth is less appreciated both by dermatologists and patients seeking for such disorders. Since alopecia areata is a fairly common condition most of the disorders presenting with hair loss are relegated to this entity, e.g. the misdiagnosis of generalized atrichia as the putative autoimmune disorder, alopecia universalis. Compounding this difficultty is the confusion created by OMIM (online Mendelian Inheritance in Man) in wrongly calling generalized atrichia, alopecia universalis congenita.

For most children lack of hair will be an isolated abnormality, but history and examination should allow the exclusion of major categories of associated features:

1. Ectodermal abnormalities, namely skin, teeth, nail and sweating
2. Functional and metabolic abnormalities, such as deafness, epilepsy and inborn errors of metabolism; and
3. Morphologic abnormalities, such as skeletal abnormalities[1]. Heritable disorders of hair are classified into those with associated abnormalities (ectodermal, chromosomal, amino acids, skeletal) and disorders without associated abnormalities (hair only)[2].

Scalp involvement, as a solitary clinical manifestation is unusual. In this report we summarize the reports on hereditary hypotrichosis simplex of scalp and other disorders that have scanty scalp hair as the main feature. Hypotrichosis simplex has several distinctive genotypes. Both the inheritance and the age of onset remain variable making diagnosis difficult. Initially the hair is normal and after a set period growth retardation sets in. Interestingly, the number of follicles remain unaltered, but fail to enter anagen. Hair elsewhere may be affected. Most commonly reported is a total and permanent absence of hair, which is autosomal dominantly, inherited; in others hair tends to be very fine, sparse and short but some growth usually remains in adulthood. Light and electron microscopic examination do not show specific changes, but scanning electron microscopic examination reveals subtle defects.[2] It is very important to take a history of similar problem in other family members.

Table 1 summarizes those conditions with atrichia or hypotrichosis as the main manifestation. Some rare entities are not included. In all, the scalp hair is affected which appears either normal or defective at birth and invariably progresses to near total alopecia. An important feature is that hair elsewhere like eyebrows, eyelashes and pubic and axillary hair, vary from total absence to sparse or normal growth. Of these disorders atrichia congenita is the commonest. A variant of this with papular lesions is considered by some to be a separate entity.

It is estimated that more than 100 genes are expressed in hair follicle, which is considered to be the most complex of all epithelial organ systems. The sheer number and range of traits indicate that hair structure and growth are highly complex biological systems subject to the influence of many genes[10].

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Table 1: Summary of the diseases that have hereditary atrichia or hypotrichosis as the main features.

Disease	Description	OMIM entry number	MI	Gene Map Locus
Atrichia congenital[1,3]	About 6 families with 100 cases known to have generalized atrichia, At birth, scalp hair appears normal, never regrows after shaving. Affected individuals are born devoid of eyebrows and eyelashes and never develop axillary and pubic hairs	#203655	AR	8p21.2
Atrichia with papular lesions [1,4]	Absence of scalp hairs, and milia-like lesions on knees and elbows	#209500	AR	8p21.2
Congenital alopecia of scalp (XL recessive)[5]	Reported in a single Japanese family. Eyebrows and eyelashes are normal	#300042	XL	
Hypotrichosis, Marie Unna type [1,6,7]	First described in 1925, approximately 17 families have been reported. Affected persons are born with little or no eyebrows, eyelashes or body hair. Coarse, wiry, twisted hair appear in the scalp followed by alopecia. Hair loss is greatest around margins and vertex	#146550	AD	8p21
Monilethrix[8]	Variable manifestations. Dystrophic hair is confined to Occiput but more severely affected individuals have near total alopecia. Follicular keratosis on the Occiput and nail defects may be found. Microscopically, hair shows elliptical nodes. It may be associated with keratosis pilaris, physical retardation, syndactyly, cataracts, hair and teeth abnormalities	#252000 #158000	AD, Less commonly AR	12p13
Total hypotrichosis, Mari type[9]	A hereditary type common in aborigines of Volga-Ural region of Russia. Seen as congenital hypotrichosis of scalp, and any hair present is wiry and twisted. Eyebrows and eyelashes are absent after the first year of life and remain sparse in adults. Pubic and axillary hairs are absent.	#664379	AR	No evidence of linkage to 8p

AD *Autosomal Dominant*
AR *Autosomal Recessive*
MI *Mode of Inheritance*
XL *X-linked*
OMIM+ Online Mendelian Inheritance in Man.

References :

1. *De Berker DAR. Congenital hypotrichosis. Int. J Dermatol 1999; 38 (suppl: 1): 25-33.*
2. *Rodriguez Diaz E, Fernandez Blasco G, Martin Pascual A, Armijo M. Hereditary hypotrichosis simplex of the scalp. Dermatology 1995; 191:139-141.*
3. *Ahmad M, Abbas H, Haque S. Alopecia universalis as a single abnormality in an inbred Pakistani kindred. Am J Med Genet 1993; 46:369-371.*
4. *Ahmed W, Irvine AD, Lam H, Buckley C, Bingham EA, Panteleyev AA, et al. A missense mutation in the zinc-finger domain of the human hairless gene underlies congenital atrichia in a family of Irish traveler. Am J Hum Genet 1998; 63:984-991.*
5. *Anzai H, Shimiza H, Nishikawa T. X-linked recessive inheritance in a family with isolated congenital alopecia. Lancet 1996; 347:337-338.*
6. *Argenziano G, Sammarco E, Rossi A, Delfino M, Calvieri S. Marie Unna hereditary hypotrichosis. Eur J Derm 1999; 9: 278-80.*
7. *Wong SN, Giam YC, Lee YS. Marie Unna Hypotrichosis in a Chinese Family. Pediatr Dermatol 2002; 19: 250-255.*
8. *Bajaj AK, Swarup V, Gupta SC, Shukla SR, Pande RC, Gupta OP. Monilethrix. Dermatologica 1978; 156:292-5.*
9. *Rogaev EI, Zinchenko RA, Dvoryachikov G, Sherbatich T, Ginter EK. Total hypotrichosis: genetic form of alopecia not linked to hairless gene. Lancet 1999; 354:1097-1098.*
10. *Calap Calatayud J, Padron Lleo J, Castilla Mª A. Atriquia Ciliar Circunscrita hereditaria en "Coup de Sabre". Actas dermo sifiliograficas 1997; 88:128.*