BRIEF ARTICLES

Pediatric Alopecia Areata in Three Siblings

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ABSTRACT

Alopecia areata (AA) is a common non-scarring inflammatory hair loss disorder with an incompletely defined pathogenesis. Prior studies have examined familial expression of AA, but few cases in the literature describe concurrent presentation amongst siblings. Our case demonstrates the complex interplay between genetic and environmental factors in the development of alopecia areata within families.

INTRODUCTION

Alopecia areata has a lifetime risk of approximately 2% and presents with a wide spectrum of hair loss ranging from patchy loss on the scalp, full hair loss of the head, or complete hair loss of the body. AA is the result of an autoimmune attack of hair follicles by predominately CD8+ T-cells leading to an inflammatory state.[1] Prior studies have shown the lifetime risk of siblings to be 7.1% and the concordance rate among identical twins to be only 55%.[2,3] These studies suggest that there is a likely interaction between genes and the environment in the development of AA within families. Although familial AA has been studied, there are few reports of concurrent pediatric AA in siblings.[4,5,6]

CASE 1

A 7 year-old girl with history of asthma presented with a 4-month history of progressive patchy hair loss of the scalp and eyebrows associated with itching and erythema. Prior to the hair loss, she had a self-resolving fever, headache, and post-auricular swelling for approximately 2 weeks. She had no prior medication use or other medical history, including thyroid disease, vitiligo, diabetes mellitus, and psychiatric symptoms.

Physical exam showed tightly braided hair and a plaque with white scales in the occipital and frontal regions of the scalp. She had loss of the bilateral eyebrows with mild hypopigmentation and normal eyelashes and nails (Figure 1). She was instructed to remove the braids and was given griseofulvin and ketoconazole shampoo for a diagnosis of tinea capitis. On six-week follow-up, the mother had shaved the patient's hair and the pruritus, erythema, and scaling had resolved. However, the patchy hair loss of the scalp and eyebrows remained (Figure 2). A biopsy of the scalp showed an increased number of hairs in catagen phase with peribulbar lymphocytic

infiltrate consistent with AA, and clobetasol lotion was started.

CASE 2

The younger sibling of Case 1 is a 21-month old male with history of asthma who presented in 2015 with complete hair loss of the scalp for 2 months. There were no exacerbating factors or illness prior to onset. Physical exam of the scalp showed diffuse black vellus hairs and intact follicles without erythema, scaling, or scarring, and intact eyebrows, eyelashes, and nails. Throughout the next two years, high potency topical corticosteroids and intralesional Triamcinolone injections were used on the scalp. During this time, he was treated for superimposed tinea capitis which resolved with griseofulvin therapy. On presentation in 2018, he had patchy regrowth of hair in the parietal and occipital regions and a SALT score of 30% (Figure 3).

CASE 3

The 10 year-old brother had history of asthma and onset of patchy hair loss of the scalp at age 6, and was diagnosed with AA at an outside clinic. The patient was started on a topical steroid and had complete regrowth after 2 years without recurrence.

There was no history of hair loss or additional medical history in the extended members of the family. The parents immigrated from Gambia and all three children were born in the United States. Given the patients' concurrent presentation of erythema and scaling which resolved with griseofulvin, our patients likely had tinea capitis superimposed on alopecia areata. The 7 year-old female patient also likely had traction alopecia secondary to her tightly-braided hair.

Figure 1. 7-year old female with complete loss of eyebrows with hypopigmentation and patchy hair loss of the scalp with some remaining tight braids intact.

Figure 2. At follow-up six weeks later, she still had complete loss of eyebrows with hypopigmentation and hair loss of the posterior and temporal-parietal scalp.

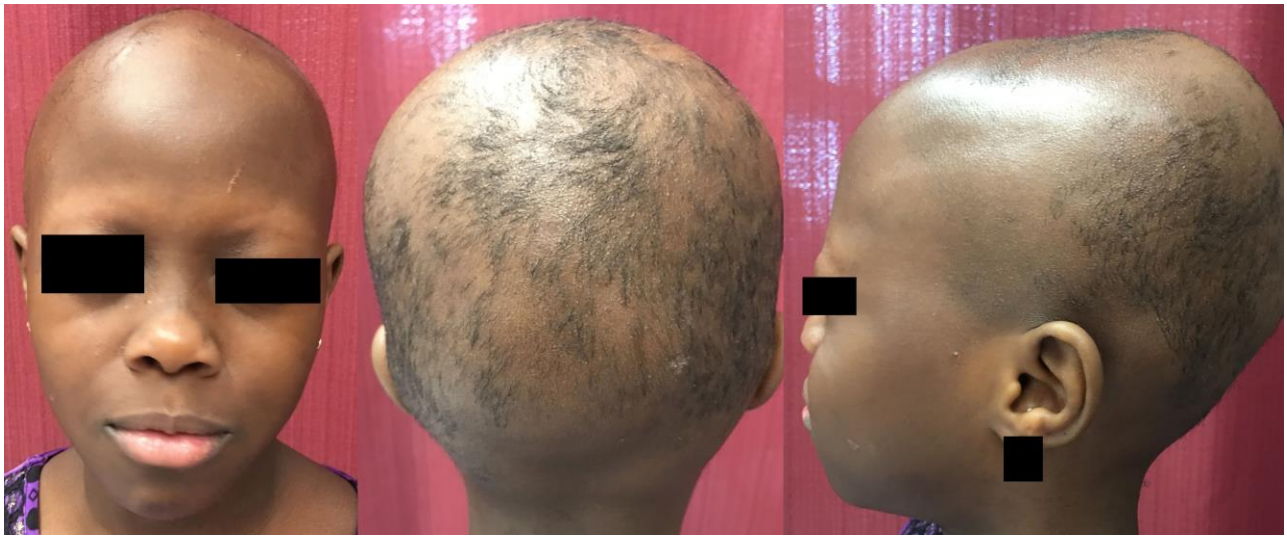

Figure 3. In 2018, the patient from Case 2 presented with patchy alopecia of the scalp in the frontal, temporal, and occipital regions despite high potency topical corticosteroid therapy.

DISCUSSION

Our unique case of pediatric alopecia areata in three siblings demonstrates the complex interaction between genetics and the environment in the pathogenesis of AA within families. The children are first-degree relatives and likely inherited similar genetic susceptibilities to AA. They also lived in the same household, and had varying clinical presentation, age of onset, and response to therapy. This suggests an environmental component, as well.

The genetics of AA is complex, and genome-wide association studies have shown that AA is associated with multiple genes largely participating in the regulation of the immune system. Examples include human leukocyte antigen (HLA) alleles DQBI*0301 and DRB1*1104, as well as ULBP. ULBP participates in stress responses involving natural killer cells and T-lymphocytes and is up-regulated in AA lesions. [7] Similarly, JAK kinases influence gene expression of interferon gamma and its related cytokines that are present in lesional skin, providing the rationale for the successful clinical trials of JAK inhibitors in AA. [1,8] Our patients may benefit from therapy with these JAK inhibitors in the future.

Whether these genes influenced the age of onset and severity of AA in our patients is unclear. Studies of familial alopecia areata have shown that the age of onset and severity of AA were similar in patients with or without family history of the disease, but that there was a positive correlation between age of onset in patients and their first-degree relatives. [3] Similarly, whether genes are implicated in the comorbidity of asthma and AA in the three siblings remains uncertain. In a study examining 2115 patients with AA, atopy was found in 38.2%. [9]

The siblings had differential response to topical corticosteroids, and only one of the three had a prior febrile illness. Differences in therapeutic response and disease triggers suggest that inherited genes alone do not entirely account for AA within families. One possible explanation for these differences is the association of epigenetic changes including histone modifications and methylation of DNA with AA.[10] Another potential explanation is that environmental factors such as hormone balance, infection, and psychological stress contributed to variations in clinical presentation.[11]

Our case of pediatric alopecia areata in three siblings demonstrates the complex role of genetics and its interaction with environmental factors in families with AA. Additional research into its pathogenesis and inheritance is required to further elucidate the variation in the presentation and progression of AA.

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