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From Bald to Bold: Reversal of Alopecia Totalis in an Adolescent Using Dupilumab Monotherapy

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ABSTRACT

Introduction: Alopecia areata (AA) is an autoimmune condition marked by non-scarring, patchy hair loss of the scalp which progresses in <10% of cases to alopecia totalis (AT), which is marked by complete hair loss from the scalp, eyebrows, and eyelashes. AA is prevalent in pediatric patients and is associated with atopic dermatitis (AD). The interleukin (IL)-4 and IL-13 antagonist dupilumab is approved for use in both pediatric and adult patients with AD and asthma. However, in some cases, dupilumab has shown promising results in regrowing hair in patients with concurrent AA.

Case Presentation: We report a 13-year-old male patient with a past medical history of AD and food atopy, who presented with AA to the scalp. The patient's hormonal lab work-up was within normal limits, and he was treated and failed typical therapies for AA. Within nine months of treatment, the hair loss progressed to AT of the scalp and eyebrows. Dupilumab was then initiated as monotherapy for the patient's AD and AT, leading to regrowth of hair on the scalp and eyebrows within several months and sustained complete hair regeneration after 17 months post dupilumab initiation.

Conclusion: This case demonstrates the potential use of dupilumab, which has a well-established safety profile, for pediatric patients with AA and its ability to initiate and sustain hair growth for the long term. Dermatologists may consider dupilumab for patients with AA and comorbid AD that have failed a variety of treatments from several drug classes.

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INTRODUCTION

Alopecia areata (AA) is an autoimmune condition which affects roughly 2% of the population globally and is characterized by non-scarring hair loss.[1] AA presents as patchy hair loss on the scalp or beard which, in <10% of AA patients, can expand to alopecia totalis (AT) resulting in complete hair loss on the scalp and often the eyebrows and eyelashes.[2,3] AA pathogenesis involves the loss of immune privilege of the hair follicle because of downregulated proteins that prevent self-antigens from binding with CD8+T Cells during follicular growth.[1] T helper type 1 cells (Th1) and the induction of IFN-γ are major contributors to AA.[1,2]

AA's effect on pediatric patients, especially adolescents, is associated with concurrent atopic dermatitis (AD).[2,3] Dupilumab is an antagonist to interleukin (IL)-4 and IL-13 receptors that is approved for treatment of AD and asthma in pediatric and adult populations. In recent years, dupilumab has shown potential for use in treating AA.[1] This report highlights the use of dupilumab in managing AT in an adolescent male.

CASE REPORT

A 13-year-old male with a history of AD and food atopy presented with two months of progressive scalp hair loss. Examination revealed discrete, non-scarring patches of hair loss on the mid scalp, crown, and parietal regions meeting the criteria for alopecia areata (Figure 1A). The patient was referred to an endocrinologist, and laboratory work-up was within normal limits (Table 1). Initial treatment for the hair loss included topical, oral, and intralesional corticosteroids, among other pharmacologic therapies (Table 1). Despite topical management, nine months after the initial diagnosis, the chronic AA progressed to AT with complete non-scarring hair loss of the scalp and eyebrows (Figure 1B). The patient's concurrent AD had also progressed in severity, failing treatment with oral and topical steroids and calcineurin inhibitors. Dupilumab was initiated for AD, and at the one-month follow-up, signs of patchy hair growth on the scalp were noted. Hair growth continued over the following months with eventual complete hair regrowth on the scalp and eyebrows. This regeneration was sustained on evaluation 17 months post dupilumab initiation (Figure 1C).

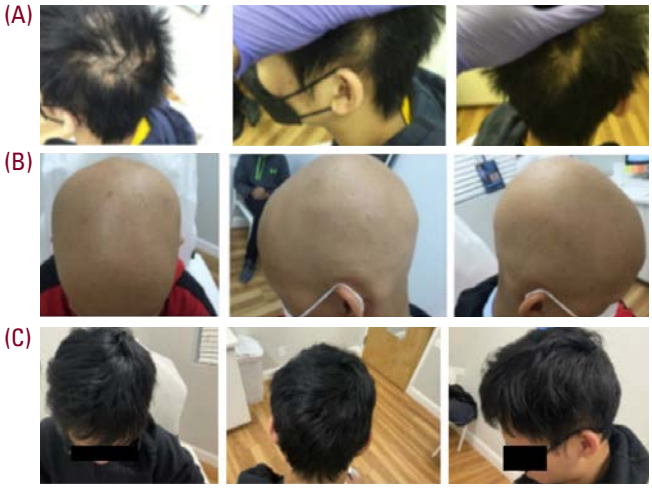
TABLE 1.

Patient Demographics and Treatment Details

Demographics	Associated Comorbid Conditions	Laboratory Studies	Failed Treatments	Treatments With Hair Growth Results
Sex: Male Age: 13 years old Race: Asian	Atopic Dermatitis Food Atopy (tree nuts)	CRP, CBC, CMP, ESR, Free T4 and TSH panel, ANA Titer, SARS-CoV-2 Serology, Testosterone Free and Total, TPO Antibody Titer	Fluocinonide 0.05% topical solution Clobetasol 0.05% scalp solution Minoxidil 5% foam Tacrolimus 0.1% topical ointment Ruxolitinib 1.5% topical cream Anthralin1% shampoo Prednisone 50 mg tablet Intralesional Kenalog Injection UVB light therapy	Dupilumab 600 mg Subcutaneous pen injector

CRP, C-reactive protein [Titer] in serum or plasma; CBC, Complete Blood Count W Auto differential panel; CMP, Comprehensive metabolic 2000 panel- serum or plasma; ESR, Erythrocyte sedimentation rate by Westergren method; ANA Titer, Nuclear Ab [Titer] in serum; SARS-CoV-2 Serology, SARS-CoV-2 (COVID-19) IgG+IgM [Presence] in Serum or Plasma by Immunoassay; TPO Antibody Titer, Thyroperoxidase Ab [Titer] in serum or plasma; UVB, ultraviolet B

FIGURE 1. The initial presentation of the patient with AA (A) which progressed to AT (B) and full hair regeneration 17 months post initiation of dupilumab (C)



DISCUSSION

AA has a greater prevalence in pediatric patients, especially females and those of Asian, Black, and Hispanic descent.[2,4] This case expands upon the growing number of reports of hair regeneration in pediatric patients with AA. However, there is little published information at the time of this report on the use of dupilumab to reverse AT in pediatric patients with sustained response in hair regrowth. Conventional treatments for AA include corticosteroids, topical immunotherapy, minoxidil, and JAK/STAT inhibitors. However, treatment outcomes are highly variable, with many experiencing recurrence upon treatment discontinuation.[2] Potential benefits of dupilumab for treatment of AA may be due to pathogenic skewing to Th2 cytokine-mediated follicular destruction in patients with atopic dysfunction. Dupilumab blocks IL-4 and IL-13 receptors, which are both major cytokines produced by Th2, and thus prevents self-antigen binding, allowing the anagen phase of follicular growth to progress.[1,2]

With dupilumab's approval for use in children and its favorable safety profile, there is potential for its use in AA and its subtypes as monotherapy or adjuvant therapy.[5] It is vital for future studies to investigate dupilumab efficacy in short-term reversal of pediatric AA, its capacity for long-term remission, and the extended reduction in the negative impacts on psychological health.[3]

DISCLOSURES

The authors have no conflicts of interest to declare.

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