

Remission of alopecia universalis in a patient with atopic dermatitis treated with dupilumab



Jan Smogorzewski, MD,^a Tiffany Sierro, BS,^b Goli Compoginis, MD,^a and Gene Kim, MD^a
Los Angeles, California

Key words: alopecia totalis; atopic dermatitis; dupilumab; hair.

INTRODUCTION

Alopecia areata (AA) is known to be associated with atopic dermatitis (AD).^{1,2} Based on retrospective studies and meta-analyses, patients with AD have higher rates of AA, and the inverse has also been found.¹⁻⁴ The comorbidity of AA with AD is potentially related to their common immunologic pathways involving the helper T cell (Th), type 2 (Th2) immune response.¹⁻⁵ Dupilumab, a fully monoclonal antibody against interleukin (IL)-4 receptor α , downregulates the Th2 pathway through inhibition of IL-4 and IL-13 and was approved for the treatment of refractory moderate to severe atopic dermatitis in March 2017 by the US Food and Drug Administration. Reported side effects of dupilumab include injection site reactions, headache, conjunctivitis, keratitis, and blepharitis, among other more rare complications.⁶ Currently 2 reports exist in the literature of hair regrowth after initiation of dupilumab in patients with concomitant AD and alopecia totalis.^{7,8} To our knowledge, this is the first reported case of hair recovery of the scalp, eyebrows, axillae, and groin in a patient with long-standing alopecia universalis treated with dupilumab alone.

CASE REPORT

A 35-year-old woman presented with a history of AD since childhood, an 8-year history of AA with progression to alopecia universalis, and a 5-year history of chronic urticaria. She had undergone treatment with class I topical steroids, intermittent oral corticosteroids, omalizumab, and cyclosporine. The topical corticosteroids and omalizumab were ineffective in controlling her AD, AA, and urticaria. Cyclosporine at 5 mg/kg/d resulted in mild

Abbreviations used:

AA: alopecia areata
AD: atopic dermatitis
IL: interleukin
Th: helper T cell

improvement in her AD. In addition, she grew sparse, patchy hair to her scalp only, which was not sustained after the medication was tapered and withdrawn. Five years after initial presentation, she started treatment for her progressive and treatment-refractory AD with dupilumab, 300 mg injected subcutaneously every 2 weeks. This therapy resulted in significant improvement in her pruritus and atopic dermatitis. After 6 months of therapy, she noted patchy hair recovery that rapidly progressed to full, thick regrowth of terminal hairs on her entire scalp by 12 months (Fig 1). In addition, she noted eyebrow, axillary, and pubic hair growth, which had not occurred with prior therapies. Comparative photographs of these body sites are unavailable. She experienced no significant side effects associated with the dupilumab therapy. At 1-year follow-up, she had a sustained response on maintenance therapy with dupilumab.

DISCUSSION

Patients with AD are at increased risk of AA, with reported odds ratios ranging from 2.6 to 26.3 compared with control groups based on retrospective data and meta-analysis studies.^{1,2} Similarly, patients with early-onset alopecia or severe alopecia have higher rates of AD.^{3,4} AD is primarily driven by Th2 pathway cytokines including IL-4, IL-5, IL-13,

From the Department of Dermatology^a and the Keck School of Medicine,^b University of Southern California.

Funding sources: None.

Conflicts of interest: None disclosed.

Correspondence to: Gene Kim, MD, 1441 Eastlake Avenue, Ezralow Tower, Suite 5301, Los Angeles, CA 90033. E-mail: Gene.kim@med.usc.edu.

JAAD Case Reports 2019;5:116-7.
2352-5126

© 2018 by the American Academy of Dermatology, Inc. Published by Elsevier, Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

<https://doi.org/10.1016/j.jidcr.2018.11.007>



Fig 1. **A**, Side view 5 months after first dose of dupilumab therapy and patient's baseline alopecia for over 8 years. **B**, Twelve months into dupilumab therapy there is full hair regrowth.

and IL-31.⁵ Recent studies in patients with AA have found both increased circulating plasma and lesional Th1 cytokines, such as interferon- γ and IL-2, along with elevated IL-13 and IL-17, pointing to a multifactorial autoinflammatory pathogenesis.⁹ The linked pathway between AD and AA via the Th2 cytokine IL-13 and the immunomodulatory effect of dupilumab may explain our patient's hair regrowth. This finding may be a promising avenue for future therapies. However, more investigation is required to further identify patients with AA who may benefit from IL-4 and IL-13 inhibition, as there has been 1 case report of a patient having AA after initiation of dupilumab, perhaps by the potentiation of a stronger Th1 response.¹⁰ The difference in response time to hair regrowth is also interesting to note, as our patient had a delay of 6 months before any growth compared with patients in prior case reports who noted hair growth at 6 to 12 weeks.^{7,8} Clinical trials studying dupilumab for AA with and without concomitant AD are currently underway.

REFERENCES

1. Andersen YMF, Egeberg A, Gislason GH, Skov L, Thyssen JP. Autoimmune diseases in adults with atopic dermatitis. *J Am Acad Dermatol*. 2017;76(2):274-280.e1.
2. Mohan GC, Silverberg JI. Association of vitiligo and alopecia areata with atopic dermatitis. *JAMA Dermatol*. 2015;151(5):522.
3. Lee NR, Kim BK, Yoon NY, et al. Differences in comorbidity profiles between early-onset and late-onset alopecia areata patients: a retrospective study of 871 Korean patients. *Ann Dermatol*. 2014;26(6):722-726.
4. Paller A, Jaworski JC, Simpson EL, et al. Major comorbidities of atopic dermatitis: beyond allergic disorders. *Am J Clin Dermatol*. 2018;19(6):821-838.
5. Suárez-Fariñas M, Ungar B, Noda S, et al. Alopecia areata profiling shows TH1, TH2, and IL-23 cytokine activation without parallel TH17/TH22 skewing. *J Allergy Clin Immunol*. 2015;136(5):1277-1287.
6. Ou Z, Chen C, Chen A, Yang Y, Zhou W. Adverse events of dupilumab in adults with moderate-to-severe atopic dermatitis: a meta-analysis. *Int Immunopharmacol*. 2018;54:303-310.
7. Darrigade A-S, Legrand A, Andreu N, et al. Dual efficacy of dupilumab in a patient with concomitant atopic dermatitis and alopecia areata. *Br J Dermatol*. 2018;179(2):534-536.
8. Penzi LR, Yasuda M, Manatis-Lornell A, Hagigeorges D, Senna MM. Hair regrowth in a patient with long-standing alopecia totalis and atopic dermatitis treated with dupilumab. *JAMA Dermatol*. 2018;154(11):1358-1360.
9. Tembhe MK, Sharma VK. T-helper and regulatory T-cell cytokines in the peripheral blood of patients with active alopecia areata. *Br J Dermatol*. 2013;169(3):543-548.
10. Mitchell K, Levitt J. Alopecia areata after dupilumab for atopic dermatitis. *JAAD Case Rep*. 2018;4(2):143-144.