SAGE Open Medical Case Reports

SAGE Open Medical Case Reports
JCMS Case Reports
Volume 8: 1–3

DOI: 10.1177/2050313X20940458
journals.sagepub.com/home/sco
SAGE

Psoriasis appearing after dupilumab therapy in atopic dermatitis: A case report

Ho Seung Kim[1] and Jensen Yeung[2,3,4,5]

Abstract

A 36-year-old Caucasian female with a long history of atopic dermatitis presented with multiple flares eventually leading to dupilumab therapy. Five months into the dupilumab therapy, she presented with well-demarcated erythematous plaques with silvery scale resembling psoriasis on her knees and shins (body surface area 2%, Psoriasis Area Severity Index 1.6, Investigator' Global Assessment 2). Biopsies were taken to confirm the diagnosis of classic psoriasis. Dupilumab was continued for another month while using clobetasol 0.05% ointment. The patient reported poor adherence to clobetasol therapy, and the lesions persisted. When dupilumab was discontinued, her psoriasis resolved over 6 weeks, but her atopic dermatitis returned. Dupilumab was restarted for atopic dermatitis management, and her psoriasis returned. There appears to be a rare causal association between dupilumab and psoriasis in this case. The mechanism of the drug reaction is yet to be discovered.

Keywords

Psoriasis, dupilumab, atopic dermatitis, drug reaction

Introduction

Psoriasis is a chronic skin condition with an underlying perpetuation of cytokine production and T-helper 1/17 (Th1/17)-driven autoimmune and inflammatory processes.[1] There have been few cases of psoriasis appearing to be induced by dupilumab, an interleukin-4 (IL-4) receptor subunit blocking the function of T-helper 2 (Th2)-mediated cytokines.[2–4] Here, we present another interesting case of psoriasis following dupilumab therapy in a patient with a long history of atopic dermatitis.

Case presentation

A 36-year-old Caucasian female with atopic dermatitis since infancy presented to the clinic after 29 years of remission. At 32 years of age in 2016, she developed lesions on her face, arms, and legs (body surface area (BSA) 4%, Eczema Area and Severity Index (EASI) 4.4, The 5-point Investigator's Global Assessment (IGA) 2) and was subsequently treated with clobetasol propionate 0.05% ointment twice daily as needed to body and tacrolimus 0.1% ointment twice daily to face. This seemed to control her atopic dermatitis for a couple of years. In August 2018, she returned with worsened skin lesions (BSA 22%, EASI 16.8, IGA 3), where the biopsy of two lesions confirmed the diagnosis of atopic dermatitis. At this point, she was given oral prednisone 30 mg daily for 2 weeks based on her weight of 61 kg. Her prednisone dose was tapered down by 5 mg every 2 weeks. Unfortunately, her atopic dermatitis exacerbated when her prednisone dose was decreased to 10 mg daily. Oral methotrexate 15 mg weekly was added, and her atopic dermatitis was once again controlled after 6 weeks while tapering off the prednisone. Despite all this, her atopic dermatitis worsened after 4 months (BSA 20%, EASI 16, IGA 3), requiring an increased methotrexate dose of 25 mg weekly. Following another 6 weeks, her atopic dermatitis was not better. We then initiated dupilumab and reduced methotrexate dose to 15 mg weekly. Her methotrexate was discontinued after 3 months as her atopic dermatitis was completely cleared. She continued to take dupilumab for 5 months.

When she was seen again in the clinic, she developed well-demarcated erythematous plaques with silvery scale resembling classic plaque psoriasis on her knees and shins

[1]Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada
[2]Faculty of Medicine, University of Toronto, Toronto, ON, Canada
[3]Sunnybrook Health Sciences Centre, Toronto, ON, Canada
[4]Women's College Hospital, Toronto, ON, Canada
[5]Probity Medical Research Inc., Waterloo, ON, Canada

Corresponding Author:
Jensen Yeung, Department of Dermatology, Women's College Hospital, 76 Grenville St, Fifth Floor, Toronto, ON M5S 1B2, Canada.
Email: jensen.yeung@utoronto.ca

(BSA 2%, Psoriasis Area Severity Index 1.6, IGA 2). She had no prior history of psoriasis and had no known family member with the disease. Two biopsies were taken and were read by a very experienced dermatopathologist to histologically confirm the diagnosis of classic psoriasis. Hematoxylin and eosin (H&E) of both biopsies showed hyperkeratosis with confluent parakeratosis, uniformly elongated rete ridges, and the absence of the granular layer. There was thinning of the supra-papillary plates and collections of neutrophils in the stratum corneum consistent with Munro's micro-abscesses. There was also a superficial perivascular infiltrate of lymphocytes. Spongiosis was not observed, and no eosinophils were present. She continued to take dupilumab while being treated with topical clobetasol propionate 0.05% ointment twice daily without any occlusion. A month later, her psoriatic lesions persisted as she had only used clobetasol ointment for 4 days as these lesions were asymptomatic. She then decided to discontinue dupilumab on her own. Six weeks later, her psoriasis resolved, but her atopic dermatitis returned (BSA 12%, EASI 9.6, IGA 2). She was restarted on dupilumab, which cleared atopic dermatitis in 2 months, but her previous psoriatic plaques on knees and shins recurred.

Discussion

Psoriasis is a common chronic inflammatory skin disease that has a significant impact on the patient's quality of life. It has a prevalence of 2% worldwide, and more predominantly appearing in Caucasian and Scandinavian populations.[1,5] In the past, psoriasis was thought to be caused by a primarily Th1-driven inflammatory process. However, with the discovery of Th17 cells, our understanding of the pathophysiology behind psoriasis has advanced, leading to novel treatments targeting the IL-23/Th17 signal as well as IL-17.[1,6] Atopic dermatitis has been shown to be precipitated by biologics used to treat psoriasis.[7–9]

On the other hand, dupilumab is a humanized IgG4 monoclonal antibody binding the alpha subunit of the IL-4 receptor, which has a close association with Th2 differentiation. Having affinity to both IL-4 receptor complexes, it can inhibit IL-4 (type 1 and type 2 specific) as well as IL-13 (type 2 specific). Consequently, dupilumab has found its place in the treatment of Th2-mediated diseases, such as atopic dermatitis and asthma.[10]

To date, there is no clear explanation to elucidate the association between dupilumab's Th2 inhibition and its implication on psoriasis pathogenesis. Previous case reports on dupilumab-induced psoriasis in patients with atopic dermatitis suggest a possible shift from a Th2- to Th1-mediated inflammatory response.[2,4] In the acute phase, atopic dermatitis is primarily a Th2 disease, but with time there is a partial shift to Th1.[3] Adding the Th2 inhibition from dupilumab, it is thought that Th1 response becomes more pronounced.[2,4] Safa and Paumier[3] mention the works of Guenova et al.[11] and Hahn and Ghoreschi,[12] where IL-4 has shown negative regulator effect on Th1/17 and suppressed IL-23 production. There is also evidence that IL-4 and IL-4 receptor contribute to the maturation of dendritic cells, which play a key role in the development of psoriatic disease.[1,10]

This case shows an eruption of psoriatic lesions in a patient with atopic dermatitis treated with dupilumab. The adverse effect was reversible upon discontinuation, and it was reproduced when dupilumab was restarted. Further research on the interplay between cytokines and triggers is needed to elucidate the role of dupilumab in the pathogenesis of psoriasis.

Declaration of conflicting interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Dr Yeung has been a speaker, consultant, and investigator for AbbVie, Allergan, Amgen, Astellas, Boehringer Ingelheim, Celgene, Centocor, Coherus, Dermira, Eli Lilly, Forward, Galderma, GSK, Janssen, Leo, Medimmune, Merck, Novartis, Pfizer, Regeneron, Roche, Sanofi Genzyme, Takeda, UCB, Valeant, and Xenon.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Informed consent

Patient consent to disclose information and publication on a journal was acquired prior to writing the manuscript.

Statement on prior presentation

This manuscript has never been published before and it is not under consideration for publication elsewhere.

References

1. Rendon A and Schäkel K. Psoriasis pathogenesis and treatment. *Int J Mol Sci* 2019; 20: 1475.
2. Fowler E, Silverberg JI, Fox JD, et al. Psoriasiform dermatitis after initiation of treatment with dupilumab for atopic dermatitis. *Dermatitis* 2019; 30(3): 234–236.
3. Safa G and Paumier V. Psoriasis induced by dupilumab therapy. *Clin Exp Dermatol* 2019; 44(3): e49–e50.
4. Varma A and Levitt J. Dupilumab-induced phenotype switching from atopic dermatitis to psoriasis. *JAAD Case Rep* 2020; 6(3): 217–218.
5. Christophers E. Psoriasis—epidemiology and clinical spectrum. *Clin Exp Dermatol* 2001; 26(4): 314–320.
6. Hawkes JE, Chan TC and Krueger JG. Psoriasis pathogenesis and the development of novel targeted immune therapies. *J Allergy Clin Immunol* 2017; 140(3): 645–653.
7. Abe F, Mitsuyama S, Nagao E, et al. Atopic dermatitis-like eruption induced by two different biologics in a patient with psoriatic arthritis. *Acta Derm Venereol* 2019; 99: 1291–1292.
8. Burlando M, Cozzani E, Russo R, et al. Atopic-like dermatitis after secukinumab injection: a case report. *Dermatol Ther* 2019; 32(1): e12751.

9. Ishiuji Y, Umezawa Y, Asahina A, et al. Exacerbation of atopic dermatitis symptoms by ustekinumab in psoriatic patients with elevated serum immunoglobulin E levels: report of two cases. *J Dermatol* 2018; 45(6): 732–734.
10. Harb H and Chatila TA. Mechanisms of dupilumab. *Clin Exp Allergy* 2020; 50(1): 5–14.
11. Guenova E, Skabytska Y, Hoetzenecker W, et al. IL-4 abrogates TH17 cell-mediated inflammation by selective silencing of IL-23 in antigen-presenting cells. *Proc Natl Acad Sci U S A* 2015; 112: 2163–2168.
12. Hahn M and Ghoreschi K. The role of IL-4 in psoriasis. *Expert Rev Clin Immunol* 2017; 13(3): 171–173.