Journal of Asthma and Allergy Dovepress

Open Access Full Text Article

CASE REPORT

Concurrent Refractory Atopic Dermatitis and Generalized Vitiligo Successfully Treated with Abrocitinib: A Case Report

Xinyi Shao*, Xingyu Pan*, Yangmei Chen, Yan Zhu, Shuang Chen, Jin Chen

Department of Dermatology, The First Affiliated Hospital of Chongqing Medical University, Chongqing, 400010, People's Republic of China

*These authors contributed equally to this work

Correspondence: Shuang Chen; Jin Chen, Department of Dermatology, The First Affiliated Hospital of Chongqing Medical University, No. 1 Youyi Road, Yuzhong District, Chongqing, 400016, People's Republic of China, Tel +8617726638759; +8615023188592, Email 179409599@qq.com; chenjin7791@163.com

Abstract: Atopic dermatitis (AD) may sometimes be comorbid with vitiligo. However, these therapeutic agents are often slow acting and lead to various adverse effects, resulting in poor patient compliance. This report describes a 65-year-old male patient with refractory moderate-to-severe atopic dermatitis (AD) and generalized vitiligo. The patient was treated with repeated antihistamine and dupilumab injections; however, erythema and pruritus did not improve. Consequently, oral abrocitinib was administered to treat AD and vitiligo, and the patient's generalized erythema, papules, and pruritus ameliorated with the repigmentation of vitiligo lesions. This case provided evidence of the efficacy and safety of oral abrocitinib for patients with concurrent refractory AD and vitiligo.

Keywords: atopic dermatitis, vitiligo, abrocitinib, JAK inhibitors

Introduction

Atopic dermatitis (AD) is a common chronic inflammatory skin condition characterized by eczematous skin lesions, including erythema and papules.[1] AD is prevalent in 15–20% of children and 2–10% of adults.[2–4] AD is associated with recurrent eczematous lesions and intense pruritus, which severely affects patient quality of life, negatively impacting psychological and social well-being.

In China, vitiligo is a common mucocutaneous depigmentation disorder with a global incidence of 0.5–2%[5,6] and prevalence of approximately 0.54%.[7] Cytotoxic $CD8^+$ T cell-mediated killing of melanocytes is the main cause of vitiligo.[8] Both AD and vitiligo belong to immune-mediated inflammatory skin diseases, and in some cases, clinical overlap may occur, with the severity of the disease showing correlation, complicating disease treatment.

Topical corticosteroid and calcineurin inhibitor therapies are widely used for the treatment of AD and vitiligo. However, these therapeutic agents are often slow acting and lead to various adverse effects, resulting in poor patient compliance. Biologics such as dupilumab and the Janus kinase(JAK) inhibitors such as topical ruxolitinib 1.5% cream that target aberrant immune responses are promising treatment options.[5,9–11] Given the immune overlap in the pathogenesis of AD and vitiligo and the treatment of AD patients with vitiligo remains a major challenge in clinical practice. Only a case report suggested that upadacitinib can be a preferred treatment option when AD and vitiligo coexist.[12] Herein, we report a case of refractory moderate-to-severe AD with generalized vitiligo that responded well to the JAK1 inhibitor abrocitinib.

Case Report

A 65-year-old male patient presented with generalized vitiligo that had been untreated for more than 30 years and was diagnosed with AD at another hospital more than 20 years ago. In May 2023, the patient visited our dermatology department for the first time because of poor response to repeated antihistamine treatment for AD. Physical examination

Received: 22 August 2024
Accepted: 14 November 2024
Published: 3 December 2024

revealed extensive erythema and papules with pruritus on the face, torso, and extremities. Additionally, large irregular vitiligo patches (skin lesions accounting for >50% of the body surface area) with blurred edges and white hair were observed on the head, face, neck, torso, and extremities. Consequently, the patient was diagnosed with moderate-to-severe AD (Scoring of Atopic Dermatitis [SCORAD] score: 70.6; Investigator Global Assessment [IGA] score: 3; Numeric Pain Rating Scale [NRS]: 8) and generalized vitiligo (vitiligo disease activity [VIDA] score=0; vitiligo area score index [VASI]=90%, facial VASI [FVASI]=1.5) (Figure 1a and d). The patient was treated with epinastine capsules (20 mg/day, qd, po), levocetirizine tablets (5 mg/day, qn, po) and betamethasone dipropionate cream (1 g/dose, bid, top).

However, after 2 months of treatment, the patient showed no signs of improvement in generalized erythema, papules, and pruritus ([SCORAD]: 70.6, [IGA]: 3, [NRS]: 8), and no change in generalized vitiligo lesions ([VIDA]=0, [VASI] =90%, [FVASI]=1.5). Subsequently, dupilumab (300 mg/dose, q2w, s. c.) was administered. After four months of treatment, erythema and papules were markedly alleviated in the lower extremities but were still severe in the torso ([SCORAD]: 53.8, [IGA]: 5, [NRS]: 6), and generalized vitiligo lesions remained unchanged ([VIDA]=0, [VASI]=90%, [FVASI]=1.5) (Figure 1b and e). The patient requested the discontinuation of dupilumab treatment.

After excluding contraindications (viral hepatitis, tuberculosis, tumor, and serious infection) and obtaining informed consent from the patient in December 2023, the treatment was modified to include abrocitinib (100 mg/day, qd, po). After a month of treatment, the patient's erythema and papules on the torso and extremities were significantly abated with alleviated pruritus (([SCORAD]: 39, [IGA]: 3, [NRS]: 6) but no change in vitiligo lesions ([VIDA]=0, [VASI]=90%, [FVASI]=1). Thus, abrocitinib (100 mg/dose, qd, po) treatment was continued. In April 2024, erythema and papules significantly improved, and subjective itching symptoms disappeared ([SCORAD]: 18, [IGA]: 1; [NRS]: 1). In addition, significant improvement and repigmentation of vitiligo lesions on the face and body ([VIDA]=0, [VASI]=65%, [FVASI] =0) were observed (Figure 1c and f). At present, the patient is still receiving abrocitinib treatment (100 mg/day, qd, po). The clinical symptoms and medication regimens are shown in Figure 2.

Discussion

Herein, we report a case of refractory moderate-to-severe AD with generalized vitiligo successfully treated with oral abrocitinib. Although previous studies have reported that abrocitinib can effectively treat AD, only a limited number of studies have evaluated its efficacy in the treatment of vitiligo. Therefore, our case confirms the therapeutic effect of abrocitinib in vitiligo and highlights its potential as a treatment option in patients with AD and vitiligo.

AD is a common chronic inflammatory skin disorder that is characterized by persistent itching. The development of AD primarily involves the activation of Th2 cells, which stimulate JAK/STAT signaling through the release of inflammatory cytokines such as IFN-γ, IL-4, IL-13, and IL-17, resulting in a cascade of inflammatory responses. In addition, abnormal Th1 and Th17 cell activation is associated with AD.[13]

Vitiligo is a chronic depigmentation disease dominated by a Th1 immune response. IFN-γ activates the JAK/STAT1 signaling pathway and Th1 cells. Activated Th1 cells secrete more IFN-γ, further affecting melanocytes and promoting the downstream release of CXCL9/10 via JAK/STAT-1 signaling in keratinocytes, eventually leading to the recruitment of $CD8^+$ T cells to skin lesions and the destruction of melanocytes.[14–16]

Previous studies have reported that patients with AD and patients with vitiligo have a higher risk of developing concurrent vitiligo and AD.[17,18] In addition, genome-wide association studies have shown substantial overlap between susceptibility loci for AD and Th1-mediated autoimmune conditions, demonstrating that Th1 cell activity is involved in the pathogenesis of both AD and vitiligo.[13] Thus, the co-occurrence of AD and vitiligo may be attributed to the overlap in immune responses.

Abrocitinib is a JAK1 inhibitor approved by the FDA for the treatment of AD, which reduces the activity of various Th2 cytokines (such as IL-4 and IL-13) in AD by inhibiting JAK/STAT-1 signaling.[19] Additionally, abrocitinib attenuates inflammation, and reducing damage to immune cells at the skin barrier. The most frequently reported side effects are gastrointestinal symptoms, acne and respiratory tract infections. Moreover, JAK inhibitors disrupt the intracellular signalling pathways responsible for the activation of immune cells and production of pro-inflammatory cytokines that are involved in the development of vitiligo.[20] Only topical ruxolitinib has been approved for the treatment of vitiligo in patients aged ≥12 years, indications for other JAK inhibitors such as tofacitinib, baricitinib use in the treatment of vitiligo

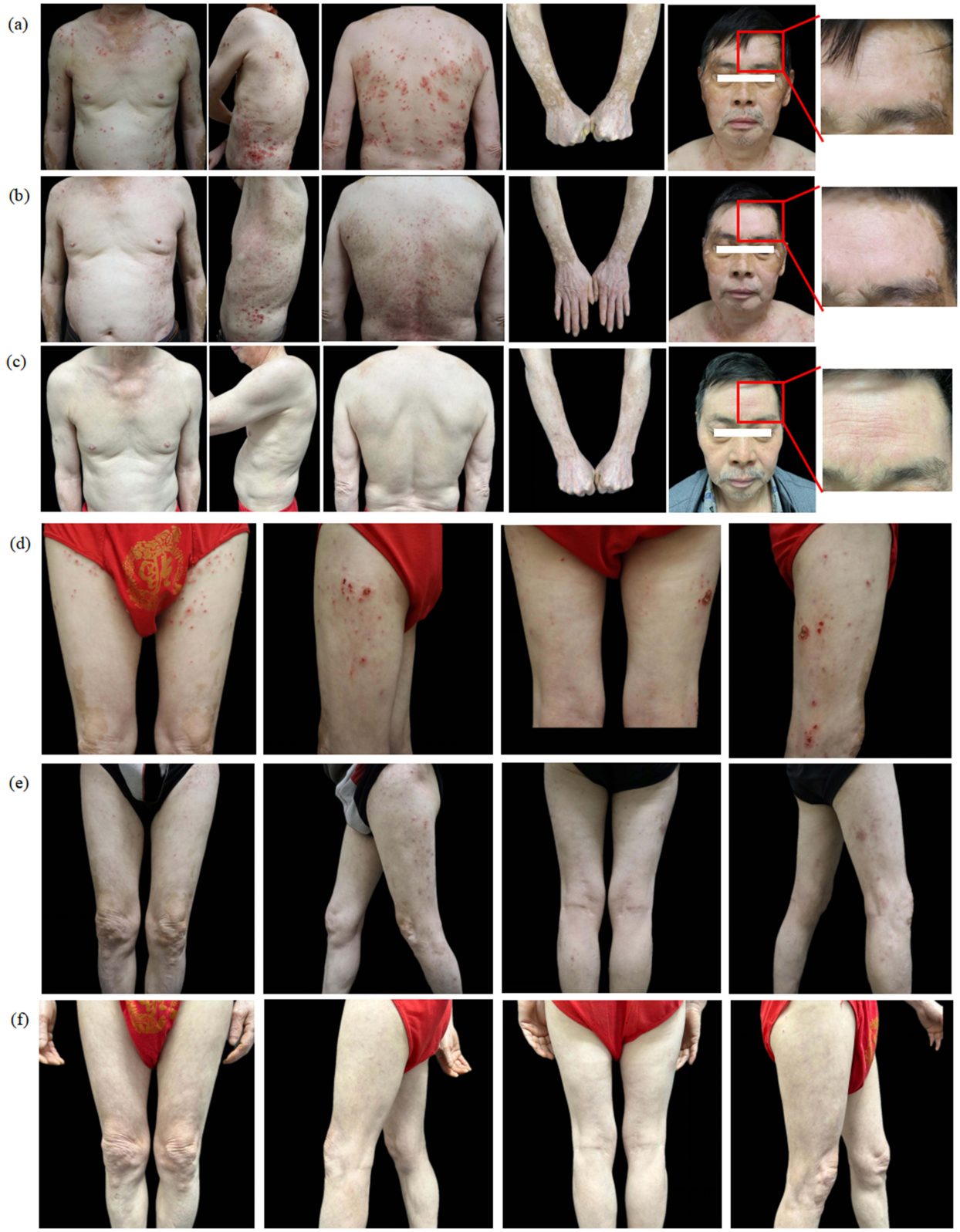

Figure 1 Clinical photographs of a 65-year-old male patient with atopic dermatitis and generalized vitiligo who presented with extensive erythema, papules and vitiligo patches showing the initial and recent response to treatment in the course of his treatment: (**a** and **d**) atopic dermatitis and vitiligo lesions on the patient's face, torso and extremities when admitted; (**b** and **e**) atopic dermatitis lesions receded partially but vitiligo lesions had no change after conventional therapies for 6 months; (**c** and **f**) atopic dermatitis lesions showed further recovery and vitiligo lesions revealed repigmentation after treatment with abrocitinib for 4 months.

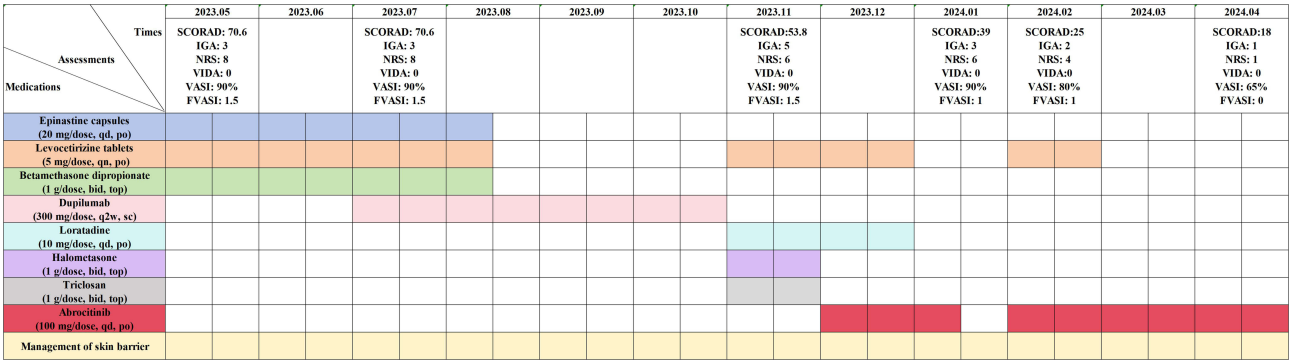

Figure 2 Timetable depicting the time frame for the medication regimen and changes in lesions of a 65-year-old male patient with atopic dermatitis and generalized vitiligo. The medication regimens are shown on the left-hand side. On the right-hand side, the duration of each medication and the disease severity assessment of each subsequent visit are depicted by different coloured boxes which correspond to the month within the whole treatment.

Abbreviations: FVASI, Facial vitiligo area score index; IGA, Investigator Global Assessment; NRS, Numeric Pain Rating Scale; SCORAD, Scoring of Atopic Dermatitis; VASI, vitiligo area score index; VIDA, vitiligo disease activity.

are lacking. And only several cases explored abrocitinib's use in vitiligo treatment.[21–23] In this case, we observed the significant improvement in AD and repigmentation of the vitiligo lesions after the treatment of abrocitinib, which confirmed the beneficial effects of abrocitinib in the treatment of AD and vitiligo.

This case report had some limitations. First, the sample size is small, further large-scale cohort studies are warranted to confirm the findings of this study. And long-term follow-up data is lacking, we still need to continue following up on the patient's later condition.

Conclusion

Our report suggested significant improvement in refractory atopic dermatitis and generalized vitiligo after treatment with abrocitinib, and provided evidence for the potential of JAK inhibitors in the treatment of vitiligo, particularly in cases where other therapies have failed. In addition, further research and clinical trials are needed to validate the effectiveness and safety of abrocitinib.

Ethics Statement

Written informed consent was obtained from the patient for the publication of case details and images. Institutional approval was not required to publish the case details.

Acknowledgments

We are grateful to the patient for permission to publish the data for this case report.

Funding

This case report was supported by the National Natural Science Foundation of China (Grant No. 82073462) and Natural Science Foundation of Chongqing (2023NSCQ-MSX0321).

Disclosure

The authors declare no conflict of interest.

References

1. Kim J, Kim BE, Leung DYM. Pathophysiology of atopic dermatitis: clinical implications. *Allergy Asthma Proc*. 2019;40:84–92. doi:10.2500/aap.2019.40.4202
2. Asher MI, Montefort S, Björkstén B, et al. Worldwide time trends in the prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and eczema in childhood: ISAAC phases one and three repeat multicountry cross-sectional surveys. *Lancet*. 2006;368:733–743. doi:10.1016/S0140-6736(06)69283-0
3. Nutten S. Atopic dermatitis: global epidemiology and risk factors. *Ann Nutr Metab*. 2015;66(Suppl 1):8–16. doi:10.1159/000370220

4. Torres T, Ferreira EO, Gonçalo M, Mendes-Bastos P, Selores M, Filipe P. Update on atopic dermatitis. *Acta Med Port*. 2019;32:606–613. doi:10.20344/amp.11963
5. Bergqvist C, Ezzedine K. Vitiligo: a review. *Dermatology*. 2020;236:571–592. doi:10.1159/000506103
6. van Geel N, Speeckaert R, Taïeb A, et al. Worldwide expert recommendations for the diagnosis and management of vitiligo: position statement from the International Vitiligo Task Force Part 1: towards a new management algorithm. *J Eur Acad Dermatol Venereol*. 2023;37:2173–2184. doi:10.1111/jdv.19451
7. Zhang X, Naz AF, Jiang L, et al. Disease awareness and treatment preferences in vitiligo: a cross-sectional study in China. *Acta Derm Venereol*. 2023;103:adv11643. doi:10.2340/actadv.v103.11643
8. Frisoli ML, Essien K, Harris JE. Vitiligo: mechanisms of pathogenesis and treatment. *Annu Rev Immunol*. 2020;38:621–648. doi:10.1146/annurev-immunol-100919-023531
9. Frazier W, Bhardwaj N. Atopic dermatitis: diagnosis and treatment. *Am Fam Physician*. 2020;101:590–598.
10. Cunningham KN, Rosmarin D. Vitiligo treatments: review of current therapeutic modalities and JAK inhibitors. *Am J Clin Dermatol*. 2023;24:165–186. doi:10.1007/s40257-022-00752-6
11. Phan K, Phan S, Shumack S, Gupta M. Repigmentation in vitiligo using janus kinase (JAK) inhibitors with phototherapy: systematic review and meta-analysis. *J DermatolTreat*. 2022;33:173–177. doi:10.1080/09546634.2020.1735615
12. Pan T, Mu Y, Shi X, Chen L. Concurrent vitiligo and atopic dermatitis successfully treated with upadacitinib: a case report. *J DermatolTreat*. 2023;34(1):2200873. doi:10.1080/09546634.2023.2200873
13. Ellinghaus D, Baurecht H, Esparza-Gordillo J, et al. High-density genotyping study identifies four new susceptibility loci for atopic dermatitis. *Nat Genet*. 2013;45:808–812. doi:10.1038/ng.2642
14. Speeckaert R, Belpaire A, Speeckaert MM, van Geel N. A meta-analysis of chemokines in vitiligo: recruiting immune cells towards melanocytes. *Front Immunol*. 2023;14:1112811. doi:10.3389/fimmu.2023.1112811
15. Faraj S, Kemp EH, Gawkrodger DJ. Patho-immunological mechanisms of vitiligo: the role of the innate and adaptive immunities and environmental stress factors. *Clin Exp Immunol*. 2022;207:27–43. doi:10.1093/cei/uxab002
16. Tsiogka A, Kyriazopoulou M, Kontochristopoulos G, et al. The JAK/STAT pathway and its selective inhibition in the treatment of atopic dermatitis: a systematic review. *J Clin Med*. 2022;11:4431. doi:10.3390/jcm11154431
17. Mohan GC, Silverberg JI. Association of vitiligo and alopecia areata with atopic dermatitis: a systematic review and meta-analysis. *JAMA Dermatol*. 2015;151:522–528. doi:10.1001/jamadermatol.2014.3324
18. Acharya P, Mathur M. Association of atopic dermatitis with vitiligo: a systematic review and meta-analysis. *J Cosmet Dermatol*. 2020;19:2016–2020. doi:10.1111/jocd.13263
19. Vazquez ML, Kaila N, Strohbach JW, et al. Identification of N-{cis-3-[Methyl(7H-pyrrolo[2,3-d]pyrimidin-4-yl)amino]cyclobutyl}propane-1-sulfonamide (PF-04965842): a selective JAK1 clinical candidate for the treatment of autoimmune diseases. *J Med Chem*. 2018;61(3):1130–1152. doi:10.1021/acs.jmedchem.7b01598
20. Qi F, Liu F, Gao L. Janus kinase inhibitors in the treatment of vitiligo: a review. *Front Immunol*. 2021;12:790125. doi:10.3389/fimmu.2021.790125
21. Xu Z, Xuan Y, Li Y, et al. A prospective observational study of oral abrocitinib and narrow-band ultraviolet-B in refractory progressive vitiligo. *J Am Acad Dermatol*. 2024;91(3):590–592. doi:10.1016/j.jaad.2024.05.078
22. Satkunanathan S, Boshra M, Chang J, Bose R. Rapid resolution of non-segmental vitiligo in a patient treated with abrocitinib: a case report. *SAGE Open Med Case Rep*. 2024;12:2050313X241231527. doi:10.1177/2050313X241231527
23. Samuel C, Cornman H, Kambala A, Kwatra SG. A review on the safety of using JAK inhibitors in dermatology: clinical and laboratory monitoring. *Dermatol Ther*. 2023;13(3):729–749. doi:10.1007/s13555-023-00892-5