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CASE REPORT

Dupilumab for Atopic Dermatitis with Twenty-Nail Dystrophy: A Case Report

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Abstract: Atopic dermatitis (AD) typically presents with cutaneous symptoms, but nail changes, particularly twenty-nail dystrophy (TND), are often overlooked. We report a case of a 40-year-old woman with a 3-year history of eczematous erythema and pruritus around the nails, accompanied by nail deformities. She had elevated serum IgE levels (2250 IU/mL) and dermatoscopic findings of thickened yellowish nails with splinter hemorrhages. Diagnosed with AD and TND, she received dupilumab after failing conventional treatments. Within 2 weeks, she experienced significant itch relief, and by 5 months, nearly complete nail recovery was observed, with serum IgE levels decreasing to 823 IU/mL. This case highlights the importance of recognizing nail involvement in AD, suggesting that periungual eczema and TND may represent a distinct phenotype. Dupilumab shows promise as an effective treatment for this condition, warranting further research.

Keywords: atopic dermatitis, twenty-nail dystrophy, dupilumab, nail dystrophy, onychodystrophy

Introduction

Cutaneous findings in atopic dermatitis (AD) are well recognized, while nail changes are often overlooked. Approximately 11% of patients with AD exhibit nail changes, which may manifest as distinctive alterations such as pitting, longitudinal striations, and increased fragility.[1] However, atopic dermatitis presenting with twenty-nail dystrophy has not been reported. We report a case of AD characterized by TND, which was successfully managed with dupilumab.

Case Report

A 40-year-old woman presented with a 3-year history of eczematous erythema and pruritus around the nails, along with nail deformities in both hands and feet for 2 years. She also had a 5-year history of allergic rhinitis. Her medical history was negative for long-term exposure to detergents or chemicals and familial genetic diseases.

Upon physical examination, the skin around the nails showed erythema and edema, and all nails showed trachyonychia, roughness, and dullness and all nails showed trachyonychia, roughness, and dullness (Figure 1a–c). No abnormalities of skin, hair, or mucosa were detectable elsewhere. Aside from extreme elevation of serum IgE (2250 IU/mL, normal<100 IU/mL), the following of laboratory tests were otherwise negative: nail fungal microscopy and culture; routine blood examination; liver and renal function tests; hepatitis B virus, and syphilis; blood sedimentation rate; antinuclear antibody assays; and 25-OH vitamin D level. Dermatoscopic examination revealed thickening of the nail plate, which exhibited a yellowish and rough texture. Beneath the nail, splinter hemorrhages were visible (Figure 1d). The patient repeatedly refused nail biopsy. Based on clinical findings and dermatological examination, the patient was diagnosed as atopic dermatitis with twenty-nail dystrophy according to the AD criteria established by Zhang Jianzhong.[2] Dupilumab was chosen after she failed to respond to conventional therapy: antihistamine, topical halometasone cream, pimecrolimus ointment and oral corticosteroid treatment. A single subcutaneous starting dose of 600 mg was followed by

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Figure 1 Fingernails of hands (**a, b**) and feet (**c**) before combination therapy. Dermatoscopic examination revealed a yellowish and rough texture of the nail plate (**d**).

Figure 2 Five months after Dupilumab treatment.

300 mg every 14 days (for 5 months) and finally 300 mg every 3 weeks. Results were impressive, affording dramatic relief from itching around the nail in just 2 weeks. Two months later, healthy new nail growth was underway, and recovery was near-complete (except for thumb nails) within 5 months (Figure 2) and the level of serum IgE decreased (823 IU/mL).

Discussion

Nail involvement in AD is relatively common but is frequently regarded as a minor comorbidity. In the present case, limited manifestations of periungual eczema and twenty-nail dystrophy resulted in significant patient distress. This observation suggests that nail changes in conjunction with AD may warrant greater clinical attention. The combination of periungual eczema and TND is proposed to represent a distinct phenotype or subtype of AD. This phenotype typically begins with periungual eczema and pruritus, followed by progressive nail changes culminating in TND as the disease progresses.

This clinical presentation must be distinguished from other conditions associated with onychodystrophy, including alopecia areata (AA), psoriasis, and lichen planus (LP). Dermatoscopic examination is a valuable diagnostic aid in this

differentiation. In cases of onychodystrophy, dermatoscopy may reveal longitudinal ridging, red lunulae, thickened cuticles, and involvement exceeding 50% of the proximal nail plate width. Additional features include splinter hemorrhage, pitting, and onychoschizia.[3]

Alopecia areata is an autoimmune inflammatory disorder that primarily targets hair follicles but can also affect nails. Common nail findings include pitting, trachyonychia, and red-spotted lunulae. Dermatoscopic characteristics often include small pits, longitudinal ridging, nail plate thinning, and distal onycholysis.[3,4] Nail alterations may precede or follow the onset of alopecia and often correlate with disease severity. In the current case, no hair changes were observed over a three-year period, thereby excluding AA-associated nail involvement.

Psoriasis is an immune-mediated inflammatory dermatosis, with nail psoriasis affecting up to 50% of individuals with chronic plaque psoriasis. The characteristic features of nail psoriasis include pitting, longitudinal ridging, oil drop discoloration, leukonychia, and onycholysis. Dermatoscopic findings in nail psoriasis typically encompass pitting, distal onycholysis, splinter hemorrhages, deep transverse grooves, oil drop signs, and dilated subungual capillaries.[3,5] In the present case, the absence of a personal or family history of psoriasis and characteristic cutaneous or nail features led to the exclusion of nail psoriasis.

Lichen planus is an immune-mediated condition affecting the skin, mucous membranes, scalp, and nails. Nail involvement occurs in approximately 10% of affected individuals, with up to 25% also exhibiting lesions at other sites. Dermatoscopic findings in nail lichen planus may include nail plate thinning, longitudinal ridging, distal nail plate splitting, onycholysis, onychorrhexis, subungual hyperkeratosis, erythematous lunular patches, and pterygium formation, potentially progressing to total anonychia.[3,5] In this case, the absence of typical cutaneous or mucosal manifestations and dermatoscopic findings consistent with nonspecific nail dystrophy supported the exclusion of nail lichen planus.

AD-associated TND's pathophysiology may involve T helper 2 (Th2)-mediated inflammatory responses. AD is a chronic inflammatory skin disease characterized by Th2-predominant immune activation. When lesions involve the periungual area, local Th2-dominant inflammation may extend to adjacent nail structures, contributing to structural changes and promoting TND development.

Dupilumab, a monoclonal antibody targeting the interleukin-4 (IL-4) and interleukin-13 (IL-13) pathways, has demonstrated efficacy in treating moderate-to-severe AD. To date, only three cases of AD with concurrent onychodystrophy treated with dupilumab have been reported in clinical trials.[6–8] In the present case, significant clinical improvement was observed after five months of dupilumab therapy. These findings suggest that dupilumab is a safe and effective therapeutic option for AD-associated TND, although further investigation is required to validate its efficacy in this context.

Given the divergent immunopathological mechanisms of psoriasis, which are primarily driven by Th1- and Th17-mediated pathways, dupilumab is not considered an appropriate treatment for nail psoriasis. Conversely, biological agents targeting tumor necrosis factor-α (TNF-α), IL-17, and IL-12/23 have demonstrated high efficacy in managing nail psoriasis, particularly in plaque psoriasis and psoriatic arthritis.[9]

Emerging evidence suggests that dupilumab may exert therapeutic effects on lichen planus; however, conflicting reports indicate that dupilumab may also induce LP or other inflammatory dermatoses.[10] Thus, the precise role of dupilumab in lichen planus, particularly in cases with nail involvement, remains unclear and warrants further investigation.

The dual immune contributions of Th1 and Th2 in AA may explain the variable responses to dupilumab. In Th1-dominant male patients, disease exacerbation has been reported, while improvement is more commonly observed in Th2-skewed female patients.[11] However, the effectiveness of dupilumab in treating AA-associated nail changes remains undocumented and necessitates additional study.

Conclusion

In conclusion, the Th2-dominant immune response observed in AD-associated TND supports the potential utility of dupilumab as a targeted therapy. Nevertheless, due to the distinct immunopathological features of other nail disorders, such as those observed in AA, psoriasis, and lichen planus, individualized diagnostic evaluation and further research are essential to guide appropriate treatment strategies.

Ethics Statement

Affiliated Central Hospital of Shenyang Medical College approved to publish the case details.

Consent Statement

The patient has provided written informed consent for the publication of their case details and accompanying images. We ensure adherence to ethical standards, respect patient privacy, and conduct our research and publication in strict accordance with relevant guidelines.

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Disclosure

The authors report no conflicts of interest in this work.

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