

## Case Report

# Complex Pediatric Case of Atopic Dermatitis with Polyvalent Allergic Reactions and Concurrent Superinfections: a Case Report

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## Abstract

This case report delineates a uniquely complex manifestation of atopic dermatitis in a 9-year-old female patient, intricately associated with hypersensitivity to dental anesthetics and methacrylate-based restorative materials, and compounded by concurrent bacterial, viral, and fungal superinfections. The report underscores the clinical challenges and diagnostic intricacies presented by the multifaceted allergic responses and persistent infection in pediatric oral pathology.

**Keywords:** atopic dermatitis; pediatric allergies; superinfections; hypersensitivity reactions; diagnostic challenges; multidisciplinary management

## Резюме

Настоящото изследване очертава уникално комплексна проява на атопичен дерматит при 9-годишна пациентка, сложно свързана със свръхчувствителност към зъбни анестетици и възстановителни материали на базата на метакрилат и съчетана от съпътстващи бактериални, вирусни и гъбични суперинфекции. Докладът подчертава клиничните предизвикателства и сложността на диагностиката, представени от многостранните алергични реакции и персистиращата инфекция при педиатричната орална патология.

## Introduction

Atopic dermatitis (AD) is a chronic and relapsing form of dermatitis, predominantly characterized by intense pruritus and typically emerging in early childhood, following an age-dependent pattern (Williams *et al.*, 1999). This condition is notably prevalent, affecting an estimated 10% to 20% of children in developed nations, and significantly impacts both patient quality of life and familial well-being (Beattie and Lewis-Jones, 2006).

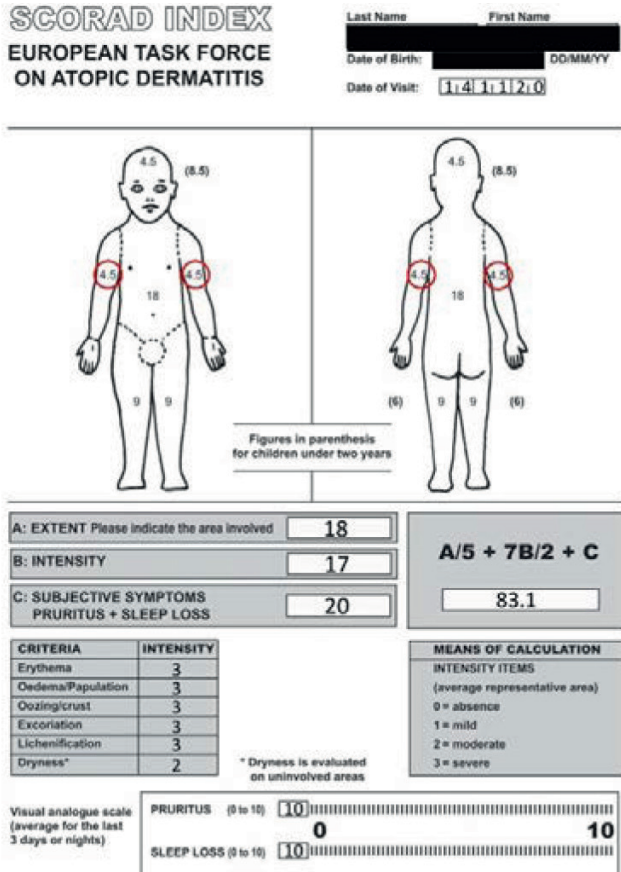
The clinical picture of AD is often further complicated by various medical comorbidities. Notable among these are infections such as *Staphylococcus aureus* superinfection and eczema herpeticum, which add layers of complexity to disease management (Yoshida and Amatsu, 2000; Beattie and Lewis-Jones, 2006). Additionally, patients with AD frequently encounter allergic contact dermatitis (ACD), a type IV hypersensitivity reaction

that is not confined to the initial contact area and may take several days to manifest clinically (Lim *et al.*, 2017), highlighted a predominance of AD in females (59%) and a notable incidence of family history of atopy (23%), suggesting a potential genetic predisposition or environmental influence in the disease's etiology (Jacob, 2017). The underlying pathophysiology of AD, particularly the compromised skin and mucosal barrier function, seems to predispose these patients to a heightened susceptibility to allergens. This increased vulnerability leads to enhanced absorption of allergens, potentially culminating in systemic reactions (Jacob, 2017). In light of these considerations, patch testing (PT) has been established as the gold standard for the diagnosis of ACD in children with AD. PT provides essential insights into allergen sensitivities, thus playing a pivotal role in tailoring effective management and treatment strategies for this popu-

lation (Goldenberg *et al.*, 2015; Chen *et al.*, 2019).

**Case Report**

The patient, a 9-year-old girl with a history of atopic dermatitis, experienced her first severe episode at 3 years and 9 months one week after a Varicella zoster virus infection. This was established as a severe case of atopic dermatitis according to the SCORAD index (European Task Force on Atopic Dermatitis, 1993) (Fig. 1).



**Fig. 1.** SCORAD index score card

This episode was characterized by a generalized urticarial rash affecting her palms, hands, and forearms (Fig. 2). Notably, five years later, within 30 minutes of receiving a Dentocaine injection for dental treatment, she developed a localized urticarial rash on the left part of her face (Fig. 3). This was followed after a few days by the emergence of an open lesion on the lip mucosa, accompanied by severe pruritus and pain. The condition escalated with the formation of vesicular and bullous lesions, culminating in honey-colored crusted formations accompanied by fever and neck lymph node swelling (Fig. 4).

**Diagnostic Evaluation**

Comprehensive diagnostic testing, including epicutaneous patch tests, prick tests, and microbiological analyses of saliva, throat secretions, wound probes, and blood samples, was conducted. Antimi-



**Fig. 2.** Acute exudative eczema with intense pruritus, with yellowish crusts and scratch marks. There is a massive staphylococcal colonization.



**Fig. 3.** Pruritic erythematous rash on the left side of the face.



**Fig. 4.** The skin underneath is moist, tender, and red, and it oozes a clear liquid. A honey-colored crust, then formed over the reddened area.

crobal susceptibility tests for fungal and microbial infections were performed by using a Vitek 2 compact (bioMerieux, France), and minimum inhibitory concentrations were reported by the system automatically. The results were interpreted according to the recommendations of the European Committee on Antimicrobial Susceptibility Testing (EUCAST Breakpoint Tables for Interpretation of MICs and Zone Diameters, version 12.0, 2022, [http://www.eucast.org/clinical\\_breakpoints/](http://www.eucast.org/clinical_breakpoints/)). These tests confirmed hypersensitivities to dental local anesthetics and methacrylate-based restorative materials, alongside infections with *Staphylococcus aureus*, *Candida albicans*, and *Herpes simplex virus*.

## Treatment and Management

Upon diagnosis, the treatment strategy focused on several key components:

### Antibiotic Therapy

To combat the identified *Staphylococcus aureus* infection, an oral antibiotic suspension, Augmentine® ES (600 mg/42.9 mg/5 ml), was administered for five days, three times daily. This targeted approach aimed to address the bacterial superinfection complicating the patient's AD.

### Allergy management

Given the patient's hypersensitivity to dental anesthetics and a history of severe allergic reactions, Xyzal® (5 mg), an antihistamine, was prescribed once daily, primarily in the evening. This medication was intended to control and reduce the symptoms of allergic reactions, providing symptomatic relief.

### Probiotic supplementation

To support gut health, particularly during antibiotic therapy, the probiotic BioGaia® Protectis was administered in tablet form, three hours before each antibiotic dose. This intervention aimed to maintain a balanced gut microbiota, potentially mitigating the antibiotic's impact on gastrointestinal flora.

### Topical antifungal application

For the management of *Candida albicans* involvement, Nystatin® cream (100,000 IU/g) was applied to the lip lesions 2-3 times daily, continuing for 3-5 days post-healing. This local treatment targeted the fungal aspect of her complex AD presentation.

The patient's management was closely monitored, with adjustments made as necessary to accommodate her evolving clinical picture (Fig. 5). This comprehensive approach highlighted the importance of addressing the multifactorial aspects of AD, including infectious comorbidities and allergen exposure.

## Discussion

This case report on a 9-year-old girl with atopic dermatitis (AD) illustrates the condition's complexity, marked by chronic relapses and multiple comorbidities. Her severe AD episode post-Varicella zoster virus infection and allergic reaction to dental treatment underscore the intricate relationship between environmental triggers, genetic factors, and impaired skin barrier function in AD.

AD's prevalence and its profound impact on life quality, particularly in developed nations, are exemplified in this case (Beattie and Lewis-Jones, 2006; Perugia *et al.*, 2017). The patient's susceptibility to infections like *Staphylococcus aureus* and Herpes simplex virus is consistent with the increased vulnerability observed in AD due to compromised skin and mucosal barriers enhancing allergen sensitivity (Yoshida and Amatsu, 2000; Jacob, 2017).

Notably, her allergic contact dermatitis (ACD), a type IV hypersensitivity reaction, presents diagnostic challenges due to its delayed manifestation and is not confined to the initial contact area (Lim *et al.*, 2017, Jacob, 2017).

This case underlines the value of patch testing (PT) in diagnosing ACD in AD patients, offering essential insights for effective management (Goldenberg *et al.*, 2015, Chen *et al.*, 2016).

The patient's hypersensitivity to dental anesthetics and certain restorative materials highlights the need for careful allergen evaluation in AD management. The comprehensive treatment with antibiotics, antihistamines, probiotics, and antifungals demonstrates the necessity of personalized therapy.

This case reinforces the need for a multidisciplinary approach, including thorough environmental assessment, diagnostic testing, and customized treatment strategies. Ongoing research into AD's genetic and environmental aspects is vital for enhancing diagnostic and therapeutic outcomes in this complex condition.



**Fig. 5.** The multidisciplinary treatment approach resulted in management of the allergic reaction and healing of the concomitant superinfection. Pictures were taken on the 7th (A) and 12th day (B) respectively from the beginning of the treatment regime.

## Conclusion and Future Directions

This case of a 9-year-old girl with atopic dermatitis (AD) and related allergic reactions sheds light on the complexities of AD management. It underscores the importance of a tailored, comprehensive approach, accounting for the multifaceted nature of AD, comorbidities, and individual sensitivities. The effective management achieved through an integrative treatment plan highlights the value of personalized dermatological care. Future research should delve deeper into the genetic, environmental, and pathophysiological factors influencing AD. Enhanced diagnostic tools, such as more precise patch testing, are needed to better identify allergen sensitivities and customize treatment.

Additionally, increasing healthcare providers' awareness of AD's complexities and potential for adverse reactions to standard medical treatments is crucial. This includes educating clinicians on AD triggers and management strategies. Exploring new treatments targeting AD's underlying immune dysfunctions presents a promising avenue for improved management. Innovations in biological therapies and topical treatments could lead to significant patient outcome improvements.

This case reinforces the necessity of a multidisciplinary treatment approach in complex dermatological conditions. Close collaboration between dermatologists, allergists, pediatricians, and other specialists is essential for comprehensive patient care. Advancing our understanding of AD will refine management strategies, ultimately enhancing patients' and their families quality of life.

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