

Anaphylaxis to diphenylcyclopropenone during sensitization for wart treatment—A case report



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INTRODUCTION

Diphenylcyclopropenone (DPCP) is a contact allergen used as immunotherapy for alopecia areata and refractory viral warts.¹ Side effects include localized blistering, swelling, burning, and generalized urticaria.² Only one case of probable anaphylaxis was briefly reported in an adult in 1988.³ This article reports a case of anaphylaxis to DPCP upon first application (sensitization stage) in a 7-year-old boy.

CASE REPORT

A previously healthy, nonatopic, 7-year-old boy was referred for the management of recalcitrant warts. His medical history is significant for possible nonanaphylactic penicillin allergy as a baby but no atopy, anxiety, or anaphylaxis. He does not take any regular medications. Twelve months of unsuccessful treatment included over-the-counter topical wart preparations and compounded trichloroacetic acid 10% with salicylic acid 60%. At presentation, multiple, large, verrucae affecting the periungual skin of multiple fingers, the right ankle, and abdominal wall were noted. Given the history and number of verrucae, it was decided to proceed with DPCP.

A 2% DPCP-soaked patch was applied with Finn chamber occlusion and Fixomull tape to the patient's inner, upper left arm. Within minutes, the patient reported a sore, itchy throat, chest tightness, and dyspnea. On examination, an audible wheeze and a hoarse voice were noted. There was no urticaria, angioedema, or gastrointestinal symptoms. The Finn chamber (containing 2% DPCP patch) was immediately removed, and the area wiped clean

Abbreviations used:

DPCP: diphenylcyclopropenone
SPT: skin prick testing

with saline-soaked gauze. The patient remained hemodynamically stable throughout. His symptoms promptly improved without need for adrenaline. He was taken by ambulance to the emergency department for observation. No further treatment was required. He was discharged with instructions to avoid further DPCP exposure. The patient had not experienced a reaction like this before. Within 24 hours, the patient had an erythematous, pruritic, eczematous patch at the application site, confirming DPCP sensitization despite the short contact time. Topical mometasone furoate 0.1% cream was applied for 4 days until symptoms resolved. No further symptoms were experienced.

The patient was referred to the immunology department for assessment. Under close supervision, he underwent skin prick testing (SPT) to DPCP at increasing concentrations, starting from 0.005% DPCP in acetone and increasing up to 1%. The SPT was negative for all tested concentrations. DPCP 1% was not used at SPT for safety reasons. Finn chamber, the patch, and Fixomull tape were all reapplied without reaction; the histamine control was adequately positive (4 mm × 4 mm). One week after SPT, the patient had contact dermatitis at the site of DPCP application, despite contact during SPT lasting for only a few seconds.

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Within 1 month of DPCP exposure, the periungual and ankle warts began disappearing. Of note, 2 new verrucae appeared on his hand and lower lip. Podophyllotoxin, 5 mg/mL solution, was prescribed for twice-daily application, 3 consecutive days per week for 1 month, followed by 1-week treatment free. The cycle was then repeated. At 5-month follow-up, all warts had completely resolved.

DISCUSSION

This is the first reported case of anaphylaxis to DPCP in children and during sensitization in both children and adults. Management of recalcitrant warts is often challenging. Treatment success with DPCP is reportedly between 82.9%⁴ and 91%.⁵ The most frequently reported side effects are localized blistering and pruritis.^{4,5}

DPCP has been linked to type IV hypersensitivity (eg, contact dermatitis and widespread autoeczematization¹) and rarely to type I reactions (eg, IgE-mediated contact urticaria and theoretically to anaphylaxis⁶). Our patient had both type I (anaphylaxis during sensitization) and type IV hypersensitivity (delayed contact dermatitis 24 hours after sensitization and 1 week after SPT).

DPCP is a strong hapten, which is the most likely mechanism through which it elicits type I hypersensitivity reactions. After initial sensitization, DPCP applied on the warts forms hapten with wart proteins. This DPCP hapten is then recognized by T cells, eventually resulting in the wart's destruction.⁷ Interestingly, in our patient, repeat DPCP application was not needed, as initial sensitization elicited a strong enough T-cell response against the warts. This finding implies that the T-cell response to DPCP or its hapten is able to cross-react with antigens expressed on the warts, resulting in the effective removal of the warts without further DPCP stimulation. This cross-reactive T-cell response is also supported by the patient's development of contact dermatitis despite the short contact sensitization time, suggesting a preexisting T-cell response to DPCP.

Anaphylaxis is largely a clinical diagnosis.⁸ Although SPT could not prove IgE sensitization to DPCP, the temporal relationship between DPCP application and clinical reaction strongly supports DPCP-induced anaphylaxis. Other potential triggers were excluded. Consequently, DPCP was deemed the causative agent. DPCP 1% was therefore not used at SPT for safety reasons. Importantly, negative SPT does not exclude the possibility of IgE-mediated

DPCP allergy. Drugs such as penicillins that cause IgE-mediated reactions are often negative on SPT.⁹ Although intradermal testing has better sensitivity, it was not used, as DPCP is not available in parenteral formulation. Additionally, anaphylaxis upon the first exposure to a drug without a history of previous exposure (as seen in our case) has been well documented for other IgE-mediated allergies, such as neuromuscular blocking agents.¹⁰

DPCP is commonly used in the armamentarium of wart treatments in the dermatologist's office. Hatzis et al³ briefly mentioned a case of presumed anaphylaxis to DPCP during alopecia areata treatment when a patient fainted and was subsequently found to be SPT positive to DCPC.³ Our case is the first reported case of anaphylaxis to DPCP in children and anaphylaxis during sensitization stage in both children and adults. This case is additionally noteworthy, as our patient had both type I and type IV hypersensitivity reactions after only brief initial exposure to DPCP. Finally, the ensuing resolution of warts suggests that the patient had a strong cross-reactive T-cell response to warts. The clinician must not forget the rare but real potential of DPCP-induced anaphylaxis. An observational period after application of the sensitization patch is recommended.

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