Severe Onychodystrophy due to Allergic Contact Dermatitis from Acrylic Nails

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Established Facts

- Acrylic nails are a known cause of allergic contact dermatitis (ACD) in manicurists and clients.
- The new gel polish ultraviolet (UV)-curable nail lacquers also contain acrylates and have been reported to cause dermatitis of the fingers, palms, and face.

Novel Insights

- ACD gel polish UV-curable nail lacquers may also lead to severe onychodystrophy with onycholysis and subungual hyperkeratosis in the absence of dermatitis of the digit.
- To our knowledge, this is the first report of severe onychodystrophy following use of UV-curable nail lacquers.

Key Words

Sculptured nails · Ultraviolet-curable nail lacquers · Acrylate · Methacrylate · Subungual hyperkeratosis · Onycholysis

Abstract

Acrylic nails, including sculptured nails and the new ultraviolet-curable gel polish lacquers, have been associated with allergic contact dermatitis (ACD). We report 2 cases of ACD to acrylic nails with severe onychodystrophy and psoriasisiform changes including onycholysis and subungual hyperkeratosis. In both cases, the patients did not realize the association between the use of acrylate-based manicures and nail changes. One patient had been previously misdiagnosed and treated unsuccessfully for nail psoriasis. The in-

formed clinician should elicit a history of acrylic manicure in patients with these nail changes, especially in cases of suspected nail psoriasis refractory to treatment. Patch testing is a useful tool in confirming diagnosis.

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Introduction

Artificial nails (AN) are gaining popularity worldwide for cosmetic enhancement of the nails. There are several different types of AN: sculptured nails, preformed (press on) nails, and silk wrap nails. Recently, ultraviolet (UV)-curable nail lacquers or gels have also been introduced. All types of ANs contain acrylates, which cause occupational and nonoccupational allergic contact dermatitis

Color version available online

Fig. 1. A 51-year-old patient with onycholysis, subungual hyperkeratosis, post-inflammatory hyperpigmentation of the proximal nail folds, and absence of a nail plate on the left third digit following long-term use of sculptured acrylic nails.

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Fig. 2. A 59-year-old patient with severe subungual hyperkeratosis and onycholysis following use of UV-curable nail lacquer.

(ACD). ACD to acrylic nails is most frequently seen in professional beauticians who handle the product, rather than in clients [1, 2].

In this article, we present 2 cases of psoriasiform nail changes due to acrylate ACD after the use of AN and include a review of the literature on this topic in an effort to aid in diagnosis and to increase clinical awareness.

Case Presentations

Case 1

A 51-year-old woman of African descent presented with a 2-month history of severe fingernail changes that had acutely developed a few days after the application of sculptured acrylic nails. Clinical examination revealed onycholysis and subungual hyperkeratosis of all fingernails except for the third digit of the left hand where the nail plate was absent. The proximal nail folds showed post-inflammatory, brown pigmentation (fig. 1). Her history revealed that the patient had used sculptured acrylic nails for 6 years and had never considered that the AN could be the cause of her current nail changes.

Case 2

A 59-year-old female developed severe subungual hyperkeratosis and onycholysis of all 10 fingernails (fig. 2). She consulted a dermatologist who treated her for nail psoriasis with acitretin and cyclosporine with no improvement. When asked, she described regular application of a gel polish manicure every 2 weeks. Patch tests showed a 2+ reaction at day 4 to both methyl methacrylate 2% pet and toluenesulphonamide formaldehyde resin 10% pet (Chemotechnique).

At follow-up after 45 days of avoidance of acrylates and weekly use of topical steroid treatment, she showed great improvement of her nail abnormalities.

Discussion

AN are used in increasing frequency worldwide. However, these acrylate-based manicures may lead to ACD and cause severe onychodystrophy. The relatively new form of acrylic-containing manicure, the gel polish system, also known as UV-curable nail lacquers, has also been associated with ACD. In most cases, ACD can be suspected because the nail abnormalities are associated with dermatitis of the fingertips. In our cases, on the contrary, the patients presented with severe onycholysis and subungual hyperkeratosis in the absence of skin changes. This presentation has previously been reported following application of sculptured nails but never following use of the new UV-curable nail lacquers [3, 4]. Distinguishing the diagnosis from nail bed psoriasis can be clinically difficult; however, involvement of all nails and the absence of specific signs of nail psoriasis, such as pitting or salmon patches, can suggest the correct diagnosis. A nail biopsy is usually not necessary as the nail changes improve rapidly after allergen avoidance, and the spongiotic changes seen in dermatitis are not uncommon in psoriasis affecting the palms and soles.

Table 1. Summary of cases of ACD to UV-curable nail lacquers (gel manicure) with associated clinical findings

First author [ref.], year	Age, years	Sex	Exposure	Clinical findings
Le [2], 2015	23	f	manicurist	dermatitis of fingers
	35	f	manicurist	dermatitis of fingers and palms fissuring
	20	f	manicurist	dermatitis of fingers
	24	f	client	Rashes of thigh, foot, and chest Dermatitis of fingers and feet paresthesia of fingertips
Vazquez-Osorio [5], 2014	27	f	manicurist	Fingertip dermatitis Nail dystrophy Periungual hyperkeratosis
	52	f	manicurist	Fingertip dermatitis
	59	f	client	Airborne dermatitis (cheeks, eyelids, forehead, and temples) Fingertip dermatitis
Scheers [6], 2015	49	f	client	Nonpruritic cheilitis Lip edema
Cravo [7], 2008	27	f	manicurist	Eyelid dermatitis
	N/A	f	client	Periungual dermatitis, persistent distal onycholysis
	N/A	f	client and manicurist	Periungual dermatitis
	N/A	f	client and manicurist	Periungual and hand dermatitis

Only 12 cases of ACD due to the new gel polish system have been reported in the literature [2, 5–7] (table 1). These include clients and manicurists. However, only 1 of these reported cases involved nail dystrophy [5]. UV-curable nail lacquers, like traditional lacquers, are applied directly to the natural nail but contain a base of UV-curable (meth)acrylate monomers and oligomers and polymerization photoinitiators instead of a solvent/resin base [8]. ACD to uncured methacrylate or acrylate oligomers and monomers is well described [1, 9]. Thus, skin contact must be avoided during application. Once the lacquer is applied, exposure to low-intensity UVA light is necessary to photocure the polymer and eliminate allergenicity; however, persistent unpolymerized monomers and oligomers are likely responsible for the occurrence of ACD [8].

The prevalence of sensitization to AN is unknown. The increasing popularity of the gel polish system will probably make this problem more common. Sensitization can develop after months or even years of use. The most frequent allergens to trigger ACD from sculptured nails are 2-hydroxyethyl methacrylate (2-HEMA) and 2-hydroxypropyl methacrylate (2-HPMA; each triggering 17.5% of the cases) followed by ethylenoglycol dimethacrylate (TMPT; 13.4%) and ethyl methacrylate (EMA; 9.3%) [10]. Acrylates are airborne and can lead to facial dermatitis in sensitized individuals, as reported in a Spanish review of 15 cases [11].

The first indication of ACD is itch in the nail bed, followed by an excruciating pain from the paronychia and sometimes paresthesia. The nail bed becomes dry and thickened, resulting in onycholysis [12]. Differentiating the diagnosis from nail psoriasis can be difficult. The severe nail alterations are explained by the technique used for the application of AN. First, the nail is cleaned and painted with antiseptic and antifungal solutions. Then, the nails are dried with a diethyl ether-based dehydrator and primed with methacrylic acid solvent to glue the acrylic to the nail [11]. An exothermic process leads to polymerization and formation of an incredibly strong bond. Persistence of the dermatitis until the nail grows out is likely due to retained adhesive and degradation of the polymer on exposure to water [13].

The cross-reaction of acrylic monomer or allergic sensitization induced by one acrylic compound extending to another acrylic compound is a well-known phenomenon [10]. Most patients with an allergic reaction to 2-HEMA will not be able to continue using sculptured acrylic nails [10]. Because the cyanoacrylate glue and powder polymer may contain hydroquinone, benzoyl peroxide, eugenol, and resorcinol, it is advisable to conduct patch testing for these compounds [11].

We described 2 cases of onychodystrophy due to ACD to acrylic nails, one following the traditional sculptured nail manicure and the other after the application

of the new gel polish system. In both cases, the patients did not realize the association between the nail changes and AN manicure due to the delayed type reaction. Severe onychodystrophy following ACD to acrylate can cause nail abnormalities that strongly resemble nail psoriasis with severe onycholysis and subungual hyperkeratosis.

Statement of Ethics

Patient consent was obtained.

Disclosure Statement

There are no conflicts of interest to disclose.

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