

Occupational fingertip eczema from acrylates in a manicurist

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ABSTRACT

Occupational hand eczema due to acrylates present in the workplace is a disease frequently reported among dentists, printers, and fiberglass workers. Acrylate monomers are used in the production of a great variety of polymers, including nail cosmetics. Our case report demonstrates a rare clinical presentations of allergic contact dermatitis from acrylic nails. Our patient was working as a manicurist and the diagnostic analyses revealed sensitisation to some of the (meth) acrylate compounds of her new nail cosmetics. Sculptured artificial acrylic and UV-hardened nails s are widely used in developed countries and they are gaining more and more popularity. We expect an increase in the number of cases of contact allergic dermatitis among manicurists and customers.

Key words: Acrylates; occupational; contact dermatitis; allergy; skin

INTRODUCTION

Acrylates are present in a wide variety of products and cause occupational and non-occupational allergic contact dermatitis. They are individual chemical molecules or monomers that bind together in a process called polymerization to form plastic materials (Table 1).

Occupational hand eczema due to acrylates in the workplace is a disease frequently reported among dentists, printers, and fiberglass workers [1]. The number of patients- manicurists or their customers is increasing, due to the new techniques in artificial nails- tips, silk, acrylic or gel nails. UV-hardened nails or photobonded nails also known as gel nails are gaining more and more popularity as a cosmetic enhancement to the natural nail. They are the newest type of artificial nails and are applied as an ordinary nail lacquer.

The diagnosis of occupational allergic contact dermatitis is based upon clinical history, analyses of exposure and eliminating tests and performing specific patch testing. The golden standard is the last one as far as it can evaluate and prove the role of different compounds of the nail products in the pathogenesis of the disease.

CASE REPORT

A 31-year-old Caucasian woman developed erythema, scaling and fissuring of her fingertips (Fig. 1). The condition started 6 months ago when new nail lacquering technique was introduced in her practice as a manicurist. In the new technique she used gels containing monofunctional and multifunctional acrylate/methacrylate monomers/oligomers and primers based on methacrylic acid, but the specific identity of the ingredients was not revealed by the manufacturer for reasons of commercial secrecy. The patient noticed that the condition improved when she was on a vacation.

Upon admittance skin changes involved the pulps of all her fingers and they were presented with erythematous plaques, desquamation and fissures. Treatment with Clobetasol propionate 0.05% and barrier creams was introduced. The patient improved in the following 30 days. Patch testing was performed with European baseline series, acrylates and semi-open application of lacquering materials brought by the patient (Table 2). Readings at day 2 and day 3 yielded positive reactions to nickel, methylmethacrylate and 2 of her nail care

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products (Figs 2 and 3). The patient was advised on change of occupation.

DISCUSSION

Acrylate monomers are used in the production of a great variety of polymers, including nail cosmetics. Currently, there are three distinct types of sculptured acrylic nails: (i) acrylate monomers and polymers that polymerize at room temperature in the presence of an organic peroxide and accelerator, (ii) photo-bonded sculptured acrylate nails in which polymerization of the acrylate requires exposure to UV radiation; (iii) cyanoacrylate nail preparations. The acrylic compounds in gel nails are similar to those used in acrylic nails, except for 2-Hydroxyethyl methacrylate (2-HEMA), which is not present in all acrylic nails. Polymerization starts by a

photo-bonding technique in the presence of a weak UV source, with benzophenone-3 and -4 as light absorbing activators (this is similar to restorative dental bonding).

The diagnosis of contact dermatitis requires a careful history of possible contacts, including household, occupational, and recreational exposures. The skin changes include wide variety of clinical symptoms including erythema, fissuring, or also development of vesicles or bullae [2]. It takes different period of time to diagnose and prove the agent that cause the eczema. Occupational exposure of beauticians and manicurists to acrylate-containing nail cosmetics may induce both allergic and irritant reactions [3-5]. Dermal exposures to acrylates usually induce type IV hypersensitivity reactions, manifesting mostly as hand (especially fingertip) eczema [6]. Reactions in sensitized patients include contact dermatitis, transient or permanent nail dystrophies, paronychia and subungual pain, and persistent peripheral paresthesias [7,8]. In our case the patient has only developed periungual and hand dermatitis without skin changes in any other areas of the body. Eyelid and face dermatitis can be seen also and it's caused by airborne dusts of completely polymerized resins that have become depolymerized by the filing process or by exposure to organic vapors and polymethacrylate dusts [7,9]. However, eyelid dermatitis can be, in some cases, related to eyelid touching by the fingertips bearing acrylic nails [9]. Acrylate monomers (including residual



Figure 1: Clinical findings on the skin of the patient's fingertip presented by erythema, desquamation and fissuring.

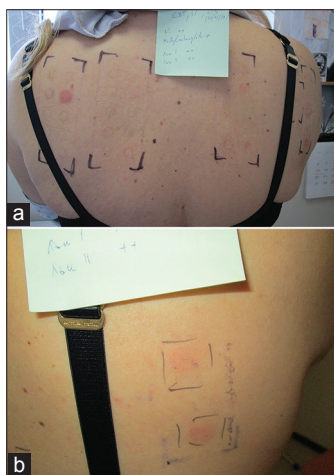


Figure 2: (a) Patch test results on day 3: positive reactions to nickel, methylmethacrylate and gel nail lacquers. (b) Closer view of the semi-open patch tested gel lacquers.

Table 1: List of the most common uses of acrylates

Acrylate	Applications/uses
Methyl methacrylate	Acrylic bone cements used in orthopaedic surgery; acrylic fibres, films, and inks; solvent-based adhesives and binders; medical spray adhesives; dental technology
2-hydroxyethylmethacrylate (HEMA)	UV inks; adhesives; lacquers; dental materials; artificial nails; coating for scratch-resistant glass; paint resins; binders for textiles and paper
Ethyl acrylate	Acrylic resin used in paint formulations, industrial coatings and latexes; acrylic rubber and plastics; denture materials; floor polishes, sealants; shoe polishes; adhesives; textiles and paper coatings
Ethylene glycol dimethacrylate	Plastic bottles for soft drinks; dental materials; artificial nails; printing inks; automobile antifreeze and engine-cooling liquids

Table 2: Patch test results

Allergen	Day 2	Day 3
Nickel	++	++
Methylmethacrylate	+	+
Nail gel I (as is, semi-open patch test)	+	++
Nail gel II (as is, semi-open patch test)	+	++

unpolymerized monomers in the sculptured nails) may also be responsible for toxic reactions. For instance, methacrylic acid used in primer for acrylic nails may even produce third-degree burns [10].

Our patient has changed her occupation and 6 months later she has no complaints due to protection from new contact with acrylic products. We suppose that re-exposure to the same acrylic agents in a new occupation might induce recurrence of skin disorder so the patient is advised to prevent occupational setting in the field of dentistry, cosmetics, printing industry and construction industry.

Acrylates are all around us and despite the plethora of publications on (meth)acrylates, new information keeps surfacing about these fascinating chemicals. Patch testing with (Meth) Acrylate Series and semi-opened tests are the golden standard for diagnosis and detecting allergic contact dermatitis from acrylates. In conclusion this case report demonstrates the importance of good occupational advice about future occupations for employees who develop occupational skin disease. Nevertheless the acrylates have been found in the not so distant 1930s, the recent increase in the number of cases of ACD among manicurists and customers makes the acrylates The Contact Allergen of the Year according to the the American Contact Dermatitis Society in 2012 [11].

CONSENT

The examination of the patient was conducted according to the Declaration of Helsinki principles. Written informed consent was obtained from

the patient for publication of this article and any accompanying images.

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