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Case report

Occupational photopolymer dermatitis. Clinical remission after epicutaneous testing

The case is reported of a 61-year-old male printer who came to consultation because of dermatitis on both hands since four years earlier. In the course of his occupational activity he usually manipulated photographic films and YET[®] photopolymer plates. The epicutaneous tests were positive for scrapings of YET[®] photopolymer plates, ethylenglycol dimetacrylate and hydroxyethyl metacrylate, suggesting an occupational allergic contact dermatitis caused by acrylates present in the photopolymer. The epicutaneous tests with the photopolymer were repeated 11 days later, with still positive but less intense results. Three months later the patient was completely asymptomatic and reported a gradual and progressive improvement of the lesions with no therapy or preventive measures whatsoever.

Key words: Dermatitis. Photopolymer. Acrylates. Printing.

Dermatitis de contacto profesional por fotopolímero. Remisión clínica tras la realización de pruebas epicutáneas

Se presenta el caso de un varón de 61 años, trabajador en una imprenta, que presentaba desde hacía cuatro años dermatitis en las manos; en el ejercicio de su actividad laboral manipulaba habitualmente películas fotográficas y planchas de fotopolímero YET[®]. Las pruebas epicutáneas fueron positivas con un raspado de la placa de fotopolímero YET[®], etilenglicol-dimetacrilato e hidroxietil-metacrilato. Esto sugirió que el paciente presentaba una dermatitis alérgica de contacto profesional por acrilatos presentes en el fotopolímero. Se repitieron las pruebas cutáneas con el fotopolímero a los once días, observando una disminución en la intensidad de las mismas. A los tres meses acudió a la consulta totalmente asintomático, refiriendo una mejoría paulatina de las lesiones sin tratamiento ni medidas preventivas.

Palabras clave: Dermatitis. Fotopolímero. Acrilatos. Imprenta.

The incidence of allergic or irritative dermatitides among printers has considerably dropped because of the automation of the printing process, even though the number of possible irritant or sensitising substances involved in it has increased. The substance that most frequently causes dermatitis in printers is potassium dichromate; further possible substances to consider are cobalt, developing preparations, a number of pigments, and turpentine.

Photopolymer printing plates are used in photographic printing; the technical fundament of the procedure is that the plates contain photosensitive synthetic resins that polymerise instantaneously upon exposure to ultraviolet light.

The pre-polymers used may be acrylates (Nyloprint®, Dycril®, etc.), or polyurethane (Letterflex®).

Ever since the '70s, cases have been reported of allergic contact dermatitis in workers who manipulated both types of plates¹⁻⁴.

CASE REPORT

A 61-year-old male who had worked as a printer since he was 17 first came to our outpatient clinic describing, since four years earlier, skin lesions on the hands and preferentially on the tips of the thumbs and the index and ring fingers, consisting in fissuration and desquamation (Fig. 1). In the course of his work he usually manipulated photographic films and, once or twice weekly, YET® photopolymer plates which he used in the manufacture of rubber stamps (Fig. 2). The photographic developer used was *cronoline cuff-developer* (diethylaminoethanol and hydroquinone), and the fixative was *cronoline cuff-fixer* (ammonium thiocyanate), both of them manufactured by AGFA.

The allergologic study performed was as follows.

Skin prick tests

Prick tests were performed with the food and airborne allergens most frequent in our environment, all of them commercially acquired from ALK-Abelló (Madrid, Spain): *D. pteronyssinus*, *Lepidoglyphus*, *Blatella germanica*, *Lolium*, *Betula*, *Plantago*, *Platanus*, *Parietaria*, *Olea*, cat, dog and hamster danders, *Alternaria*, *Aspergillus*, latex, shrimp, *Anisakis simplex*, chestnut, cow's milk and egg white, with negative results in all cases.

Epicutaneous tests

The allergens were kindly provided by J. Marti Tor; they were applied with Leucotest® patches to the back of the patient, and the tests were read after 48 and 96 hours and graded according to the assessment scale standardised by Fregert: (+?): doubtful reaction with mild erythema; (+): weakly positive reaction with erythema and whealing; (++): strongly positive reaction with erythema, whealing and vesiculation; (+++): intense positive reaction with blebbing. The following tests were performed:

Standard panel recommended by the Spanish Contact Dermatitis Group: epoxy resin (True-Test®), mercury, sesquiterpenic lactones and tixocortol pivalate: negative.

P-aminobenzoic acid (PABA) and *p*-amino azobenzene: negative.

Photographic products panel: benzyl alcohol, amino-

diethylamine sulfate, *p*-aminophenol, benzotriazole, colour developers (CD1, 2, 3 and 4), ethylene-diamine, phenylpyrazolidinone, glutaraldehyde, hydrazide sulfate, pyrocatechol, pyrogallol, potassium dichromate, tricresyl phosphate and triphenyl phosphate: only the test with pyrocatechol was positive, (+) after 96 hours.

Epicutaneous tests were performed with the YET® photopolymer, using scrapings from the surface of a plate. The results were intensely positive, (+++) after 48 hours.

Epicutaneous tests with the photopolymer were carried out using the same method on six control patients, with negative results in all six cases.

The epicutaneous test with the photopolymer was repeated eleven days later, on a Monday, with the patient's consent, so as to photographically document the results. At this time, the results were graded as strongly positive, (++) after 48 and 96 hours.

Two days later (Wednesday), a metacrylate panel was tested: acrylic acid, metacrylic acid, ethyl acrylate, acrylonitrile, ethylenglycol dimetacrylate, ethyl metacrylate monomer, hydroxyethyl metacrylate, methyl metacrylate monomer, methyl metacrylate polymer and triethylenglycol dimetacrylate. Positive results were observed with 1% ethylenglycol dimetacrylate, (++) after 48 hours, and with 2% hydroxyethyl metacrylate, (++) after 48 hours. No 96-hour readings were performed.

No tests were performed with diethylaminoethanol or ammonium thiocyanate, firstly because these compounds were not available for epicutaneous testing and secondly because no specific references could be found in the available literature.



Fig. 1.

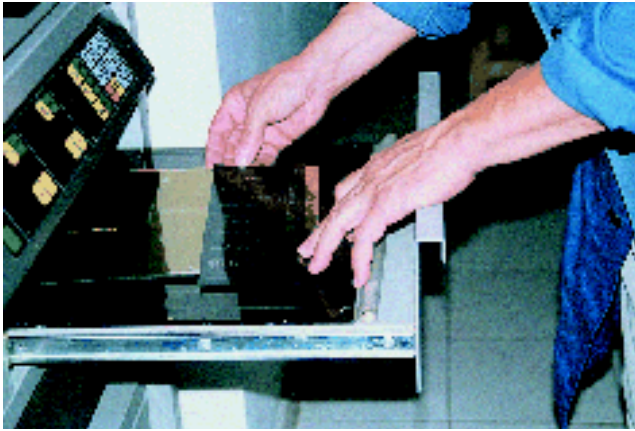


Fig. 2.

Evolution

The patient was told to avoid manipulating photopolymer plates and, if this was found to be unfeasible, to wear protective gloves. He returned three months later to our outpatient clinic reporting gradual and progressive improvement of the lesions. At that time he was fully asymptomatic despite the fact that he continued to manipulate the same photopolymer with no protective measures and with no therapy. At the time of writing, ten months later, the patient is still asymptomatic.

DISCUSSION

The patient reported presented dermatitis of the hands, with preferential involvement of the areas that came into contact while manipulating the plates. The epicutaneous tests with the YET[®] photopolymer were positive while those with a panel of photography products yielded negative results with the exception of a mild positive result to pyrocatechol. The latter might have its explanation in that the patient may have had some occasional contact with that substance, which is used as a photographic developer. Negative results were also seen in the tests with epoxy resin (True Test[®]), PABA and *p*-aminobenzene, all of them substances that are also used in photopolymerisation processes². Pigments were not tested, as the patient reported no contact with them at his workplace. All the above results suggest that the patient presented an allergic contact dermatitis caused by a substance or substances present in the photopolymer.

Even though we do not know the actual composition of the photopolymer, we believe that the responsible substance(s) may be metacrylates, both because of the positivity of the patch tests with 1% ethylenglycol dimetacrylate and 2% hidroxyethyl metacrylate and because these substances are habitual components of these photopolymer plates. Widström³ has reported the case of a female printing worker with dermatitis on the face and hands, with positive epicuta-

neous tests to scrapings of the plates she manipulated in ethanol and petroleum jelly and with 0.1% triacrylate (a component of the plate). Malten *et al.*⁴ reported two patients with sensitisation to Nyloprint[®] plates and to *NN'*-bis-acrylamine.

The one salient peculiarity in the present case is its ensuing evolution: the patient reported, in the review visit three months after the conclusion of the study, a gradual progressive improvement of the lesions, and at that time he evidenced no lesions at all. He reported he continued to manipulate the same batch of photopolymer plates as often as before, without wearing gloves, as well as the same developing products. In the initial epicutaneous tests with scrapings of a photopolymer plate the intensity of the results had decreased from an "intensely positive" reaction with blebbing (first test) to a "strongly positive" one with vesiculation (second test), even though it cannot be ruled out that this might have been due to the low reproducibility of the technique used.

There are very few reports on the induction of tolerance or hyposensitisation to contact allergens. Sensitisation to Japanese lacquer (an oleoresin from *Toxicodendron verniciflua*, comprising a mixture of pyrocatechols known as "urushiol") has been shown to abate upon continued use of the lacquer. Experimentally, it has been shown that repeated topical application and/or oral administration of dinitrochlorobenzene (DNCB) and urushiol (the main component of Japanese lacquer) induces hyposensitisation in sensitised Guinea pigs⁵.

Considering the evolution in our patient and the reports in the literature, the question arises whether we might have induced tolerance by having repeated the epicutaneous tests. Other possibilities are rather difficult to imagine, as the patient had had lesions since four years earlier and had not, either before or after diagnosis, introduced any changes in his occupational activities.

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