Occupational Allergic Contact Dermatitis from Epoxy Resin in a Dental Nurse with Primary Sensitization during Cyclosporine Treatment

Sir,

Acrylics, including epoxy di(meth)acrylates, are moderate to strong occupational sensitizers, especially for dental personnel (1). Concomitant sensitization to diglycidyl ether bisphenol A epoxy resin (DGEBA-ER) has been reported in some cases (2). It is believed that DGEBA-ER sensitization is caused by the impurities in dental acrylics (2). Here we report on a patient who was sensitized to DGEBA-ER from dental acrylics without concomitant acrylic sensitization. Interestingly, the patient was on cyclosporine immunotherapy when she became sensitized.

CASE REPORT

The patient was a dental nurse, born in 1947, who had had hypertension since the early 1970s, then a chronic glomerulonephritis since the late 1970s, which developed into uremia. She received a renal transplant in 1986. She was then treated with cyclosporine, corticosteroids and antihypertensive medication. During the past years her treatment has included cyclosporine A (Sandimmun®, 225 mg/day), methylprednisone acetate 4 mg every second day, felodipine (Plendil®, 5 mg/day) and metenaminehippurate (Hipeksal®, 1 g/day). She had had mild hand dermatitis in the early 1980s but did not contact a doctor. Her hand dermatitis cured, but in 1994 she developed a significantly worsened hand, finger and fingertip dermatitis, and two patch test sessions were performed, as previously described (2). In a modified European standard series, nickel sulfate (1+) and diglycidylether of bisphenol A epoxy resin (DGEBA-ER; 2+) provoked allergic reactions. The dental screening series and the (meth)acrylate series (Chemotechnique Diagnostics, Malmö, Sweden) revealed no further allergic patch test reactions, whereas in an epoxy resin series brominated DGEBA-ER, which contains DGEBA-ER, provoked a 2+ reaction. An epoxy-reactive diluent, phenylglycidylether, provoked a 1+ reaction. Prick testing with 20 common environmental allergens was negative.

The patient had worked as a dental nurse since 1968, and during the past decades she had been increasingly exposed to dental composite resins (DCR). At the time of the worsening of her hand dermatitis, she was daily exposed to DCR, but she has then been able to avoid contact with DCR and her hand dermatitis has cleared.

DISCUSSION

Our patient had been exposed to a great number of sensitizing compounds in dental work (1), including acrylics, but "by chance" became sensitized to DGEBA-ER, present at very low concentrations in DCR. Various patterns of allergic patch test reactions resulting from exposure to epoxy di(meth)-acrylates have been summarized in Table I.

DCRs are based on epoxy di(meth)acrylates but may contain traces of DGEBA-ER, because DGEBA-ERs are used in the manufacture of epoxy di(meth)acrylates (2). BIS-GMA (2,2-bis[4-(2-hydroxy-3-methacryloxypropoxy)phenyl]-propane), the addition reaction product between bisphenol A and glycidyl methacrylate, or an epoxy resin and methacrylic acid, is the most commonly used epoxy diacrylate in DCRs (2). BIS-GMA is a dimethacrylated epoxy compound but does not contain a reactive epoxy group. Our patient suspected a dentin primer containing BIS-GMA to be the cause of her dermatitis, and we have earlier shown that this very compound contains minute amounts of DGEBA-ER (3). There was no other history of DGEBA-ER exposure, and apparently her sensitization was caused by minute amounts of DGEBA-ER in dental acrylics.

Several similar compounds are used as substitutes for BIS-GMA or in addition to BIS-GMA in DCRs. Such dimethacrylates based on bisphenol A with various chain lengths are BIS-MA (2,2-bis[4-(methacryloxy)phenyl]-propane), BIS-EMA (2,2-bis[4-(2-methacryloxyethoxy)phenyl]-propane) and BIS-PMA (2,2-bis[4-(3-methacryloxypropoxy)phenyl]-propane), and BIS-GA (2,2-bis[4-(2-hydroxy-3-acryloxypropoxy)phenyl]-propane) (2). BIS-GMA seems to be the most common sensitizer in humans. Patients allergic to BIS-GMA have shown allergic patch test reactions to other epoxy di(meth)acrylates (2), possibly due to cross-reactivity (2,4), and some have been allergic to DGEBA-ER (Table I).

The action of cyclosporine is not fully understood (5), although cyclosporine has been used in the treatment of many inflammatory and non-inflammatory dermatoses (6), including allergic contact dermatitis (7). The development of contact hypersensitivity in humans has been prevented by oral cyclosporine (8), but despite a total block of the expression of sensitization, the process of sensitization itself was not blocked (9). Cyclosporine was reported to block both the sensitization and elicitation phases of allergic contact dermatitis (ACD) but did not induce tolerance when applied at the time of sensitization (10). Interestingly, successful treatment of patients with severe ACD with oral cyclosporine has been reported, even though patch test reactions in the treated patients were not altered (7). Our patient reacted differently: she both became sensitized and developed ACD during her cyclosporine A treatment. Based on this case report, it is suggested that long-term treatment with cyclosporine does not prevent sensitization in humans.

Table I. *Patch test results of the present patient (patient 1) and 7 earlier reported patients sensitized from products based on epoxy di(meth)acrylates (4).*

Abbreviatons; see text.

Compound	Conc. % (w/w) in pet.	Patient no. 1	2	3	4	5	6	7	8
BIS-GMA	2	–	–	–	4+	3+	2+	2+	3+
BIS-GA	0.5	–	–	3+	4+	2+	2+	2+	3+
BIS-EMA	1	–	–	–	–	3+	–	–	3+
BIS-MA	2	–	–	–	–	–	–	–	?+
Standard epoxy resin based on DGEBA	1	2+	–	–	3+	3+	3+	3+	3+
Bisphenol A	1	–	2+	–	–	–	–	–	–

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