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Short Communication

Fingertip paresthesia and occupational allergic contact dermatitis caused by acrylics in a dental nurse

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Case Report

A 58-year-old non-atopic dental nurse had been occupationally exposed to dental acrylics for 19 years when she developed dermatitis and moderately severe paresthesia of fingertips I–III of both hands.

Patch testing was performed 2× according to the recommendations of the ICDRG. European standard series, antimicrobials, fragrances, cosmetics and rubber chemicals were negative. Several allergic patch test reactions were provoked in the (meth)acrylate series (Chemotechnique Diagnostics, Malmö, Sweden; Table 1). Allergens other than acrylics were negative in a dental screening series. The patient considered All-Bond dental products (BISCO Inc, Itasca, Illinois, USA) to have caused her symptoms. 2 All-Bond products gave allergic patch test reactions (Table 1). As All-Bond 2 primer did not contain any known allergens as judged from the material safety data sheet (MSDS, Table 2), and the patient had an allergic patch test reaction to this product, it was analyzed by gas chromatography/mass spectrometry as previously described (1, 2), which showed that it in fact contained 2-hydroxyethyl methacrylate (2-HEMA), to which the patient had been allergic on patch testing.

A routine somatosensory-evoked potential recording showed no signs of malfunction in the somatosensory tract. The conduction velocity between wrist (median nerve) and shoulder (brachial plexus), as well as the latencies of the evoked potentials at the somatosensory cortex, were bilaterally normal compared to reference values.

Discussion

Allergic contact dermatitis from acrylic monomer may be accompanied by burning, tingling, and slight numbness of the fingertips (3), which may persist for several weeks (3–6), or up to 6 months (7), after the dermatitis has subsided. Paresthesia may also develop without allergic contact dermatitis (6). Methyl methacrylate (4, 5) and dental acrylics (7), including 2-HEMA (8), have previously been implicated. Paresthesia in our patient was caused by a local effect of acrylics on the peripheral nerves without systemic neural effects, in agreement with earlier observations (9–11). Whether dental personnel are at any risk of systemic neurotoxicity from acrylics is not yet clear (12).

All-Bond 2 dentin/enamel bonding resin was declared to contain 2-HEMA, which corresponded to our analysis (Table 2). This resin also provoked an allergic patch test reaction in our 2-HEMA allergic patient. MSDS should, however, be more exact (1, 2): our patient showed an allergic patch test reaction to All-Bond 2 primer B, and our analysis showed that 2-HEMA was present in it; however, the MSDS did not contain this information. The manufacturer then informed us that the American MSDS declared All-Bond 2 primer B to contain 2-HEMA, but that this information was lacking from the Finnish MSDS (Table 2), although the 2 products were identical.

2-HEMA and ethyleneglycol dimethacrylate (EGDMA) are common sensitizers in dental products (1, 13), but sensitivity to urethane dimethacrylate (UDMA) (14, 15) is rare (1, 13, 16).

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Table 1. Results of patch testing with the (meth)acrylate series and dental acrylics

(Meth)acrylate series	Abbreviation	Concentration % (w/w)	Result
ethyl acrylate	EA	0.1	++
butyl acrylate	BA	0.1	−
2-ethylhexyl acrylate	2-EHA	0.1	−
2-hydroxyethyl acrylate	2-HEA	0.1	−
2-hydroxypropyl acrylate	2-HPA	0.1	−
methyl methacrylate	MMA	2	++
ethyl methacrylate	EMA	2	++
n-butyl methacrylate	BMA	2	−
2-hydroxyethyl methacrylate	2-HEMA	2	++
2-hydroxypropyl methacrylate	2-HPMA	2	++
ethyleneglycol dimethacrylate	EGDMA	2	++
triethyleneglycol dimethacrylate	TREGDMA	2	++
1,4-butanediol dimethacrylate	BUDMA	2	++
urethane dimethacrylate	UDMA	2	++
2,2-bis[4-(2-methacryloxyethoxy)phenyl]propane	BIS-EMA	1	−
2,2-bise[4-(methacryloxy)phenyl]propane	BIS-MA	2	−
2,2-bis[4-(2-hydroxy-3-methacryloxypropoxy)phenyl]propane	BIS-GMA	2	−
1,4-butanediol diacrylate	BUDA	0.1	−
1,6-hexanediol diacrylate	HDDA	0.1	−
diethyleneglycol diacrylate	DEGDA	0.1	+
tripropyleneglycol diacrylate	TPGDA	0.1	−
trimethylolpropane triacrylate	TMPTA	0.1	−
pentaerythritol triacrylate	PETA	0.1	−
oligotriacrylate 480	OTA 480	0.1	−
2,2-bis[4-(2-hydroxy-3-acryloxypropoxy)phenyl]propane	BIS-GA	0.5	−
urethane diacrylate (aliphatic)	al-UDA	0.1	−
urethane diacrylate (aromatic)	ar-UDA	0.05	−
triethyleneglycol diacrylate	TREGDA	0.1	?+
N,N-methylenebisacrylamid	MBAA	1	−
N,N-dimethylaminoethyl methacrylate	DMAEMA	0.2	++
tetrahydrofurfuryl methacrylate	THFMA	2	++
ethyl cyanoacrylate	ECA	2	−
All-Bond® 2 primer A		10	−
All-Bond® 2 primer B		5	++
All-Bond® 2 dentin/enamel bonding resin		5 and 2	++
impregum® catalyst		1	−
impregum® base		5	

Table 2. Gas chromatographic/mass spectrometric analysis of (meth)acrylates of 2 dental products; the results have been compared with data given in the material safety data sheets (MSDS)

Product	MSDS	%	CAS number	Analysis	%
All-Bond 2 primer B	acetone	40–70	67-64-1	2-HEMA	16
	ethanol	10–30	64-15-5	BIS-GMA	<0.02
	biphenyl-dimethacrylate	8–30	125086-31-9	BIS-MA	<0.02
All-Bond 2 dentin/ enamel bonding resin	bisphenoldiglycidyl-methacrylate	15–40	1565-94-2	2-HEMA	31
				EGDMA	5
	dihydroxytoluidine	1–5	3077-12-1	methacrylic acid	0.3
	2-HEMA	1–5	868-77-9	BIS-GMA	25
				BIS-MA	<2
				UDMA (=chemicals corresponding to degradation products of aliphatic urethane dimethacrylate)	ng

For abbreviations of acrylics, see Table 1; ng=not given.

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