

Short Communication

Dental nurse's occupational allergic contact dermatitis from eugenol used as a restorative dental material with polymethylmethacrylate

LASSE KANERVA, TUULA ESTLANDER AND RIITTA JOLANKI

Section of Dermatology, Finnish Institute of Occupational Health, Topeliuksenkatu 41 aA, FIN-00250 Helsinki, Finland

Key words: dental nurse; occupational; allergic contact dermatitis; eugenol; CAS 97-53-0; balsam of Peru; plastics; IRM[®] liquid. © Munksgaard, 1998.

Case Report

A 35-year-old dental nurse presented with vesicular hand eczema and rhinitis, which had started after 15 years in the profession. Since childhood, she had occasionally had dermatographism and urticarial whealing, and she had a family history of atopy. Her work involved exposure to (meth)acrylates, antimicrobials, rubber chemicals, etc. (1).

Patch testing was performed as previously described, according to the recommendations of ICDRG, with 2 days' occlusion with a modified European standard series, a fragrance series, a dental screening series, and with several "own" chemicals used at the workplace. In the standard series, balsam of Peru elicited a ++ reaction, para-phenylenediamine a + reaction, and fragrance mix a weak reaction. In the fragrance series, eugenol elicited a weak reaction, and the (meth)acrylate series was negative, whereas an intermediate restorative material, IRM[®] liquid (10% pet.) (Dentsply DeTrey GmbH, Konstanz, Germany), gave a ++ patch test reaction. 20 control persons were negative with the same patch test substance.

The material safety data sheet revealed that IRM[®] liquid contained >99% 4-allyl-2-methoxy phenol (eugenol) and <1% acetic acid. Gas chromatography/mass spectrometry of IRM[®] liquid confirmed that IRM[®] liquid was eugenol, i.e., the specimen corresponded to Fluka Chemie AG's (Switzerland) eugenol (46 100; CAS 97-53-0). The patient was advised to avoid work with eugenol, including IRM[®] liquid. Her hand dermatitis improved, and she was symptomless at a follow-up 6 months later.

Discussion

Eugenol is the essential constituent of clove oil and is also in cinnamon oil, perfumes, soaps, bay rum, oil of carnation (hyacinth), pimento oil (allspice), flower oils, food spices, and flavors (2). In dentistry, eugenol is mixed with zinc oxide to form zinc oxide-eugenol (ZOE) cement. Eugenol is highly soluble and continuously released from ZOE (3). Eugenol is also used in toothache

drops, antiseptics and mouthwash (4). ZOE is used as a provisional restorative material, base material, and root canal filling material. ZOE impression pastes and ZOE periodontal packs are also available. Eugenol may also be combined with colophony, and is used as an intermediate 2-component restorative material with polymethylmethacrylate, e.g., in IRM[®]-liquid. IRM[®] polymethylmethacrylate powder is mixed with IRM[®] liquid before use. Our patient had been occupationally exposed to eugenol and IRM[®] products for 15 years before her symptoms developed.

Eugenol is one of the 8 components of the fragrance mix in the standard patch test series. Fragrance mix is slightly irritant and may give false-positive reactions. Therefore, before making a diagnosis of allergy to perfume (including eugenol), the individual components should be patch tested. Our patient had only a weak reaction to eugenol (2% pet.), whereas IRM[®] liquid (10% pet.) gave a ++ reaction. When fragrance components are tested separately, higher concentrations (2–10%) than in the fragrance mix can be applied (5). Eugenol is considered to be a less common sensitizer than cinnamic aldehyde, cinnamic alcohol or isoeugenol (2). When eugenol is used in dental preparations, it may cause contact urticaria (6), gingivitis, stomatitis venenata and allergic hand eczema in dental personnel (7–10). Göransson et al. (7) reported 3 cases of eugenol hypersensitivity. In 1 patient, a eugenol impression paste produced allergic cheilitis and stomatitis. In the other 2, an eczematous reaction was provoked by handling eugenol. To our knowledge, allergy to eugenol used as an intermediate restorative material with polymethylmethacrylate, as in our patient, has not previously been reported. Our patient had no allergic reactions to (meth)acrylates. Balsam of Peru contains eugenol (11) and, accordingly, eugenol-allergic patients may react to balsam of Peru, as did our patient. A dental nurse's positive patch test reaction to balsam of Peru in the standard series may be a clue to the diagnosis of occupational allergic contact dermatitis from eugenol.

5 of the periodontal dressing materials listed in *Accepted Dental Therapeutics* (12) contain colophony, and 4 of them contain eugenol. The only one that is "eu-

genol-free" (Coe-pak, Coe Laboratories) contains balsam of Peru (3).

References

1. Kanerva L, Estlander T, Jolanki R. Occupational skin allergy in the dental profession. *Dermatol Clinics* 1994; 12: 517–532.
2. Rietschel R L, Fowler J F Jr. Fisher's contact dermatitis, 4th edition. Baltimore, Philadelphia: Williams & Wilkins, 1995.
3. Wiltshire W A, Ferreira M R, Ligthelm A J. Allergies to dental materials. *Quintessence Int* 1996; 27: 513–520.
4. Vilaplana J, Grimalt F, Romaguera C, Conellana F. Contact dermatitis from eugenol in mouthwash. *Contact Dermatitis* 1991; 24: 223–224.
5. De Groot A C, Liem D H, van Ketel W G. Patch tests with fragrance materials and preservatives. *Contact Dermatitis* 1985; 12: 87–92.
6. Safford R J, Basketter D A, Allenby C F, Goodwin B F J. Immediate contact reactions to chemicals in the fragrance mix and a study of the quenching effect of eugenol. *Br J Dermatol* 1990; 123: 596–606.
7. Göransson K, Karltorp N, Ask H, Smedberg O. Några fall av eugenolöverkänslighet (Some cases of eugenol hypersensitivity). *Svensk Tandläkaretidskrift* 1967; 60: 545–549 (in Swedish with English summary).
8. Rudzki E. Occupational dermatitis among health service workers. *Dermatosen* 1979; 27: 112–115.
9. Hensten-Pettersen A, Østavik D, Wennberg A. Allergenic potential of root canal sealers. *Endod Dent Traumatol* 1985; 1: 61–65.
10. Hensten-Pettersen A, Jacobsen N. The rôle of biomaterials as occupational hazards in dentistry. *Int Dent J* 1990; 40: 159–165.
11. Hjorth N. *Eczematous allergy to balsams, allied perfumes and flavoring agents*. Copenhagen, Munksgaard 1961: 134.
12. Accepted Dental Therapeutics, 38th edition. Chicago. American Dental Association, 1975: 237–238.