

Delayed hypersensitivity to silicon causing gingival hyperplasia

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Key words: gingival hyperplasia; allergic contact gingivitis; silicon; dental patients; curing cement; porcelain/metal crowns; methyldibromoglutaronitrile. © Munksgaard, 1997.

Case Report

A 35-year-old woman was evaluated in 1996 for red swollen gums overlying teeth #8 and #9. This condition had been present for 11 years. At the onset in 1985, she was assessed by her dentist and found to have crowns on the teeth adjacent to the hyperplastic areas. The crowns consisted of porcelain fused to metal. After various unsuccessful medical therapies, she was referred to a periodontist in 1987, who performed a surgical procedure to correct what was thought to be a "biological width deformity" caused by the previous crowns. Although her symptoms improved with the placement of temporary crowns, they gradually recurred when the permanent crowns were replaced. These replacement crowns were similar to her first, i.e., porcelain fused to metal. She denied the use of phenytoin, carbamazepine, cyclosporin or calcium channel blockers, all of which can cause gingival hyperplasia (1). She was a computer operator at a retail clothing store and had no significant chemical exposure in the workplace or at home. There was no history of metal intolerance. She had a history of an allergic reaction to penicillin.

She was patch tested to the NACDG standard series and to the University of Kansas Medical Center's dental and supplemental allergens. These chemicals included all of the known allergenic ingredients listed on the MSDS for the dental materials that had been used. Included among these was silicon tetrachloride 2% pet. (pH 5.1). In a prior report (2), this ingredient had been used to screen for silicon allergy. In our experience of testing over 100 patients with this allergen, no prior allergic reaction and only a very few minor irritant reactions had been seen.

At 3, but not 2, days after application of the patches, the patient had a ++ reaction to silicon tetrachloride and a + reaction to methyldibromoglutaronitrile. There was no evidence of an allergic reaction to any of the other chemicals tested. After detailed review of her MSDS, it was noted that the curing cement used in her porcelain crowns contained silicon dioxide. In contrast, the patient had no evident exposure to methyldibromoglutaronitrile. Methyldibromoglutaronitrile/phenoxyethanol is a preservative used in cosmetics and did not appear to be relevant to her gingival hyperplasia.

Discussion

Although the literature contains many references to phenytoin, cyclosporin and/or calcium channel blockers and gingival hyperplasia, silicon-induced gingival hyperplasia has not been reported. In 1 study, patch testing with silicon tetrachloride 2% aq. in 30 patients with contact stomatitis yielded no allergic reactions, although 10 patients developed irritant reactions most likely related to the low pH (0.5) of the solution (2). In a single case report of an allergic reaction to a silicon-based dental material, it was the catalyst that was the offending allergen (3). Nonetheless, silicon is known to induce granulomatous reactions (4). Furthermore, allergic reactions to silicon, although not documented by patch testing, have been blamed for the rejection of ventriculoperitoneal shunts in 3 patients (5). Thus, although silicon is a rare cause of delayed-type hypersensitivity, such reactions seemingly occur.

While it is probable that the dental exposure to silicon was responsible for the patient's gingival hyperplasia, to confirm the allergy would require removing the putative allergen and replacing the crowns with materials free of silicon dioxide. However, silicon may be difficult to avoid in the dental crown materials presently available. The patient was provided with detailed results of her patch testing and was referred to her periodontist for further care. Due to financial matters, she has not yet had the crown replaced and the gingival hyperplasia persists.

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Clinical atopy score and TEWL are not correlated in a cohort of metalworkers

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Atopy score (1) is a clinical assessment which might be expected to determine the risk of irritant contact dermatitis. Transepidermal water loss (TEWL) can be measured by an evaporimeter and assesses barrier function. As persons with poor barrier function are more likely to develop irritant contact dermatitis, the relationship between atopy score and TEWL was investigated.

Patients and Methods

We studied 204 unselected metalworker trainees as part of PROMETES (Zürich Prospective Metal Workers Eczema Study) of whom 6% had an atopy score of 10 or above and had to be considered atopics. TEWL was measured at the middle of both forearms and the dorsal side of both hands with an evaporimeter (Tewameter, Courage & Khazaka, Cologne, Germany), following the guidelines of the ESCD (2). Irritation with NaOH, SLS, 90% and 95% solutions of DMSO has been described elsewhere (3). The software package SPSS 7.5 was used for computing the Pearson correlation coefficients between the parameters measured.

Results

The population examined was not significantly different from the "normal" population of Diepgen (4), 4.5% of whom had an atopy score of 10 or above. Pearson's analysis did not show any significant correlation between atopy score and the TEWL values measured.

Discussion

Our findings are in accordance with Nöring et al. (5), who studied TEWL on the forearm, back and palm, though they did not perform any irritation tests. Thus, our results

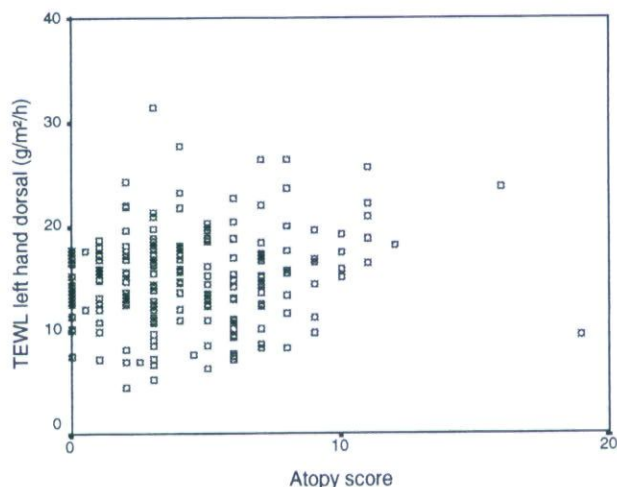


Fig. 1. The relationship between atopy score and TEWL on the left hand (no significant correlation between the parameters by the Pearson correlation).

verify that TEWL is independent of the atopy score and remains important as a measure of barrier function.

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Table 1. Correlation between atopy score and TEWL before and after irritation

	Atopy score	TEWL left H.	TEWL right H.	TEWL left FA	TEWL right FA	TEWL NaOH	TEWL DMSO 90	TEWL DMSO 95	TEWL SLS
Atopy score	×								
TEWL left H.	Ø	×							
TEWL right H.	Ø	×	×						
TEWL left FA	Ø	×	×	×					
TEWL right FA	Ø	×	×	×	×				
TEWL NaOH	Ø	×	×	×	×	×			
TEWL DMSO 90	Ø	×	×	×	×	×	×		
TEWL DMSO 95	Ø	×	×	×	×	×	×	×	
TEWL SLS	Ø	×	×	×	×	×	×	×	×

×-significant correlation ($p \leq 0.05$); Ø-no significant correlation; H-hand; FA-forearm.

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