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Professional Contact Dermatitis in Odontostomatology with Special Reference to Meth(acrylates): A 15 year Experience

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Abstract

Background and aim of the study

Dental personnel including dentists and dental nurses, dental surgeons and dental technicians are a population at risk for the development of contact dermatitis. The aim of this article is to evaluate and compare the epidemiological data from our allergy department between 1992 and 2006 (15 years) on dental personnel.

Patients and methods

Dentists, dental nurses, dental surgeons and dental technicians were included. In total 52 patients were patch tested to exclude or confirm contact dermatitis.

Results

48 cases were categorized as contact dermatitis: 10 as irritant contact dermatitis and 38 as allergic contact dermatitis, with 83% of relevant positive allergens split between 46% male and 54% female patients. Two cases of contact urticaria from latex gloves in 2 dental nurses, both female, and 2 cases of airborne contact dermatitis in dental technicians, both male, were observed. The positive allergens, in order of frequency, were: nickel (57%), meth(acrylates) (26%), rubber compounds (19%) and cobalt (14%).

Conclusions

Dental professionals are in high risk of developing contact dermatitis. The present study may help other investigators on assessing which allergens should be tested in dental professionals and help them on the avoidance of such allergies.

Keywords: Occupational; Meth(Acrylates); Contact Eczema; Contact Urticarial; Airborne Dermatitis; Epidemiology; Odontostomatology.

Introduction

Dental personnel including dentists and dental nurses, dental surgeons and dental technicians are an important population at risk for the development of contact dermatitis. Not only for the amount of different type of metal products they use in their daily practice but also for the acrylates and gloves are they in contact with. Moreover many of these

professionals are forced to frequent washing due to hygienic needs thus irritant hand dermatitis is also a common observation on them.

We have performed the following 15 years study with the idea of better understanding the real importance of the acrylates not only on dental personnel but also on acrylate users and how could be better help them on avoiding contact der-

matitis and improving our diagnostic tools.

Material and Methods

The patients included in our study presented one or more of the cutaneous clinical picture set out in Table 1. These patients were subjected to patch-tests with 3 different series of allergens: 1.- Spanish Group of Research on Contact Dermatitis (GEIDAC) Standard Series. 2.- Chemotechnique Dental Series. 3.- Marti Tor Metals Series.

The last allergen series (Marti Tor Metal Series) have changed in the last 15 years. So, the first patients were patch tested with the allergens listed in Table 1; the latest patients were tested with the modified metal series also available in Table 1.

“Marti Tor” Metals Series, before and after revision

BEFORE REVISION

- Gold chloride to 1% in petrolatum
- Palladium chloride to 1.5% in petrolatum
- Zinc chloride to 2% in petrolatum
- Ammonium heptamolybdenum to 1% in petrolatum
- Tin chloride to 1% in petrolatum
- Gallium chloride to 5% in petrolatum
- Indium chloride to 5% in petrolatum
- Chromium trioxide to 0.5% in petrolatum
- Ferric chloride to 2% in petrolatum
- Beryllium chloride to 1% in petrolatum
- Tantalum chloride to 1% in petrolatum
- Tetrachlorosilane to 1% in petrolatum
- Copper sulfate to 1% in petrolatum
- Rhodium chloride to 5% in petrolatum
- Platinum chloride to 1% in petrolatum
- Mercury metal to 0.5% in petrolatum

AFTER REVISION

- Ammonium tetrachloroplatinate to 0.25% in petrolatum or at 1% in aqueous solution
- Cadmium chloride to 0.5% in petrolatum
- Copper sulfate to 2% in petrolatum
- Tin chloride to 0.5% in petrolatum or at 1% in aqueous solution
- Iron chloride to 2% in petrolatum
- Palladium chloride to 2% in petrolatum
- Gold sodium thiosulfate to 0.5% in petrolatum
- Titanium oxide to 10% in petrolatum
- Titanium nitrate to 5% in petrolatum
- Zinc chloride to 2% in petrolatum
- Neodymium chloride to 1% in petrolatum
- Samarium chloride to 1.5% in petrolatum
- Germanium chloride to 2% in petrolatum
- Gallium chloride to 5% in petrolatum

- Indium chloride to 5% in petrolatum or at 1% in aqueous solution
- Beryllium chloride to 1% in petrolatum
- Tantalum chloride to 1% in petrolatum
- Iridium chloride to 1% in petrolatum
- Rhodium chloride to 2% in petrolatum
- Platinum chloride to 1% in petrolatum
- Silver nitrate to 1% in petrolatum
- Tungsten metal to 5% in petrolatum
- Molybdenum chloride to 5% in petrolatum
- Cesium chloride to 2% in petrolatum
- Magnesium chloride to 2% in petrolatum
- Manganese chloride to 2% in petrolatum
- Neobium chloride to 0.2% in petrolatum
- Vanadium chloride to 1% in petrolatum
- Antimony chloride to 1% in petrolatum
- Strontium chloride to 2% in petrolatum
- Tellurium chloride to 2% in petrolatum
- Terbium sulfate to 2% in petrolatum
- Yttrium oxide to 2% in petrolatum
- Ruthenium oxide to 2% in petrolatum
- Mercury metal to 0.5% in petrolatum
- Mercury chloride to 0.1% in petrolatum
- Aluminum hexahydrate chloride to 2% in petrolatum
- Mercury ammonium chloride to 1% in petrolatum
- Aluminum to 100% in petrolatum
- Copper oxide to 5% in petrolatum
- Tin to 50% in petrolatum
- Indium chloride to 5% in petrolatum
- Tin oxalate to 1% in petrolatum
- Tin chloride to 1% in aqueous solution
- Zirconium chloride to 1% in petrolatum
- Phenylmercury acetate to 0.01% in aqueous solution
- Potassium dicyanoaurate to 0.1% in aqueous solution
- Silver nitrate at 1% to aqueous solution
- Lead acetate at 0.5% to aqueous solution
- Lead chloride at 0.2% to aqueous solution
- Ammonium hexachloroplatinate to 0.1% in aqueous solution
- Ammonium tetrachloroplatinate to 0.25% in aqueous solution

In total, between 1992 and 2006, 655 patients were patch tested with the three series: 549 females between 10 and 86 years of age and 106 males between 22 and 78 years of age. Of these, 607 were users of dental prosthesis (92.1%) and 52 were professionals (7.9%). Of these 52 professionals, 14 were dental technicians, 26 dental nurses, 10 dentists and 2 dental surgeons.

Morphology and topography of the clinical symptoms presented by these 52 patients are set out in Table 2.

Table 2. Clinical findings in males and females.

	TOTAL	MALES	FEMALES
Dermatitis dry and cracked in the hands and pulpfingers	18	10	8
Dyshidrosis	16	8	8
Dry hands syndrome	8	0	8
Eczema on hands and forearms	6	4	2
Airborne dermatitis	2	2	0
Contact urticaria	2	0	2
TOTAL	52	24	28

Results

Clinical findings: Clinical presentation of patients included: Eczema on the dorsum of hands, contact urticaria (latex), and airborne contact dermatitis.

The most common location was: dorsum of hands, forearms, face (eyelids) and neck. Itching, erythema and oedema, especially on the eyelids, were the most common clinical presentations.

Of the 52 patients (24 males and 28 females), 42 showed positive results to one or more allergens (17 males and 25 females) of which, 35 (83%), were relevant (15 males and 20 females). The relevancy was assessed as past, present or unknown.

The most frequently occurring allergens, in number and percentage, are displayed in Table 3.

The most frequent allergen was nickel-sulphate positive in 23 females, of which 21 were assessed as relevant, all with past relevancy, and in 1 male. Meth(acrylates) were positive in 11 positive cases (9 males, all dental technicians, and 2 females, a dentist and a dental nurse), all were assessed as present relevancy.

It should be pointed out that 6 patients (14%), 5 females and 1 male were patch- test positive to thiuram mix, all with past relevancy, and 2 females with contact urticaria showed a prick test positive to latex.

The fourth most frequent allergen was cobalt chloride with 6 patients (14%), all female with unknown relevancy.

Table 3. Results of the Study

ALLERGEN	NUMBER	PERCENTAGE
Nickel sulphate	24	57%
Meth(acrylates)	11	26%
Rubber	8	19%
- Rubber compounds	6	14%
- Latex	2	5%
Cobalt chloride	6	14%
Palladium	3	7%
Potassium dichromate	3	7%
Vanadium	2	5%
Mercury	2	5%
Epoxy resin	2	5%
Beryllium	1	2,5%
Formaldehyde	1	2,5%
Rosin	1	2,5%
Camphorquinone	1	2,5%

The frequency of occurrence of positivity for various meth (acrylates) in different statistics, from lesser to greater, can be observed in Table 4 [1-10], while in Table 5 the frequency of positivity for different allergens can be observed in two series compared with ours [8,10].

Discussion

Rustemeyer and Frosch [11] published an interesting questionnaire sent to 1132 dental technicians. 55 of the patients suspected of suffering occupational contact dermatitis, displayed symptoms which in 93% of cases affected hands and pulp fingers, and 17% were labelled as airborne contact dermatitis, with 63.3% diagnosed as allergic contact dermatitis and 23.6% as irritant contact dermatitis. These 55 patients were subjected to patch tests with an acrylate series, with 42 testing positive to one or more of these allergens, without establishing relevance, which is equivalent to 74%.

Tucker and Beck [1], between 1983 and 1998, over a period of 15 years, discovered 15% positivity to meth(acrylates) of which 71% were occupational contact dermatitis, 34% in odontostomatology and 66% in other occupations.

Table 4. Frequency of positivity for various meth(acrylates) in different statistics.

	Romaguera 2009	Tucker 1999	Wallan-hammer 2000	Geakens 2001	Goon 2006	Aalto-korte 2007	Isaksson 2007
2 HEA	50-75%	0-50%	0-50%	0-50%	0-50%	50-75%	0-50%
2 HEMA	50-75%	50-75%	75-100%	50-75%	50-75%	50-75%	50-75%
TEGDM	50-75%	50-75%	75-100%	50-75%	50-75%	50-75%	50-75%
EGDM	50-75%	0-50%	50-75%	75-100%	50-75%	75-100%	50-75%
MMA	0-50%	0-50%	0-50%	0-50%	0-50%	50-75%	0-50%
Bis GMA	0%	0%	0%	0%	0-50%	0-50%	0-50%

Table 5. Frequency of positivity for different allergens in two series compared with ours.

	Romaguera 2009	Wallanhammer 2000	Wranskjok 2001
Nickel	75-100%	75-100%	50-75%
Meth(acrylates)	50-75%	50-75%	75-100%
Tiuram mix	0-50%	50-75%	0-50%
Fragrance Mix	0-50%	50-75%	0-50%
Cobalt	0-50%	0-50%	0-50%
Palladium	+/-	0%	0-50%
Rosin	+/-	+/-	0-50%

Kanerva et al. [2], in a 24-year series, between 1975 and 1998, found 25 % of occupational contact dermatitis showing positivity to meth(acrylates) in odontostomatology, of which 87% were allergic. Over three periods this breaks down as 2% between 1975 and 1982, 25% between 1983 and 1990, and 73% between 1991 and 1998.

Goon et al., [8] in a 10-year series, from 1995 to 2005, found 5.8% occupational contact dermatitis to meth(acrylates) in dental personnel, and Aalto-Korte et al. [10], in their 12-year series, between 1994 and 2007, found 7% positivity to meth(acrylates) in dental personnel.

When our own study of 15 years with 26% relevant positivity-

ty to meth(acrylates) in professionals related to odontology, is divided into three groups, we find 48 % in the first 5 years (1992-1996), 37 % in the next 5 (1997-2001) and 15% in the last 5 (2002-2006).

The results in percentages and in the different periods seem to indicate that there was a rise in occupational contact dermatitis between 1990 and 2000, and that this could have been due to the introduction of new materials together with limited measures of prevention and a lack of attention and protection in the face of them at the time, a situation which seems to have been subsequently remedied.

From our limited but well studied range of 52 patients and that of Aalto-Korte [10], not being able to use complete series of meth(acrylates), when occupational contact dermatitis is suspected, markers can be used such as EGDMA and MMA in cases involving dental technicians, and 2-HEMA and Bis GMA in cases involving dentists and dental nurses [7].

In our study we have observed only 2 patients (4%), both dental technicians, affected by airborne contact dermatitis, a very low percentage compared to the published series [1] and the book chapter [11] of Rustemeyer and Frosch, and different from the published case in a dental nurse [9].

Lastly we make reference to 2 cases (4%) of contact urticaria to latex, fully referred in the literature [12].

In conclusion we believe that dental professionals are in high risk of developing contact dermatitis. The present study may help other investigators on assessing what allergens should be tested when dental professionals are suspected to have contact dermatitis.

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