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## HYPERSENSITIVENESS TO TOOTH-PASTE SIMULATING REACTION TO DENTAL PLATE

by

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Contact between foreign substances and the oral mucosa may give rise to mucosal reactions of varying pathogenesis.

*Trauma*, as Nyquist (9) pointed out, is the dominant factor in local mucosal reactions to dental plates --- "denture sore mouth". Other studies have confirmed this (3).

*Primary irritants* may give reactions in the mucosa as well as in the skin. Such reactions follow the initial contact with the irritant if its concentration is sufficiently high, and thus are not dependent on prior allergic sensitization.

To compare the mucosal and cutaneous reactivity to a primary irritant, Greither (6) applied various concentrations of thymol to such surfaces in 20 persons with normal skin. He found that the mucosa reacted to considerably lower concentrations as compared with the skin.

*Allergic reactions of contact type* may occur in the oral mucosa as well as in the skin. Such reactions cannot occur until sensitization has developed. The mode of sensitization varies. As a rule it implies contact between the skin and the allergen in sufficient concentration and for a sufficient length of time. Sensitization may also take place if the allergen is allowed to act on the oral mucosa, but this is unusual.

When an allergen has induced sensitization by contact with

the skin, the reactivity may subsequently be demonstrated by cutaneous patch tests with the allergen. The test concentration of the allergen must be so low that it does not act as a primary irritant. After about 24 hours an eczematoid reaction with papules and/or vesicles and erythema appears.

Clinical investigations have shown, however, that in persons with allergic contact eczema who have been sensitized via the *skin*, the reactivity may also be demonstrated in the *oral mucosa* by mucosal contact tests with the relevant allergen. Delbeck (2) reported that in such persons the oral mucosa displayed erythema, papules and vesicles following local exposure to the specific allergen. Analogous findings were described by Bisgaard-Lefèvre (1) from a study of 20 patients with eczematous dermatitis. In 13 cases the oral mucosa responded to local application of the allergen with "a distinct eczematous reaction". Using a special technique, Nyquist (9) performed mucosal contact tests on 18 patients with allergic eczema of contact type. Papular and vesicular reactions appeared in 14 cases, erythema alone in 3, and in 1 case there was no response.

As mentioned above, sensitization may also arise from contact between an allergen and the oral mucosa. In such cases the primary route of sensitization is thus the *mucosa*. The resultant reactivity may be demonstrated in the skin (by patch tests). This was reported in 6 patients with cheilitis and stomatitis produced by a tooth-paste - "ST-37". The allergic origin of the condition was established by elimination and exposure procedures and also by cutaneous patch tests. Control tests on healthy persons elicited no reactions (12).

Allergy of contact type in the oral mucosa was also demonstrated in other cases by cutaneous patch tests. Thus a patient with stomatitis was shown to be hypersensitive to an antiseptic — "baxin" — in a tooth-paste (4). Four patients with stomatitis, glossitis, cheilitis, perlèche and circumoral dermatitis displayed allergy to G-4 — "dichlorophene" — another tooth-paste antiseptic (5). In a patient with cheilitis, hypersensitiveness to cinnamon oil in the tooth-paste used was demonstrated by patch tests on the skin (7). Many other substances, such as ingredients in lipsticks and dentures, have been reported to produce allergic reactions on the lips and the oral mucosa (11, 8, 10, 13, 14).

Demonstration that a mucosal or cutaneous reaction is due to allergy of contact type demands a careful technique. Reactions to cutaneous or mucosal tests are not necessarily allergic. Toxic and traumatic reactions may be clinically indistinguishable from allergic phenomena. A toxic reaction may occur if, for instance, the test concentration of the allergen is too high. A traumatic reaction may be produced by unsuitable test substances which exert mechanical pressure on the skin. Thus Fisher (3) interpreted as traumatic some severe (bullous) reactions to skin tests with full upper dentures.

The case described below exemplifies the allergic mucosal reactions in which all the evidence points to sensitization via the oral mucosa.

#### CASE REPORT

##### Anamnesis

A 60-year-old woman had worn upper and lower dentures for more than 30 years. Her first plates were made of vulcanite, but 3 years ago she was provided with new acrylic dentures. After 2 years she complained of an increasingly severe burning sensation in the mouth. The oral mucosa became inflammatorily reddened where it was in contact with the dentures. The reaction was most intense in the upper jaw, affecting both the palatine and the buccal surfaces. The patient also reported a general swollen feeling in the mouth.

When these symptoms had been present for several months the lips also became swollen and reddened. Pronounced labial desquamation gradually appeared, together with fissuring of the lips and the commissures.

At times the patient felt a general soreness in the mouth, which was intensified by eating and drinking. Tenderness was most severe in the denture-covered hard palate.

For many years she had used various makes of tooth-paste, but she could not state if any of these evoked or aggravated her symptoms. Like the doctors she had consulted, the patient was most inclined to believe that the dentures were responsible for her distress. As allergy to the denture material was suspected, she was admitted to this skin clinic for investigation.

### Status

Inspection revealed an oedematous, severely reddened mucosa at the areas of dental plate contact. This reaction was greatest in the hard palate and in the buccal mucosa corresponding to the surfaces in contact with the upper denture. The tongue was markedly oedematous. The lips presented a generalized rubrosquamous appearance with numerous superficial rhagades and oedematous swelling.

### Clinical analysis

*Patch tests:* Skin tests were made with finely ground substance from the patient's dentures and with the 3 brands of tooth-paste she had most recently used. The patches were left on the skin for 48 hours. Readings of reactions were made 48, 72 and 96 hours after application. The ground denture material evoked no reaction. One of the tooth-pastes (Stomatol), on the other hand, produced erythema and papules.

Because of these findings from patch tests, the Stomatol tooth-paste was used in elimination and exposure tests. Control tests were made on 23 healthy persons.

*Elimination test:* When the patient ceased to use the tooth-paste to which she had reacted in the patch tests the oral changes subsided. After 7 days the erythema and oedema had disappeared from the oral mucosa and from the lips and the patient was free from discomfort.

*Exposure test:* When the objective and subjective manifestations had completely disappeared, an exposure test was made. The dentures were brushed with Stomatol in the morning and in the evening, as had been the patient's custom. Five minutes after the brushed dentures were inserted in the morning the patient complained of a burning sensation in the tip of the tongue and the inner surface of the lower lip. In the evening of the same day -- about an hour after repeated Stomatol brushing -- she reported considerable "burning" also around the mouth. Twenty-four hours later the tongue was oedematous and severely reddened. The buccal mucosa and the denture-contacting surfaces of the maxilla were likewise markedly erythematous. The lips showed intense erythema and oedema with commencing desquamation and a tendency to rhagade formation.

*Control tests:* Analogous patch tests with Stomatol tooth-paste were made on 12 healthy controls. Four of them reacted with erythema, but none with papules as in the above-described reaction. Eleven other control subjects with upper and lower dentures brushed their plates with Stomatol twice daily for 1 to 3 weeks. None of them showed any mucosal reaction. Nor were there any complaints of oral discomfort.

#### DISCUSSION AND SUMMARY

After wearing vulcanite dentures for more than 30 years, a 57-year-old woman was fitted with acrylic plates. Two years later the mucosal surfaces in contact with the dentures and also the lips showed reactions which were initially attributed to hypersensitiveness to the material of the dental plates. Closer analysis of the case, however, revealed that the cause was one of the three tooth-pastes most recently used by the patient. The mucosal reactions were not produced by toxic action, but were a manifestation of contact allergy. This was established by cutaneous patch tests, by elimination of and exposure to the tooth-paste in question, and by control tests on normal subjects. All the evidence pointed to repeated, intimate contact between the allergen (the tooth-paste) and the oral mucosa as the cause of the hypersensitiveness. Such relatively rare sensitization by contact between an allergen and the *mucosa* is an analogous phenomenon to the much more common sensitization by contact between an allergen and the *skin*.

#### RESUME

#### HYPERSENSIBILITÉ À LA PÂTE DENTIFRICE SIMULANT UNE HYPERSENSIBILITÉ AU DENTIER

Une femme de 60 ans qui depuis l'âge de vingt ans portait un dentier en caoutchouc, l'a échangé à l'âge de 57 ans contre un dentier en résine acrylique.

Quand, après deux ans, la muqueuse de la bouche présenta des signes de réactions aux surfaces de contact et sur les lèvres, ces symptômes furent interprétés comme représentatifs d'une hypersensibilité à la matière plastique dont le dentier était fait. Une analyse plus profonde du mal, démontra qu'il n'était pas

dû au dentier, mais plutôt à l'une des trois pâtes dentifrices que la malade avait employées récemment. On prouva que les réactions de la muqueuse n'étaient pas de nature toxique, et qu'elles n'étaient dues qu'à une allergie de contact. Ceci fut confirmé de façon sûre par des tests épicutanés, par des essais alternés de suppression et d'emploi de la pâte dentifrice en question, et par des essais de contrôle sur des sujets normaux. L'hypersensibilité de la malade, à en juger par ce que nous savons, est dûe au contact intime répété de la muqueuse avec l'allergène (pâte dentifrice). Une telle sensibilisation par contact d'un allergène avec *la muqueuse*, qui est relativement rare, est analogue au phénomène plus courant de sensibilisation par contact d'un allergène avec *la peau*.

#### ZUSAMMENFASSUNG

#### ÜBEREMPFINDLICHKEIT GEGEN ZAHNPASTE UNTER DEM BILDE DER ÜBEREMPFINDLICHKEIT GEGEN PLATTENPROTHESE

Eine 60-jährige Frau, welche seit dem Alter von 20 Jahren Kautschukprothesen getragen hatte, erhielt statt dieser im Alter von 57 Jahren Zahnersatz aus Plastikmaterial.

Als sie nach zwei Jahren Schleimhauterscheinungen am Zahnfleisch, an den Berührungsstellen der Prothesen, sowie an den Lippen bekam, erklärte man dies durch Überempfindlichkeit gegen das Prothesenmaterial. Eine eingehendere Untersuchung machte jedoch ersichtlich, dass die Schleimhautveränderungen nicht durch die Prothesen verursacht waren, sondern durch eine der drei Zahnpasten, welche die Patientin angewendet hatte. Wie sich ergab, waren die Schleimhauterscheinungen ihrer Natur nach nicht toxisch, sondern kontaktallergisch. Das wurde durch Lättchenproben, Eliminations- sowie Expositionsversuche an der Mundschleimhaut und ferner durch Kontrollversuche an Normalen festgestellt. Allem Anschein nach war die Überempfindlichkeit der Patientin durch wiederholte enge Berührung der Mundschleimhaut mit dem Allergen (der Zahnpaste) hervorgerufen worden. Eine derartige, verhältnismässig seltene Sensibilisierung durch Kontakt zwischen einem Allergen und der *Schleimhaut* ist ein analoges Phänomen der viel häufigeren Sensibilisierung durch Kontakt Allergen-*Haut*.

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