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## CASE REPORT

# Gingivo-mucosal and cutaneous reactions to amalgam fillings

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#### Abstract

**Background:** A number of reports exist on the side effects of materials used to restore teeth. Most of the cases involve local allergy reactions, but also skin lesions are described. Few cases are described where both local effects on the mucosa and skin lesions distant to the oral cavity are caused by amalgam.

**Result:** The case presented indicates that the release of mercury from amalgam fillings is able to induce hypersensitivity reactions resulting in soft-tissue changes in the gingiva, buccal mucosa, tongue and on the skin of the back of the hands.

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Materials which are used to restore teeth can affect both the oral soft tissues adjacent to the restorations and give soft-tissue reactions at sites distant to the restorations. Hypersensitivity to haptens such as metals may be responsible for the changes in the soft tissues.

Local reactions to restorative materials are described as type IV delayed hypersensitivity involving T lymphocytes resulting in a lichenoid reaction pattern in the oral soft tissues. A transepithelial route of entrance for the metal haptens has been described (Konttinen et al. 1999).

Ingestion of metals from diet and dental alloys has been reported to induce a variety of dermatoses, including hand dermatitis, lichen planus, palmoplantar pustulosis and nummular dermatitis (Fisher et al. 1986a, b, Nakayama et al. 1998).

Amalgam is probably the dental alloy mostly associated with oral mucosal changes. It is thought that it is the mercury component of the alloy that is responsible. Mercury has been described to cause oral lichen planus (Pang & Freeman 1995), cutaneous lichen planus, palmoplantar pustulosis, pompholyx and nummular dermatitis (Fisher et al. 1986a, b, Nakayama et al. 1998, Atsuko et al. 2000). The majority of case reports have reported either oral or cutaneous lesions and usually not both. Recently a case is presented describing oral mucosal, skin and nail lesions because of mercury allergy (Kato et al. 2003).

The case presented in this report describes gingival, oral mucosal as well as cutaneous lesions due to mercury hypersensitivity from amalgam restorations.

#### **Case Report**

A 73-year-old Caucasian male was referred by his own general dental practitioner for acute onset gingival inflammation bilaterally in the maxillary molar regions.

He complained of discomfort and mild pain from the gingival areas of the upper molar teeth.



Fig. 1. Photograph showing a lichenoid reaction in the oral mucosa corresponding with amalgam restoration in tooth 37.



*Fig.* 2. Histological picture of section from the biopsy stained with hematoxylin and eosin showing epithelial atrophy with hyperplastic, saw-shaped rete ridges and a dense inflammatory cell infiltrate in the connective tissue stroma. Original magnification  $\times$  10.



*Fig. 3.* Histological picture of section from the biopsy stained with hematoxylin and eosin showing parakeratotic epithelium with scattered intra-epithelial mononuclear cells and a dense mononuclear inflammatory cell infiltrate in the connective tissue stroma. Original magnification,  $20 \times .$ 

The medical history revealed the use of a cholesterol reducing agent, a  $\beta$ -blocker and the use of sublingual nitroglyceride tablets for angina pectoris.

The oral examination revealed a nearly intact, but heavily restored dentition. The restorations consisted mainly of amalgam fillings and gold\acrylic crowns. A gingival\periodontal examination revealed marked gingival inflammation with swelling in the proximal areas of the maxillary molars bilaterally. Apart from these areas, the gingiva showed little or no gingival inflammation, general pocket depths of 3–4 mm and only minor loss of bone support.

The treatment consisted of local scaling and Chlorhexidine 0.2% irrigation over three visits.

The patient's symptoms subsided, and the gingival conditions returned to normal.

After 5 months, the patient returned to the practice with the same symptoms as he was initially referred for. The examination this time revealed similar gingival inflammation except that the gingiva showed both erosions and white lesions. In addition the buccal mucosa and the mucosa of the tongue showed white lesions and ulceration in areas corresponding to the amalgam fillings in the maxillary and mandibular molars (Fig. 1).

A biopsy was performed of the lesion in the left cheek. The findings were reported as: "Mucosa with local epithelial atrophy and subepithelial chronic inflammation". The biopsy demonstrated mainly an atrophic surface epithelium, but with focal areas of acanthosis. Scattered apoptotic cells could be observed in the basal cell layer. There was a lichenoid reaction pattern with subepithelial inflammation consisting mainly of lymphocytes and macrophages (Figs 2–3). The mucosal changes were deemed to be related to the amalgam fillings.

The patient was informed of the result of the biopsy and with his consent, the referring dentist was instructed to apply to the Norwegian Health Service to cover the costs of replacing the amalgam fillings. The reply from the Health Service suggested that one side only should be treated initially to observe any improvements. This decision was based on the fact that the clinical pictures enclosed with the application showed some sharpness on the one tooth indicating a possible mechanical irritation.

It was decided to treat the teeth on the left side of the oral cavity with composite restorations and porcelain–bonded crowns. Following this treatment the mucosal lesions improved to close to normal in the left buccal mucosa. However, 4–6 weeks after replacing the amalgam fillings, the patient developed polygonalpapular skin lesions with Wickhams striae on the back of his hands (Fig. 4).

Biopsy of the skin lesions revealed lichenoid reaction pattern concurrent with lichen planus.

Epicutaneous patch tests with a dental series (Chemotechnique, Malmö, Sweden) revealed an allergic reaction mercury.

The teeth on the right side of the mouth were then also treated by replacing/covering all the amalgam fillings in



*Fig. 4.* Photograph showing polygonalpapular skin lesions with Wickhams striae on the back of the patients hand.



Fig. 5. Photograph showing healed lesion in the oral mucosa shown in Fig. 1.

pre- and molars with composite restorations or porcelain/bonded crowns.

Over the next few weeks, both the lesions in the oral mucosa and the skin lesions subsided and both the skin and the oral mucosa returned to normal (Figs 5 and 6).

The patient has since been observed over 4 years, and no return of the gingival, oral mucosal or skin lesions have been observed.

#### Discussion

This report describes a case of gingival, oral mucosal as well as a cutaneous reaction to amalgam restorations used in molar teeth. This finding is based on the results from biopsies obtained from the oral mucosa, the skin, a positive patch test for mercury and the fact that the lesions were reversible when the amalgam fillings were replaced. In addition, there has been a 4-year follow-up period without relapse.

Our case is contrary to a recent report by Dunsche et al. (2003), who found that amalgam removal had very little impact on intra-oral lesions in patients with cutaneous lichen planus compared with patients without cutaneous lesions. It is generally accepted that often it is not possible to distinguish clinically or histologically between oral lichen planus and a lichenoid reaction induced by amalgam fillings (Camisa et al. 1999). Scalf et al (2001) reported that sensitization to dental metals is more common among lichen planus patients than in routinely tested patients. It is suggested that the dental metals may be a triggering factor in the disease. Whether this means that dental restorations should be replaced in all lichen planus patients remains to be resolved.

The importance of obtaining a positive patch test for mercury before replacing amalgam fillings has been stressed in several reports (Laine et al. 1997, Camisa et al. 1999, Thornhill et al. 2003). However, other reports point out that improvement in the clinical lesions also occur in patients with negative patch test results (Wong & Freeman 2003, Dunsche et al. 2003).

It is not clear as to whether materials may sensitise directly through the mucous membranes or merely elicit pre-existing sensitivity (Wilkinson et al. 1992). Adachi et al. (1997) reported that the ingestion of metals such as nickel, cobalt, chromium, palladium, mercury and gold from foods or dental alloys may exacerbate certain atopic patients who have metal sensitivity. They recommended avoidance of dental-filling materials containing metals in nummular dermatitis patients with contact hypersensitivity to metal. They indicate that metals in the oral cavity may only elicit pre-existing sensitivity.

There was no indication of occupational or other previous systemic exposure to mercury in the present patient, so it seems that mercury in this case has sensitized the patient directly through the oral cavity.

It was observed that the amalgam fillings responsible for the soft-tissue reactions were old corroded fillings in contacts with the soft tissues. Variations in temperature in the mouth, components of food, drink, saliva and mechanical wear may have promoted corrosion and the release of mercury from old amalgam fillings in sufficient concentrations to induce a hypersensitivity to mercury in this patient.

It is important to stress that the reaction reported in the present case is extremely rare considering the extensive use of amalgam over the last century and only one other documented case (Kato et al 2003).



Fig. 6. Photograph showing healed lesions on the back of the hand shown in Fig. 4.

WHO stated in 1997 that "dental amalgam restorations are considered safe, but components of amalgam and other dental restorative materials may, in rare instances, cause local side effects or allergic reactions. The small amount of mercury released from amalgam restoration, especially during placement and removal has not been shown to cause any other adverse health effects".

In conclusion, the release of mercury from amalgam fillings is able to induce hypersensitivity in the case presented. This hypersensitivity resulted in softtissue changes in the gingiva, buccal mucosa, tongue and on the skin of the back of the hands.

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