A Case of Non-Allergenic Intractable Dermatitis Likely Caused by Mercury in Dental Amalgams

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Abstract: The case subject is a 46-year-old woman with a history of severe dermatitis of the head, face, neck, and torso for more than two years. Although the subject had undergone a patch test, which was negative for metal allergens (including mercury), the subject's dermatitis dramatically improved shortly after the amalgam fillings in her mouth were removed. It seems likely that the main cause of dermatitis was mercury-related toxicity due to the amalgams.

Keywords: Dental amalgam, dermatitis, mercury, poisoning.

INTRODUCTION

The construction of restorative and prosthetic dental appliances comprises a wide range of metals. The corrosion of the appliances releases metal ions into the body [1], and the linings of the mouth and the digestive system can absorb these metal ions. Such absorbed metal ions, including mercury, can move throughout the body, potentially causing allergic reactions and/or metal poisoning anywhere within the body. Many dental metals may become allergens [2]. Moreover, it is said that there is cytotoxicity also in the composite resin which may replace amalgam [3]. Dermatitis caused by allergic reactions to mercury in dental amalgams is well known in the medical community [4-6]. We experienced a case of possible intractable dermatitis, which may have been caused by mercury poisoning rather than an allergic reaction. There are two main reasons for this hypothesis. First, the subject underwent a patch test, which was negative to all the metals in her mouth. Second, her dermatitis dramatically improved after the amalgam was removed from her mouth. Mercury poisoning is a disease caused by exposure to mercury or its compounds. Mercury is a heavy metal occurring in several forms, all of which can produce toxic effects in high enough doses. Symptoms typically include sensory impairment (i.e., vision, hearing, and speech), disturbed sensations, and a lack of coordination. The type and degree of the symptoms exhibited depends upon the individual toxin, dose, and method and duration of exposure [4]. In the case presented in this study, amalgam-related mercury toxicity was likely the main cause of the dermatitis. Unfortunately, the underlying mechanism of severe dermatitis due to high levels of mercury is unclear. Further research is required on this issue.

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CASE

Subject: The subject was a 46-year-old woman. She was a normal housewife.

Chief Complaint: A rash on her head, face, and torso.

Clinical History

The subject's symptoms first began as a rash with small, well-defined circular spots on her face and torso, more than two years before treatment began. She was initially diagnosed with atopic dermatitis by a dermatologist, and therefore, topical steroids were prescribed. The treatment was discontinued after six months because no noticeable improvement was observed. The rash became worse approximately two weeks after the steroid treatment was discontinued. The subject's condition remained relatively unchanged for the next year and a half. At which point, she sought treatment at our institution.

Initial Physical Condition

The rash was extremely severe on her face and neck (Figure **1**). The subject also presented with intense itching, and therefore, many scratch marks were observed (Figure **1**).

Initial Oral Condition

The subject still had 29 adult teeth, including the upper left wisdom tooth. She also had two restoration teeth likely made from silver alloy, containing gold and palladium. In addition, nine teeth had amalgam fillings, which were filled more than 10 years ago, and one tooth had an untreated dental caries.

The subject's gums and oral membranes appeared healthy, even where the membranes and gums contacted with the dental metals in her mouth. Moreover, she did not report any discomfort in her mouth.

E-ISSN: 2311-8695/14

Figure 1: The rash on the subject's face and neck was severe. She also reported extreme itching, which caused her to scratch, leading to many scratch marks all over her face.

Laboratory Findings

The subject's dermatologist performed a metal patch test, which highlighted an allergy to cobalt and nickel. These metals are not included in amalgam alloy. Neither of these metals were present in her mouth. Hence, her dermatitis was likely not allergy related.

The dermatologist also performed a blood test, and no abnormalities were observed in her immunoglobulin E antibody (I g.E) level. Further more, an examination of her family and personal medical history revealed no predisposition to a topic dermatitis or instances of allergic reactions. However, her hair analysis showed high levels of mercury (Table **1**).

Table 1: Hair Analysis Results

Metal	Concentration (ppm)	Reference interval (ppm)
Bismuth	0.087	< 2.0
Cadmium	0.016	< 0.05
Lead	0.30	< 0.6
Mercury	2.27	< 0.8
Nickel	0.17	< 0.3
Silver	0.02	< 0.15

*ppm = parts per million = µg/g.

Treatment and Progress

The author was unable to determine any other source of the subject's abnormally high mercury levels other than her amalgam fillings (Table **1**). As a result, all of her amalgam fillings were removed, including nine molar and premolar fillings. Every precaution was taken to avoid further exposure to mercury during the removal of the amalgam fillings. A rubber dam and an outside suction were used to prevent the subject from swallowing the amalgam debris or inhaling any mercury vapor [7-9] (Figure **2**). The amalgam fillings were replaced with gold alloy inlay and glass ionomer cement fillings. Further, the untreated caries was restored using the same gold alloy inlay.

Figure 2: The amalgam removal procedure. A rubber dam and external suction were used in order to prevent the patient from swallowing any of the amalgam debris or inhaling any mercury vapor.

The subject's rash began to improve soon after the replacement of her fillings. There was a noticeable improvement after two weeks, and after five months, the rash and itchiness almost completely disappeared (Figure **3**). Symptoms did not reoccur.

Figure 3: About five months after the removal of the amalgam fillings, the subject's dermatitis and itching markedly improved.

DISCUSSION

In dentistry, amalgam fillings containing approximately 50% mercury have been used for almost 200 years and have been controversial almost ever since. The SCENIHR has stated that while amalgam fillings are potential sources of allergic reaction, they do not pose any threat of adverse systemic effects [10]. On the other hand, Wojcik, *et al*. [11] have reported systemic disease, including chronic fatigue memory impairment and depression, which appeared to be the result of mercury toxicity. In addition, Wojcic, *et al*. [11] found that removing amalgam mercury fillings when combined with other treatments reduced reports of systemic disease to the levels of healthy subjects. In such a confused situation, further study is required. Recent evidence that amalgam fillings continuously release small amounts of mercury fuels the controversy [12]. Because mercury concentrations in the blood and urine of people who received amalgam restorations are high compared to those who have not received this treatment, it is thought that mercury released from amalgam fillings spreads throughout the body [13-15]. In this case, hair analysis was used instead of blood or urine tests because hair analysis can be performed without any pain or the danger of infection. Moreover, hair samples may be collected, transported and stored. These benefits support the use of hair analysis for evaluating mercury intoxication of the human body [16].

There are many reports of dermatitis caused by allergic reactions to the mercury present in dental amalgams [3]. However, in the present study, according to the patch test performed by the dermatologist in charge, the subject's dermatitis could not be classified as allergy related.

However, the subject's condition markedly improved after the removal of her dental amalgam. We propose that the improvement in her condition was not the direct result of removing an allergen from her body. It appears to be related to a decrease in the subject's mercury levels once the dental amalgam was removed. Although the subject was a normal housewife, so there is little chance of her high mercury levels being the result of environmental exposure, an analysis of her hair showed high levels of mercury [16] (Table **1**), which was likely the result of mercury leaching out of her dental amalgam. Therefore, her dermatitis seems to have been induced by mercury poisoning.

CONCLUSION

In some cases, patients who may not test positively for allergies to dental materials in their mouths may suffer from ailments, such as dermatitis, caused by the same materials. This indicates that symptoms that we associate with allergic reactions may not always be caused by allergic reactions. Sometimes, the source of such symptoms is more complicated. Therefore, a more comprehensive treatment, which includes the cooperation of dentistry and medicine, is needed.

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Received on 25-07-2014 Accepted on 29-07-2014 Published on 22-12-2014

DOI: http://dx.doi.org/10.12974/2311-8695.2014.02.02.4