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Removal of dental amalgam fillings and its influence on saliva morphological picture – case report

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ABSTRACT

The influence of dental restorative materials on patients' general and oral health is the main interest of many researchers but the question of their safety is still under consideration. An otherwise healthy 23-year-old patient with no history of oral abnormalities was examined. Dental amalgam restorations were replaced by composite resin material. Salivary smears prepared two days and two weeks after the amalgam removal were compared with those taken before the procedure.

Key words: saliva, dental amalgam, composite material

INTRODUCTION

Dental amalgam is a commonly used restorative material, especially for restorations in premolars and molars, due to its durability and resistance to mastication. Longevity of dental amalgam fillings is much higher than this of resin based composite material. Removing dental amalgam fillings for aesthetic reasons is one of the most frequent patients' request in dental practice, and one of the most controversial as well [1].

Every restorative material, especially that used improperly, may have a harmful influence on patients' general and oral health. However, it is dental amalgam that has a very bad reputation. It is known to release mercury, silver, copper and zinc and is usually blamed for symptoms and diseases of unknown etiology [2, 3]. Dental amalgam shows the highest ion release during and directly after the application and removal procedures [4]. In most patients, daily amalgam exploitation does not affect general or oral health. However, such symptoms as discoloration of the oral mucosa, an amalgam tattoo, lichen planus, irritability, depression, numbness and tingling of the extremities, frequent urination at night, chronic fatigue, cold hands and feet, bloating, memory loss, anger and constipation are rarely reported [5-7].

On the other hand, in the moist oral cavity environment composite materials also release cytotoxic, mutagenic and genotoxic substances, but the public is not well informed about this matter [8].

The large number of studies evaluating the influence of substances released from dental materials are carried out with *in vitro* methods. Considering the disproportion of concentration of substances used during the *in vitro* study, real *in vivo* status and complex oral environment composition that include many protective factors, the results should be verified.

The aim of the study was to compare morphological pictures of saliva, collected from the patient with amalgam restorations, before and after the removal of amalgam fillings.

CASE PRESENTATION

A twenty-three-year-old, otherwise healthy non-smoking male with no complaints or any sign of oral cavity disease was qualified to the study. Patient's medical history was taken and an intraoral examination was performed. Oral status described by DMF count was 21 (10 amalgam and 11 composite fillings, no decayed or missing teeth). The non-stimulated, mixed saliva was collected in the morning (8:30 am) before the dental amalgam removal and the saliva smear was prepared. During one month, at four appointments, all amalgam fillings were replaced by composite resin material. The removal procedure followed the protocol involving rubber

Figure 1. **The salivary smear of patient before the procedure of the removal of dental amalgam. Picture show a large number of epithelial and inflow cells. May-Grünwald-Giemsa stain. Mag. x 200.**

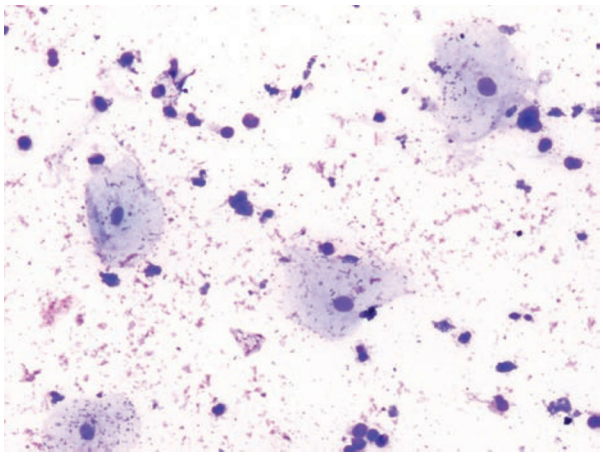


Figure 2. **The salivary smear of patient before the procedure of removal of dental amalgam. The picture of oral epithelial cells differ a lot in shape, size, nucleus-to-cytoplasm ratio and intensity of staining. May-Grünwald-Giemsa stain. Mag. x 200.**

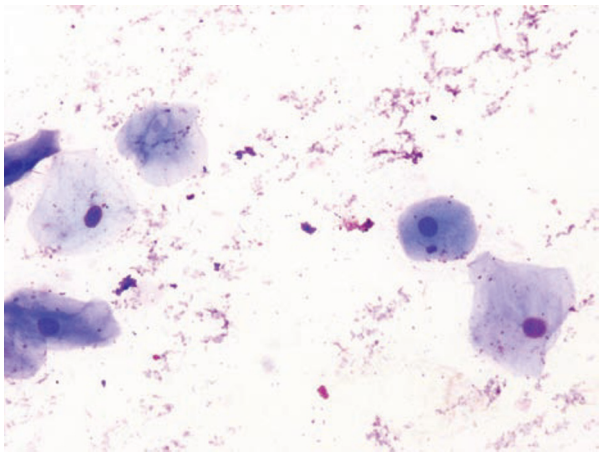


Figure 3. **The salivary smear two days after the procedure of dental amalgam removal. Significant alterations of morphological picture of oral epithelial cells, especially in shape, size and intensity of cytoplasm staining. May-Grünwald-Giemsa stain. Mag. x 200.**

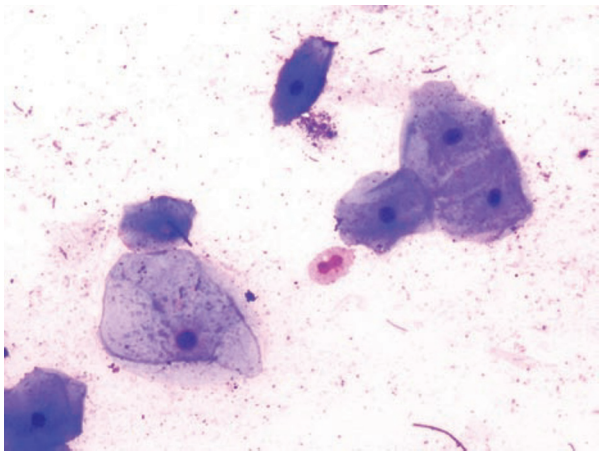
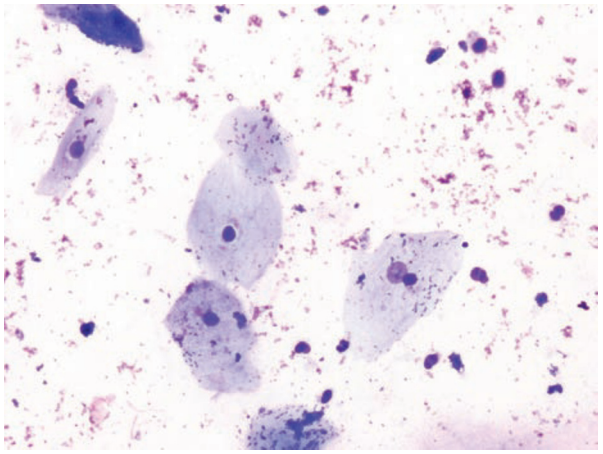


Figure 4. **Salivary smear two days after procedure. The large number of inflow cells can be noticed. May-Grünwald-Giemsa stain. Mag. x 200.**



dam, rinsing the working area with water, evacuation behind the dam, evacuation over the tooth, cutting away rather than drilling out the amalgam filling in order to protect the patient, dentist and dental staff from single high mercury exposure. The saliva was collected two days and two weeks after the removal of all dental amalgam fillings. The smears were fixed in 98% ethanol and the May-Grünwald-Giemsa staining was performed.

A large number of all cell types in saliva collected before the procedure was observed. High amount of inflow cells, such as lymphocytes and neutrophiles, was significant (*Fig. 1*). Oral epithelial cells showed morphological alterations. Cells varying in size and shape were observed in one field of vision (mag. x 200). Some of them had a big nuclei, while the others contained a smaller, pycnotic nuclei, thus the nucleus-to-cytoplasm ratio differed a lot (*Fig 2*).

Two days after the removal of all amalgam fillings, previously observed alterations in the morphology of salivary cells were still substantial, in some pictures even more pronounced. In particular, irregular shape, different sizes and changes in the intensity of cytoplasm staining of epithelial cells were noticed (*Fig. 3*). The large number of inflow cells was also observed (*Fig. 4*).

Two weeks after the procedure, we detected epithelial cells similar in size, shape and nucleus-to-cytoplasm ratio (*Fig. 5*). Only the difference in intensity of cytoplasm staining could be seen (*Fig. 6*). In comparison to previous observations, the amount of inflow cells decreased.

Figure 5. **The smear of patient two weeks after the procedure of replacing dental amalgam by composite material. Epithelial cells regular in shape, similar in size and nucleus-to-cytoplasm ratio. May-Grünwald-Giemsa stain. Mag. x 200.**

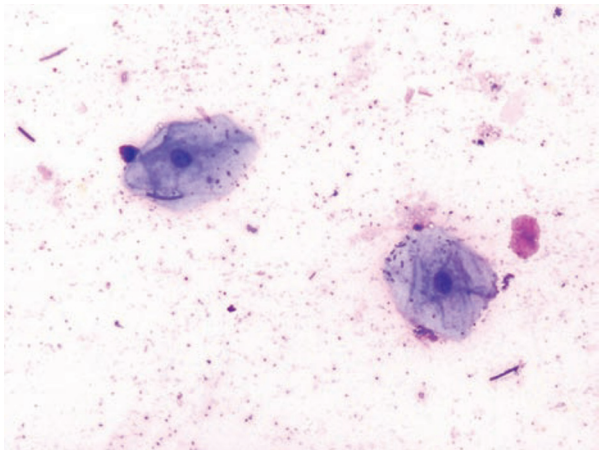
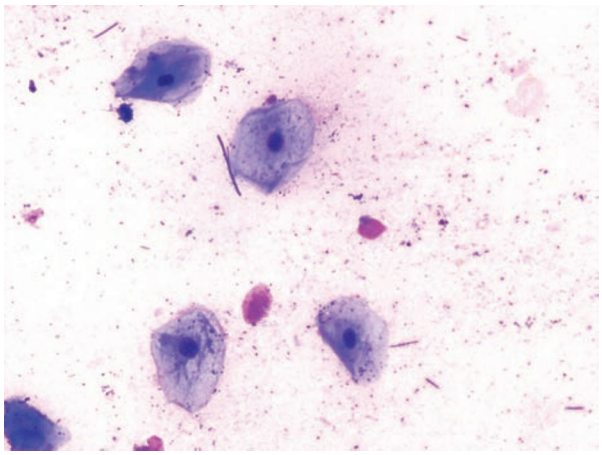


Figure 6. **The smear of patient two weeks after the procedure of replacing dental amalgam by composite material. Slight differences in cytoplasm staining and only few inflow cells can be observed. May-Grünwald-Giemsa stain. Mag. x 200.**



DISCUSSION

Many researchers consider replacing dental amalgam fillings with composite resin material. However, they focus on measuring levels of mercury and other metal ions in saliva, blood, urine and feces [4, 9]. Some of the studies investigate the influence of removal of dental amalgam on improvement in local or general abnormalities course [10]. There is a few reports investigating the effect of dental restorative materials, including amalgam, on salivary cells [11-14]. Due to poor scientific evidence, the present study was conducted to evaluate the influence of replacing dental amalgam fillings with composite resin materials on epithelial and inflow cells in salivary smears.

The epithelial and inflow cells alterations, such as a large number of all cell types, changes in size, shape and nucleus-to-cytoplasm ratio, noticed before the procedure, were similar to those observed in our previously published data on patients with amalgam restorations [13, 14]. It should be noted, that the patient had no complaints before and after the procedure and no abnormalities during oral mucosa examination were detected.

Two days after replacing dental amalgam with composite material, morphological changes of salivary cells were major and even more pronounced than before the procedure. Our study confirmed the observations of Björkman et al [4] and Kirkevang et al [7] who claimed that the largest ion release from dental amalgam occurs after the placement and removal of dental amalgam. The picture of salivary cells tested two weeks after the procedure was similar to salivary smears observed in patients without any amalgam or composite restorations used in our previous study as a control group [13, 14]. Slight changes in cytoplasm staining resembled those observed in patients with composite resin restorations [14].

CONCLUSIONS

We find the result of our study interesting, but since it is only a single case, further investigation should be performed to confirm our observations.

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