EARLY EFFECTS OF AMALGAM RESTORATION ON TASTING ABILITY

ABSTRACT

Background and Aim: The aim of this study is to test the possible side effects of amalgam restorations on gustatory function with a whole-mouth, above threshold test (with bitter, sour, sweet and salty taste solutions) 1 to 7 days after their placement.

Subjects and Methods: Measurements were recorded before Class II amalgam fillings, after 24h and after 1 week. Interevaluation period comparisons were performed using Friedman Test. (p=0.05).

Results: For female subjects, there was a difference between the sweet and salty scores pre-restoration and after 1 day (p<0.05). For male subjects, there was a difference between the salty scores pre-restoration and after 1 day (p<0.05). There was a difference between the sweet scores pre-restoration and after 7 day (p<0.05). There was also difference between the sour scores pre-restoration and after 1 day (p<0.05).

Conclusion: In the present study, sweet and salty tastes were affected by amalgam restoration; however, further studies are needed to obtain more information about amalgam restoration on tasting ability.

Keywords: Amalgam, Taste, Mercury

Submitted for Publication: 09.28.2016
Accepted for Publication: 02.15.2017

AMALGAM RESTORASYONUN TAT ALMA YETENEĞİNE ERKEN DÖNEMDEKİ ETKİSİ

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ÖZ

Amaç: Bu çalışmanın amacı, amalgam restorasyonlarının tat alma hissi üzerindeki olası yan etkilerini, tüm ağız eşik testi ile (аци, ekşi, tatlı ve tuzlu tat çözeltleri kullanarak) dolgu yerleştirildikten sonra 1. ve 7. günlerde test etmektir.

Bireyler ve Yöntem: Ölçümler, Sınıf II amalgam dolgular yapılmadan önce, 24 saat sonra ve 1 hafta sonra kaydedildi. Dönemler arası karşılaştırmalar Friedman Testi kullanılarak yapıldı (p= 0.05).

Bulgular: Kadın denekler için, restorasyon öncesi ve 1 gün sonrasında; tatlı ve tuzlu skorlar arasında bir fark bulunmaktadır (p<0.05). Erkek denekler için restorasyon öncesi tuzlu skorları ile 1 gün sonrası arasında bir fark bulunmaktadır (p<0.05). Tatlı skorlarında restorasyon öncesi ile 7 gün sonra arasında fark gözlenmiştir (p<0.05). Ekşi skorları için restorasyon öncesi ve 1 gün sonrası arasında da fark gözlenmiştir (p<0.05).

Sonuç: Bu çalışmanın sonuçlarına göre tatlı ve tuzlu hisleri amalgam restorasyonundan etkilenmiştir; bununla birlikte, amalgam restorasyonların tat alma kabiliyeti üzerine olan etkileri hakkında daha fazla çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Amalgam, Tat, Civa


Yayına Kabul Tarihi : 15.02.2017
INTRODUCTION

Taste is a sensation that is typically elicited during eating and drinking. From a physiological perspective, this impression is a result of simultaneous input from three different sensory systems: retronasal olfaction, mechano- and chemo-sensitivity via the trigeminal nerve, and the gustatory system. Taste buds are peripheral structures responsible for sensing taste compounds in food and drink. Taste bud homeostasis can be disrupted under various disease conditions, by gustatory nerve damage, or by exposure to toxic compounds. The main reasons for taste disorders are cranio-cerebral injury, infection of the upper respiratory tract, exposition to toxic substances, iatrogenic causes (e.g., radiation, middle ear surgery, tonsillectomy, dental operation), and side effects of medication and burning mouth syndrome. Toxic substances may also lead to alterations in taste receptor activation or may even reduce the number of taste receptors present. There have been several studies on metals and taste bud homeostasis. The main reasons for taste disorders are cranio-cerebral injury, infection of the upper respiratory tract, exposition to toxic substances, iatrogenic causes (e.g., radiation, middle ear surgery, tonsillectomy, dental operation), and side effects of medication and burning mouth syndrome. Toxic substances may also lead to alterations in taste receptor activation or may even reduce the number of taste receptors present.

SUBJECTS AND METHODS

Ethical approval for the investigation was obtained from the university ethics committee in November 2010. Thirty patients who consulted the faculty of dentistry for routine dental treatment were included in this study. All patients had at least one approximal caries and had no fillings in their mouth. Of the total subjects, 15 were women (age between 18-30 years) and 15 were men (age between 18-30 years). All patients participating in the study were required to fulfill the following criteria: not to be taking any medication, having good oral hygiene, not smoking, not having any systemic disease and not having any history that could affect gustatory function. Informed consent was obtained from all the participants. Periodontal examination and treatment of the patients were performed one week before the restoration process.

Whole-mouth, Above Threshold Taste Test

To test gustatory function, a whole-mouth, above threshold test (with bitter, sour, sweet and salty taste solutions) 1 to 7 days after their placement.
given in increasing concentrations. The patients were then asked to identify the quality (salty, sour, sweet, bitter, or tasteless) and intensity of each test solution. “Tasteless” was the inability of the participant to perceive a taste at any of the levels of concentration. The threshold of each solution was determined by scoring the lowest concentration as “9” and the highest concentration as “1”. Answers were noted regardless of their correctness; no feedback was given to the patients during testing.17, 18

After the initial taste test, standard Black II (mesio-occlusal or disto-occlusal) cavities were prepared, and zinc phosphate cement (Adhesor® Fine SpofaDental Czech Republic) was used as a liner, followed by placement of high copper Cavex Avalloy II (Cavex, Haarlem, The Netherlands) spill lathe-cut amalgam. Burnishing was applied with an egg-shaped burnisher after carving to improve the physical properties.19-21 Patients who had pain were anesthetized by an infiltrative technique with Ultracain D-S (articaine hydrochloride 4% with epinephrine 1:200,000, Sanofi Aventis, Turkey). Regional (mandibular) anesthesia was not used to eliminate possible nerve damage. A single restoration was placed for each patient. The second taste test was performed after 24 hours; the third taste test was performed after 1 week.

The obtained data were statistically analyzed using SPSS software version 20. Inter-evaluation period comparisons were performed using Friedman Test. (p=0.05)

RESULTS

When comparing taste scores (1-9); low values indicate that patients perceived taste at higher concentrations, for example score 1 means the highest concentration and score 9 means the lowest taste concentration. Only intergroup comparisons of same taste group were analyzed, no comparisons made between different taste groups. For female subjects, there was no statistically significant difference (Table 1 and Figure 1) in the bitter and sour scores pre-restoration, after 1 day and after 7 days (p>0.05). There was a difference between the sweet scores pre-restoration and after 1 day (p=0.009), the 1-day results were significantly lower. There were no statistically significant differences between the results pre-restoration and after 7 days or between the 1-day and 7-day results for sweet scores (p>0.05). For salty scores, there was a difference between the results pre-restoration and after 1 day (p<0.001), the 1-day results were significantly lower. There were no statistically significant differences between the results pre-restoration and after 7 days or between the results after 1 day and 7 days for salty scores (p>0.05).

DISCUSSION

This study tested early taste perception differences after single amalgam restoration. Some tastes were affected after restoration.

Several authors have reported on gender differences in taste thresholds in adults. For this reason the data was analyzed separately for male and female in this study.22-24 Taste disturbance after dental anesthesia by inferior alveolar nerve block reported in some patients so in this study only infiltrative technique was used to avoid possible nerve damage.17, 25

Mortazavi et al.26 investigated the effects of high-field MRI on mercury release from dental amalgam filling. Amalgam restorations were exposed to high-field MRI after 24 hours, and there were significant differences found in the urine mercury levels compared with the control group. According to this finding, it should be considered that amalgam restorations might release a higher concentration of metallic components in the early stage. Mercury release from the amalgam could influence taste. However, fresh amalgam will also release many other ions from the surface, as the restoration will not have a corrosion layer on its surface.
This may be the reason for taste change. This study showed that amalgam restoration affected gustatory function 1 day and 7 days after their placement. For both genders, bitter taste did not change. For female subjects, the sweet and salty tasting ability were decreased at 1 day, but after 7 days, the tasting ability was recovered. For male subjects, the salt and sour tasting ability was decreased at 1 day, but after 7 days it was recovered; however, sweet tasting ability was decreased at 7 days.

One of the limitations of this study is the lack of knowledge about amalgam restoration and post-restoration taste changes, so we cannot compare our results with other studies. Another limitation was the time period; the effects of amalgam restorations on tasting ability should be evaluated in long-term studies. Tasting abilities may recover or change after a period of time or in the long-term, but it should also be considered that in a long-term study, consistent oral and physiological conditions couldn’t be assured. The reason for testing 1st day and 7th day results to ensure same or close oral and physiological conditions. Different time and health conditions may alter the subjects’ tasting ability.

Size and amount of tested material also could affect the results. This study provides data on the effect of a single restoration on gustatory function. Further studies could be assess the effects of multiple amalgam restorations and

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restoration size on gustatory function but it would seem with the dental federations mandating the reduction of amalgam use, and seeing this occurring in many parts of the world.

**CONCLUSIONS**

Within the limitations of this early period in-vivo study,
- Bitter taste was not affected by amalgam restoration.
- Sour taste was affected for only male subjects by amalgam restoration.
- Sweet and salty tastes were affected for both genders by amalgam restoration.
- Further studies are needed to obtain more information about amalgam restoration on tasting ability.
EFFECTS OF AMALGAM RESTORATION ON TASTING

Figure 2. Median values of test scores and interquartile range for male subjects *: Significant difference (p<0.05)

REFERENCES


