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The overhang rate in posterior teeth restorations among a sample of patients from Sari City, Iran, in year 2017

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Original Article

Abstract

BACKGROUND: Overhang is the extension of restoration material from the prepared cavity. Restoration overhangs have an important role in plaque accumulation, caries, severe gingival inflammation, and periodontal diseases. Therefore, the aim of this study was to determine the frequency of restoration overhanging, and the managements in order to reduce its prevalence and subsequent complications.

METHODS: This descriptive cross-sectional study was conducted on 277 patients, who had at least one restoration in the proximal surface of posterior teeth. At first, all the patients were examined using a mirror, and dental floss under the light of the dental chair. In cases in which the existence of the overhang was suspected, Bitewing radiography was operated on respective regions. Data were analyzed using SPSS software.

RESULTS: 120 teeth had overhangs (19.60%) and 492 (80.39%) exhibited no overhangs. From 120 restorations with overhang, 76 (63.33%) were amalgam restorations, and 44 (36.66%) were composite restorations. In total, 55.83% of them (67 restorations) were in maxilla and 44.16% (53 restorations) were in mandible. The prevalence of overhang in mandible was as 37.73% in mesial regions, 54.71% in distal regions, and 7.54% in mesial-occlusal-distal (MOD) regions; in addition, the prevalence rate in maxilla was as 38.80% in mesial regions, 58.20% in distal regions, and 2.98% in MOD.

CONCLUSION: The overall frequency of restoration overhang was 19.60%, most of which was in amalgam restorations in comparison to composite restorations; and it is mostly seen in distal surfaces of maxillary teeth.

KEYWORDS: Prevalence, Overhang, Posterior Teeth, Composite Resin Restoration

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Introduction

Loss of teeth due to decay and periodontal diseases cause several issues in function (chewing, speaking, etc.) beauty, health, and patient comfort. Thus, restoration and prosthesis treatments are used to return proper function to dental system of patient.[1,2] Amalgam has still been the most common restorative material which is used to restore decays.[3] High fracture resistance of this material in posterior teeth and cores, demonstrating low technique sensitivity, having favorable results concerning microleakage, and being affordable are the reasons why we use amalgam in our treatments.[4]

The main cause of gingival inflammation is due to bacterial plaques, calculus, overhang, orthodontic treatment, radiation therapy, smokeless tobacco, iatrogenic factors, the restoration materials, and the design of removable partial dentures.[3] Overhang is the extra-amount of restoration which is out of prepared cavity.[5] Overhang in amalgam

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restorations is a considerable issue in oral hygiene.[4] The most common local factor causing periodontal disease in adults is overhanging dental restorations, and despite all efforts and techniques, Class II composite restoration will result in marginal overhang.[5] In the past, it was difficult to create a good proximal contact with composite resin, as this material cannot be condensed like dental amalgam. However, now we can establish tight proximal contact using special separation rings.[6]

A review study on the prevalence of overhanging dental restorations reported the interproximal overhang from 25% to 76%.[7] Restoration methods,[3] and variable morphologies in cervical aspect of the tooth such as furcation, fluting, and concavities are the most common causes of poor restorations with overhang, which makes it difficult to place a wedge and matrix band, and to make marginal adaptation.[4] Overhanging margins of dental restorations are the risk factors for periodontal diseases by changing the ecologic balance of the gingival sulcus to a desired area for growing disease-associated organisms (mainly Gram-negative anaerobic species), inhibiting patient's access to remove plaque, and it also causes caries.[3,7-11] The position of gingival margin, compared to restoration margin, has direct effect on adjacent periodontal tissues; so the incorrect restoration margin or subgingival margins can be associated with reduction in bone height, high plaque accumulation, severe gingival inflammation, deep pockets, and periodontal disease.[12-19] In summary, restorations must be based on tooth anatomy considering quality and proximal surface condition, contour, embrasures, and the ending level of margins.[20]

The aim of this study was to assess the overhang frequency in patients, and the managements in order to reduce its prevalence and subsequent complications.

Materials and Methods

This descriptive cross-sectional study was performed to investigate the prevalence of overhang (OH) in posterior teeth restorations. This study was completed over a period of 6 months, from May to October 2017. All individuals who visited a private dental office, Sari, Iran, and had at least one restoration in proximal surface of posterior teeth (molar and premolar), were included. People, with trismus or mental disorders such as mental retardation, which hindered effective communication, were excluded. Moreover, patients with restorations, that the existence of overhang in them was suspected but not confirmed, were excluded. Eventually, 277 patients were examined by two expert dentists. Written informed consent was obtained from all the participants.

At first, all the patients were examined by a mirror, and dental floss (Oral B, P & G GrossGerau, Germany) under the light of dental chair. In case of sticking or tearing of the flossing tape, the existence of overhang was suspected, and to confirm clinical findings, Bitewing radiography was operated on respective regions. Radiographies were conducted with Kodak photographic film (Estman Kodak, New York, NY, USA) and radiographic equipment (Planmeca ProX™; Planmeca Oy, Helsinki, Finland).

The data were analyzed using chi-square test via SPSS software (version 23, IBM Corporation, Armonk, NY, USA).

Results

According to the mentioned inclusion and exclusion criteria, 277 patients were included in this study. In total, 612 teeth had restorations in proximal surfaces and according to examination, 120 teeth had overhangs (19.61%) and 492 teeth (80.39%) exhibited no overhangs, the difference was statistically meaningful [$\chi^2 = 228.118$, degree of freedom (df) = 1, $P < 0.001$].

Among all the successful restorations, 359 restorations (72.96%) were carried out

Table 1. The frequency of restorations without overhang according to the surfaces

Site \ Surface	Mesial	Distal	MOD	Total
Maxilla	146 (67.59)	65 (30.09)	5 (2.31)	216 (43.90)
Mandible	145 (52.53)	123 (44.56)	8 (2.91)	276 (56.10)
Total	291 (59.14)	188 (38.21)	13 (2.64)	612 (100.00)

The amounts are presented as number (percent).
MOD: Mesial-occlusal-distal

using amalgam, and 133 restorations (27.03%) were performed using composite. There was a statistically significant relationship between the types of restoration and the overhang frequency ($\chi^2 = 5.125$, df = 1, P = 0.024).

Furthermore, out of all restorations with no overhangs, 216 were in upper jaw; and with respect to dental surfaces, 146 were in mesial, 65 in distal regions, and 5 in mesial-occlusal-distal (MOD) regions. On the other hand, 276 of restorations without overhangs were in lower jaw. With respect to dental surfaces, 145 were in mesial and 123 in distal (Table 1).

From 120 restorations with overhang, 76 (63.33%) were amalgam restorations, and 44 (36.67%) were composite restorations. In total, 55.83% (67 restorations) of them were in maxilla and 44.16% (53 restorations) were in mandible.

The prevalence of overhang in maxilla was as 38.80% in mesial, 58.20% in distal, and 2.98% in MOD regions. In addition, the prevalence rate in mandible was as 37.73% in mesial, 54.71% in distal, and 7.54% in MOD regions (Table 2).

There was no statistically significant relationship between teeth location and restoration success ($\chi^2 = 0.003$, df = 1, P = 0.096).

Discussion

Overhang is one of the most common factors that cause periodontal disease in adults.[21] Restoration overhangs cause plaque accumulation, caries, and periodontal diseases.[22] We assessed overhang using clinical examination methods (dental floss), and bitewing radiographies. In this study, overhang and successful restoration frequencies were 19.6% and 80.4%, respectively, with a statistically meaningful difference. In other studies by Sikri and sikri,[20] Quadir et al.,[22] Svensson,[23] and Pack et al.,[24] the restoration overhangs frequency was high, too.

The relationship between the prevalence of overhangs and restorative material (amalgam and composite) was significant in the present study. This finding could be attributed to dentist ability in accessing and isolating teeth during restoration, cause composite more sensitive technique than amalgam. However, there was no statistically significant relationship between teeth location and restoration success. Similar to our study, Quadir et al.[22] reported no significant relationship between the prevalence of overhangs and teeth location (P = 0.063). These results are not consistent with those obtained by some other studies,[10-25] as their results revealed that overhang frequency was higher in the maxilla than the mandible, which was attributed to the easy accessibility of the mandibular teeth.

Table 2. The frequency of restorations with overhang according to the surfaces

Site \ Surface	Mesial	Distal	MOD	Total
Maxilla	26 (38.80)	39 (58.20)	2 (2.98)	67 (63.33)
Mandible	20 (37.73)	29 (54.71)	4 (7.54)	53 (36.67)
Total	46 (38.33)	68 (56.66)	6 (5.00)	120 (100.00)

MOD: Mesial-occlusal-distal

Tavangar et al.[26] assessed overhang frequency with respect to jaw side, and found no significant relationship. Moreover, they found a higher frequency of overhang in distal surfaces and in posterior teeth (P = 0.498),[26] which was consistent to the other study performed in Pakistan.[22]

These inconsistencies may be attributed to a relatively smaller sample size obtained from a private dental office in this study, compared to those treated by different dentists.

Amalgam is still the most common restorative material used in restorations, and according to studies, the highest frequency of overhang is related to amalgam restorations.[1] We found higher frequency of overhangs in amalgam restorations, which could be due to inaccuracy of the dentists to place wedge or not to use it, and incorrect using of matrix bands. Tough, in addition to the mentioned factors, variation in dental malformations is also considerable.

Conclusion

The prevalence of overhanging restorations was 19.60% in this study. In total, 55.83% and 44.16% of restorations with overhang were in maxilla and mandible, respectively. Amalgam restorations had more overhanging margins than composite restorations, whereby most of them were observed in distal surfaces of maxillary teeth, which may be a result of difficult accessibility of this area, during restoration, for dentists.

Conflict of Interests

Authors have no conflict of interests.

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