

The Reasons for Composite Restoration Replacement in Patients of the Restorative Department of Babol Dental School

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Received 2014 November 25; Revised 2015 April 3; Accepted 2015 April 6.

Abstract

Background: Dental composites are popular restorative material. The success of these restorations depends on many factors.

Objectives: The purpose of this study was to investigate the reasons for replacing composite restorations in patients who had referred to Babol dental school during years 2013 and 2014.

Patients and Methods: Age, sex, type of occlusion, DMF, existing parafunction, type of tooth, class and reason of composite restoration replacement was recorded for patients who had referred to the Babol university of dentistry during years 2013 and 2014. Data analysis was done using descriptive statistical analysis.

Results: Among 242 patients, there were 56 (21.3%) males and 186 (70.7%) females. More than half of the patients were aged between 20 and 30 years old (51.7%), and had class I dental occlusion (63.1%). The mean DMF was 9.4 ± 2.8 . Upper incisors were the most frequent teeth group for replacement of composite restorations, commonly due to secondary caries. Major causes for composite restoration replacement were secondary caries. The most common composite restoration replacements were class II restorations. Secondary caries was the most prevalent cause in class II MO / DO (20 cases (34.4% with secondary caries)).

Conclusions: The most common cause of restoration replacement in patients referred to the Babol university of dentistry during years 2013 and 2014 was secondary caries that were found in Class II restorations.

Keywords: Restoration Cause, Composite, Patients

1. Background

Dental composites are currently used as a popular restorative material in dentistry. They have achieved great acceptability among patients and dentists due to their beauty and conservative nature (1).

Studies have shown that dental composites are suitable restorative material yet require great sensitivity (2) while complete prevention of marginal microleakage is not possible (1).

The success of a restoration depends on many factors such as type and size of restoration, type of tooth (3), clinician experience (4), tooth location in the dental arch (5), the amount of restored tooth surfaces (6) and age of the patient (7). Failure in restoration occurs when beauty, function or the ability of the restoration to prevent new caries are endangered (3).

According to previous studies, the main reasons for replacing composite restorations include secondary caries, fracture of restoration, marginal discoloration, tooth sensitivity, periapical abscess or loss of restoration anatomy. The confounding factors in the failure of composite restorations include dentist's experience, type of

composite and dentine bonding material, isolation quality and age of the restoration (8).

Despite disadvantages of cross-sectional studies, useful information could be obtained from these studies. Such researches are the most useful method for recording the daily practice of dentists. Therefore, rather than controlled- and ideal-condition treatment the results of the dentist's daily practice will be assessed (9, 10).

The obtained data on the causes of restorations replacement specifies the basis and framework for recording treatment patterns in order to prevent future failures. Amongst factors affecting the results of such studies, national differences and the time of the study can be mentioned. Thus, such researches should be conducted in different countries and regions and at different times.

2. Objectives

The purpose of this study was to investigate the reasons of replacing composite restorations in patients who had referred to the Babol Dental School during years 2013 and 2014.

3. Patients and Methods

Amongst patients who had referred to the Babol university of dentistry during the years 2013 and 2014, those requiring replacement of composite restoration were enrolled in this study.

After obtaining informed consents, patients were examined by one of the researchers and the study form was filled. The form of the study included three parts. The first part of the form was about patient information such as age and sex. For ethical reasons name of the patients was not recorded.

The second part of the form was based on oral examination, including type of dental occlusion, existing of para-function and DMF.

The third part of the form recorded the results of the evaluation of the existing composite restoration. In this part the type of tooth with failed composite restoration was recorded (upper/lower molar, upper/lower premolar, upper/lower canines, upper/lower incisors). Class of the failed composite restoration (class 1, class 2 MO/DO, class 2 MOD, class 3, class 4, class 5, class 6 and complex) and reasons of restoration replacement (primary caries, secondary caries, restoration fracture, loss of restoration, tooth fracture, open proximal contact, overhang, pain/sensitivity, marginal discoloration, bulk discoloration, poor anatomic form and other reasons) were also specified.

The following explanations were provided by the examiners, who recorded the reasons for replacement:

Primary caries: lesion in the original caries of the tooth, which are not related to the existing restoration (11)

Secondary caries: caries detected on restoration margins

Restoration fracture: fracture in isthmus or main body of the restoration

Loss of restoration: loss of all or major parts of the restoration

Tooth fracture: fracture of the tooth adjacent to the restoration

Open proximal contact: space between adjacent teeth

Overhang: excess of restoration that projects beyond the gingival margin

Pain/sensitivity: tooth pain related to the restoration

Marginal discoloration: discoloration in the margin of the restoration

Bulk discoloration: discoloration of the main body of the restoration

Poor anatomic form: any loss of substance due to material degradation and wear (12)

Data analysis was done using the SPSS software, version 19, and conducting descriptive statistical analysis.

4. Results

Among the 242 patients who participated in this study, there were 56 (21.3%) males and 186 (70.7%) females. Twenty-seven patients (10%) were aged between 10 and 20 years old, 136 patients (51.7%) were between 20 and 30 years old,

41 patients (15.6%) were between 30 and 40 years old, 15 patients (5.7%) were between 40 and 50 years old and seven patients (2.7%) were between 60 and 70 years old.

Amongst patients who participated in this study, 166 patients (63.1%) had class I dental occlusion, 48 patients (18.3%) had class II dental occlusion and 28 patients (10.6%) had class III dental occlusion.

The mean DMF was 9.4 ± 2.8 with maximum of 16 and minimum of one.

Frequency of each teeth group, which needed composite restoration replacement was 70 (28.9%) for upper incisors, 54 (22.3%) for lower molars, 44 (18.1%) for upper premolars, 35 (14.4%) for lower premolars, 19 (7.8%) for lower incisors, seven (2.8%) for upper molars, seven (2.8%) for lower canines and six (2.4%) for upper canines.

Major causes for composite restoration replacement were secondary caries, loss of restoration and fractured restoration (Table 1).

Table 2 shows the classification of replaced restorations. The most common classes for composite restoration replacement were class II (MO / DO), class III and class II (MOD).

Table 1. Causes of Composite Restoration Replacement^a

Cause	Values
Primary caries	15 (5.7)
Secondary caries	58 (23.9)
Fracture of restoration	35 (13.3)
Lost restoration	38 (14.4)
Open proximal contact	31 (11.8)
Pain/sensitivity	13 (4.9)
Marginal discoloration	10 (3.8)
Bulk discoloration	9 (3.4)
Poor anatomic form	9 (3.4)
Tooth fracture	0 (0.0)
Over-hang	0 (0.0)
Others	24 (9.9)

^aData are presented as No. (%).

Table 2. Restoration Classes of Composite Restoration Replacement^{a,b}

Class of Restoration	Values
Class 1	19 (7.2)
Class 2 MO/DO	55 (20.9)
Class 2 MOD	39 (14.8)
Class 3	48 (18.3)
Class 5	14 (5.3)
Class 4	23 (8.7)
Class 6	0 (0.0)
Complex	44 (16.7)

^aAbbreviations: DO, Distocclusal; MO, Mesiocclusal; MOD, Mesiocclusodistal.

^bData are presented as No. (%).

Secondary caries was the most prevalent cause in class II MO / DO (20 cases (34.4% of cases with secondary caries)), class III (19 (32.7%)), class II MOD (7 (12%)), complex restorations (7 (12%)), class V (3 (5.1%)), class I (1 (1.7%)) and class IV (1 (1.7%)).

The most prevalent teeth group for accruing secondary caries in composite restoration was upper incisors (18 (31%)), followed by upper premolars (11 (18.9%)), lower premolars (9 (15.5%)), lower molars (7 (12%)), upper molars (5 (8.6%)), lower incisors (4 (6.8%)), lower canines (2 (3.4%)) and upper canines (2 (3.4%)).

5. Discussion

The results of this study showed that secondary caries were the most common reason for replacement of composite restorations in patients who had referred to Babol dental school during years 2013 and 2014; these caries were mostly found in class II (MO / DO and MOD) restorations. Secondary caries, as a histopathological complication, depend on the gap between the teeth and the restoration (13, 14), and gingival regions of Class II, III, IV and V of restorations are common locations for secondary caries. Class I and Class IV of restorations, which do not reach the gums are less likely to develop secondary caries (15, 16). A number of factors can contribute to the creation of gaps and secondary caries at the gingival margin. It is a difficult area to control clinically during filling procedures and it is the area most difficult to reach by oral hygienists (12).

Due to polymerization shrinkage, resin-based materials tend to create a gap between the restoration and the teeth, especially at the gingival margin of the dentin (12). Thus, a majority of risk factors are related to secondary caries. In this study more than half of the replacement composite restorations were due to secondary caries. Other studies in this field also obtained similar results (3, 8, 12, 17-19). The results of a ten-year-study conducted by Gaengler et al. showed that the most common cause of composite restoration replacement in the first five years was restoration fracture, yet in the next five years the main cause was secondary caries (20). However in other studies, Raskin et al. (21) reported very few secondary caries and Mair et al. (22) did not report any secondary caries in a 10-year-study.

Restoration fracture is the main reason for replacement of composite restorations, as indicated by a number of previous studies (23, 24). However, in the present study replacing composite restorations was ranked third in terms of frequency. This difference in the results may be due to differences in the study population, the applied composite properties, and the dentist and patient-related factors.

In this study, Class 2 (MO / DO and MOD) restoration was the most common class of replacement, found in more than half of the cases. The high prevalence of restoration replacements in this class can be due to problems during restoration in posterior regions such as isolation and more difficult access.

Restoration replacement and secondary caries had the highest frequency in the upper anterior, which could be due to the higher prevalence of anterior composite restorations compared to posterior restorations. Composite restorations are more commonly used for anterior teeth rather than posterior, due to their beauty and high cost. On the other hand, problems such as discoloration of teeth restoration, marginal discoloration and decay can be more easily seen and recognized by the patient in anterior composite restorations than posterior. This is why repair and replacement of anterior composite restorations are the chief complains of the majority of the patients.

Because of the limited sample size in this study and multiple variables it was not possible to evaluate statistical significance between causes and correlation between causes with tooth type and class of restoration. Therefore, the authors of this study suggest future studies with a greater sample size.

In order to eliminate intervention factors such as dentist's skills and the composite type, a prospective study to assimilate the samples is recommended.

Regarding the limitations of this study, the most common cause of replacement of composite restorations in patients who had referred to Babol dental school during the years 2013 and 2014 was secondary caries seen in Class II restorations.

Acknowledgments

The authors acknowledge the dental material research center of the faculty of dentistry of Babol university of medical sciences for supporting this research.

Footnotes

Authors' contributions: Faezeh Abolghasemzade and Homayon Alaghehmand carried out some of the experiments and developed the concept and design of the study; Reza Judi cooperated in carrying out the experiments, analyzed the data and prepared the manuscript.

Funding/Support: This study was supported and funded by Babol university of medical sciences.

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