



Practice of Restorative Dentistry in Iraq: Causes of Replacement of Composite Restorations Northern Iraq

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Abstract

Aims: To investigate the reasons for replacement of composite restorations northern Iraq. **Materials and Method:** Seventy general dental practitioners (GDP) were recruited by personal contact, and asked to provide data on consecutive composite restorations they replaced for adult patients (ranged from 14-year-old to 60 years) over an eight-month period. In addition, a cross-sectional survey was carried out over eight months at the undergraduate student clinics of a University Dental Hospital (DS). The data was analyzed using SPSS software with significance set at $p \leq 0.05$. **Results:** Of the performed 1,338 restoration replacements. The types of restorative materials were 395 (30%) were amalgam, 929 (69%) were composite and 14 (1%) were glass ionomers (GIC). Secondary caries was the most diagnosed failure reason for the replacement of composite restorations (32%), which were more in class II cavities (47%). **Conclusion:** The study exposed different features of the restorative practice in the north of Iraq. The evidences are of importance that the everyday restorative practice will be analyzed by academics to make a progression in the dental services in Iraq.

الخلاصة

الأهداف: تهدف الدراسة الى التحقيق في أسباب استبدال الترميمات المركبة في شمال العراق. **المواد وطرائق العمل:** تم تعيين سبعين ممارسا عاما لطب الأسنان عن طريق الاتصال الشخصي، وطلب منهم تقديم بيانات عن عمليات الترميم المركبة المتتالية التي استبدلوها بالمرضى البالغين (تراوحت أعمارهم بين 14 عاما و 60 عاما) على مدى فترة ثمانية أشهر. بالإضافة إلى ذلك، تم إجراء مسح مقطعي على مدى ثمانية أشهر في عيادات الطلاب الجامعيين $p \leq 0.05$ تم تحليل النتائج عند مستوى الأهمية. **النتائج:** من بين 1338 عملية استبدال للترميمات وكانت أنواع المواد الترميمية مركب راتنج 929 (69%) وملغم 395 (30%) في المائة) و 14 (1%) كانت الأيونات الزجاجية. كان التسوس الثانوي هو سبب الفشل الأكثر تشخيصا لاستبدال الترميمات المركبة (32%)، والتي كانت أكثر في تجاويف الفئة الثانية (47%). **الاستنتاجات:** كشفت الدراسة عن سمات مختلفة لممارسة ترميمات الاسنان في شمال العراق. أن ممارسة ترميمات الاسنان اليومية سيتم تحليلها من قبل الأكاديميين لتحقيق تقدم في خدمات طب الأسنان في العراق.

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INTRODUCTION

Restoration replacements have an important place in the practice of dentistry which can be seen in many studies 1,2. Any restoration placed may need replacement in the future for many reasons. The reasons for replacement of restorations may vary depending on restorative material, patient, and clinician-related factors 3-5. Over the last 30 years, a major change has been seen in the philosophy of restorative dentistry 6. Better understanding of the factors involved in the development of caries, advances in adhesive restorative materials, and the consequences of unnecessary removal of dental hard tissue have played a role in this change 7, 8. In the 21st century, composite resins have begun to take the place of amalgam and become an integral part of routine dental practice 9, 10. This research is the first research performed regarding the causes of reasons of replacement of composite restorations northern Iraq. The aim of the study is to evaluate the etiologies of replacing direct composite and other restorations northern Iraq.

MATERIALS AND METHODS

This study started after the agreement of the research authority in the university. All the data collected by GPD during their private practice and by dental students during the conservative dentistry.

Study Design

-Private Examination Centres

Dentists working in private dental clinics participated to collect the data. Authors contacted the participated clinicians personally. Specialized dentists in any dental specialty were excluded from the study. The participant dentists graduated from different universities. In order to be able to represent whole northern Iraq dentists so we chose dentists working in private dental clinics in the city center of Erbil were included in order to be able to represent the entire northern Iraqi region, and to be able to contact them during the study. The total contacted dentists were 100 dentists. The authors provided the research information to the participants. Volunteer dentists and those were opened to participate in the study were included.

-University Students

At Faculty of Dentistry, 4th and 5th-year undergraduate students were trained in teaching clinics in the course of training in conservative dentistry which was three weeks. It is expected that the students will complete about 30 restorations during these three weeks.

The students undertake a one-day refresher training at the beginning of the course. During training, information about restorative materials and instruments were provided and information about

approaching patients and infection control was given. Students were also trained to complete restorative dental treatment forms on the first day of their training.

Collection of data

The GPD who volunteered to participate in the study contacted for the second time to explain the details of the study. A presentation made by the researchers for the participating dentists in their private clinics. The presentation consisted of information such as patient selection criteria, the number of replaced composite restorations needed to be collect, and the method for the data collection. The presentations were held in groups of two or three dentists. For the calibration of clinicians, they provided with clinical photographs and radiographs of composite restorations that need to be replaced for various reasons and discussed with each clinician. These photographs, were obtained from books and some websites. Clinicians were requested to collect different parameters for the 100 restorations they placed or replaced. The GPD and DS were asked to collect the data within eight months. The participants recorded details of the patient's gender, age, restored tooth number, cavity type, number of replaced restorations, and number of replaced composite restorations and reasons for replacement for each

Forms are completed by the students at the beginning, then reviewed by supervisors and revised when necessary.

restoration, the age of the restoration being replaced (based on the patients' statements). Forms are designed for each restoration they placed or replaced, not for each patient, so the patient had multiple restoration had more than one form was filled. The sample consisted of 929 replaced composite restorations were for patients whose ages ranged from 14-year-old to 60 years or older as those ages had completed their permanent dentition.

Statistical analysis

The data were collected in the Microsoft Excel and SPSS 20.00 software for Windows was used to evaluate the findings. The Pearson Chi-Square test (with continuity correction and Fisher's exact test, if necessary) was used. It was considered that a *p* value less than 0.05 was significant.

RESULTS

The total data was 1338 replaced restorations. Of the performed 1,338 restoration replacements, the types of restorative materials were 395 (30%) were amalgam, 929 (69%) were composite and 14 (1%) were glass ionomers (GIC) (Figure 1).

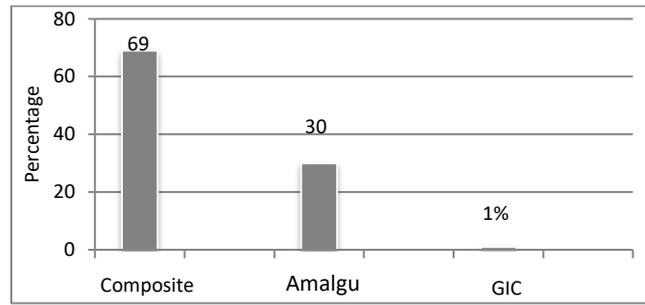


Figure (1): Types of replaced restorative materials and their percentages.

Figure (2) shows the overall distribution of the reasons of replacement of composite restorations. Secondary caries was the most diagnosed reason for replacement of composite restorations (32%), ($p = 0.000$) at $p \leq 0.05$. This was followed by bodily discoloration (14%) and then loss of restoration (11%), the

fourth factor was marginal discoloration (9%) followed by pain and sensitivity and restoration loss (7% for both), then fracture was 6% followed by the replacement for material change and anatomic form deficiency factors were equal (5%) and finally the replacement for the reason of marginal discoloration (2%).

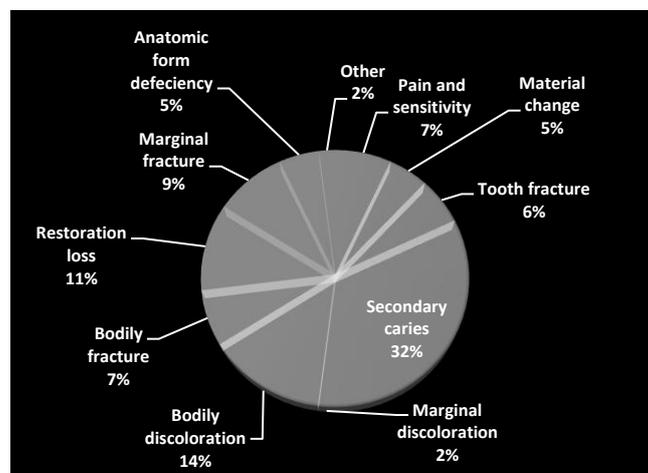


Figure (2): Percentage distribution of the reasons of replacement of composite restorations

Distribution of replaced composite restorations according to cavity types is shown in figure (3). It was found that 47% of the replaced composites in class II, 23%

in class IV, and 16% in class III cavities. The ratio obtained for Class II cavities was statistically significant ($p = 0.000$) at level of $p \leq 0.05$.

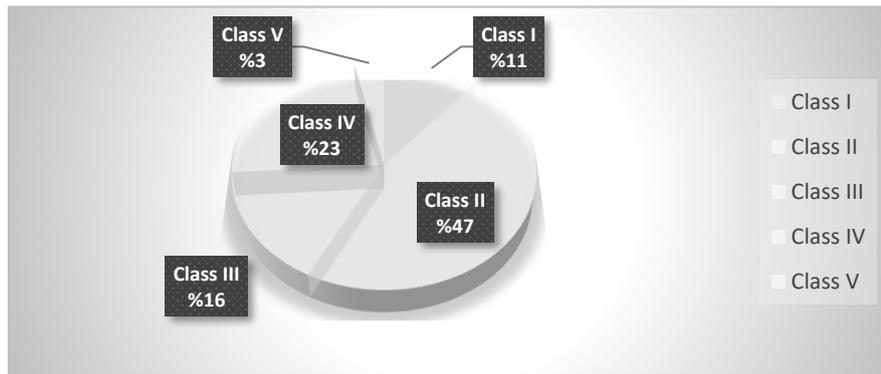


Figure (3): Percentage distribution of replaced composite restorations according to cavity type

Figure (4), shows the distribution of the causes of replacement of composite restorations in different types of cavities. Secondary caries was the most frequently diagnosed reason for replacement in all cavity types. This formed 63.1% of class I and 33.1% of class II cavities. The next most commonly diagnosed reasons for restoration failure were bodily discoloration in class III and class IV restorations (34.2% and 34.3%,

respectively) and pain/sensitivity in class II restorations (79.7%). Pain/sensitivity and anatomic form deficiency, material change, tooth fracture, restoration loss and marginal fracture factors were mostly seen in class II (79.7%, 74.5, 64.3%, 51.5%, 43.7% and 42.4% respectively). Marginal fracture seen mostly in class II (42.4%), and class IV was the second (32.9%) followed by class III (15.3) then both class I and V (4.7%).

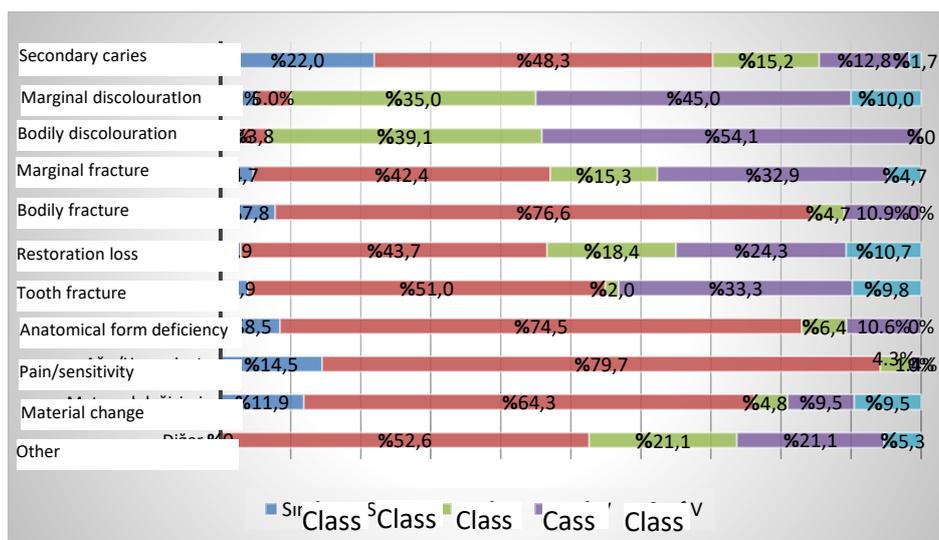


Figure (4): Percentage distribution of reasons of replacement of composite restorations in different cavity types.

DISCUSSION

In this practice-based study the researchers depend on the analysis of data stated by GPD and DS during their daily dental practice according to international medical literature that the researchers provided to the clinicians ¹¹.

The evidence-based dentistry can be strengthened by the combination of clinical experiences and scientific researches ¹². Henceforward, establishing those researches can make a links between experienced clinicians and academics to improve dental services in everyday practice ¹³. Documentation of the problems and recognising the results' limits that are found by the thorough studies carried out in under clinical conditions and transmitting them to the researcher working in the laboratory can supply a good plan in terms of upcoming studies that will eventually affect routine practice ¹⁴. This type of studies has been carried out in many countries around the world countries, but our work is the first to have been carried out northern Iraq. This can be expressed as another important feature of our work.

Many studies have shown that secondary caries was the most important factor in the replacement of composite resin restorations ^{3, 4, 5} and the findings obtained in our study support these results. Multiple treatments that are not properly performed after restorations, polymerisation shrinkage and errors in

cavity design may contribute to the frequent development of secondary caries in composite restorations ¹⁵. In addition, studies have found a positive correlation between good oral hygiene and restoration lifespan. Especially after inadequate polishing, the environment is appropriate for growth of *Streptococcus mutans* and that was improved in composite materials which can provide good environment for the bacteria. This, combined with poor oral hygiene may increase the formation of secondary caries creating synergistic effects ¹⁶.

In this research, the participant collected data about GIC, amalgam and composite restorations. The higher restoration used by the dentist was the composite (69%) followed by amalgam (30%) then GIC (1%). Silvani (2014)¹ obtained the same result in Brazil for the sequence but in different percentages which were 95% for composite, 5% for amalgam and 0% for GIC. This indicates that composite restoration is preferred over other types of restorations for its tooth-color.

Bodily and marginal discolouration is another problem that is mentioned in the replacement of composite restorations. Mjor (2000) ¹⁵ stated that marginal discolouration may develop due to insufficient acid-etching before placement of the bonding agent, deficiencies in handling the material (placement, adaptation), and polymerization shrinkage.

Bodily and marginal discolorations were the second and third cause for replacement of composite in the current study. Sufficient acid etching and bonding agent needed and careful handling composite recommended.

Inadequate isolation results in the formation of a gap and then microleakage, plaque build-up, and transition of bacteria and toxins at the tooth-restoration interface, causes marginal discoloration which is common in composite restorations. Therefore, the prevention of leakage from the tooth/restoration interface is of great importance for the success and clinical longevity of composite restorations¹⁷. It has also been noted that thermal changes in the mouth may increase microleakage potential by causing deterioration of the bond between the tooth and the restorative material¹⁸ for the reasons above, in this study, the results show that most of composite restoration replacement were in C1 II cavity type. Bodily (14%) and marginal discoloration (2%) were the most frequent causes of replacement after secondary caries in our study. International studies have reported discoloration rates ranging from 9% to 27% in composite restorations^{19, 20, 4, 5}. In our study, the 2% ratio obtained for marginal discoloration was comparable to some studies²¹ but lower than Jordan¹⁹ and England²⁰.

Pain and sensitivity were diagnosed in 7% of the composite replacements performed. This rate is similar to that

reported by Colak (2013)²² in Turkey (7%), but is higher than rates reported by Burke *et al* (1999)²⁰ (3%). However, in many studies from countries such as Pakistan, USA, England and Greece, no references to restoration replacement due to pain or sensitivity have been made^{3-5,10,20}. It is possible to explain these results by the use of total-etch methods in adhesive procedures by dentists as well as the inability to follow the technique-sensitive steps required for placing composites²³. Costa *et. al.* (2017)²⁴ concluded that, the general hazard of instant postoperative sensitivity was 20.3% and the adhesive strategy (etch-and-rinse/self-etch) or the technique of filling (incremental/ bulk) had no effects on starting of sensitivity. Replacement of composite restoration because of loss was 14% in this study; this can be prevented by enhancement of dentin bonding materials and techniques. Though, those materials became improved and easier to use, but these materials need care during usage and well understanding of the process of bonding to obtain good restoration retention²⁵.

CONCLUSION

In the limit of this practice-based study, the composite restorations were mostly replaced because of secondary caries as well as mostly in C1 II cavity type. Hereafter, commencement links between experienced clinicians and academics can progress dental services.

More researches are required to identify more reasons for initial placing and replacing restorations in northern Iraq.

Conflict of interest: authors declare that there is no conflict of interest.

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