Restorative procedures in posterior teeth placed during a graduation course clinic: Quantitative evaluation about amalgam versus composite resin

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Abstract
A demand increase for aesthetic procedures in Dentistry has been observed due to the crescent interests of patients and the evolution of aesthetic restorative materials. The dental files of patients assisted at the clinic of the graduation course of restorative dentistry, School of Dentistry, University of São Paulo, were analyzed during the period from 1998 to 2003, with the purpose of accomplishing an evaluation of the assisted population as well as a longitudinal comparative study of the percentage of class I and class II restorations with amalgam or composite resin in posterior teeth placed by dental students. In the analyzed period, the amalgam was used in 28.5% of the class I and 27.5% of the class II whereas the composite resin was used in 32.1% of the class I and 11.9% of the class II restorations. Although the class I posterior composite resin restorations had been made in a higher proportion and an increase of these procedures was observed, the class II amalgam restorations were predominant along the analyzed period. The prevalent group was between 31 and 40 years old and female gender. Although there were prevalence of class II amalgam restorations placed, there was an increase of the resin composite restorations in posterior teeth when compared with amalgam restorations, mainly in class I cavity restorations, probably due to its conservative characteristics.

Key Words:
composite resin, amalgam, direct restoration materials

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Introduction

Aesthetics plays a very important role in the current Dentistry which starts from the moment in that the population worries about its oral health and its beauty. It can be observed an increase in the demand for the aesthetic procedures in the several areas of the Dentistry. Important changes in the restorative dentistry kept up with the introduction of the acid etching technique and the composite resin. These changes were not only in the techniques and in the restorative materials but also in the philosophy of the restorative treatment. Since the cavity retention for the composite resin restorations is provided by the adhesive system, their cavity preparation could be smaller than those for amalgam restorations.

Dentists of Scandinavia were questioned about the material that they would choose to restore a lesion of occlusal caries, in a mandibular second molar, of a 20 years old patient. The majority of the dentists of Denmark (52.4%) suggested that the amalgam was the first restorative material of choice for restoring the occlusal surface, while the composite resin was the first restorative material of choice for 71.5% of the dentists of Sweden and for 39.1% of the dentists of Norway.

Changes in teaching the direct restorative techniques have occurred at the dental schools. For years, the amalgam was considered the only choice for class I and class II restorations in posterior teeth. Nowadays, there is the tendency in teaching that the amalgam and the composite resin are considered as possible alternatives since regarding their indications, their characteristics and their own restorative techniques. An increase in the application of the composite resin restorations in the posterior teeth has been occurred since 1991 and it has become a rule in some dental schools, like at the Nijmegen University (Netherlands) where the composite resin became the first material of choice in cases of primary caries. Gordan et al., in an investigation that evaluated 92 Brazilian dental schools through a specific questionnaire, did not find significant differences in the philosophy of teaching the posterior composite resin restorations, when compared to the data collected in North America, Japan and Europe. Among the schools that answered to the questionnaire in Brazil, most of them (88%) dedicate 10% up to 50% of the amount curriculum time of operative dentistry in teaching posterior composite resin restorations.

However, the choice of the restorative material is determined by a group of factors beyond the aesthetic features. The dentition to be treated (permanent or deciduous), the age and the gender, the socio-economic status, the type of assistance (private or public health) and the clinical experience of the professional are relevant factors when performing a restoration.

The aim of this investigation was to accomplish a longitudinal comparative study of the percentage of class I and class II posterior teeth restorations using amalgam or composite resin, placed by dental students of restorative dentistry, School of Dentistry, University of São Paulo, in the period from 1998 to 2003, evaluating the frequency of the use of these restorative materials in this period.

Material and Methods

Dental files of the patients (n: 886), assisted at the clinic of restorative dentistry, graduation course at School of Dentistry, University of São Paulo, were analyzed in the period from 1998 to 2003. The study was approved by the Ethical Committee on Research Ethics, School of Dentistry, University of São Paulo.

The personal data selected for this study were gender and age. The dental data collected were the number of class I and class II posterior teeth restorations with amalgam or composite resin and the overall number of these posterior restorations placed in this period. These data were collected in a spreadsheet especially elaborated for this research based on the files filled out by the dental students of the restorative dentistry during the period in which the treatments were developed. Sealant, indirect restorations, as well as resin-based filling materials were not taken into account.

The descriptive statistical analysis was made using the obtained data, relating the amount of amalgam or composite resin posterior restorations in the period, regarding the gender, age and the overall number of posterior restorations.

Results

Four thousand eight hundred and eighteen restorations in posterior teeth were placed during the evaluated period. An increase in the overall number of posterior restorations placed each year was observed, which varied from 728 in 1988 to 888 restorations in 2003. That came together with an increase of the number of the patients assisted in the same period (Figure 1).

The women corresponded to 60.5% of the patients assisted in this period, whose ages varied between 10 and 85 years old, with prevalence of the group from 31 to 40 years old, which was 25% of the total cases (Figures 2 and 3).

An increase in the percentage of posterior teeth composite resin restorations could be observed. However, the amalgam restorations continued to be placed, presenting a small reduction in the number of restorations during the analyzed years (Figure 1). In 1988, the class I posterior teeth amalgam restorations corresponded to 31.9% of the total number, decreasing to 22.4% in 2003. The increase of the percentage of class I posterior teeth composite resin restorations was observed with proportional decrease of the class I posterior teeth amalgam restorations, which developed from 25% in 1998 to 36% in 2003 (Figure 4).

However, the class II composite resin restorations were always placed in a smaller percentage than do the class II...
amalgam restorations. Considering the total class II restorations placed in 1998, 34.1% were amalgam restorations and 9.1% were composite resin restorations. In 2003, the class II amalgam restorations corresponded to 26.5% while the class II composite resin corresponded to 15.1% of the total of restorations placed (Figure 4).

Discussion
In the dental schools, a change has been occurred in the teaching of restorative dentistry, not considering the amalgam as the single restorative material of choice for class I and II restorations. The current tendency points to both, amalgam and composite resin, as possible alternative materials for dental restorations, at least in premolars. The values obtained in this investigation showed an increase of the class I composite resin restorations proportionally to the decrease of amalgam restorations during the analyzed period. These results can be related, besides the popularization of the composite resin in the last years, to the evolution of the profile of oral health of the population in general, and consequently, of the patients assisted at the graduation clinic. The prevalence of the female patients and of the age group from 31 to 40 years old probably is associated to an aesthetic subject as the main reason for the choice of the restorative material to be used. In addition, patients in this age group present a smaller propensity of developing carious lesions when compared to children or adolescents, what allows the use of the composite resin with larger safety when the possibility of secondary caries is consider. Besides this, composite resin allows conservatives class I cavity preparations in agreement with the tendency about conservative dentistry.

The reduction of the amalgam restorations found in this research was in accordance with the results verified in several countries. On the other hand, a study when consulting dentists of the United States about the material of choice to be used in their own posterior teeth, found certain rejection to the aesthetic alternatives. The teaching of posterior teeth composite techniques of restorations in Brazil has been growing in the last years.

Nevertheless, some restrictions in the placement of these materials in class II cavities and more extensive carious lesions in molars demonstrate the importance of the continuity in teaching the amalgam restorations as an integral
part of the curriculum of the dental schools, as well as to encourage its proper usage and indication in the clinical practice. In spite of a certain increase of the number of the posterior teeth composite resin restorations observed here, the class II composite resin restorations were always placed in smaller percentage than were the amalgam restorations. This finding showed a special attention to the indication of class II composite resin restorations, considering that their technical requirements are more critical than those to the amalgam restorations.

The dental students may not have the necessary experience for placement the composite resin restorations successfully, however the teaching in the graduation courses constitutes the suitable opportunity for the correct teaching and learning of new techniques. It is important to focus that the posterior restorations using composite resin constitute an alternative besides the amalgam for direct restorations, and they not should be considered as substitutes of the amalgam restorations since both materials present different characteristics.

In conclusions, although there were a prevalence of class II amalgam restorations placed during the studied period, there was an increase of the composite resin restorations in posterior teeth when compared with amalgam restorations, mainly in class I cavity restorations, probably due to its conservative characteristics. The data obtained from the dental files of the patients assisted at a clinic of graduation of a dental school constitute valuable information that allows an appropriate evaluation of the work developed by dental students and faculty.

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**References**