Direct posterior coronal restoration: Practice of students clinicians of the odonto-stomatological consultation and treatment center of Abidjan

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Abstract

Introduction: Dental amalgam and adhesive materials (composite resin and glass ionomer cement) are commonly used for occluso-functional and esthetic teeth rehabilitation. The objective of this study was to assess direct posterior coronal restorative materials used by 19 students' clinicians' classes.

Material and Methods: A retrospective study was carried out to collect from students' performed care records the different types of restorations' data from 1994 to 2016. The choice of materials is estimated according to education levels [1st year Master (M1), 2nd year Master (M2) 1st year Doctorate (D1)]. The collected data was processed with SPSS software. Pearson chi-square test was used to compare qualitative variables and the significance threshold set at 5%.

Results: From 1994 to 2016, there were 11 registers recording 19 students' classes distributed according to education levels. In all, 6,033 posterior teeth procedures were performed on 3,134 patients. These restorations refer to 73.4% of molars and 26.6% of premolars. In 1994, the amalgam was used for 99.86% and adhesive materials for 0.14%. However, in 2016, these same materials were frequently used in 78.86% to 21.14% for the amalgam. Between the first year of Master (M1) and the last year (D1), the use of amalgam declines over the years while that of adhesive materials increases.

Conclusion: It seems, in recent years, that under the influence of educational approaches centered on adhesive materials, youngest practitioners are using composite resin more for posterior restorations compared with senior practitioners.

Keywords: Adhesive materials, Dental amalgam, Posterior coronal restorations, Students clinicians.

Introduction

Coronal restoration of a tooth is a procedure to make up for a loss of dental substance for biological, functional and aesthetic purposes.[1] Direct coronal restorations are very common in daily practice.[2] They require two types of materials: non-adhesive materials with dental amalgam and so-called adhesive materials with composite resin and Glass Ionomer Cement (GIC). For a long time, dental amalgam, due to its mechanical properties, had been the only restorative material recommended for posterior teeth restoration.[3] However, mechanical properties of so-called adhesive materials, recommended, in the past, exclusively for anterior teeth restorations due to their aesthetic quality, have been improved to be used for posterior teeth also.[4] Hence, a corollary of restoration is the development of a new therapeutic concept called "preventive medical" which is based on the protection of dental structures.[5,6] Thus, cavity layouts for amalgam with a significant disposal of dental tissues are diminishing in favor of adhesive restorations. Moreover, because of its mercury content, its use has caused controversies regarding the intoxication of patients and caregivers.[7,8] At the dental school of Abidjan, the Odonto-Stomatological Consultation and Treatment Center (OSCTC) has a sole purpose of clinical training of students. These potential dental surgeons perform coronal restorations under the supervision of the department of Conservative Odontology and Endodontics (COE) teachers. Once the supervisor approves the therapeutic indications, various operating sequences are followed and validated during the treatment. However, students have certain autonomy in choosing the restorative material according to the decision agreed on with the patient. The purpose of this study was to assess direct posterior coronal restorative materials used by 19 students' clinicians' classes.

Material and Methods

This is a descriptive retrospective study based on COE service records. This service records students' performed procedures. For each academic year, a register per care center is made available to all students clinicians. This registration system was set up from the first fully trained class of Dental Surgeons in Abidjan that is for the 1990-1991 academic year. Until 2011, all COE clinical sessions were held at only one of the two OSCTC sites. From 2014, COE clinical sessions are expanded to both sites with one registry per site and one extra clinical year, the 6th year. All records prior to 2017 have been used in this study. In these, all posterior teeth (premolars and molars) coronal restorations with a definite coronal filling material were selected. Only procedures with complete information (file number, patient's identification, date of treatment, number of restored teeth, material type) along a supervisor's signature certifying the effective completion of the treatment were included. The data collected was processed with SPSS software. Qualitative variables

were compared using the Pearson chi-square test, a significance threshold set at 5%.

Results

Available registers are from 1994, 2003 to 2006 and 2014 to 2016. Each year is composed of two classes (4th and 5th years) for the first five years and three classes (4th, 5th and 6th years) for the last three years. Out of a total of 28 registers, only 11 had 19 classes divided by education level (4th, 5th and 6th years). On all classes, 6,033 treatments which met the inclusion criteria were selected and these coronal restorations on posterior teeth were done on 3,134 patients.

Performed treatments results, their distribution according to years and materials used are presented in the format of tables and figures.

Discussion

Study protocol

Available registers have significant years' gaps. This is due to the 2011 crisis in the country which resulted in looting and destruction of goods and properties nationwide. The UFR did not escape the crisis and suffered significant losses of its equipment and other materials. Only available registers made this study possible.

Number of direct posterior coronal restorations by years

Results show that 1994, 2014 and 2016 are marked by an increase in student performed treatments, estimated at an average of 10% (Table 1 and 2). The variable number of students, according to classes could explain these gaps. Indeed, establishing the common core since 1992 which gather together first year health sciences students (medicine, pharmacy and odontology), has contributed to the reduction of the number of students since 1995. The class of 1994 which did not undergo this scheme has a large number of students, reflecting the high number of care provided. Moreover, beside the socio-political crisis, the OSCTC was closed from 2011 until the end of 2013. During that time, students received theoretical training only, consequently, the health center reopened in 2014, accumulating several classes of students clinicians: one 4th year class, two classes of 5th year and one 6th year. This justifies the high number of performed procedures during that year. From 2016, the decline in the number of procedures was directly due to a tendency to normalization with one class by education level 4th, 5th years and very few students in a 6th year.

Types of posterior coronal restorations by education level

This study shows that students from 5th year class have performed more procedures than their counterparts (Fig. 1). This is due to the fact that they have at least two years of clinical experience and more procedures are required from them than from 4th year students. Regarding their counterparts from 6th year class, they are subjected to performing specific procedures for their end of clinical internship memoir. Of all classes, amalgam remains the most used material (Fig. 2). Its superior mechanical properties, ease of handling and low cost could justify its use in coronal restorations of most of our population in a low socio-economic situation.[3,9] However, compared with previous academic years, the use of amalgam has been decreasing over the years, while adhesive materials use increases (Fig. 3). The teaching which insists more on adhesive materials according to the new therapeutic concept has impacted this development.[10] Indeed, amalgams are being replaced by aesthetic materials in posterior coronal restorations due to the controversy over their use.[4,11]

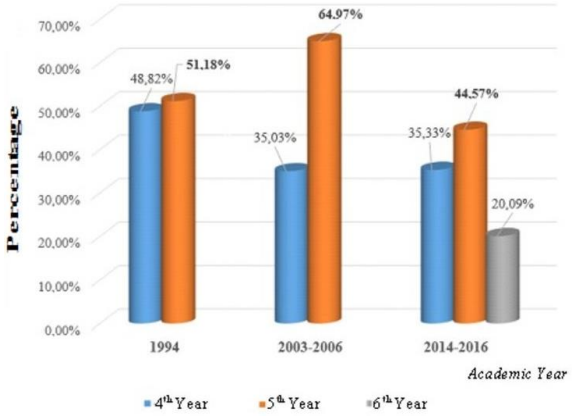

Fig. 1: Activities volume per academic year: 5th year students perform more direct coronal restorations than their counterparts *(P=0.000)*

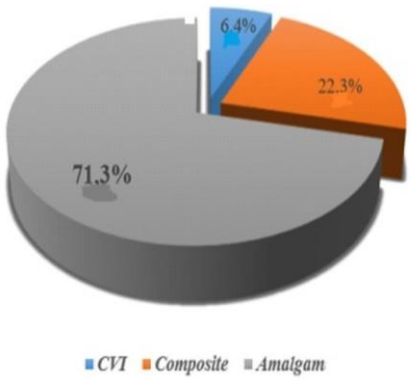

Fig. 2: Distribution of used direct restorative materials: Dental amalgam is by far (71.3%) the most used material on all performed procedures from 1994 to 2016

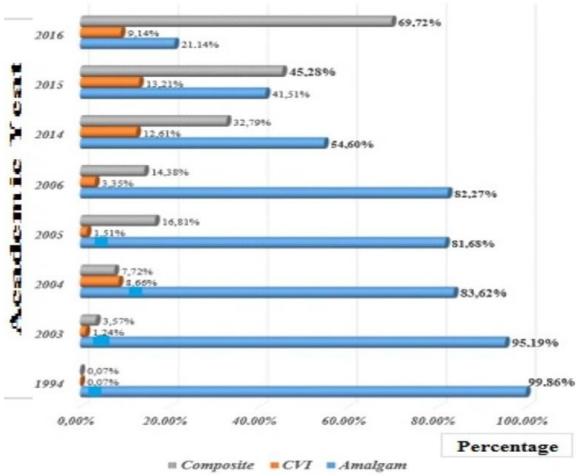

Fig. 3: Frequency use of restorative materials per year: Dental amalgam was practically the only material used in 1994, but twenty years later (2015), the composite is the most used material with a constant evolution the following year

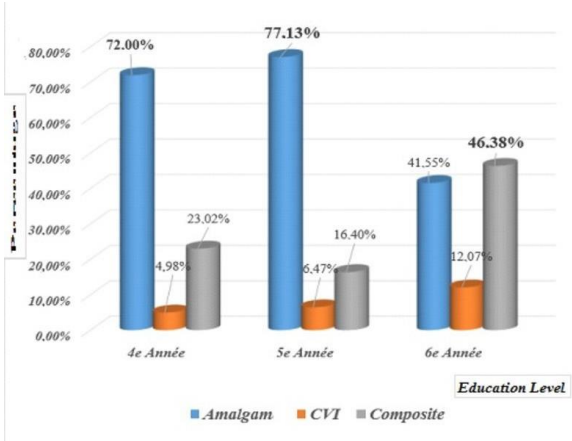

Fig. 4: Frequency of use of restorative materials according to academic year: On all restored teeth, 4th and 5th year students used amalgam mainly; for 6th year students, there was a virtual balance between amalgam and composite with a slight increase in favor of adhesive material *(P=0.000)*

Compared with education level, results also show a decrease in amalgams use for adhesives from the 4th to the 5th year class (Fig. 4). At the beginning of clinical training, to quickly validate their required amount of clinical procedures, less experienced students tend to use the amalgam due to its ease to implement. 6th year students, though, who have at least three years of clinical experience, are more skillful and therefore handle adhesive materials with much more ease (Fig. 4). There is, indeed, a real tendency to the use of composite resin for posterior teeth restorations. The choice of this type of material at the end of clinical training of Ivorian students matches that of students in Ireland, the United Kingdom, the United States and Israel.[12,14] Other findings reveal that professional experience is a factor influencing the choice of material.[15] It seems that in recent years, under the influence of educational approaches centered on adhesive materials, youngest practitioners are more keen to posterior restorations with composite resin compared with seniors.[16]

Table 1: Number of coronal restorations by students per years, direct posterior coronal restorations were the most performed during 1994, 2014 and 2016

Academic year	Effective (n)	Percentage (%)
1994	1,391	23.1
2003	645	10.7
2004	635	10.5
2005	464	7.7
2006	300	5.0
2014	1,578	26.2
2015	320	5.3
2016	700	11.6
Total	6,033	100.0

The frequency of direct coronal restorations in 1994, 2014 and 2016 shows an increase in performed procedures by students.

Table 2: Performed treatments before 2000 (1994), during the first decade of 2000 (2003-2006) and during the last decade of 2000 (2014-2016)

Classification according to 2000	Patients		Coronal restorations	
	Effective (n)	Percentage (%)	Effective (n)	Percentage (%)
Before (1994)	724	23	1,391	23
1st decade (2003-2006)	1,021	33	2,044	34
2nd decade (2014-2016)	1,349	44	2,598	43
Total	3,134		6,033	

The distribution of these treatments according to three periods, before 2000, during the first decade of 2000 and the last decade of 2000, shows an increase of carried out procedures respectively passing from 23%, 34% to 43% of restorative treatments.

Conclusion

This study highlights the various posterior coronal restorative materials used by students' clinicians over the years. Dental amalgam remains the most used material, but a trend towards adhesive materials seems to be rising in recent years. This is a reflection of the teaching that emphasizes the use of adhesive materials in accordance with new therapeutic recommendations.

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