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Evaluating the Trends for Restorative Treatment, Reasons and Management of Failures in General Dental Practices of Hail Region, Saudi Arabia

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Abstract

Aim: The study aims to identify the common causes of performing restoration of teeth in General Dental Practice (GDP). Analyze the common reasons for restoration failure, the material used in the management of restoration repair/replacement in Hail, Saudi Arabia.

Objective: This study gave an insight into identifying the reasons for performing dental restorative procedures in general dental practices in Hail, Saudi Arabia. It helped to determine the trends and justification for carrying out therapeutic dental treatments, with a particular emphasis on the treatment modalities, techniques, and materials used for replacement/repair of faulty or failing restorations.

Material and method: It was an observational study with a cross-sectional design conducted in Hail, Saudi Arabia. A self-administered face and content validated questionnaire was used as a study tool to analyze the reasons that the general dental practitioners chose to place restorations. This study was done in February 2018. A total of 200 questionnaires were distributed, out of which 191 (response rate: 95.5%) were returned from the clinics of the college of dentistry, private dental clinics and specialist dental center in Hail city, Saudi Arabia.

Result: Considering the reason of performing the restorative procedure, replacement of restoration was the most common with a percentage of 95(49.7%) followed by placement of new restoration due to caries represent 78(40.9%) and finally tooth fracture with a total rate of 18 (9.4%). The primary reason for the replacement of restoration reported was restoration fracture 40(42.1%), followed by secondary caries 33(34.7%) and finally aesthetically not acceptable restorations 22(23.2%).

Conclusion: The results indicate that, within the parameters of this study, replacement of restoration was the most common reason for the dental procedures. The alarming thing identified by this study was that nearly half of the dental procedures (40.9%) were replacement restoration. Restoration fracture followed by Secondary caries was identified to be the main reason for replacement/ repair of restoration, with practitioners in general practice. Studies of this type give an insight into the prevailing trends and developments in dentistry.

Keywords: Aesthetics, Amalgam, Composite, Restoration failure, Repair and replacement, Hail.

Introduction

Dental caries still is a highly prevalent disease affecting a large part of the population around the world, especially those more deprived [1]. Even though the developments in preventive strategies to control dental caries are much emphasized, the prevalence of dental caries is still a concern affecting developing societies. A significant demand for restorative procedures in clinical dentistry is still observed, with placement and replacement/ repair of existing restorations being one of the most common dental procedures accounting for a significant part of the dentists working time [2]. It has been reported that the replacement of failed/ faulty restorations constitutes about 60 percent of all the restorative dentistry work performed in general dental practices [3].

Various factors can be attributed to the failure of dental restorations. The most reported reasons for failure in posterior teeth are secondary caries and fracture [4-5]. An unacceptable color match is reported as the primary reason for the replacement of composite resin restorations [6-7]. The surface texture of dental materials has a major influence on plaque accumulation, discoloration, wear and the aesthetical appearance of both direct and indirect restorations [8]. Resin composite restorations tend to accumulate more dental plaque compared with other restorations [9-10]. It is known fact the polymerization of resin composites is incomplete, as indicated by the low degree of conversion [11] and the leaching out of these unpolymerized monomers accelerates the growth of cariogenic bacteria [12]. In the United States,

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amalgam is still considered as the most favored material used for restorations in posterior teeth [13]. However, patients concern about using mercury-containing filling may change their opinion about amalgam restoration or partly with patient's demand of aesthetics as reported in an assessment that a proportion of the population was not satisfied with restoration color in their teeth [14]. Accordingly, the increased demand for tooth-colored restorations without concerning the better longevity of amalgam restorations may be considered [15]. Studies suggest that reasons for amalgam restorations failure are retention failure, restorations fracture, marginal leakage, and hypersensitivity, poor characteristic of surface and periodontal problems [16]. In a study of replaced restorations of permanent teeth, amalgam restorations median age has been documented to be ten years [17]. A recent survey for composite restoration indicated secondary caries, restoration fracture, discoloration and gingival irritation due to over-hang restoration are common causes of composite restoration failure. The same study of 413 replaced composite restoration indicated that the median age of composite restorations was three years [18].

This study aimed to identify the most common reasons for performing restorations in the General Dental Practices (GDP) based on placement, replacement due to secondary caries, fractured restorations or others. Restorative materials most commonly replaced in case of replacement of restoration.

Materials and Method

It was an observational study with a cross-sectional design and conducted in Hail, Saudi Arabia. Self-administered face and content validated questionnaire used as a study tool to analyze the current reasons by dental practitioners in general practice settings choose to perform any restorations. Inclusive criteria of the study were characteristics of participants Saudi and non-Saudi dental practitioners, at least one year of clinical experience and agreed to participate in the study after a written informed consent willingly. The questionnaire contained two sections. The first section contained the educational level of practitioners, the gender of practitioners and clinical experiences. The second section included patient's age, patient's gender, reasons of procedure, the reason for replacement restoration, which material used for replacement and material clinician decided to restore the tooth with. All participants were over 18 years and who was diagnosed of the need for restorative therapy due to caries; repair and/or replacement of direct restorations (composite resin, silver amalgam or GIC) were included in the study. Indirect restorations such as crowns, inlays and onlays, and restorations where the patient's disagreed or refused treatment, were not included in the study. The present study was undertaken in February 2018. The Research Ethics Committee of the University of Hail granted ethical approval, verbal and written informed consent was obtained from all participants before their enlistment. Reliability of the questionnaire was measured through internal consistency using Cronbach's alpha test. The value of the test was 0.85, which make the questionnaire reliable. A sample size of the present study was 200 collected from clinics of the college of dentistry, private clinic and dental center in Hail city using non-probability, convenient sampling technique. The study had a response rate of 95.5%. Statistical analysis was done on the Statistical Package of Social Sciences, SPSS version 20. Data was displayed as number and percentage.

Result

Characteristics of Participants

Two hundred questionnaires were distributed, out of which 191 were returned (response rate: 95.5%). Most of the practitioners were female participants 124(64.9%) and 67(35.1%) male practitioners. The findings showed that most participants had a Bachelor's degree 153(80.1%),

followed by dental intern 30(15.7%). Only 6(3.1%) respondents had a master's degree and 2(1.1%) were having Ph.D. degrees. According to the clinical experiences, most participants were more than nine years 98(51.3%), followed by 1-4 years 64(33.5%) and then 5-9 years 29(15.2%) (Table 1).

Gender	N (%)
Male	67(35.1%)
Female	124(64.9%)
Educational level	
Dental intern	30(15.7%)
Bachelor	153(80.1%)
Master	6(3.1%)
PhD	2(1.1%)
Clinical Experiences	
1-4 years	64(33.5%)
5-9 years	29(15.2%)
More than nine years	98(51.3%)

Table 1: Characteristics of Participants

Characteristics of Patient

The finding showed that the majority of patient's gender was female 105(55%), followed by male 86(45%). Of these, approximately 61(31.9%) patient's belonged to 18-25 years group. Patients from age groups 36-45 years old were 60(31.4%), followed by 26-35 years age group 59(30.9%), and then more than 46 years age group 11(5.8%). Evaluating the reason for performing the restorative procedure, the findings revealed that replacement/ repair of restoration was the most common with a percentage of 95(49.7%) followed by placement of new restoration due to caries which represents 78(40.9%) and finally due to tooth fracture with a total rate of 18(9.4%) (Table 2).

Patient's gender	N (%)
Male	86(45%)
Female	105(55%)
Patient's age	
18-25 years old	61(31.9%)
26-35 years old	59(30.9%)
36-45 years old	60(31.4%)
More than 46 years old	11(5.8%)
The reason for the dental procedure	
Placement of restoration due to caries	78(40.9%)
Replacement of restoration	95(49.7%)
Tooth fracture	18(9.4%)

Table 2: Characteristics of Patients

Reasons for Replacement Restoration

The reason for replacement of restoration being, restoration fracture 40(42.1%), then secondary caries 33(34.7%) and finally esthetically not acceptable 22(23.2%). The most common restorative material in terms of failure were composite 58(61.1%), followed by amalgam 27(28.4%) and glass ionomer cement (GIC) 10(10.5%). The restorative material used for repair/ replacement in the tooth was composite 81(85.3%), followed by amalgam 13(13.7%) and Glass Ionomer Cement (GIC) 1(1.0%) (Table 3).

Discussion

The survival of a dental restoration is determined by multiple factors which rely on the clinician's skills, experience and knowledge of materials sciences in addition to patient factors and tooth-related factors [3,19,20].

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The present study aimed to identify the most common reason for doing a restoration by the general dental practitioner based on the placement of new restorations, repair/replacement of failing and fractured restorations. Identify the most common material replaced in case of replacement of failing restorations, whether secondary caries was the most common cause for restoration replacement in Hail, Saudi Arabia. To the best of our knowledge, the present study is the first of its kind in Hail region.

Reasons for replacement of restoration	N (%)
Secondary caries	33(34.7%)
Restoration fracture	40(42.1%)
Esthetically not acceptable	22(23.2%)
The material used in the failing restorations	
Composite	58(61.1%)
Amalgam	27(28.4%)
GIC	10(10.5%)
The material used to restore the failing restorations	
Composite	81(85.3%)
Amalgam	13(13.7%)
GIC	1(1.0%)

Table 3: Reasons for replacement restoration, Material used in the failing restorations and Material used to restore /repair/replacement.

The results of this study have revealed some interesting facts concerning the reasons that practitioners state for restorations to be placed or replaced. In our study amongst the predominant reasons for patients visiting GDP for restorations was dental caries 40.9%, a majority of respondents had a replacement of restoration 49.7% for previously done dental procedures followed by tooth fracture 9.4%. Our results somewhat conform to the study of Forss in Scandinavia wherein restoration replacement accounted for approximately 60% of all operative dentistry done. This not only contributes to financial burden but also accounts for majority of time consumed. These findings further reaffirm the fact that repair and replacement of old restorative work still constitutes the bulk of workload thus adding on the burden especially in public /state funded practices like in Saudi Arabia.

In our study, accounting the reasons for restoration failure, restoration fracture was the predominant cause at 42.1%, secondary caries accounted for the second most reason 34.7% followed by aesthetically unacceptable restorations at 23.2% for replacement of restorations. These results are somewhat in contrast to most of the studies wherein secondary caries was the predominant reason for restoration failure. [21-23]. This finding most probably could be justified by the fact that composite restorations accounted for the majority of the failed/replaced restorations (61.1%) in our study as compared to amalgam (28.4%). Although our study did not account for the time factor, most of the composite restorations have a reported approximate median survival time ranged from three to eight years and five to 15 years for amalgam restorations [24]. The predominant cause of restoration fracture can be attributed to factors like the socioeconomic status of the patient [25], large restorations with minimum tooth support, endodontic treated posterior teeth without cuspal coverage [26], masticatory overload, occlusion derangement, material choice and clinician skills [27]. Although a limitation in our study was not segregating anterior and posterior tooth fractures, this might have contributed to an overall increase in the restoration fracture as the dominant cause compared to secondary caries. In anterior teeth, Class IV restorations involving the incisal edge are subjected to high masticatory loads, with fracture as a possible clinical outcome over time [28,29].

Another aspect investigated was the choice of material used for repair or replacement of failed restorations, composite (85.3%) was the

material of choice in the majority of cases compared to amalgam (13.7%). This reflects the increasing trend for resin materials being used as tooth restoration replacing amalgam as a choice.

As a comparative aspect between amalgam and light-cured composite usage for varying restorative treatment circumstances, a study in the UK in 2015/2016 reported amalgam and light-cured composite to be the material of choice with the same percentage for core-build-up of vital teeth for around 62% GDP practices [30]. Whereas in our study, on the contrary light-cured composite were the most common material preferred to be used in different situations of treatment for around (85.3%) suggesting a growing trend towards the use of aesthetic restorative materials and phasing out of Amalgam as a posterior restorative material. Although the longevity of tooth colored restorations was shorter than that of amalgam [31]. With the advent of much superior generation of composite materials which have improved wear strength and modified matrix to minimize shrinkage, these provide a viable alternative as a universal restorative material for posterior bulk and anterior esthetic direct restorations, polymerization shrinkage remains a challenge which undermines the survival of composite restorations. The better understanding and scientific knowledge regarding dental bonding and isolation skills reflect good results for the dental restoration to survive for a reasonable time for the patients [32].

It is imperative not only to emphasize on providing sufficient clinical and theoretical knowledge but teaching skills and contemporary techniques to the students during their undergraduate dental schools is critical for performing proper dental procedures.

Despite the plethora of research and advancement in material development, choosing a material to replace and restore a tooth and ensure success and longevity is a challenge for a dental practitioner. The choice of material, dentist's skills, and knowledge significantly determine the longevity and success of a restoration. It is imperative to emphasize on imparting knowledge and continuous updating of skills amongst the dental fraternity to maximize success and overcome limitations.

Systemic research on the longevity and the replacement of direct restorations in Saudi Arabia amongst the general dental clinical practices is necessary. Studies like this are imperative for the assessment of the professional's performance and for the management of the dental service (proposing protocols, reducing costs and increasing efficiency).

A limitation of our study was related to data collection. The restoration was considered the unit of analysis, neglecting the fact that the restorations were placed in patients. This fact is critical when more than one restoration is evaluated in the same individual.

Conclusion

The results indicate that, within the parameters of this study, replacement of restoration was the most common reason for dental procedures. Restoration fracture was identified to be the main reason for the replacement of restoration with practitioners in general practice. A concerning fact identified by this study was a high percentage of restorations done to manage dental caries contributing nearly to half of the dental procedures.

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