

# Reasons for Retreatment of Amalgam and Composite Restorations among the Patients Referring to Tabriz Faculty of Dentistry

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## Abstract

**Background and aims.** Retreatment of existing restorations not only requires a lot of money and time but also there is a danger of weakening tooth structure and irritating the pulp. Since awareness of the reasons for the retreatment of teeth will save the teeth from possible future failure, the aim of this study was to assess the reasons for retreatment of amalgam and composite restorations in patients referring to Tabriz Faculty of Dentistry.

**Materials and methods.** In this descriptive study, the subjects had previously received an amalgam or a composite restoration in the Operative Department by dental students and were judged to need retreatment in their second visit. A total of 300 defective teeth were selected by simple random sampling method. The data was collected through examination and questionnaires and analyzed using chi-square test.

**Results.** There was a statistically significant association between the type of the restorative material and the reason for retreatment ( $p=0.001$ ).

**Conclusion.** Although the reasons for the retreatment of amalgam and composite restorations were different, recurrent caries was the main reason for the retreatment for both restorative materials.

**Key words:** Amalgam, composite, failure, replacement, retreatment.

## Introduction

Dental practitioners spend a significant portion of their time each year replacing failed restorations.<sup>1</sup> Contrary to long-standing beliefs, restorations do not cure dental caries; they may fail and require

replacement. It is believed that a practitioner spends 50% of his or her time replacing defective restorations.<sup>2</sup> It has been concluded that in general about one-third of all restorations present at any one time may

be considered to have failed for one reason or another.<sup>3,4</sup> In previous studies recurrent caries was the most prevalent reason for retreatment of amalgam and composite restorations with different percentages.<sup>3-6</sup> Replacing a restoration means an 0.2-0.5 mm increase in the size of the cavity and, thus, a weakening of the remaining tooth structure.<sup>2</sup> As restorations are replaced, cavities enlarge and both the tooth and restorations become more fragile. Few teeth will withstand successive restoration replacements without requiring endodontic treatment and/or a prosthetic crown.<sup>2</sup> In fact, the placement of effective long-lasting restorations reduces the long-term cost of dental treatment.<sup>5</sup> Awareness of the reasons for the retreatment of restorations will save the teeth from possible future failure.<sup>1,5</sup> Since little is known about the reasons for retreatment of restorations in our country, the aim of this study was to assess the reasons for retreatment of amalgam and composite restorations in patients referring to Tabriz Faculty of Dentistry.

### **Materials and Methods**

In this descriptive study, the subjects had previously received an amalgam or a composite restoration in the Operative Department of Tabriz Faculty of Dentistry by dental students and were judged to need retreatment in their second visit. A total of 300 defective teeth (150 amalgam and 150 composite restorations) were selected by simple random sampling method. Defective restorations were in contact with natural teeth. Patients with systemic, osseous<sup>7</sup> and periodontal diseases and also patients with oral habits and dental wear were excluded from the study. The data was collected through examination and judgment made by the dental specialists in the Operative Department and also by questionnaires in 1384-85 in a period of 6 months. Clinical examinations were performed in a clean, dry and well-illuminated mouth by the use of a mirror, explorer, dental floss and radiograph(s). The examiners were asked to record retreatment reason(s) (recurrent caries, inappropriate contour, restoration fracture, tooth fracture, margin failure, and pain and sensitivity), type of restorative material and class of restoration (G.V Black

classification<sup>8</sup>). The criteria for retreatment of restorations were the same as described by Deligeorgi et al and Mjor.<sup>9,10</sup> The association between the type of the restorative material (amalgam and composite) and the reason for retreatment was tested using chi-square test at a significance level of  $p < 0.05$ .

### **Results**

According to the classification of amalgam restorations, presented by G.V Black, 37 cases (24.66%) were Class I, 71 (47.33%) were Class II and 42 (28%) were complex and in composite restorations, 15 cases (10%) were Class I, 21 (14%) were Class II, 44 (29.33%) were Class III, 44 (29.33%) were Class IV and 26 (17.33%) were complex. Frequency distributions of retreatments for amalgam and composite restorations according to the class of restorations are shown in Tables 1 and 2. There was a statistically significant association between the type of the restorative material and the reason for retreatment ( $\chi^2 = 21.31$ ,  $df = 5$ ,  $p = 0.001$ ). Figure 1 summarizes the reasons for retreatment of the teeth restored with amalgam and composite.

### **Discussion**

Although recurrent caries was the main reason for retreatment of amalgam and composite restorations in the present study, there was a significant association between the type of the restorative material and the reason for retreatment. This association might be attributed to different physical and mechanical properties, manipulative techniques and technique sensitivity of the two restorative materials. In previous studies, recurrent caries has been reported as the main reason for retreatment of amalgam and composite restorations with different percentages.<sup>5,9,11-13</sup> The difference in percentages could be related to differences in the patient population, caries susceptibility, oral hygiene and diet.

In the present study, restoration fracture was the second most prevalent reason for retreatment of amalgam restorations. This finding is consistent with the results of a previous study.<sup>13</sup> The results of our study

indicated that restoration fracture in composite restorations was less than that in amalgam restorations. This result concurs with that of a study by Deligeorgi et al.<sup>9</sup> The difference may be due to higher elasticity and less brittleness of composite. Furthermore, composite fractures were observed only in Class IV and complex restorations. This can be attributed to restoration size, heavy occlusal contacts, lower modulus of elasticity of composites and dietary habits.

This study demonstrated a high prevalence of inappropriate contour in both restorative materials, while other studies have reported less percentages.<sup>10,11</sup> This disparity might be related to the fact that in the present study restorations had been placed by dental students, whereas in previously mentioned studies dentists had placed the restorations. Lack of sufficient experience and skill of the students, improper use of wedge and matrix, and incorrect restorative technique(s) may have resulted in the difference. Furthermore, a proper technique has been reported as the key to the long-term success of restorations.<sup>4, 14</sup> The higher prevalence of inappropriate contour in composite restorations than that in amalgam restorations could be related to the nature of composite that is not condensable compared to amalgam. In addition, packable composites that can provide more appropriate contours had not been used by the students.

Regarding tooth fracture, the results of the present study coincide with those of previous studies.<sup>9,15</sup> On the contrary, Mjor reported a higher prevalence of tooth fracture in both restorative materials.<sup>10</sup> It might be due to differences in dietary habits, occlusion, oral habits and age of the restorations, which may result in tooth fracture because of fatigue phenomenon or reduced bond strength over time. This study indicated lower prevalence of tooth fracture in composite restorations compared to amalgam restorations. This may be related to bonding of composite to enamel and dentin, which might cause reinforcement of remaining tooth structure. In amalgam restorations the highest prevalence of tooth fracture was related to complex restorations, which may have resulted from inappropriate

resistance form, cavity preparation without cusp reduction and improper occlusion of the restoration.

Regarding margin failure, the prevalence in amalgam and composite restorations was less compared to previous studies.<sup>5,11,13,16</sup> In amalgam restorations it might be related to less use of high Gamma II alloys. A correlation has been established between margin failure and high Gamma II alloys.<sup>17</sup> In composite restorations it might be related to improvements in bonding agents, which have resulted in better marginal sealing.<sup>18,19</sup> Furthermore, the introduction of composites with higher mechanical properties and less wear might be another reason.

Pain and sensitivity were not a prevalent reason for retreatment in amalgam and composite restorations. This finding concurs with that of a study by Burke et al.<sup>5</sup>

Changes in dental restorative treatment patterns for various reasons, including changes in disease prevalence, introduction of new restorative materials and techniques, and changes in the attitudes of dental patients towards dental restoration, are all factors that may have affected the reasons for retreatment of restorations and may have resulted in different findings compared to previous studies.

It is suggested that future studies consider factors such as patients' oral hygiene, caries susceptibility, diet and age of the restorations.

### **Conclusion**

Although the reasons for the retreatment of amalgam and composite restorations were varied, recurrent caries was the main reason for the retreatment for both restorative materials. This finding confirms the need for improvements in restorative materials, methods and diagnostic techniques, effective preventive measures, enhancement of students' clinical skills, and patients' oral hygiene and diet.

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**Table 1.** Frequency distribution of retreatments for amalgam restorations in relation to the class of restorations \*

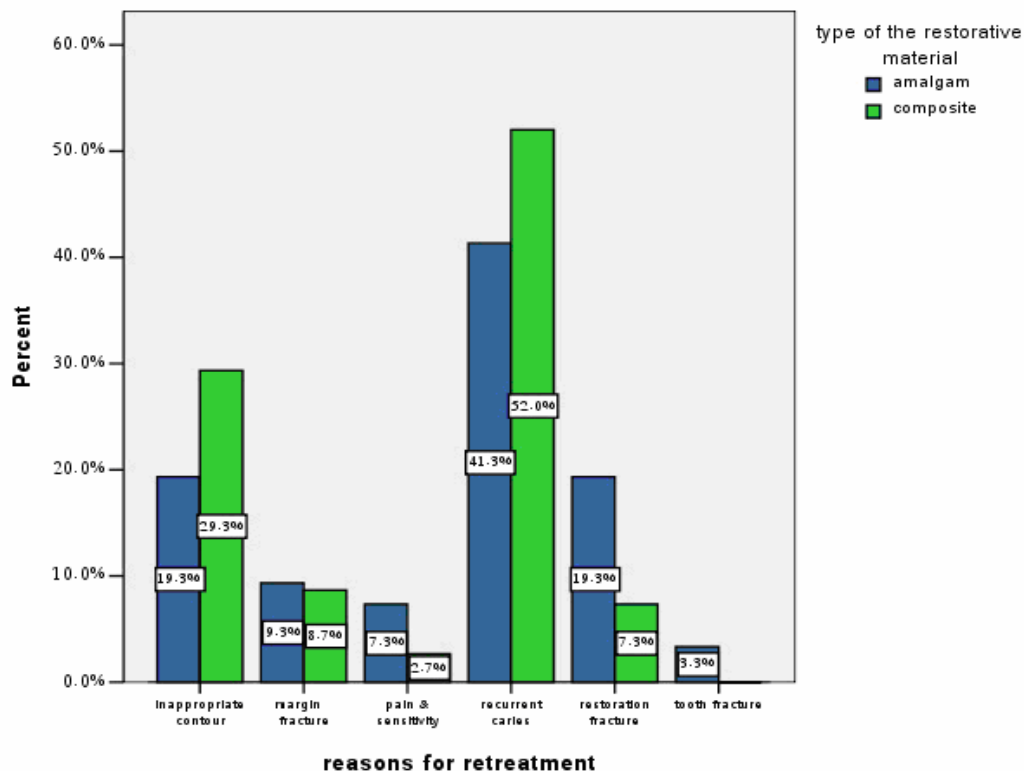
<i>Reason for retreatment</i> \ <i>Class</i>	<b>I</b>	<b>II</b>	<b>COMPLEX</b>
Recurrent caries	31 (83.7)	24 (33.8)	7 (16.6)
Tooth fracture	1 (2.7)	2 (2.8)	3 (7.1)
Restoration fracture	3 (8.1)	12 (16.9)	14 (33.3)
Pain and sensitivity	1 (2.7)	5 (7)	4 (9.5)
Margin failure	1 (2.7)	10 (14)	3 (7.1)
Inappropriate contour	0 (0)	18 (25.3)	11 (26.1)

\*N (percent)

**Table 2.** Frequency distribution of retreatments for composite restorations in relation to the class of restorations \*

<i>Reason for retreatment</i> \ <i>Class</i>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>COMPLEX</b>
Recurrent caries	15 (100)	9 (42.8)	25 (56.8)	17 (38.6)	11 (42.3)
Tooth fracture	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Restoration fracture	0 (0)	0 (0)	0 (0)	8 (18.1)	4 (15.3)
Pain and sensitivity	0 (0)	2 (9.5)	0 (0)	2 (4.5)	0 (0)
Margin failure	0 (0)	0 (0)	6 (13.6)	6 (13.6)	2 (7.6)
Inappropriate contour	0 (0)	10 (47.6)	13 (29.5)	11 (25)	9 (34.6)

\*N (percent)



**Figure 1.** Reasons for retreatment of amalgam and composite restorations

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