

## A CROSS SECTIONAL ANALYSIS OF AMALGAM RESTORATIONS

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### ABSTRACT

*The objective of this study was to determine the different causes of failures of amalgam restorations in the department of dentistry at the Pakistan Institute of Medical Sciences, Islamabad. It was a cross sectional study and was based on collection and interpretation of data.*

*Eighty (80) patients of both genders were selected randomly from out patient department of the department of dentistry. All the patients selected presented with post restoration complaint after amalgam fillings. Majority of cases reported with fractured restorations followed by recurrent caries and overhang fillings. Food lodgment due to poor proximal contact was the fourth common complaint.*

### INTRODUCTION

Replacement of the failed restorations accounts for a large portion of the dentist time.<sup>1,5,7</sup> Restorative dentists spend most of their time replacing failed restorations<sup>3,6</sup>. Amalgam constitute 80% of the restorations placed and average life of amalgam restoration is 7-8 years. An amalgam restoration serving less than 5 years is considered a failure.<sup>9</sup> It is therefore, imperative to evaluate and find out the causes of failure in order to provide a more lasting restoration and service.

Common causes of amalgam failure are secondary caries, ditched margins, and fracture of teeth or restorations and overhang fillings.<sup>4</sup> Secondary caries is considered to be the predominant causes. Many studies indicate that 50% of the failure was attributed to be due to faulty cavity preparation, geometry, incorrect manipulation of the amalgam and inherent problems associated with metallurgical properties of amalgam. To identify the causes of failed amalgam restoration, it is necessary to assess the performance of restoration

clinically. The purpose of this study was to evaluate the failures and to determine the ways to reduce these failures.

### MATERIALS AND METHODS

Eighty (80) patients of both genders were selected from the Dental Department of PIMS. Patients coming to the dental department with post amalgam restoration complaints were selected randomly from the OPD. Specially designed proformas were used to get the detailed history of the patient. The duration of the restoration, which included the time since when the

restoration was placed, was noted down. This helped in calculating the time duration in which the restorations failed. These time durations were based on patient history and gave the average time figures for these restorations. However, some patients presented with previous dental records which showed the time when the restoration was placed.

The criteria of amalgam failure were stated as:

- 1) Fractured restoration
  - a) Marginal fracture
  - b) Isthmus fracture
- 2) Recurrent caries
- 3) Improper proximal contact and marginal ridge
- 4) Discolored restoration
- 5) Gingival irritation due to overhang filling

Patients were divided into groups according to the above mentioned five categories. Data were analyzed on the basis of age, sex, group and results were obtained.

### RESULTS

Male to female ratio was 18:1. The average age was 29 years. There were 28 maxillary and 52 mandibular teeth involved. 65 out of 80 teeth had fractured restorations. In the 65 cases with fractured restorations, 49 showed isthmus fracture and 16 displayed marginal fractures. There were 49 class II restorations and the rest were class I. Recurrent caries were found in 52 cases. Most of the fractured cases were associated with recurrent caries. There were 8 restorations where improper proximal contact and marginal ridge were the causative factor. 3 restorations were found discol-

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**TABLE 1: TABLE SHOWING DISTRIBUTION OF TEETH GROUPS (n=80)**

Total No of Teeth	Maxillary	Mandibular
1st Premolar	3	6
2 <sup>nd</sup> Premolar	4	4
1 <sup>st</sup> Molar	12	23
2 <sup>nd</sup> Molar	8	16
3 <sup>rd</sup> Molar	1	3
	28 (36%)	52 (64%)

**TABLE NO 2: TABLE SHOWING INCIDENCE OF FAILURE ACCORDING TO BLACK'S CLASSIFICATION OF CAVITIES**

Total No of patients	Class-I No (%)	Class-II No (%)	Class-IV No (%)
80	29 36.25	49 61.25	2 2.5

ored and gingival irritation due to over-hang was noticed in 4 cases.

### Longevity of restorations

The proformas included the history of the duration of the restoration which showed the time since it was placed. From this history it was concluded that 38 out of 80 failures occurred after one year, 16 after six months, 6 after one month and 20 after three or more than three years. All these durations of the restorations were based on patient history.

### DISCUSSION

The failure in amalgam restorations has been attributed to the type of material used, the technical quality of the restoration and the degree of patient compliance. Few studies have documented the failures in amalgam restorations and their longevity. Due to flaws in the study design, mixed placement criteria and other methodological weaknesses only a few reliable studies are available about the subject.

Data from this study shows that 38 out of 80 (47.5%) failures occurred after one year and 20 (25%) after 3 years or more. This is a very high failure rate as compared to 24% after one year and 13% after three years in studies done by Marymiuk et al. This high rate of failure was due to inadequate removal of caries and improper technique employed during placement of the restoration.

Most commonly involved tooth was first molar. Among fractured restoration incidence of isthmus fracture was greater than that of marginal fracture. Marginal fracture was due to mainly overhang amalgam and butt joint more/less than 90°. Class II failure was more than class I mainly due to isthmus fracture, recurrent caries and gingival affections. There were some problems in the present study as the recall rate dropped after the first few visits. A high percentage recall increases the accuracy in determining the post

restoration results. Recall of patients is very important not only for finishing and polishing of the restoration but also for examination of any possible discrepancy. The patient hygiene maintenance is also important in the success of a restoration. Regular flossing of proximal contacts is a must along with brushing as well as

regular check ups.

### CONCLUSIONS

The following conclusions can be drawn from this study:

1. Recurrent caries and fracture of the restoration are the most common reasons of failure of amalgam restorations.
2. Differences in the incidence of failures in amalgam restorations among teeth, age and sex were not significant.
3. The recall of patient after 24 hours is important not only for polishing but also for identifying and discrepancy in the restoration.
4. Patient's oral hygiene maintenance is important in success or failure of amalgam restorations.

The quality of any restoration is dependent upon the skill of the operator and upon the type of material used. The quality is also affected by a number of factors such as size of lesion, oral hygiene and salivary function of the patient.

Further research is required to understand the individual cause of failures and to improve the longevity of the restoration.

### REFERENCES

1. Kreulen CM, Tobi H, Grythuisen RJM, Van Amerongen WE, Borgomeiger PJ. Replacement risks of amalgam treatment modalities, 15 years results. J Dent 1998; 26: 627-632.
2. Jannak M, Mahmood S, Chohan A N. Placement and replacement of restorations in patient from selected polyclinics of Riyadh Area. J Pak Dent Assoc 2003;
3. Cardoso M, Baratieri L N, Ritter A V. Effect of finishing and polishing on decision to replace existing amalgam restoration. Quintessence Int 1999; 30: 413-418.
4. Burke F J T, Cheung S W, Mjor I A, Wilson N H F. Restoration longevity and analysis of reasons for the placement and replacement of restorations provided by vocational dental practitioners and their trainers in United Kingdom. Quintessence Int; 1999, 30: 234-242.
5. Mjor I A, Toffenetti F. Secondary caries: A literature review with case report. Quintessence Int; 2000, 31: 165-179.
6. Pimenta L A F, Navarro M F, Consolaro A. Secondary caries around the amalgam restoration. J Pros Dent 1995; 74: 219-222.
7. Mahmood S, Smales RJ. Placement of restorations in selected patients from different practice environment. J Pak Dent Assoc 2002; 3: 131-5.
8. Al Negrish AR. Reasons for placement and replacement of amalgam restorations in Jordan Int Dent J 2001; 51: 109-115.
9. Hawthorne WS, Smales RJ. Factors affecting the amount of long term restorative dental treatment provided to 100 patients by 20 dentists in 3 Adelaide private practices. Aus Dent J 1996; 41: 256-259.