

CLINICAL APPROACH OF DENTISTS TOWARDS REPAIR OF FRACTURED REMOVABLE COMPLETE DENTURES

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ABSTRACT

The objective of this study was fourfold; 1) To find out the approach of dentists working in the prosthodontics department towards a fractured complete denture, 2) To identify which kind of denture base fracture do dentists mostly encounter in their clinical practice, 3) To find the choice of material preferred by dentists for the repair of complete dentures and 4) To find out whether dentists use any polishing technique after the repair of a fractured denture. A cross-sectional study was conducted in four teaching dental hospitals; Armed Forces Institute Of Dentistry (AFID), Islamic International Dental Hospital, Rawal Dental Hospital, And Watim Dental Hospital in the twin cities of Pakistan from 1st to 20th of August 2021. A questionnaire comprising of seven questions was used and all the clinicians working in the prosthodontic department were targeted. The response rate was 80 percent. The collected data were analyzed and interpreted using IBM SPSS version 25. The frequency of categorical variables was calculated. Fischer exact test was used to evaluate the association between variables. The results indicate that a greater percentage of dentists prefer repair of fractured complete dentures instead of refabrication. Separation of a single tooth from the denture base is identified as the most common type of fracture. Heat cure acrylic was the preferred material for the repair of denture bases. The polishing technique was employed by a majority of dentists after the repair of denture bases. This study provided a unique result in contrast to other studies that reported midline as the most common type of denture fracture.

Keywords: Denture, Complete, Denture bases, Prosthodontics, Acrylic resins, Geriatric patients,.

This article may be cited as: Fatima SR, Bano NZ, Kaleem M. Clinical approach of dentists towards repair of fractured removable complete dentures. Pak Oral Dent J 2022; 42(2):109-113.

INTRODUCTION

Complete edentulism is a crippling condition of the oral cavity, often labelled as the “final marker of disease burden for oral health”.¹ It is a common oral health condition affecting people across the globe especially in lower-middle-income countries (LMICs).² A number of treatment options are available but the most popular one remains the traditional removable acrylic complete denture. The main reason for its popularity is its low cost and technique insensitivity.³

One of the main problems encountered with the use of complete removable dentures is its tendency to fracture.⁴ There are several causes for the higher percentage of fractures of complete dentures. One of the main causes is the accidental dropping of the denture by geriatric patients especially mandibular dentures.⁵

In addition, poor design, poor occlusal fit, and a greater number of stress concentration areas can also contribute to denture fracture.⁶

A fracture can occur at any site of the complete denture. It mostly depends on the forces that are the cause of its fracture and the angle at which they are exerted on the denture.⁷ However, there is no ISO classification of denture base fractures.

A clinician can either refabricate or repair a fractured denture. The approach taken is mostly dependent on the recommendation of the dentist.⁸ Several materials can be used for the repair of dentures based on the preference of the dentist. Some of the common commercially available materials are the conventional heat cure, light cure, and auto polymerizing acrylic.⁹ Recently, microwave polymerized acrylic along with the glass fiber reinforced acrylic have also become available.^{10,11}

The aim of this study to find the most common type of complete denture fracture encountered by clinicians working in the prosthodontics department and to evaluate their approach towards fractured complete dentures.

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Received for Publication: Jan 15, 2022

Revised: May 30, 2022

Approved: June 1, 2022

METHODOLOGY

A cross-sectional study was performed in four dental hospitals in the twin cities (Rawalpindi and Islamabad) of Pakistan. The teaching hospitals included AFID, Islamic International Dental Hospital, Rawal Dental Hospital, and Watim Dental Hospital. The hospitals selected were teaching dental hospitals with fully functioning prosthodontic departments. The hospitals included in this study were those that gave the researcher access to their employees. Non-probability convenience sampling was done. The clinicians included in this study were house officers, medical officers, FCPS residents, and Prosthodontists working only in the prosthodontic department. House officers were included in this study based on their exposure to the prosthodontic department and complete denture fabrication since their third year of dental college. Hence, House officers were considered capable of making their own decisions regarding issues related to complete dentures. Moreover, since the OPD in most dental departments is done primarily by House officers, they were deemed able to identify the type of fracture most commonly presented in the dental clinic. The clinicians who showed unwillingness to participate in the study were excluded.

Data were collected anonymously through a survey comprising of seven questions. The questionnaire addressed fractured complete dentures and the materials used for the repair. A demographic profile (Age, Gender, Qualification, Designation, Clinical experience) of clinicians was included in the questionnaire. Questions regarding the probability of recommendation of a complete denture by dentists, the frequency of their fractures, the type of fracture most commonly encountered, the materials used for its repair, and the usage of any polishing technique after repair were also a part of this questionnaire. The data collected were analyzed and interpreted using SPSS version 25. The level of association between various variables was checked using Fischer- Freeman- Halton Exact test to accommodate small sample size and limited number of variables.

RESULTS

The target of this study was the clinicians working in the prosthodontic department of four major dental teaching hospitals of Rawalpindi and Islamabad, Pakistan. The number of dentists working in the prosthodontic department in these hospitals was 60. Among the participants, 40% were from AFID, 20% from Islamic International Dental hospital, 18 % from Rawal dental hospital, and 22% from Watim dental hospital. The response rate was 65%. Among the sample, the percentage of house officers working in the prosthodontic department was the highest at 48%. The FCPS residents were 33%, the qualified prosthodontists were at 13%. Table 1 shows the descriptive analysis of the

Variables	N	Percent- age
1. Dentist advise for use of removable complete dentures		
Yes	40	100
No	0	0
2. Frequency of patients with fractured removable complete denture		
Very frequently	4	10
Frequently	13	33
Occasionally	14	35
Rarely	7	17
Never	2	5
3. Type of fracture of complete denture often encountered		
Separation of a single tooth from acrylic base	24	60
A dentoalveolar fracture involving multiple teeth	3	8
Moon shaped fracture through buccal and labial flanges	3	7
Midline fracture	4	10
Diagonal fracture extending to the posterior region	6	15
4. Recommendation regarding a fractured acrylic denture base		
Repair	31	78
Refabrication	9	22
5. Recommendation regarding a fractured complete denture involving teeth		
Repair	29	73
Refabrication	11	26
6. Material of choice for fractured acrylic denture base		
Auto polymerizing acrylic resin	13	32
Glass fiber reinforced auto polymerizing acrylic resin	6	15
Heat cure acrylic resin	19	48
Light cure acrylic resin	2	5
7. Any polishing technique employed after repair of denture base		
Yes	38	95
No	2	5

variables of this study.

The level of association was checked between variables and the designation of clinicians. No significant association ($p \leq 0.05$) was found between the

TABLE 2 ASSOCIATION BETWEEN DESIGNATION OF CLINICIANS AND VARIABLES OF STUDY WITH THE CORRESPONDING P-VALUES

Variables	Designation				P value
	House Officer	Medical officer	FCPS resident	Prosthodontist	
1. Denture fractures most often encountered					
Separation of a single tooth from denture base	9	2	9	4	0.96
Diagonal fracture involving posterior region	4	1	1	0	
Midline fracture	2	0	1	1	
Moon shaped fracture involving flanges	2	0	1	0	
A dentoalveolar fracture involving multiple teeth	2	0	1	0	
2. Recommendation regarding fractured denture base					
Repair	15	1	11	4	0.32
Refabrication	4	2	2	1	
3. Recommendation for fractured denture involving teeth					
Repair	13	2	10	4	0.54
Refabrication	6	1	3	1	
4. Material of choice for repair of fractured acrylic denture base					
Heat cure acrylic	11	1	3	4	0.55
Auto polymerizing acrylic	4	1	7	1	
Light cure acrylic	1	1	1	0	
Acrylic reinforced with glass fibers	3	0	2	0	
5. Polishing technique employed after repair of denture base					
Yes	18	2	13	5	0.15
No	1	1	0	0	

variables. Table 2 shows the relationship of study variables with designations of clinicians and their corresponding p- values.

DISCUSSION

The study was conducted to find out the most common type of fracture of complete dentures encountered by dentists employed in the prosthodontic department of four dental hospitals.

All dentists regardless of designations were found to recommend the use of complete removable dentures to their patients. The reasons behind the popularity of this treatment option are its low cost, ease of the procedure, and overall acceptable aesthetic and masticatory results.¹² Complete removable dentures, therefore, occupy a principal position in the treatment regime of the edentulous mouth. Most commonly used complete dentures are fabricated from an acrylic base with either

acrylic or porcelain teeth.¹³

The percentage of fractures of complete removable dentures is quite high.¹⁴ Almost 77.5% of the participants reported that they were consulted by patients with a fractured denture on a frequent to occasional basis. There are several causes of fracture of complete denture. These range from clinical causes such as poor occlusal retention and fit to more patient-related causes such as repeated mishandling of the denture.¹⁵

Separation of a single tooth from the denture base was the most common type of fracture encountered, by almost 60% of the participants. Diagonal fracture through the posterior region was the second most common type of fracture.

Midline fracture was reported by only 10% of the participants. This finding is in contrast to several studies. Khasawneh and Arab in Jordan concluded in

their study that the most common fracture of complete denture that patients present with is the midline fracture.¹⁶ Two studies conducted in India in 2009 and 2019 also reported the midline fracture as the most common type of fracture in complete dentures.^{7,17} Research done in 2011 by Hawler medical university's prosthodontic department reported midline fracture as the most common type of fracture.¹⁸

Moon-shaped fracture of the buccal and labial flanges and Dentoalveolar fracture involving multiple teeth are the least encountered types of complete denture fractures.⁷ Each of these was selected by only 3% of the participants.

The approach towards a fractured denture by most dentists regardless of designation or clinical experience was repair rather than refabrication.¹⁷ This is justifiable as repair is far less time-consuming and bears a lower financial strain on the patients.¹⁹ The process of repair is preferred in the case of a fractured acrylic base with or without the involvement of teeth. Almost 75% of the participants in this study preferred repair over refabrication of the fractured complete denture.

Several materials are employed for the repair of a fractured denture. A material frequently used for the past six decades for this purpose was the auto polymerized acrylic resin, the most common drawback of which is its poor strength.²⁰ Heat, light, and microwave polymerized acrylics are also options for the repair of fractured dentures.²¹ Apart from these, active research is also being done on reinforced repair acrylics. Glass fiber reinforced acrylic has been used as a repair material with promising results.²² Aramide, nylon, and ultra-high-modulus polyethylene fibers are also used as reinforcing agents, however, these are still in the early stages of testing.²⁰ Nanoparticles such as oxides of zirconium, aluminum, silicon, and titanium have invaded the field of reinforced acrylics.²³⁻²⁵

47.5% of the participants of this study chose heat cure acrylic as their choice of material for the repair of complete dentures whereas 32.5% chose auto polymerizing resin. The majority of those who chose heat cure were prosthodontists and house officers. Auto polymerizing resin was chosen by mostly FCPS residents. Glass fiber reinforced acrylic resin was chosen by 15% while the light cure was only chosen by 5% of the participants.

The polishing of a complete denture is an important step in its fabrication as it discourages plaque accumulations and bacterial colonization.²⁶ There are several mechanical and chemical polishing techniques available. Conventional laboratory polishing remains the most widely accepted and common polishing technique.²⁷ 95% of the participants of this study reported

the use of any polishing technique after the repair of denture bases.

The limitation of this study is that it was conducted in four teaching dental hospitals of Rawalpindi and Islamabad. Due to this limitation, the results of this research cannot be generalized to dentists serving in the prosthodontic departments of all dental hospitals in the country. Hence, the sample size is not representative of the entire population.

This study highlights the most common type of fracture of complete dentures encountered by dentists. In this regard, it provides us with a unique result that separation of a tooth from a denture base is most common as compared to a midline fracture. Further research with a larger sample size needs to be done to verify the observed pattern.

CONCLUSION

Hence, within the limitations of the study the following conclusions can be drawn;

- A larger percentage of dentists working in prosthodontic departments of AFID, Islamic Dental Hospital, Rawal Dental Hospital, and Watim Dental hospital recommend repair of fractured dentures instead of refabrication.
- The separation of a single tooth from an acrylic denture base is the most commonly encountered fracture.
- Heat cure acrylic is the most commonly used material employed for the repair of fractured dentures.
- Employment of a polishing technique after repair of denture bases is highly recommended.

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