

ORIGINAL ARTICLE

A Prevalence Based Evaluation of Etiology and Site of Fracture of Acrylic Resin Dentures: A Survey Based Original Study

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ABSTRACT:

Background: Fracture of acrylic resin removable dentures happens frequently amid benefit through substantial occlusal force or unplanned harm. The primary goal of this study is to analyze and determines the prevalence of type of denture fracture. **Materials and Methods:** Relevant data were gathered logically from patients visiting prosthodontic centers for denture repairs at dental hospitals. For each and every patient requiring repairing of a fractured complete and partial denture, the factors were recorded; reasons for denture crack, the kind of crack and the historical backdrop of past repetitive fractures. **Result:** Out of 320 repaired dentures 176 (55%) were complete dentures, 74 (23%) were removable partial dentures, and 70 (22%) included substitution of the teeth that had debonded from the denture bases. The proportion of upper to lower total denture breaks was roughly 2:1, the majority of the cracked dentures (59%) were those of males. The fundamental driver of denture fracture was poor fitting (42%), trailed by poor occlusal connection. Midline fracture was the commonest kind of crack (61%). From the examination most of the dentures had already been repaired once or more. **Conclusion:** The aggregate number of total denture fractures was extensively enhanced by repetitive fractures, which can be lessened by the use of prosthetic standards in building and keeping up dentures specific amid the laboratory stages. Upgrades in the processing techniques and type of resin can diminish the rate of denture crack.

Keywords: Midline fracture; Single denture; Complete denture fractures, Acrylic resins.

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I NTRODUCTION:

Repair of denture fractures is slow down a typical issue in prosthodontics. With denture fracture, patient might be influenced esthetically, practically, and mentally .furthermore, will convey extra expenses .There is no data about the causes and examples of fracture of acrylic denture. Denture repairs include joining two sections of a broke denture with a denture repair material.¹ Agreeable repairs must have sufficient quality, be effectively and quickly finished, match the first shade of the material, hold its dimensional precision and reestablish the first quality of the denture in order to evade additionally break, however this is not generally conceivable.²

The fracture of acrylic resin dentures is an uncertain issue in removable prosthodontics. Endeavors to break down and decide the reason for such cracks have gotten impressive consideration as of late.³ An assortment of elements might be in charge of a definitive disappointment of a denture and disappointment is not really because of the natural properties of the denture base material.⁴ The material most

usually utilized for the manufacture of dentures is the acrylic resin, poly methyl methacrylate (PMMA). This material is not perfect in each regard and it is the mix of properties instead of one single alluring property that records for its fame and utilization. In spite of its prevalence in fulfilling esthetic demands whereby, with a suitable level of clinical mastery and with the cautious selection and game plan of artificial acrylic teeth, it is conceivable to create a prosthesis which opposes location, it is still a long way from perfect in satisfying the mechanical necessities of a prosthesis.⁵

Fractures in dentures result from two unique sorts of powers, to be specific, flexural fatigue and impact.⁶ Mechanical causes are identified with broken outline, defective manufacture or potentially poor materials choice. Any factor that compounds disfigurement of the base or modifies its anxiety circulation will incline the denture to fracture.⁷ Fracture might be because of an assortment of elements instead of the denture base material itself and these variables have been examined in detail. For instance, any figure which wrinkles the distortion of a denture base; extra

factors which frame ranges of stress fixation, for example, a huge frenal notch, dentures with poor clinical plan thin or under-broadened flanges; inadequately fitting dentures or an absence of satisfactory alleviation; dentures with a wedged or locked occlusion; and dentures which have been beforehand repaired.^{8,9} A definitive objective of denture repair is to accomplish the first shape and quality of the denture with least cost and time. Sadly, the repaired units may lose some of their unique transverse quality. Besides, break of repaired dentures regularly happens at the intersection of old and new materials as opposed to through the focal point of repair. The reason for this investigation was to recognize the reasons for the most regular sorts of denture fractures, which could be identified with patients, clinicians and technique.

MATERIALS AND METHODS:

Following incorporation and avoidance criteria were received. Inclusion criteria incorporate patients with satisfactorily controlled fundamental ailments like diabetes and osteoporosis or disease free status of patients and acknowledgment of the denture by the chose patients. Exclusion criteria include patients with poor control of foundational sicknesses like hematological, cardiovascular and renal disorders, immune system/endocrinological disarranges; patients with propensities like bruxism, habitual eccentric movements and so on which would compromise the outcomes and patients who have experienced chemo/radiotherapy. Mandibular arch dilemmas were corrected by selective grinding / restorations / flexible partial dentures. Standard clinical systems with respect to impression making and maxilla-mandibular jaw connection records were taken after. Information was gathered for one year from 320 denture patients who revealed for the repair of their dentures because of crack of the denture. The information was arranged with the accompanying parameters independently for upper and lower dentures:

1. Age and sex of the patient
2. Age of the denture
3. Explanation behind the crack/fracture, as per history, given by the patient and clinical examination of the clinician.
4. Site of the fracture
5. Past or repetitive fracture.

To decide the reason and kind of fracture, dentures were subjected to watchful examination outside and inside the mouth for maintenance and steadiness of the denture, sort and area of break, occlusal contact blunders and nature of opposing teeth (natural or artificial, partial or complete denture). Retention of repaired denture was evaluated by examining the resistance of denture to displacement on removing the denture from the mouth. Broken dentures were repaired with conventional procedure by using auto polymerizing acrylic resin. Examination and evaluation of repaired dentures were carried out by the same operator in

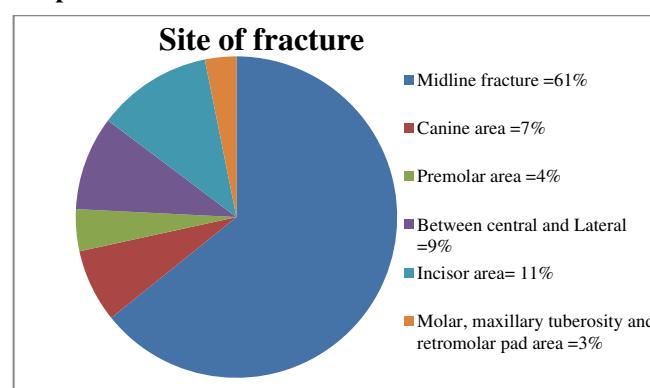
all hospitals. A detailed history of the fracture was taken from the patient and the denture was assessed for retention, stability, occlusal errors, etc by the clinician.

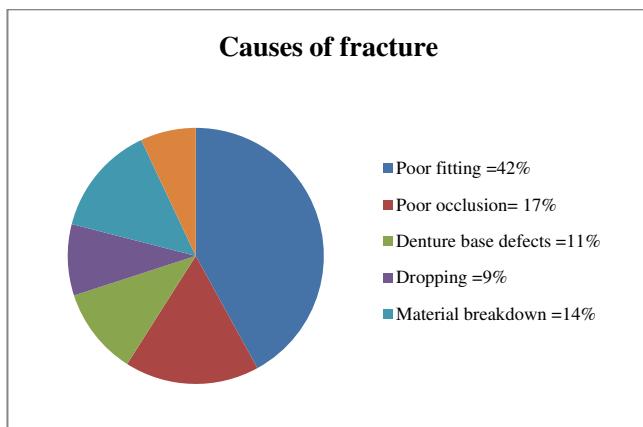
Statistical Analysis and Results: All the collected data were arranged systematically and subjected to fundamental statistical analysis using SPSS statistical package for the Social Sciences version 21 for Windows. Nonparametric test, namely, chi-square test, was used for further data analysis; p-value. Of 320 repaired dentures 176 (55%) were complete dentures, 74 (23%) were removable partial dentures, and 70 (22%) included substitution of the teeth that had debonded from the denture bases. The proportion of upper to lower total denture breaks was roughly 2:1, the majority of the cracked dentures (59%) were those of males. The fundamental driver of denture fracture was poor fitting (42%), trailed by poor occlusal connection. Midline fracture was the commonest kind of crack (61%). From the examination most of the dentures had already been repaired once or more [Table 1 & 2, Graph 1 & 2].

Table 1: Demographic details of patients

Variables	No of cases
Age of wearer	
<40 years	59
40-50 years	78
50-60 years	96
>60 years	87
Gender	
Male	197
Female	123
Type of denture	
Upper CD	107
Lower CD	79
Upper RPD	81
Lower RPD	53
Retention	
Good	86
Moderate	173
Poor	61
Age of denture (years)	
0-2	66
3-6	92
7-10	73
11-15	55
>15	34

Graph 1: Estimation of site of fracture of dentures



Graph 2: Estimation of cause of fracture of dentures**Table 2:** Repetition of fractures

Repetition of fractures	Upper denture	Lower denture
Denture repaired for first time	113	81
Denture repaired once previously	53	18
Denture repaired twice	23	10
Denture repaired three or more times	16	6

DISCUSSION

Denture repaired material have been utilized as a part of dentistry for over a century. These materials play an imperative in present day prosthodontics. Denture repaired material must have satisfactory physical and mechanical properties.¹⁰ Midline fracture was the most widely recognized sort of break in this examination, spoke to 61% of the aggregate denture repairs did. Of those dominant parts were found in upper complete dentures when contrasted with lower dentures. These discoveries are predictable with different examinations, which have demonstrated that midline fracture was a typical issue in upper complete dentures.¹¹ Midline fracture of a denture base speaks to a flexural fatigue failure, coming about because of cyclic deformation of the base amid work. Along these lines, development of the denture amid mastication will cause crack because of a progression of rehashed little loadings, which prompt fatigue failure. In the event that the score is adequately sharp, the nearby anxiety focus may surpass the breaking quality of the acrylic material and a split will from which will run directly through to finish disappointment under rehashed loadings. Break of a denture in mouth by a solitary nibble is exceptionally unrealistic, on the grounds that the heap required to cause crack went from 180-800 Ib , substantially higher than that which a denture wearer gives off an impression of being skilled to create

amid work , 13-16 Ib.¹² Patients who wear complete maxillary denture against mandibular natural teeth or with mandibular incomplete denture regularly confront the issue of midline fracture in their maxillary dentures.¹³ A few components have been ascribed to be the reason for midline fracture i.e. flexural exhaustion coming about because of cyclic twisting and factors that compound the misshapening of the base or modify its anxiety appropriation may incline the denture to break.^{14,15}

Different components which frame zones of stress fixation, for example, a huge frenal notch, dentures with thin or under extended flanges, ineffectively fitting dentures or an absence of satisfactory alleviation, dentures with a wedged or bolted impediment have been embroiled. Every one of the endeavors to strike midline fracture in complete maxillary denture against normal mandibular teeth by enhancing materials did not give the indispensable outcomes.¹⁶⁻¹⁷ Injection moulding technique was created to conquer this issue. Despite the fact that this innovation has been being used since 1954, it has turned out to be prevalent just as of late. Poor fit (42%) was the primary driver of denture fracture in this examination. Poor fit denture is flexed in the mouth amid work about the midline or around which is like study by Beyli and Von Fraunhofer (1981) who found that poor fit was the most widely recognized reason for denture fracture in 12 out of 15 dental laboratories.¹⁴ In the present investigation, poor occlusion was the second reason for denture, (17%) dentures were broken because of overwhelming or uneven masticatory loads. A considerable lot of the dentures in the examination opposed common dentition and the greater part of the sets were not adjusted occlusally prompting undesirable worries in the weaker parts of the denture. Overwhelming occlusal contacts from the normal teeth and overerupted characteristic teeth prompt solid powers and caused consistent impediments in the masticatory developments. Faulty teeth setting outside the ridge may focus weights on non-push bearing zones of the denture. From investigations of Beyli and Smith, unmistakably interior deformities in the acrylic denture base like voids, porosities, notches, scratches, residual stresses are prevalent factors in the break of the denture.^{14,2} These regions of stress fixation prompt split development and engendering. Different reasons for break was observed to be identified with acrylic denture base material, for example, poor denture base outline, deficient thickness and deformities, for example, porosities, voids inside the material, profound scratches, and also acrylic denture base handling stresses which contributed roughly to 37 (16%) dentures crack. This finding concurs with the consequence of different examinations.^{16,18} In spite of the fact that repairing fracture dentures with auto polymerizing resin is a monetary and fast technique however the repaired denture will normally lose around 40%-60% of their transverse quality.^{19,20} That is the reason many repaired dentures will be re cracked, so in the present examination the larger part of repaired dentures were

beforehand repaired once or more, which had been concur with the aftereffects of different investigations which demonstrated that majority of aggregate breaks had already been repaired, 23% of them had been repaired twice or more.^{21,22} Different precautions can be made to decrease the frequency of denture breaks through, maximal denture maintenance and steadiness, uniform occlusal loading and adjusted verbalization. Utilizing higher quality polymers (high-impact resins), a great handling method to kill surface imperfections and incorporations inside the denture base, decreasing the requirement for a profound frenal notch by a frenectomy, sufficient thickness in the foremost area (the most extreme reliable with tongue space) and putting a thin beading around the labial frenum to enhance the seal. Metals can be included the type of wires, plates or fillers to expand the transverse quality of acrylic resin.^{23,24} The fortification of acrylic resin with glass fibers as a woven mat has been exhibited to be an attractive method for delivering a resin with enhanced mechanical properties.

CONCLUSION

Notwithstanding progresses in dental innovation, it can be seen that the fracture of acrylic resin dentures remains a noteworthy issue and the quantity of dentures has not diminished. An examination of the potential reason for fracture in 320 repaired dentures has demonstrated that, poor fit was the fundamental driver of fracture, in dentures. Upper dentures were repaired more than lower denture. Midline fracture was the commonest sort of crack and greater part of repaired dentures had beforehand been repaired.

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