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RESEARCH ARTICLE

A CLINICAL STUDY - EVALUATION OF BREAKAGE OF COMPLETE DENTURE

***Dr. Sunny Jain**

Department of Prosthodontics, Shree Bankey Bihari Dental College and Research Centre, Ghaziabad India

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ABSTRACT

The main purpose of the study was to determine the causes for the breakage of complete dentures of patients reporting to the Department of Prosthodontics, SDM College of Dental Sciences and Hospital, Dharwad, Karnataka, India. Data collected from 200 patients reported for repair of their complete dentures. Data was collected from patients, aged between 30 to 80 years (Mean 55 plus/minus 25 years), from both the genders. Investigations were done on factors causing the breakage. After the analysis it was observed that the ratio of breakage of upper to lower denture was 1:3. Most breakages were common among males (55%). The most common reason being accidental dropping of the denture in case of the lower and improper fit and stability of the denture, improper arrangement and occlusion of the teeth for the upper one. Midline breakage was the most common site for breakage (60%). After analysis, the causes for the breakage were divided into material factors and clinical/technical factors. It was concluded that after denture insertion, instructions of denture care were required to be told to the patients to reduce mishaps, proper principles of denture fabrication were required for mechanical advantage of the denture – balanced occlusion, removal of interferences, reduction of stress concentration areas etc has to be followed. The use of high Impact acrylics and strengthened acrylic along with methods increasing breakage toughness of the conventional acrylic dentures are to be used.

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INTRODUCTION

The life of a complete denture wearer is abruptly paralyzed by the sudden breakage of his/her denture which is of utmost necessity for his/her day to day routine life. As part of the dental education faculty, it is always our goal to make the life of denture-wearers easier and happier by investigating and solving the problems related to complete denture patients. As literature suggests, there are many causes and reasons associated with breakages of complete dentures. This study was undertaken to investigate the causes of denture breakages and device ways of reducing these problems in the future.

MATERIALS AND METHODS

This study was conducted in the Department of Prosthodontics, SDM College of Dental Sciences and Hospital, Dharwad, Karnataka, India. Data was collected for one year from 200 complete denture patients who reported for the repair of their dentures due to breakage of the denture. The data was categorized with the following parameters separately for upper and lower dentures.

1. Age and gender of the patient
2. Age of the denture
3. Reason for the breakage, according to history, given by the patient and clinical analysis of the clinician.
4. Site of the breakage

A detailed history of the breakage was taken from the patient and the denture was assessed for retention, stability, occlusal errors by the clinician. The data collected was analyzed using chi square test and the result was considered statistically significant when probability was less than 0.05.

RESULTS

In this study, 200 complete dentures were examined, excluding removable partial dentures and debonded teeth. (Table 1) and (Table 2). It was observed that the ratio of breakage of upper denture to lower denture was 1:3 (Table 3). Maximum breakage was seen in the denture age group of two to four years

Corresponding author:* **Dr. Sunny Jain,
Department of Prosthodontics, Shree Bankey Bihari Dental College and Research Centre, Ghaziabad India.

post- delivery followed by zero to two years. Accidental dropping of the denture while cleaning, insertion and removal (53%) was the most common cause for lower denture breakage followed by poor retention and fit (22%) whereas poor fit was the most significant factor for upper denture breakage (43%) followed by accidental dropping of the denture (25%). Midline breakage was most common in both the upper and lower dentures (more than 60%).

Table 1.

Number of Breakages in relation to age of denture	
Age of the Denture (years)	No Of Dentures
0-2	42
2-4	56
4-6	32
6-8	24
8-10	31
>10	15
Total	200

Table 2.

Causes for Breakage in relation to Upper and Lower Denture		
Proposed cause of Breakage	Upper	Lower
Accidental Dropping	13(25)	79(53)
Poor Fit, Retention Stability	22(43)	33(22)
Poor Occlusion and Interferences	08(16)	18(12)
Acrylic Base Defects	02(04)	03(02)
Material Breakdown	01(02)	12(08)
Faulty Teeth Arrangement	05(10)	04(03)
Total	51(100)	149(100)
X2 = 20.89, *P*=0.034, Figures in parentheses are in percentage		

Table 3.

Upper and Lower Denture breakages in relation to site of fracture		
Site of Fracture	Upper	Lower
Midline Breakage	32(62)	89(60)
Incisor Area	13(26)	15(10)
Canine Area	02(04)	21(14)
Premolar Area	00(00)	06(04)
Molar, Maxillary Tuberosity and Retromolar Pad Area	02(04)	06(04)
Any other Area	02(04)	06(04)
Total	51(100)	149(100)
X2= 14.90, *P* = 0.186, Figures in parentheses are in percentage		

DISCUSSION

In this study, midline breakage was the most common site of breakage (more than 60%). Midline breakage results from cyclic deformation of the base during function. Since lower dentures broke it was postulated that the less surface area and thinness in the middle part of the denture are responsible for the breakage. Also, patient negligence during insertion, removal and cleaning of the denture are the major causative factors. Accidental dropping of the denture was the prime cause in these cases, the lower being the delicate of the two broke in the ratio of 3:1 to the upper. Presence of deep incisal notches, diastema and thin labial flanges for esthetics and comfort factors of the patient act as stress raisers and contribute to midline breakage of the maxillary denture. Poor fit was the prime cause in upper denture breakage, such dentures flex in the mouth during function around the midline and due to repeated small loadings during mastication lead to the fatigue breakage. This study also holds good with the study of Beyli and von Fraunhofer (1981) who suggest the poor fit is the main culprit. Mathews and Wain (1965) show that tensile stresses are on the palatal aspect of the denture. The other causes of breakage are poor occlusion (16% in upper, 12% lower). Many of the dentures in the study opposed natural dentition and most of the sets were not balanced occlusally leading to unwanted stresses in the weaker parts of the denture. Heavy occlusal contacts from the natural teeth and over-erupted natural teeth lead to strong forces and caused constant interferences in the masticatory movements. Faulty teeth setting outside the ridge may concentrate stresses on non-stress bearing areas of the denture. From studies of Beyli and Smith, (1961) it is clear that internal defects in the acrylic denture base like voids, porosities, notches, scratches, residual stresses are predominant factors in the breakage of the denture. These areas of stress concentration lead to crack formation and propagation. Inherent properties of the denture base material also play a very important role in impact strength of the denture. Breakage from accidental droppings can be prevented to a large extent by using high impact resins, metal reinforcement (in the form of plates, wires and fillers) and glass fibers in the form of woven mat. Reinforcement with glass fibers enhances the mechanical strength characteristics of denture bases such as the transverse strength, ultimate tensile strength and impact strength.

The technical work of fabricating acrylic dentures using modern techniques which reduce voids and porosities releasing residual stress is a must. Material breakdown with age and water sorption will reduce the fatigue resistance of the material. Hence selection of the material for denture requires more emphasis. The study showed that maximum denture breakages are in the group of two to four years post-delivery followed by zero to two years. According to Hargreaves, (Hargreaves, 1969) physical properties of acrylic do not deteriorate with age, but the clinical function may induce stress which after a period of usage may bring deterioration of the material and hasten breakage.

Conclusion

From this study, the following conclusions can be drawn:

- Proper patient education and motivation of patients using dentures to reduce accidental mishaps
- Following definite prosthodontic principles in denture construction - analyzing proper fit and retention of the denture. Eliminating occlusal interferences and establishing balanced occlusion
- Using high impact polymers, metal reinforcements, glass fibers
- Using processing techniques which reduce chances of voids and porosities.
- Maintaining proper thickness in flanges and incisal notch areas to prevent stress concentration.

Inducing methods of research for manufacture of high strength material which can reduce the denture breakages (Jameson, 2000).

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