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CLINICAL ASSESSMENT OF FRACTURES OCCURRING IN COMPLETE DENTURES: A RETROSPECTIVE STUDY

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ABSTRACT:
Background: A midline fracture of single maxillary complete denture (CD) base especially in patients who have retained their natural mandibular teeth is an inevitable problem. Several factors have been attributed for the midline fracture including flexural fatigue resulting from cyclic deformation and those which exacerbate the deformation of the base or alter its stress distribution. Hence; the present study was undertaken to assess the common causes responsible for denture fracture. **Materials & methods:** The data for the present study included assessment of records of all the patients that received CD. A total of 100 patients were included from the present study after meeting the inclusion and exclusion criteria. 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. All the results were analyzed by SPSS software. **Results:** 20 broken dentures had age of zero to two years. 29 and 17 broken dentures had age of two to four and four to six years respectively. Only 9 broken dentures had life of more than 10 years. Poor stability was the reason for breakage of dentures in 10 and 36 cases of maxillary and mandibular dentures respectively. Non-significant results were obtained while comparing the cause of breakage of dentures in maxillary and mandibular arches respectively. **Conclusion:** For the reduction of the accidental mishaps, proper patient education and motivation is required.
Key words: Denture, Fracture

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INTRODUCTION

In the field of prosthodontics, one of the challenges encountered by the dentists is the fracture of complete dentures (CD).[1] A midline fracture of single maxillary complete denture base especially in patients who have retained their natural mandibular teeth is an inevitable problem. Several factors have been attributed for the midline fracture including flexural fatigue resulting from cyclic deformation and those which exacerbate the deformation of the base or alter its stress distribution.[2] As literature suggests, there are many causes and reasons associated with fractures of complete dentures.[3] Hence; the present study was undertaken to assess the common causes responsible for denture fracture.

MATERIALS & METHODS

The data for the present study was taken from the patient record room of the department of prosthodontics of the dental institution and included assessment of records of all the patients that received CD. Inclusion criteria for the present study were as follows:

- Patients with 50 to 80 years of age
- Patients that reported with broken denture for repair
- Patients without history of any systemic illness
- Patients without any known drug allergy

Data records of patients that didn't met this inclusion criteria were excluded from the present study. Ethical approval was taken from the institutional ethical committee for this retrospective study. A total of 100 patients were included from the present study after meeting the inclusion and exclusion criteria. The data was categorized with the following parameters separately for upper and lower dentures:

- Age of the patient
- Gender of the patient
- Age of the denture
- Reason for the occurrence of fracture of denture
- Site of the occurrence of the fracture

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. All the results were analyzed by SPSS software. Chi- square test and student t test were used for the assessment of level of significance.

RESULTS

Graph 1 shows the distribution of fractures of dentures according to the age of the denture. 20 broken dentures had age of zero to two years. 29 and 17 broken dentures had age of two to four and four to six years respectively. Only 9 broken dentures had life of more than 10 years. **Table 1** and **Graph 1** correlation of cause of fracture of denture in both the arches. Accidental dropping of the dentures was the cause of denture breakage in 5 and 36 maxillary and mandibular denture cases respectively. Poor stability was the reason for breakage of dentures in 10 and 36 cases of maxillary and mandibular dentures respectively. Non-significant results were obtained while comparing the cause of breakage of dentures in maxillary and mandibular arches respectively.

Graph 1: Distribution of fracture of dentures according to the age of the denture

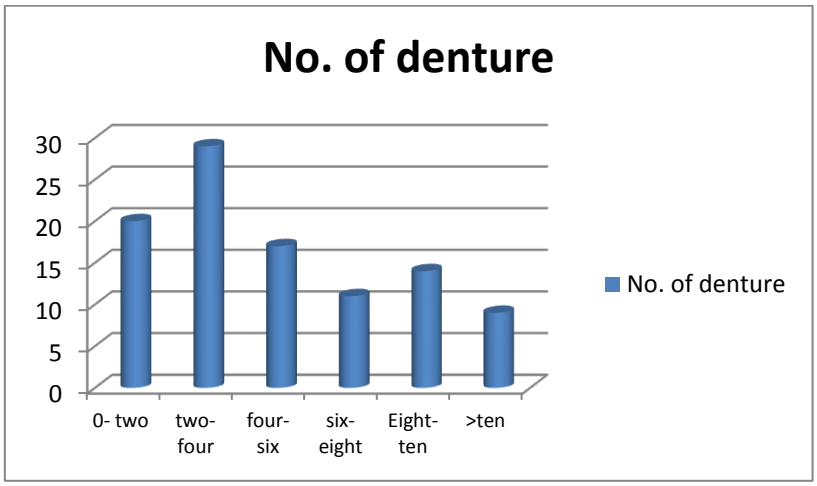
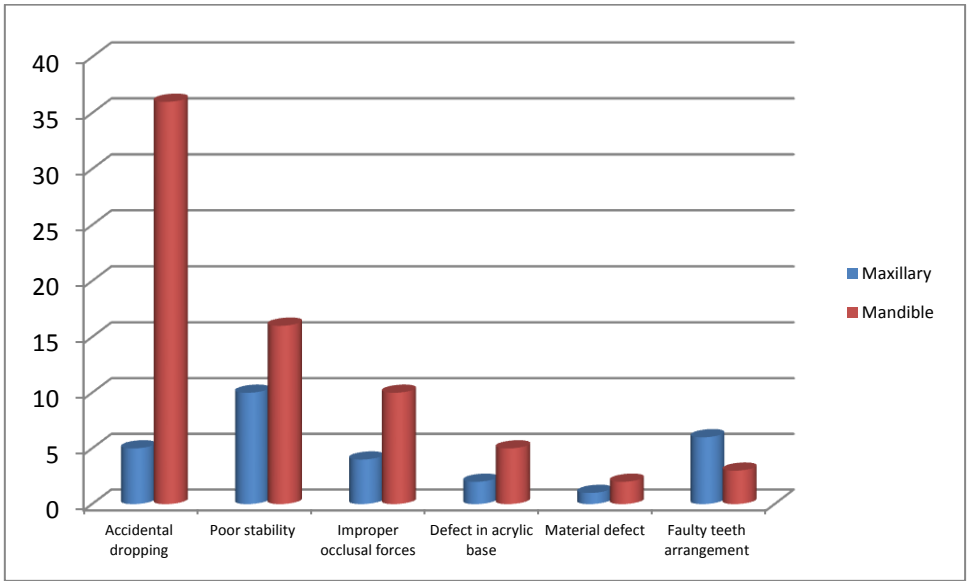


Table 1: Correlation of cause of fracture of denture in both the arches

Cause of denture fracture	Maxillary	Mandible	p-value
Accidental dropping	5	36	0.21 (NS)
Poor stability	10	16	
Improper occlusal forces	4	10	
Defect in acrylic base	2	5	
Material defect	1	2	
Faulty teeth arrangement	6	3	

NS: Non- Significant

Graph 1: Cause of fracture of denture in both the arches



DISCUSSION

Despite advances in dental materials, techniques, and equipment, fracture of poly methyl methacrylate resin denture remains a significant problem.[4] Previous studies have shown that the most common type of fracture is debonding / fracture of denture teeth in both complete and partial dentures followed by the midline fractures of complete dentures and other types of denture fracture.[5] Patients who wear complete maxillary denture against mandibular natural teeth or with mandibular partial denture often face the problem of midline fracture in their maxillary dentures.[6] Several factors have been attributed to be the cause of midline fracture i.e. flexural fatigue resulting from cyclic deformation and factors that exacerbate the deformation of the base or alter its stress distribution may predispose the denture to fracture.[7- 9] Hence; the present study was undertaken to assess the common causes responsible for denture fracture.

In the present study, we observed that majority of the broken dentures were two to four years old (**Graph 1**). Poor stability was the most common cause of denture fracture in maxillary dentures and denture breakage due to accidental dropping was the most common cause of denture breakage in case of mandibular dentures (**Table 1** and **Graph 2**). Dhiman et al compared midline Fractures in Single Maxillary Complete Acrylic versus Flexible Dentures. A total of 58 patients in the age group of 38 to 80 years, who had experienced midline fracture in their acrylic maxillary dentures were selected. They were provided with new dentures using flexible denture material. Various parameters, namely, mastication, phonetics, esthetics and comfort level were evaluated. Only two cases reported slight crack in the palatal region of the-maxillary dentures after 18 months of use. Mastication and phonetics were found to be improved with flexible dentures. The flexible denture is a promising material for preventing midline fractures in a single maxillary denture. It is well tolerated by the patients as compared to the methyl meth-acrylate dentures.[10] Naik determined the causes for the fracture of complete dentures of patients reporting to the Department of Prosthodontics. 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 fracture. After the analysis it was observed that the ratio of fracture of upper to lower denture was 1:3. Most fractures 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 fracture was the most common site of fracture (60%). After analysis, the causes for the fracture were divided into material factors and clinical/ technical factors. It was concluded that the after denture delivery, instructions of denture care were required to reduce mishaps, proper principles of denture construction 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 fracture toughness of the conventional acrylic dentures are to be used.[11]

Prombonas et al determined the midline stress field of a mandibular complete denture under different loading conditions, and to compare this with the corresponding field of a maxillary denture to identify whether significant differences in maximum stresses between these 2 stress fields are responsible for the higher rate of failure seen clinically in maxillary dentures. The identical casts used in this study were fabricated with commercial molds. Two complete acrylic resin dentures (1 maxillary and 1 mandibular) that were used in a previous study were selected as prototype dentures for this study. The mandibular acrylic denture was used to fabricate a 2-piece mold from silicone (upper half) and polymethyl methacrylate (PMMA) sheets (lower half) that was subsequently used to produce 3 identical mandibular complete dentures. The single maxillary acrylic denture was used to load the mandibular dentures. A rosette strain gauge was cemented onto the midline of each of the 3 mandibular dentures. The test conditions, including the fabrication of the casts used to induce loads, simulation of oral mucosa, loading procedure, strain measurement, and stress calculations, were identical to those used in a previous investigation of maxillary complete dentures to allow a direct comparison between maxillary and mandibular dentures. The midline stress field of the mandibular complete denture was characterized by 2 low compressive principal stresses and a low maximum shear stress, whereas the corresponding stress field of the maxillary complete denture was characterized by a high principal tensile stress and a high shear stress. These differences between the stresses of maxillary and mandibular dentures were statistically significant (P<.001). The differences in stress patterns between mandibular and maxillary complete dentures as determined by this study, which also used data from a previous study, may be the primary reason why maxillary dentures fracture more often than mandibular dentures.[12]

CONCLUSION

From the above results, the authors concluded that for the reduction of the accidental mishaps, proper patient education and motivation is required. However further studies are recommended.

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