



Prevalence based evaluation of fracture sites of complete Dentures in Institutionalized Patients: An Original Research Study

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ABSTRACT

This prevalence based study was aimed to evaluate fracture sites of complete dentures in institutionalized patients. The study was abstracted and executed in the department of Prosthodontics of the institute. Total 50 denture fracture patients were finally selected wherein 32 were mandibular and 18 were maxillary dentures. Careful examination of the broken denture was attempted to find out the probable etiology. All fractured dentures were repaired with self cure acrylic resin using conventional manner and evaluated in the mouth for retention, stability and occlusion. Statistical analysis was attempted by SPSS software. Among all the studied age groups, total 17 patients were in the age group of >60 years. The p value was highly significant in this age group. 13 subjects were noted in the age group of 56-60 years. Maximum 28% maxillary dentures were fractured at Incisor area followed by Central and Lateral region and midline. P value was highly significant for Incisor area. Maximum 44% mandibular dentures were fractured at Midline followed by Incisor area and Central and Lateral region. P value was highly significant for Midline area. Poor fit and inappropriate occlusion of the denture was the commonest etiology of the fracture as stated by the patients. We concluded that midline fractures were the commonest mode or site of the mandibular denture fracture in the studied patients. Incisor area fractures were the commonest mode or site of the maxillary denture fracture in the studied patients.

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

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INTRODUCTION

Artificial replacement of natural dentition is one of the most practiced areas of oral rehabilitation. Since decades, artificial replacement of natural dentition has been tried with many primitive materials like wood, animal bone, ivory, metals and other materials[1-2]. With the advancements of the dental material science and technology, many newer materials have been introduced in the recent past for replacement of human teeth[3-4]. Of all experimented materials, poly methyl methacrylate is one of the ideal, safest and most commonly used materials across the globe. It is quite popular for its esthetics, economical and handling properties[5-6]. Commercially available denture teeth are also fabricated from poly methyl methacrylate based acrylic resin. Researchers have very well studied this material by adding other constituents to improve its physical and mechanical properties. Denture fracture is a very common issue which is directly associated with the mechanical properties of the poly methyl methacrylate. Denture fracture is mostly because of the external trauma or impact which creates cracks. These crack propagation ultimately leads to complete fracture of the denture into two or multiple pieces. Literature has well evidenced about other potential causes of the denture fracture which includes primarily poor denture fit, poor stability, inaccurate occlusion and faulty jaw relations[7]. Complete denture processing errors like denture porosities also play an important role in the development of fracture in complete dentures. Therefore in view of these facts, this prevalence based study was conducted to evaluate fracture sites of complete dentures in institutionalized patients.

MATERIAL AND METHODS

The study was planned and completed in the department of Prosthodontics of the institute in the year 2022 wherein authors aimed to see the different parameters of fracture of complete dentures. The data was collected from the existing complete denture patients those who reported with the chief complaint of

denture fracture (maxillary or mandibular). Subjects with dentures fabricated outside the institute were excluded from the study. The idea was to explore the commonest pattern and etiology of the denture fracture those fabricated in the institute with similar materials and equipments. Patients were explained about the proposed study and about the value of this study. Detailed case history was noted with special focus on the history and cause of denture fracture. Total 50 patients were finally selected based on the above mentioned criterion. Out of total 50 fractured denture cases, 32 were mandibular and 18 were maxillary dentures. The first step was careful examination of the broken denture to explore the possible etiology. Denture was assessed intraorally and extraorally to confirm the relative fit and comfort by the prostheses. The fractured surfaces and surface detailed was also noted. Authors also evaluated the change or alteration in occlusion with fractured denture. The severity of dis-occlusion was also examined to plan the appropriate fracture repair. All broken dentures were included in the study; two piece fractures and three (or more than three) piece/multiple fractures. All fractured dentures were repaired with self cure acrylic resin using conventional manner. All repaired dentures were comprehensively evaluated in the mouth for optimal retention, stability and occlusion. Phonetics, esthetics and chewing was also assessed and asked form patients. All the details and relative information was entered into spreadsheet further analysis.

RESULTS

Data was analyzed by statistical analysis software (SPSS) statistical package for the Social Sciences version 22 for Windows. Of 50 participants, 32 fractures were mandibular and 18 fractures were maxillary dentures. Table 1 shows age wise distribution of study subjects. All studied patients were divided into 5 age groups. Total 17 patients were in the age group of >60 years. The p value was highly significant in this age group. 13 subjects were found in the age group of 56-60 years. Minimum 4 subjects were noted in the age group of 41-45 years. Table 2 illustrates essential statistical explanation for maxillary dentures. Maximum 28% maxillary dentures were fractured at Incisor area followed by Central and Lateral region and midline. P value was significant for Incisor area. Table 3 illustrates essential statistical explanation for mandibular dentures. Maximum 44% mandibular dentures were fractured at Midline followed by Incisor area and Central and Lateral region. P value was significant for Midline area. Figure 1 illustrates about assessment of site of fracture of mandibular dentures. Poor fit and improper occlusion of the denture was the commonest etiology of the fracture as agreed by the subjects. This was also confirmed by during examination of broken pieces of the dentures.

DISCUSSION

Complete dentures are the most common prosthesis among all the prosthesis used worldwide. Researchers have confirmed that predictable resorption of upper jaw induces flexure effects on the on the denture flanges as well as in the denture midline [8-9]. Dental plaque accumulation and bacterial overgrowth on the denture surfaces can also weaken the denture material. These processes eventually lead to denture fracture. Many of the pioneer workers have also studied these fracture etiologies in details. The problem of mid line denture fracture is very severe in patients those wear only one denture i.e.; single complete denture. Different methodologies have been experimented over the decades to address the dilemma of denture fractures [10]. Many clinicians and pioneer workers have shown that these denture fractures occur primarily by flexural and impact forces [11-12]. Sharry has stated that denture fractures could be due to inadvertently fall of dentures [13]. This is particularly stands true during denture cleaning out side of mouth. Smith stated that the fracture of the maxillary complete denture is very uncommon before three years of clinical usage [14]. He confirmed that midline fracture is equally prevalent in maxillary and mandibular complete dentures. Winkler reconfirmed the significant findings of Smith by showing equal midline fracture in upper and lower dentures [15]. Boucher has stated that molar teeth can create different misaligned leverage forces that could lead to the inadvertent denture fracture [16]. Many researchers have agreed to the facts put forwarded by Boucher. Ray and associates explored the occurrence of fracture of complete denture and analyze the underling etiology. They performed the study in 1.5 years in which 646 complete dentures were studied in detail. They concluded that the fracture of mandibular complete denture fracture is more common than maxillary complete denture fracture [17].

Table 1: Age & gender wise allocation of patients

Age Group (Yrs)	Male	Female	Total	%	P value
41-45	2	2	4	8%	0.20
46-50	4	2	6	12%	0.09
51-55	5	5	10	20%	0.10
56-60	7	6	13	26%	0.50
>60	9	8	17	34%	0.01*
Total	27	23	50	100%	*Significant

*p<0.05 significant

Table 2: Essential statistical explanation for maxillary dentures

Site of fracture	Prevalence %	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Midline	18	0.532	0.930	1.63	1.033	1.0	0.08
Canine	8	0.837	0.035	1.45	2.537	1.0	0.28
Premolar	11	0.431	0.251	1.94	2.947	2.0	0.20
Central and Lateral	24	0.864	0.644	1.54	1.234	1.0	0.50
Incisor area	28	0.327	0.035	1.45	2.537	1.0	0.01*
Molar and	8	0.211	0.271	1.94	2.954	2.0	0.20
Any other	3	0.564	0.324	1.54	1.946	1.0	0.40

*p<0.05 significant

Table 3: Essential statistical explanation for mandibular dentures

Site of fracture	Prevalence %	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Midline	44	0.387	0.372	1.53	1.036	1.0	0.01*
Canine	8	0.837	0.031	1.93	2.732	1.0	0.20
Premolar	4	0.456	0.243	1.91	2.994	2.0	0.30
Central and Lateral	16	0.834	0.603	1.52	1.204	1.0	0.70
Incisor area	21	0.309	0.054	1.44	2.564	1.0	0.09
Molar and surroundings	5	0.211	0.254	1.95	2.954	2.0	0.20
Any other	2	0.523	0.324	1.56	1.943	1.0	0.40

*p<0.05 significant

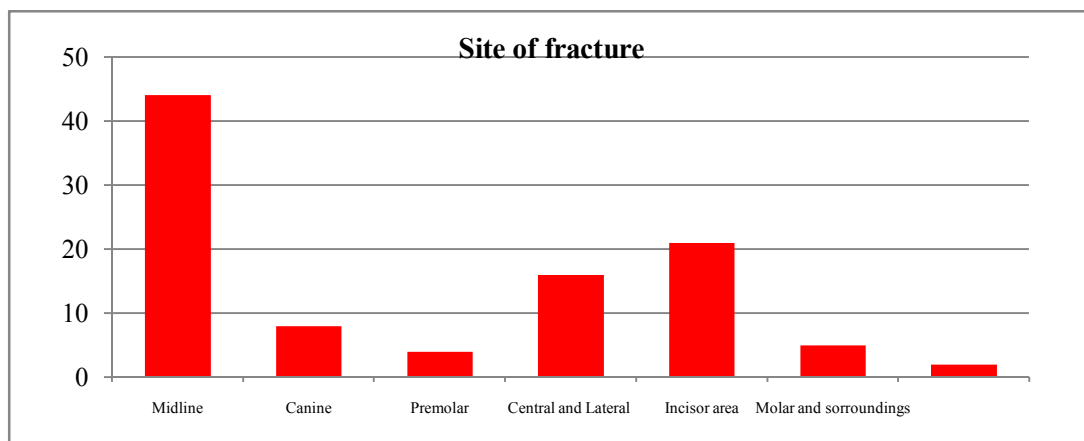


Figure 1: Assessment of site of fracture of mandibular dentures

CONCLUSION

Fracture in the complete denture is a very common clinical dilemma seen in completely edentulous patients. Our study evaluated the relative cause and site of the fracture in the maxillary and mandibular complete dentures individually. Within the limitations of the study, authors concluded that midline fractures were the commonest mode or site of the mandibular denture fracture in the studied patients. This was followed by incisor region. Incisor area fractures were the commonest mode or site of the maxillary denture fracture in the studied patients. This was followed by lateral incisor region and midline region. Inferences of this study must be clinically correlated wherever utilized for different demographic setup.

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