

Prevalence Based Etiological Estimation Of Locations Of Fracture Of Conventional Complete Dentures Made With Balanced Occlusion Philosophy: An Original Research Study

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Abstract

Background & Aim: Acrylic fracture is one of the commonest problems seen in conventional complete dentures. This fracture can be due to various reasons and at different locations. Therefore, this study was primarily conducted to estimate the prevalence and etiologies of location related fractures of complete dentures made with balanced occlusion philosophy.

Materials and Methods: Total 50 patients with the chief complaint of their broken complete dentures, were included logically. Dentures made only with balanced occlusion philosophy were included in the study. Systematic sampling procedure was utilized rationally to select all participating subjects. Total 30 male and 20 female patients were studied in comprehensively. Each denture was examined carefully for the details of fracture. The dentures were repaired as per the requirements and standards. The probable etiology of the denture fracture was asked from the patients. All data was sent for statistical analysis for further analysis and interpretations. P value less than 0.05 was taken as significant.

Statistical Analysis & Results: All data was statistically analyzed by SPSS statistical package for the Social Sciences version 21 for Windows. In the first age range of 45-50 years, total 17 patients were noticed. P value was highly significant for this group (0.01). Fracture (Midline) was noticed in maximum 19 patients whereas Fracture (with teeth) was noticed in only 2 patients. P value was highly significant in the Fractures noticed at midline areas (0.01). Denture fracture due to Poor fit was identified in 12 patients. P value was highly significant here (0.02). For ill fit group, the measured Statistical Mean was 0.738, standard error was 0.403, 95% coefficient I was 1.96, Pearson Chi-Square Value was 1.838 and Level of Significance (p value) was 0.02.

Conclusion: It was concluded that midline fracture was the most common site of fracture followed by canine region and premolar/molar region. Likewise, the most common etiology of denture fracture was accidental fall followed by loose fit and faulty occlusion. However, authors also expect other long term studies with larger sample size and wider parameters so as to set other related recommendations.

Keywords: Midline fracture, Conventional Denture, Complete Denture, Acrylic resins, Denture Base

Introduction

Oral hygiene maintenance is an integral part of daily routine in dentulous as well as edentulous patients both. In dentulous patients, mechanical plaque control is the method of choice for maintaining hygiene.^{1,2} While in edentulous patients, this oral hygiene maintenance is directly related to the prosthesis that is worn by the patients. As we all know that the most common prosthesis given to edentulous people worldwide is complete denture.^{3,4} The material of choice for the construction of dentures is the polymethyl methacrylate based acrylic resin. Most of the dental practitioners recommend cleaning of the complete denture by brushing or by chemical aid. All these measures actually increase the possibility of accidental slippage or sudden fall of the complete denture.^{5,6,7} This factually creates different types of fractures in the denture. However, accidental fall is not the only reason for denture fracture. Many popular researchers in the literature have demonstrated several other etiologies for denture fracture. The denture fracture can be because of errors in denture fabrication, reduced retention and inaccurate balanced occlusion. Many of the researchers have shown that these fractures can result from internal flexural fatigue or impact.^{3,5,8} Hence, this study was primarily conducted to estimate the prevalence and etiologies of location related fractures of complete dentures made with balanced occlusion philosophy.

Materials and Methods

The study was planned, abstracted and performed in the department of Prosthodontics of the institute in which fractures of complete dentures were evaluated comprehensively. The study included total 50 patients those reported with the chief complaint of their broken complete dentures. The place of fabrication was also taken into consideration in the study so as to standardize the sample size. Dentures made only with balanced occlusion philosophy were included in the study. Other inclusion criteria were a) subjects with no systematic disorder like diabetes or osteoporosis b) patients in the age range of 45 to 65 years c) patients in which complete denture were fabricated in past in the institution itself. Exclusion criteria included a) patients with any possibility of follow up loss b) patients with any ongoing medication c) patients with any known systemic complication which could affect the denture performance d) hematological, cardiovascular and renal disorders, immune system dilemmas, patients with problems like bruxism, regular eccentric movements and so on which would compromise the outcomes and patients who have experienced chemotherapy or radiotherapy. After explaining the study aim, written and signed consents were obtained from all 50 willing participants. Systematic sampling procedure was utilized logically to select all participating subjects. Both male and female patients were included in the study. 30 male and 20 female patients were studied in detail. Also, both maxillary and mandibular complete dentures were studied in detail/included in the study. However, only single denture per patient was included (either upper or lower denture). After initial case history recording, each denture was inspected carefully for the fracture segments, fracture surfaces, fracture site, fracture location, fracture extent, fracture which included teeth also. The dentures were sent for repairing as per the requirements and need. Examination and evaluation of repaired dentures were performed by the same operator in all patients. The possible etiology of the denture fracture was asked from the patients and recorded accordingly. All data was sent for statistical analysis for further analysis and interpretations. P value less than 0.05 was taken as significant.

Statistical Analysis and Results

All the relevant data were set systematically and subjected to basic statistical analysis using SPSS statistical package for the Social Sciences version 21 for Windows. Table 1 shows about age & gender wise allocation of patients. Total

50 patients were studied including 30 male and 20 females in the age range of 45 to 50 years. In the first age range of 45-50 years, total 17 patients were noticed. P value was highly significant for this group (0.01). In the age range of 61-65 years, total 4 patients were noticed. P value was highly significant for this group (0.02). Table 2 and graph 1 depicts about basic statistical analysis and related interpretations for Site of Denture Fracture. Fracture (Midline) was noticed in maximum 19 patients whereas Fracture (with teeth) was noticed in only 2 patients. Fracture at Canine region was in 11 patients whereas Fracture at premolar region was seen in 8 patients. P value was highly significant in the Fractures noticed at midline areas (0.01). Table 3 represents about fundamental statistical analysis and related interpretations for etiology of Denture Fracture. Denture fracture due to Poor fit was identified in 12 patients. P value was highly significant here (0.02). Faulty Occlusion was the reason of fracture in 10 patients. Accidental fall and related fracture was noticed in maximum 18 patients. Fracture due to material problems was seen in total 6 patients. For ill fit group, the measured Statistical Mean was 0.738, standard error was 0.403, 95% coefficient I was 1.96, Pearson Chi-Square Value was 1.838 and Level of Significance (p value) was 0.02. For Faulty Occlusion group, the measured Statistical Mean was 0.604, standard error was 0.601, 95% coefficient I was 1.39, Pearson Chi-Square Value was 1.503 and Level of Significance (p value) was 0.10. For Sudden Fall group, the measured Statistical Mean was 0.442, standard error was 0.854, 95% coefficient I was 1.28, Pearson Chi-Square Value was 1.623 and Level of Significance (p value) was 0.76. For Material Issues group, the measured Statistical Mean was 0.745, standard error was 0.423, 95% coefficient I was 1.96, Pearson Chi-Square Value was 1.838 and Level of Significance (p value) was 0.20.

Table 1: Age & gender wise allocation of patients

Age Group (Yrs)	Male	Female	Total	P value
45-50	8	9	17	0.01*
51-55	12	6	18	0.07
56-60	7	4	11	0.08
61-65	3	1	4	0.02*
Total	30	20	50	*Significant
*p<0.05 significant				

Table 2: Basic statistical analysis and related interpretations for Site of Denture Fracture

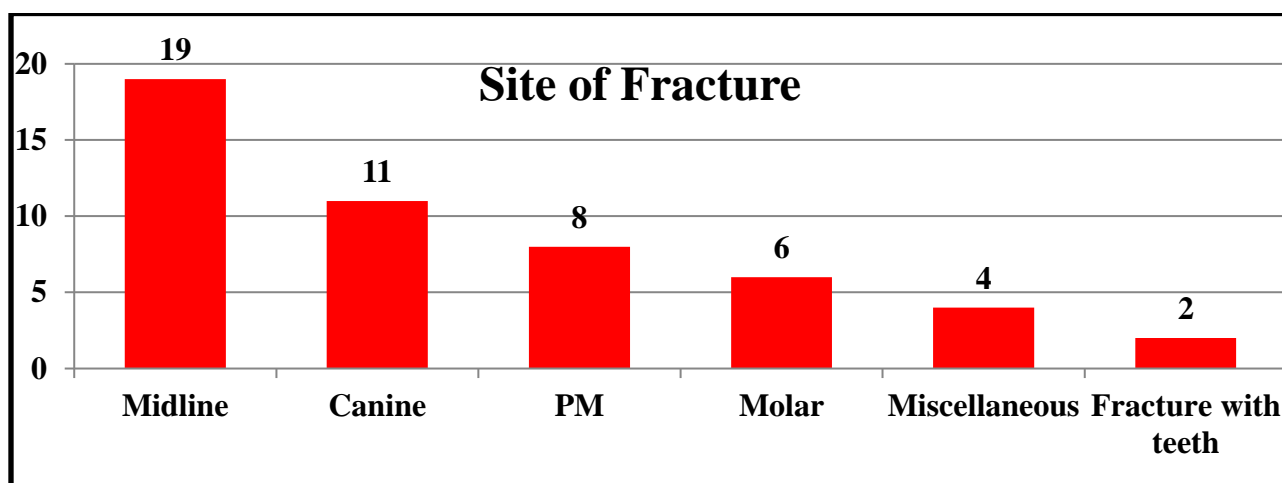
Site	n	Statistical Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Fracture (Midline)	19	1.41	0.486	0.945	1.96	1.983	1.0	0.01*
Fracture (Canine)	11	1.26	0.622	0.609	1.89	1.546	2.0	0.09
Fracture (PM)	8	0.94	0.499	0.832	1.98	1.690	1.0	0.06
Fracture (Molar)	6	0.83	0.847	0.839	1.43	1.983	1.0	0.30
Fracture (Miscellaneous)	4	0.52	0.693	0.602	1.34	1.433	2.0	0.08
Fracture (with teeth)	2	0.39	0.435	0.854	1.23	1.563	1.0	0.06
*p<0.05 significant								

Table 3: Basic statistical analysis and related interpretations for etiology of denture fracture

Etiology	n	Statistical Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Ill Fit	12	0.738	0.827	0.403	1.96	1.838	1.0	0.02*
Faulty Occlusion	10	0.604	0.603	0.601	1.39	1.503	2.0	0.10
Sudden Fall	18	0.442	0.423	0.854	1.28	1.623	1.0	0.76
Material Issues	6	0.745	0.403	0.423	1.96	1.838	1.0	0.20
Processing Errors	2	0.643	0.622	0.601	1.39	1.503	2.0	0.10
Others	2	0.403	0.442	0.033	1.23	1.532	1.0	0.12

*p<0.05 significant

Graph 1: Evaluation of site of fracture of dentures



Discussion

Denture fracture can be seen due to several reasons. Despite of the external mechanical impact, residual flexural impact of fatigue strength of the acrylic resin may also lead to crack propagation and associated fracture.^{9,10} Fracture in complete denture can be initiated at any site of denture like denture base, denture border, and denture flange. In some special conditions, fracture line may involve the artificial teeth also. The incidences of fracture those associated with teeth are compromising the bond strength of acrylic-teeth.^{11,12,13} Tooth de-bonding mostly happens as a result of defective laboratory technique. All such defective laboratory procedures results into weakened bond surfaces or inappropriate curing cycle. In our study also, the most common site of fracture was midline and most common etiology of fracture was sudden fall.^{14,15} During the literature search, it was very surprising to see very little availability of literature about complete denture fracture. Interestingly, complete denture fracture is one of the very common problems faced by edentulous patients worldwide. Even authors did not notice any valid classification system of denture fracture.^{16,17} Also, the association of the location and etiology of complete denture fracture has been minimally explored in the past.^{12,16,18} Therefore, the standard knowledge or association of fracture site and etiology is apparently

unknown. Our study has some limitations also like authors had included patients of a particular region only with smaller sample size.

Conclusion

Within the limitations of the study, authors concluded that midline fracture was the most common site of fracture followed by canine region and premolar/molar region. Similarly, the most common etiology of denture fracture was accidental fall followed by loose fit and faulty occlusion. All these findings were noted in both maxillary as well as mandibular complete dentures. All these factors and parameters are applicable to the studied patients only hence we must be very careful while applying these inferences on other populaces. Interpretations and findings of the present study must be correlated thoroughly. Authors also expect other long term studies with larger sample size and wider parameters.

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