



Original Article

Frequency of Various Grades of Failure and Their Number of Units Involved in Non Maintained Metal Ceramic Fixed Dental Prosthesis

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ABSTRACT

Replacement of missing teeth with fixed partial denture is high in demand, so high are the problems and failures of these prostheses if they are not maintained well. **Objective:** This study focused on determining the frequency of various grades of failures and the number of units involved in non maintained fixed partial dentures in patients reporting to public sector dental hospital. **Methods:** A total of 216 patients, (both genders) having age ranging from 20 to 60 years, were clinically examined for failed fixed partial dentures. Various parameters of failed bridges including number of pontics and retainers were recorded by using a self structured proforma. These prostheses were divided in six different grades as proposed by Manapallil. Mild, moderate and severe groups were used depending on the severity of failure. SPSS (version 23) was used for data analysis. **Results:** Out of 216 patients, a male (91) to female (125) ratio of 0.72 was found with a mean age of 47 years (SD ± 18.553). Failed prostheses in grades 1 to 4 were having a similar rate of failures (22% to 25%), while other grades of failure were less than 5%. Prosthesis service life ranged from 2 to 5 years. Almost 82% of prostheses had 4 or 5 pontics in the design of bridge with a mean number of pontics 5 (SD ± 2.1). **Conclusions:** It was concluded that majority of failures were observed in mild and moderate groups in non-maintained fixed prostheses.

INTRODUCTION

Patients usually prefer fixed replacement for their missing teeth and metal ceramic fixed dental prosthesis has been their choice over the decades. During their service life, these prostheses fail owing to various reasons. Removal of fixed dental prostheses (FDP), extraction of abutment tooth due to fracture, gross caries and periodontal diseases are considered failure of the FDP. All abutment teeth and FDPs that require additional treatment are considered complications [1]. Dealing with such complications of fixed prosthesis can be costly, time consuming, cause discomfort to the patient and bring into question the competence of practitioner. Causes of FDP failure can be patient related, dentist related and

technician-related [4]. Collectively these can be grouped as biological, mechanical and esthetic failures. Different studies have observed different reasons for failure. Some studies have documented mechanical failure as a major factor contributing to prosthesis failure while others observed esthetics and biological as a causal factor. A long span FPD will have lower survival rate when compared to short span, mainly due to inadequate retainer to pontics ratio, which can adversely affect its longevity [2]. A patient with risk factors such as history of periodontal disease, smoking and bruxism may demonstrate higher rates of failure and complication than a patient without such complications. Without regular maintenance, periodontal

problems may start in patients with FDP [3]. Higher survival rate is expected in the patient with chronic periodontitis having end abutment fixed dental prosthesis and lower survival rates with cantilever design [4]. Corrections of prosthesis may typically be cumbersome. Mild failure can be correctable without replacing restoration, moderate failure can also be correctable but with restoration replacement and more severe failure result in loss of abutment teeth. At times an adjacent tooth, if available, may be used as an abutment for FPD otherwise other means of replacement such as implants or removable partial denture are considered. The objective of this study was to determine the frequency of various grades of FDP failure with regards to the number of units and pontics involved in non-maintained FDPs presented by patients reporting to public sector dental hospital. This study was rationalized as it will help through assessment of cause and severity of different levels of failure and the number of units and pontics involved which will be valuable for patient education and treatment planning and will also facilitate interoperate discussion.

METHODS

This cross sectional study was conducted at Khyber College of Dentistry (Peshawar), after taking ethical approval from Institutional Review Committee. An informed verbal consent was taken from the patients. The study was completed over a period of six months (March - September, 2015). A sample size of 216 was determined using 2.30% proportion grade 1 failure, 95% confidence level and 2% margin of error, under WHO software. Consecutive, non-probability sampling technique was used for sample collection. Subjects fulfilling the inclusion criteria were invited. Patients of both genders with the age range of 20 to 60 years having fixed -fixed metal ceramic prosthesis were included in study. Exclusion criteria included all ceramic and cantilevered bridges. For the purpose of this study patients were divided in 4 different age groups, each group comprising of ten years. Group 1 included patients between 20 and 30 years, Group 2 (31 to 40 years), Group 3 (41 to 50 years) and Group 4 (51 to 60 years). Fixed dental prostheses were divided on the bases of number of retainers and pontics collectively, for example, 3-unit prosthesis was having two retainer and one pontics, 4-unit having two retainers and two pontics and so on. Depending on the grades of severity 3 groups were formed namely; mild (group 1 and 2), moderate (group 3 and 4) and severe (group 4 and 5). A detailed intraoral examination was done using standard technique of inspection, palpation, percussion, probing and, where necessary, with radiographic examination. Prosthesis was evaluated for the number of units and pontics along with

grades, severity and type of failure. Data was calculated using prestructured proforma. Frequency and percentages were calculated for gender, number of units and pontics. Mean and standard deviation was calculated for age. Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) version 23.0.

RESULTS

Various grades of failures in non-maintained FDP were assessed in patients at prosthodontics department of a public sector dental hospital. Age distribution among 216 patients was analyzed as 13% (n=28) patients were in age range 20-30 years (Group-1), 30% (n=65) patients were in Group-2, 35% (n=75) were in Group-3 and 22% (n=48) patients were in Group-4. Mean age was 47 years with SD \pm 18.5 (Table-1)

Age (yr) Mean \pm SD 47 \pm 18.5	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Total
Group-1(20-30)	3	6	8	8	1	0	28
Group-2(31-40)	15	16	15	15	2	2	65
Group-3(41-50)	17	17	19	19	2	1	75
Group-4(51-60)	11	11	12	12	1	1	48

Table 1: Frequency of different grades of failure in different age groups

Out of 216 patients 42% (n=91) were males and 58% (n=125) were females, with a male to female ratio of 0.72 as in Table 2. Almost half of the cases recorded were in moderate category of severity and less than half were in mild and severe category.

Gender	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Male (42%)	20	21	23	23	2	2
Female (58%)	28	29	31	31	4	2
Total	Mild		Moderate		Severe	
	95(45%)		108(50%)		10(5%)	

Table 2: Gender wise distribution of different grades of prosthesis failure

In the observed failed fixed prosthesis minimum observed units were 5 and maximum units were 7 having a mean of 5 units (SD \pm 1.3). Analysis observed a mean number of pontics as 3 (SD \pm 2.1) given in Table 3, and a mean service life of 3 years (SD \pm 1.93) given in Table 4.

Units	3 Units	4 Units	5 Units	6 Units	7 Units	Total
	26 (12%)	60 (28%)	48 (22%)	43 (20%)	39 (18%)	
Minimum=3		Maximum=7		Mean= 1.3 (SD\pm2.1)		
Pontics	2 Pontics		3 Pontics		4 Pontics	
	39 (18%)		82 (38%)		95 (44%)	
Minimum=3		Maximum=4		Mean= 3		
		(SD \pm 2.1)				

Table 3: Number of units and pontics with mean and standard deviation

Patients were asked to recall the approximate time of prosthesis cementation. Then these were divided in different groups as given in table 3. More than half of the observed cases had a service life of 3 to 4 years at the time of assessment of failed prosthesis.

Prosthesis Service life	Frequency (%)
<2 years	35(16%)
2-3 years	45(21%)
3-4 years	136 (63%)
Total	216(100%)

Table 4: Service life rendered by the failed prosthesis at time of clinical evaluation

DISCUSSION

Fixed dental prosthesis is popular in all age groups patients for replacement of missing teeth owing to their favorable properties when compared to removable prosthesis. However with the passage of time they may show changes in the structural material of prosthesis and abutment teeth leading to several complications. Some complications are considered correctable while others are uncorrectable which may lead to failure of prosthesis. Such complications may develop early or late in the service life of prosthesis. Patient with risk factors such as history of bruxism, periodontal diseases, poor oral hygiene, smoking and prolonged service life of prosthesis may show higher rates of failure [2,6]. Literature is full of evidence regarding various reasons for failure of prosthesis. In majority of cases a prosthesis fail merely because of some technical issue/ problem rendered by practitioner or laboratory technician, such failures of fixed dental prosthesis due to technical reasons are grouped in grade-3. A variable rate of recurrence of failure has been documented in literature in similar studies. Our study observed that greater parts of failures (43%) were in grade 3 groups. This type of failure is somehow close to the one recorded earlier by Shah et al in his study, where group-3 failure was 32% [14]. The observed difference might be due the sample size dissimilarity. Fulfilling the basic needs in design of fabrication is essential for best possible service life rendered by the prosthesis. For fixed dental prosthesis the pontics more than the required optimum number may adversely affect the life of prosthesis. This is mainly because of flexion factor produced in long span prostheses and thus putting extra stresses on abutment teeth. The current study observed that majority of failed cases had 3 or 4 pontics present in the design of prosthesis. This was also concluded in another study that survival rate of long span (52%) is less when compared to short span (70%) [15]. Fixed dental prostheses are considered expensive depending on the type of material; hence patient may expect a longer life rendered by the same prostheses. The cost benefit ratio must be in line with service life offered by

such prosthesis. Studies conducted earlier on the subject matter have witnessed variable mean life of prosthesis from 2.8 to 8.3 years. Keeping in mind the sample size of our study, it was found that at the time of examining the patients for failed prosthesis, 63% were in the time range of 3-4 years of service life rendered by prosthesis. Though this does not reflect the failure prevalence, however the larger percentages of failure observed in this study cannot be justified when compared to the life expectancy of fixed prosthesis. On the other hand, this finding can be defended and outweighed by the actuality that successful prostheses are not considered in the current study. Out of the all failures, obviously grade-1 failure will be more clinically favorable when compared to grades 1 and 2, merely because it can be corrected easily. Our study observed 50% moderate failure cases where prosthesis needed replacement. This finding is similar to a study done earlier by Kawaz [1], where they found 52% of such failures. The high percentage of this failure might be attributed to the negligence on part of the patient. It can also be assumed that patient keep on delaying dental treatment until a visible and annoying problem in prosthesis is observed.

CONCLUSIONS

Within the limitation of this study it can be concluded that more failures were observed in long span non maintained bridges. According to severity of failed prostheses maximum numbers were present in mild and moderate group.

Conflicts of Interest

The authors declare no conflict of interest.

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