

Frequency of Esthetic and Periodontal Complications in Patients of Metal Ceramic Fixed Dental Prosthesis

Moiza Ijaz, Saira Ibrahim, Ammara Sharafat, Sameena Younis, Ayesha Satti, Abdul Rehman

ABSTRACT

Objective: To determine frequency of complications in patients with fixed metal-ceramic dental prosthesis

Study Design & Setting: A cross-sectional study was designed and conducted on 141 post-treatment patients of Fixed Dental Prosthesis (FDPs) at Armed Forces Institute of Dentistry, Rawalpindi, Pakistan from Sept 2019 to Feb 2020.

Methodology: This study analyzed the results of 141 patients whose records were completed during study duration of 06 months at Department of Prosthodontics, Armed Forces Institute of Dentistry, Rawalpindi. Patients were called at three months follow up after provision of fixed dental prosthesis. Intraoral examination for presence of esthetic and periodontal complications was done by inspection, palpation and probing. Complications were graded according to severity.

Results: Esthetic complications with FPDs were observed in 13.47% (n=19) of the subjects, periodontal complications were encountered in 9.2% (n=13) and 77.3% (n = 109) showed no complications at all. No significant difference was observed in terms of type of complication encountered between males and females or between different age groups.

Conclusion: Complications in patients of metal-ceramic FDPs were observed in 22.7% patients only, of which 13.47% were esthetic and 9.2% were periodontal complications.

Keywords: Esthetics, Metal ceramic, fixed dental prosthesis, Periodontal

How to cite this Article:

Ijaz M, Ibrahim S, Sharafat A, Younis S, Satti A, Rehman A. Frequency of Esthetic and Periodontal Complications in Patients of Metal Ceramic Fixed Dental Prosthesis. J Bahria Uni Med Dental Coll. 2022; 12(2):73-76 DOI: <https://doi.org/10.51985/JBUMDC2021104>

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non Commercial License (<http://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non commercial use, distribution and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION:

Fixed partial dentures is one of most commonly chosen treatment modality for restoration of incompletely edentulous arches as it serves a good means of substituting the missing

teeth.¹ Since metal ceramic fixed-dental prosthesis offer greater holding, firmness and stability, its demand to replace missing or lost teeth is on the rise both in the developed and developing countries across the world.² The placement of metal ceramic fixed restoration is one of the most widely done procedures in dental practices assuring predictable function and esthetics and proves a good value for money when properly planned and designed. However, poorly designed prosthesis not only fails but also damages the tooth and its supporting structures irreversibly.³ Poor patient selection and improper execution of core buildup of tooth preparation, impression taking and cementation leads to early complications and subsequent failures in metal ceramic fixed dental prosthesis. Risk factors associated with these complications are inadequate history taking by the dentist, poor oral hygiene, smoking, inappropriate or poorly designed prosthesis and poor selection of position and number of units of the restoration.⁴⁻⁵ A successful porcelain fused to metal crown satisfies biological, esthetic and mechanical concerns. Poor placement of margins of tooth preparation leads to severe periodontal problems and results in poor esthetic results.⁶ Improved biological, mechanical and esthetic results can be obtained by proper patient selection, good treatment planning and proper placement of cervical finish line without violating biological width, thus, assuring the longevity of prosthesis and excellent oral health.⁷⁻⁹ In a study conducted by Raza M et al, 140 patients were examined

Moiza Ijaz
Assistant Professor, Department of Prosthodontics,
Margalla Institute of Health Sciences, Rawalpindi, Pakistan.
Email: moiza91@gmail.com

Saira Ibrahim
Senior Registrar, Department of Prosthodontics,
IOD CMH Lahore Medical College, Lahore, Pakistan.
Email: i_saira@hotmail.com

Ammara Sharafat
Demonstrator, Department of Prosthodontics,
Margalla Institute of Health Sciences, Rawalpindi, Pakistan.
Email: ammara1390@gmail.com

Sameena Younis
Demonstrator, Department of Prosthodontics,
AFID, Rawalpindi, Pakistan.
Email: fazsam24@hotmail.com

Ayesha Satti
Demonstrator, Department of Prosthodontics,
Margalla Institute of Health Sciences, Rawalpindi, Pakistan.
Email: ayesha.satti@hotmail.com

Abdul Rehman
Assistant Professor, Department of Prosthodontics,
Margalla Institute of Health Sciences, Rawalpindi, Pakistan.
Email: abrehmankt@gmail.com

Received: 11-Nov-2021
Accepted: 04-Mar-2022

with 245 abutments, 58 males and 82 females with the mean age of 42 ± 8.9 years, it was reported that the length of services ranging from 3-7 years with an approximate average of 5.4 years. The most commonly reported problems comprised of esthetic (10.2%) and periodontal (12.65%) problems.¹⁰ The aim of this study was to determine frequency of complication, which will help prevent the occurrence of the same in future, ultimately resulting in better patient care. Results of this study can be applied in future for better treatment planning of the metal ceramic fixed dental prostheses which can further be implemented for improved patient care.

METHODOLOGY:

A cross sectional study was designed and conducted at the Armed Forces Institute of Dentistry, Rawalpindi, Pakistan from Sept 2019 to Feb 2020. Prior approval from Institutional Ethics Committee was obtained with ref # (905/Trg-ABP1K2 dated 17 Aug 2019). Verbal and written consent was taken from patients enrolled in the study. The sample size for this study was calculated by using WHO-sample size calculator, where prevalence of complication associated with ceramic metal fixed dental prosthesis was taken to be 10.20%¹⁰, 95% level of confidence, 80% study power and a precision of 5%. Minimum required sample size was calculated to be 141 using WHO sample size calculator.

Data was collected using non probability consecutive sampling technique. Both female and male patients, aged 20-60 years having single unit or 3-unit Porcelain Fused to metal-ceramic fixed dental prosthesis were examined. Patients were called for follow up visit 3 months after provision of metal ceramic fixed dental prosthesis. Factors like caries, abutment fracture, prosthesis fracture and mesial/distal cantilever were not considered. Detailed history, complete intra oral examination of involved tooth/teeth was carried out comprising of inspection, palpation and probing to look for esthetic and periodontal complications.

Periodontal problems were assessed using Community Periodontal Index of Treatment Needs (CPITN) probe and was graded as follows:

- Grade I – Slight color change and/or edema but no bleeding observed on probing
- Grade II – Redness and edema with bleeding on probing
- Grade III – Significant redness and edema, ulceration with spontaneous bleeding

Esthetic problems were assessed by both researcher and the patient himself and will be graded as follows:

- Grade I – Unacceptable to patient only
- Grade II- Unacceptable to researcher only
- Grade III- Unacceptable to researcher and patient

The data was entered into IBM SPSS (version 23.0) for analysis. To analyze the qualitative and quantitative variables, descriptive statistics were used. For qualitative variables like gender, esthetic and periodontal causes frequency and

percentage was calculated. For quantitative/continuous variables including age, the mean/standard deviation was calculated. Categorical group comparisons were made by using Chi-square test or Fischer exact test as applicable. Effect modifiers including age and gender were controlled by stratification and sub-group analysis. P value of less than or equal to 0.05 were considered significant.

RESULTS:

There were 141 patients enrolled in the study. Out of 141, 69 (48.9%) were males and 72 (51.1%) were females with a mean age of 39.54 ± 12.94 years. Baseline characteristics of study participants were given in table 1. Esthetic complications with FPDs were observed in 13.47% (n=19) of the subjects while periodontal complications were encountered in 9.2% (n=13) of the patients as shown in Figure 1. On the contrary, remaining 77.3% (n=109) showed no complications at all.

Distribution of esthetic and periodontal complications in terms of severity grading among study participants is given in Table 2. For the purpose of stratification, patients were distributed into two groups with respect to age i.e. 40 years or less and 41 years above. No significant difference was observed between ≤ 40 and > 40 years' age groups in terms of severity of esthetic complication encountered ($p=0.413$). On the other hand, a significant relationship was found between gender and grade III aesthetic complications i.e. more number of females experienced grade III aesthetic complications as compared to males who more commonly encountered grade I and II complications ($p<0.001$) as shown in Figure 2a. In terms of periodontal complications, significant relationship was found between both age group and gender. Females were more likely to encounter grade III periodontal complications as compared to males who more commonly experienced grade I complications ($p=0.011$), similarly patients with age more than 40 experienced grade II complications whereas those with age less than 40 years more commonly experienced grade I and III complications ($p=0.002$).

DISCUSSION:

A study conducted by Ercoli C in 2021, determined the factors affecting the longevity of fixed-metal ceramic dental prosthesis, retainer, and abutments, in which it was concluded that the material, such as gold or cobalt-chromium alloy, used for the denture fabrication was the most important factor associated with the longevity and better clinical survival of prostheses. In the same study, it was also concluded that gender and the age of the patient had a significant affect the denture's overall lifetime. Similarly, it was also reported that the risk of failure of fixed metal-ceramic dental prosthesis significantly increases when the abutment tooth is treated endodontically.¹¹

On contrary, some studies reported no significant association between higher age group of the patient and denture's

Table 1: Summary of baseline characteristics of study participants (n=141)

Characteristics	Frequency (n)	Percentage (%)
Age in years (mean±SD)	39.54±12.94	
Age range	40-60	
Age groups		
• ≤40 years	81	57.4%
• >40 years	60	42.5%
Gender		
• Male	69	48.9%
• Female	72	51.1%

Fig 1: Occurrence of esthetic (a) and periodontal (b) complications among study participants over three months follow up

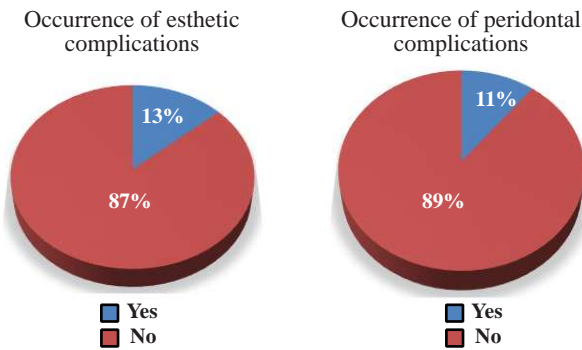
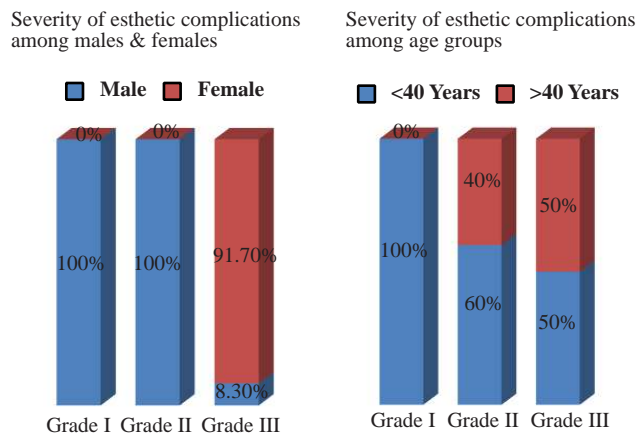


Table 2: Distribution of esthetic and periodontal complications in terms of severity grading among study participants

	Grading Levels	Frequency (n)	Percentage (%)
Esthetic Complications (n=13)	Grade I	5	38.5%
	Grade II	4	30.8%
	Grade III	4	30.8%
Periodontal Complications (n=19)	Grade I	2	10.5%
	Grade II	5	26.3%
	Grade III	12	63.2%

Figure 2: Comparison of occurrence of esthetic complications with respect to gender (a) and age groups (b).



longevity. A systematic review/meta-analysis conducted by Ioannidis G et al, in 2009, with an aim to investigate the relationship between patient age and survival rate of fixed prostheses, included studies published between 1985 - 2007, and a total of 2,811 patients with age range of 17 - 94 years, were included. The author reported in results that there was some evidences of higher failure rates among patients with middle-age group but no significant conclusion could be drawn in terms of increasing age to have an impact on the survival rate of fixed prostheses.¹²

The common complications related to prosthesis, length of services in term of success are largely determined at the time when a patient visits a dentist for repair or replacement of the existing restorations. The overall mean years of service for FDPs in this study were found to be 5.4 years, although metal-ceramic restorations are generally considered to be definitive restorations. These findings are similar to the findings reported in a study conducted by Oginni A et al¹³ but the result was lower as compared to the result of studies conducted in developed countries.¹⁴

In studies conducted by Ikai H et al and Walton TR et al, the incidence of periodontal problems related to fixed-metal ceramic dental prosthesis is reported to be 23% and 27% respectively.¹⁵⁻¹⁶ On the contrary, a local study conducted by Ghani F et al, reported 11.0% incidence of periodontal complications associated with fixed metal-ceramic dental prosthesis.¹⁷

The main factors that are responsible to produce the final esthetics includes arrangement of the teeth, tooth color, tooth shape and restoration quality. A study conducted by Abduo J et al reported poor esthetics to be the most frequent and significant cause of failure of restoration, followed by another important factor i.e. fracture of fixed-denture prostheses.¹³ On the other hand, studies reported by western researchers identified caries to be the primary reason of FPD failure, but data of this study in addition to another local study conducted by Memon MR et al showed that decementation was the major factor responsible for FPD failure. Results of present study identified technical complications including de-cementation and unacceptable aesthetics and laboratory complications including fixed prostheses fabrication to be the common causes of FPD failure.¹⁸

In another study conducted by Bluma E et al, unacceptable aesthetics was reported to be only 7% and an important parameter to observe was, restoring aesthetics with MCFDPs was reported to be controlled by numerous factors relating to designing of tooth preparation, dentist's clinical/judgement skills for appropriate matching of the shade tab to the neighboring teeth and technician's skills to reproduce the form and exact required shade in the laboratory.¹⁹ In this study, no association of complications with gender was found. Out of total study subjects 13.47% had esthetic complications and 9.11% had periodontal complications of fixed dental prosthesis.

In a study, patients were asked questions related to the time of service, nature of complaint, and materials used. Clinical examination was then performed. The percentage of the failures were periodontal disease (51%), shade mismatch (42%). The duration of service and oral hygiene was found to influence most of the complications especially periodontal disease, esthetics and occlusal wear.⁶In a study, the aesthetic and periodontal problems were more often associated with single crowns.²²

One of the common complications or risk factors associated with the fixed prostheses is the presence of periodontal disease. Despite many researches carried out to know about the failure and complications of fixed prosthesis, the present topic of studying the relationship between the fixed prosthodontics and gingival problems is still insufficient and much research is required on this topic. Various researches associated gingival or periodontal problems with fixed prosthodontics to poor oral hygiene and lack of dental professional maintenance therapy. However the prevalence of complications was very low.²¹ In our study, 77.3% study subjects had no complications.

CONCLUSION:

Complications in patients of metal ceramic fixed dental prosthesis were observed in 22.7% patients only, of which 13.47% were esthetic and 9.2% were periodontal complications. Age and gender of patients had no effect on the frequency of complication encountered.

Authors Contribution:

Moiza Ijaz: Concept design, methodology data collection, guarantor

Saira Ibrahim: Data collection and analysis

Ammara Sharafat: Data analysis and collection, manuscript writing

Sameena Younis: Manuscript writing

Ayesha Satti: Data collection and interpretation

Abdul Rehman: Data interpretation

REFERENCES:

1. Al-Sinaidi A, S.Preethanath R. The effect of fixed partial dentures on periodontal status of abutment teeth. Saudi J Dent Res. 2014;5:104-8. DOI: <https://doi.org/10.1016/j.ksujds.2013.11.001>
2. Saleem T, Amjad F, Bhatti M. Complications associated with tooth supported fixed dental prosthesis among patients visiting University College of Dentistry, Lahore. Pak Oral Dental J. 2013;33:207-211.
3. Briggs P, Ray-Chaudhuri A, Shah K. Avoiding and Managing the failures of Conventional Crowns and Bridges. Dental Update. 2012;39(2):78-80, 82-4. DOI: <https://doi.org/10.12968/denu.2012.39.2.78>
4. Chatterjee U. Margin designs for esthetic restoration. J Advanced Oral Research 2012;3:7-11. DOI: <https://doi.org/10.1177/2229411220120102>
5. Sailer I, Balmer M, Hüsler J, Hämmerle CH, Känel S, Thoma DS. 10-year randomized trial (RCT) of zirconia-ceramic and metal-ceramic fixed dental prostheses. J Dent. 2018;76:32-9. DOI: <https://doi.org/10.1016/j.jdent.2018.05.015>

6. Sailer I, Strasing M, Valente NA, Zwahlen M, Liu S, Pjetursson BE. A systematic review of the survival and complication rates of zirconia ceramic and metal ceramic multiple unit fixed dental prostheses. Clin Oral Implants Res. 2018;29:184-98. DOI: <https://doi.org/10.1111/clr.13277>
7. Roa'a Al Refai SS. Clinical and radiographic assessment of reasons for replacement of metal-ceramic fixed dental prostheses in patients referring to dental school. J Clin Exp Dent. 2018;10(1):e75
8. AlMogbel AA, AlOlayan AA, AlFazwan AA. Assessment of the complications associated with tooth-supported fixed dental prosthesis at Qassim Region, Saudi Arabia. Int J Med Res Prof. 2017;3(2):93-5.
9. Papaspyridakos P, Bordin TB, Natto ZS, El-Rafie K, Pagni SE, Chochlidakis K, Ercoli C, Weber HP. Complications and survival rates of 55 metal-ceramic implant-supported fixed complete-arch prostheses: A cohort study with mean 5-year follow-up. J Prosthet Dent. 2019;122(5):441-9. DOI: <https://doi.org/10.1016/j.prosdent.2019.01.022>
10. Raza M, Fahimullah, Fayyaz M, Akram S. Complications and their severity in patients of conventional metal ceramic fixed dental prosthesis: A clinical study. Pak Oral Dental J. 2015;35:155-8.
11. Ercoli C, Tarnow D, Poggio CE, Tsigarida A, Ferrari M, Caton JG, Chochlidakis K. The Relationships Between Tooth-Supported Fixed Dental Prostheses and Restorations and the Periodontium. J Prosthodont. 2021;30(4):305-17. DOI: <https://doi.org/10.1111/jopr.13292>
12. Sharma R et al. Complications associated with fixed partial denture. JAMDSR 2016; 6(1):131-4
13. Abduo J, Lyons KM. Interdisciplinary interface between fixed prosthodontics and periodontics. J Periodontol. 2017;74(1):40-62. DOI: <https://doi.org/10.1111/prd.12189>
14. Øzhayat EB, Gotfredsen K. Patient-reported effect of oral rehabilitation. J Oral Rehabil. 2019;46(4):369-76. DOI: <https://doi.org/10.1111/joor.12756>
15. Ikai H, Kanno T, Kimura K, Sasaki K. A retrospective study of fixed dental prostheses without regular maintenance. J Prosthodont Res. 2010;54:173-8. DOI: <https://doi.org/10.1016/j.jpor.2010.04.003>
16. Walton TR. An up to 15-year longitudinal study of 515 metal-ceramic FPDs: Part 2. Mode of failure and influence of various clinical characteristics. Int J Prosthodont. 2003;16:177-82.
17. Ghani F, Memon MR. Complications in metal ceramic fixed dental prostheses among patients reporting to a teaching dental hospital. JLUMHS. 2010;09:17-22
18. Memon MR, Ghani F. Reasons and problems in dislodged metal ceramic fixed partial dentures presented for re-cementation by patients. J Pak Dent Assoc. 2007;16:13-9.
19. Bluma E, Vidzis A, Zigurs G. The influence of fixed prostheses on periodontal health. Stomatologija. 2016;18(4):112-21.
20. HindMajed EA. The Relationship between Fixed Prosthodontics and Gingival Problems: A Systematic Review. Saudi J Oral Dent Res. 2021;6(8):372-7.
21. Curtis DA, Plesh O, Sharma A, Finzen F. Complications associated with fixed partial dentures with a loose retainer. J Prosthet Dent. 2006;96(4):245-51.
22. Saleem T, Amjad F, Bhatti MU. Complications associated with tooth supported fixed dental prosthesis amongst patients visiting university college of dentistry Lahore. Pak Oral Dental J. 2013;33(1):93-95.