

## ORIGINAL ARTICLE

## Clinical Evaluation of the Failures in Fixed Partial Dentures

MAGDI MOHAMED ISWALHIA<sup>1</sup>, AMAL EMHEMED BENJAREED<sup>2</sup><sup>1,2</sup>Department of Fixed Prosthodontics, Faculty of Oral and Dental Medicine, Gharyan University, Libya  
Correspondence to: Magdi Mohamed Iswalhia, Email: [Magdiswalhia@gmail.com](mailto:Magdiswalhia@gmail.com)

## ABSTRACT

The researchers in this study set out to do just that by investigating what goes wrong with people's permanent dental prostheses in Libya. One hundred patients from the clinic in Gharyan, Libya, who had come in complaining of problems with their fixed dental prostheses were included in the study, and the reasons for their failure were categorized using Manappallil's system. Failures in Class 3 accounted for 30% of all failures, Class 4 for 24%, Classes 2, and 4 for 8%, Classes 5 and 6 for 15%, and Class 6 for 11%. Class 1 for 8%, Class 2 for 12%, Class 4 for 24% Class 5 for 15 % and Class 6 for 11%. Unserviceable restorations due to poor margins were indicated as the most common cause of failure in class 3 failures in the current study.

**Keywords:** Rehabilitation, Fixed partial dentures, Failure classification, success.

## INTRODUCTION

It is well-acknowledged and much sought after that Fixed Partial Denture (FPD) rehabilitation is among the most popular forms of dental restoration work (1). On the other hand, it takes a long time and causes the patient to have great hopes (2). The effectiveness of rehabilitation may be measured by the degree to which the patient is pleased with the service they have received, their level of comfort, and the durability of their prosthesis (3). The question for the clinician when a tooth-supported fixed prosthesis fails is whether or not the problem can be simply remedied, or whether or not more complex therapies are needed to get the desired result (4). Nowadays, patients prefer tooth or implant-supported fixed prostheses due to the psychological and social benefits and simplicity of use they provide. Although advancements in materials science have reduced complications and increased the prevalence of chairside dentistry, some restorations still need to be removed after some time for mechanical, biological, or aesthetic reasons (loss of retention, broken abutment teeth, cracks, fractures, wear, and discoloration) (5).

This highly hard and rigorous field requires careful attention to every detail, from the initial patient interview and diagnosis to the active treatment phases and a planned schedule of follow-up care, if success is to be achieved predictably. If not, the dentist and the patient are likely to be left with a result that is less than ideal (6). In most cases, problems arise either during or after a properly executed fixed prosthodontics procedure (5). If you suspect that a previously completed restoration is flawed and in need of replacement or repair, you should conduct a thorough and dispassionate assessment of the work in question. Poor patient care is one cause of failures, while improperly planned or carried out clinical or laboratory procedures are another (4).

Traditional fixed partial dentures have a long history of issues and failures documented in the dental literature. Some examples include clinical research into the durability of FPD and the factors that lead to its eventual ineffectiveness. There has been a lot of research, but we still don't have good criteria for grading or classifying the different kinds and degrees of failure. One possible explanation is that the indications and symptoms of failure are very contextual and multifaceted (6). Thus, the current investigation was undertaken to assess the root causes of failed fixed partial dentures.

## MATERIALS AND METHODS

Patients over the age of 30, partially edentulous with at least 3 to 5 units of the fixed prosthesis, and both sexes were included in the study of 100 patients at a dental clinic in Gharyan, Libya who had FPD failures owing to various reasons. The study lasted for six months. Names, ages, genders, and other identifying data were collected. Throughout the entire process, one clinician performed the clinical evaluation. It was determined what kind of prosthesis material was utilized and how long the patient had worn it. Manappallil's failure level scale was used to categorize the outcomes of fixed partial denture failures. Based on the work of

"John J. Manappallil, "4 failures 6 failures can be ranked in severity from "Class I" Class 1 (the least severe) to "Class VI" Class 6 (the most severe).

## RESULTS

One hundred tooth-supported FPD cemented for 100 patients, were clinically examined. There were 73 participants (73%) with metal-ceramic restorations, 27 participants (27%) with all-ceramic restorations, and 48 participants (48%) who were male and 52% female. According to Table 1, the main benefits of John J. Manappallil's classification method are that it is easy to use, universal, and applicable to every FDP failure scenario. The algorithm determines the severity of a failure and takes into account the more common retreatment strategies.

Table 1: John J. Manappallil's classifications.

Class	Description
Class 1	Failure can be resolved without replacing the prosthetic restoration.
Class 2	Failure can be resolved without replacing the prosthetic restoration; however, repair or restoration of the abutment tooth structure is needed.
Class 3	Failure can only be solved by replacing the prosthetic restoration; there is no need for repair or restoration of the abutment tooth structure.
Class 4	Failure can only be resolved by replacing the prosthetic restoration; the abutment tooth structure needs repair or restoration.
Class 5	Failure cannot be solved by simply replacing the prosthetic restoration; however, fixed prosthetic treatment can be performed by adding abutment teeth or planning a new prosthesis.
Class 6	Failure cannot be achieved by changing the prosthetic restoration, adding an abutment, or planning a new prosthesis, and fixed prosthetic treatment is not possible.

Patients' rates of failure ranged from 8% in Class 1 to 12% in Class 2 to 30% in Class 3 to 24% in Class 4 to 15% in Class 5 to 11% in Class 6. These data may be seen in Table 2. Class III Class 3 failures accounted for the bulk of defects (30%) that were discovered.

Table 2: Patient Distributions According to Failure Classes

Class	Percent	Number
Class 1	8%	8
Class 2	12%	12
Class 3	30%	30
Class 4	24%	24
Class 5	15%	15
Class 6	11%	11

Table 3 shows the number of men and women in each class of failure. 52% of the participants who took part in the study were women, and 48% were men.

Table 4 shows how many of each failure class there are. According to the prosthetic materials used, 73% of the patient's in

the study had metal-ceramic restorations (n=73), and 27% had all-ceramic restorations (n=27).

Table 3: Failure Classes Distribution by Gender

	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6
Male	46%	52%	64%	55%	59%	44%
Female	54%	48%	36%	45%	41%	56%

Table 4: Failure Class Distribution According to Prosthetic materials used

	Metal-ceramic 73% n=73	All-ceramic 27% n=27
Class 1	87.5% n=7	12.5% n=1
Class 2	75% n=9	25% n=3
Class 3	80% n=24	20% n=6
Class 4	67% n=16	33% n=8
Class 5	67% n=10	33% n=5
Class 6	64% n=7	36% n=4

Table 5 shows that the average usage time in  $\leq 5$  years was 37.5% n=3 in Class 1, 67% n=8 in Class 2, 63% n=19 in Class 3, 58% n=14 in Class 4, 60% n=9 in Class 5, and 64% n=7 in Class 6. Average usage time in  $> 5$  years was 62.5% n=5 in Class 1, 33% n=4 in Class 2, 37% n=11 in Class 3, 42% n=10 in Class 4, 40% n=6 in Class 5, and 36% n=4 in Class 6.

Table 5: Failure Class Distribution According to Duration of Use

	$\leq 5$ years 60% n=60	$> 5$ years 40% n=40
Class 1	37.5% n=3	62.5% n=5
Class 2	67% n=8	33% n=4
Class 3	63% n=19	37% n=11
Class 4	58% n=14	42% n=10
Class 5	60% n=9	40% n=6
Class 6	64% n=7	36% n=4

## DISCUSSION

The patient has high hopes for treatment with a fixed partial denture because it is long and expensive (7). But the durability of fixed partial dentures depends on several things, such as the skill of the dentist, the materials and techniques used, and how well the patient takes care of them. So, keeping an eye on how well patients clean their mouths while wearing fixed prostheses is a powerful way to help this type of rehabilitation work. Patients should be told about special ways to stop plaque (8).

Even though some studies have shown that periodontal disease is the most common cause of bridge failure (9), the results of this study show that only a small number of the patients who came to our clinic were in Classes 1 or 2. The majority of the patients were in other classes. Carlsson and Omar found the same thing when they looked at the failure of tooth-reinforced fixed prostheses. Class 3 (30%) and Class 4 (24%) contributed to the bulk of the failures. In both cases, the prosthesis needs to be replaced. In class 3 the abutment does not need any repairs while in class 4 the abutment tooth/teeth need repair or restoration. Both cases involve a significant investment of time and effort on the part of the dentist. Removal of the prosthesis is stressful for both the patient and the dentist. This is more so if a crown remover is used. Also, crown removal is a difficult procedure with the newer all-ceramic crowns which are bonded with resin types of cement.

The gender distribution of the failures did not throw up any significant findings. As regards the materials used 73% of the

sample comprised metal ceramic crowns the rest being all ceramic crowns. This makes it difficult to draw accurate conclusions as to which of the two restorations has a better or worse success rate. Metal ceramic restorations have been an established treatment modality for many years and it is but natural that in any random sample more cases will show up. However, with the increasing use of all ceramics in recent years more studies exclusively targeting all ceramic crown failures will be providing more useful data. Concerning the duration of failures, all classes reported a duration of use of fewer than 5 years before failure except class 1. While it is difficult to draw accurate conclusions based on this such early failures lead to a loss of confidence in the patient in the dentist.

Furthermore, some different types of complications were put together statistically and looked at, and clinical and radiological evaluations were done, but there was no link between failure classes. Future researchers might find it helpful to increase the size of the sample, rearrange the forms based on the exam results and failure scale, and maybe even do a new scale study.

## CONCLUSION

Failure classification systems in tooth-supported fixed partial dentures identify trends that can be used to develop treatment plans that maximize success and communicate appropriate expectations to patients. The best way to reduce fixed dental prosthesis failures is to be well-versed in diagnosis and treatment procedures. The clinician's mind should be creative, advanced, and original, which are critical factors in successful treatments and handling repairs when faced with an FPD failure. The unique and difficult situation for a dentist is to solve the failure most effectively and cost-effectively as possible.

## REFERENCES

1. Reitemeier B, Hänsel K, Kastner C, Weber A, Walter MH. A prospective 10-year study of metal ceramic single crowns and fixed dental prosthesis retainers in private practice set tings. *J Prosthet Dent.* 2013;109(3):149–55.
2. Layton D, Walton T. Patient-evaluated dentistry: development and validation of a patient satisfaction questionnaire for fixed prosthodontic treatment. *Int J Prosthodont.* 2011;24(4):332–41.
3. Newsome PRH, Wright GH. Qualitative techniques to investigate how patients evaluate dentists: A pilot study. *Community Dent Oral Epidemiol.* 2020;28(4):257–66.
4. Manappallil JJ. Classification system for conventional crown and fixed partial denture failures. *J Prosthet Dent.* 2008;99(4):293–8.
5. Goodacre CJ, Bernal G, Rungcharassaeng K, Kan JYK. Clinical complications in fixed prosthodontics. Vol. 90, *Journal of Prosthetic Dentistry.* 2019. p. 31–41.
6. Bukhari S, Goodacre BJ, AlHelal A, Kattadiyil MT, Richardson PM. Three-dimensional printing in contemporary fixed prosthodontics: A technique article. *J Prosthet Dent.* 2018 Apr 1;119(4):530–4.
7. Napankangas R, Raustia A. An 18-year retrospective analysis of treatment outcomes with metal-ceramic fixed partial dentures. *Int J Prosthodont.* 2011;24(4):314–9.
8. Brägger U, Hirt-Steiner S, Schnell N, Schmidlin K, Salvi GE, Pjetursson B, et al. Complication and failure rates of fixed dental prostheses in patients treated for periodontal disease. *Clin Oral Implants Res.* 2011;22(1):70–7.
9. Carlsson GE, Omar R. The future of complete dentures in oral rehabilitation. A critical review. Vol. 37, *Journal of Oral Rehabilitation.* 2010. p. 143–56.