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Fixed Prosthesis Failures: Survey among Moroccan Dentists

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Abstract **Original Research Article**

Introduction*:** The fixed prosthesis reveals many prosthetic complications, which occur most often by not respecting the appropriate means of approach. This error concerns both the clinic and the laboratory additionally it may be due to simply not knowing the right criteria of the different prosthetic conceptions. The main objective of this study, through a survey conducted among dentists practicing in different Moroccan cities, was to have a global overview of the incidence and prevalence of the different types of failures encountered in fixed prostheses and their different manifestations. ***Material and Method*:** This is a national descriptive survey that was conducted among 100 dentists practicing in the private and public sectors. ***Results*:** 63% of the dentists surveyed reported that pain was the most frequently encountered reason for consultations. The failure rate with ceramic crowns was 16% according to the dentists surveyed. Endodontic failures were the most frequent problem encountered by dentists with a rate of 66%. Periodontal failures were second with a percentage of 54% aesthetic failures were 36%. ***Conclusion: Fixed prosthesis is certainly one of the fields of dentistry in which the clinical and laboratory development is the most delicate. The approach must be global, to meet the biological, functional, aesthetic and comfort requirements of the patient.

Keywords: The fixed prosthesis, consultations, Periodontal failures, Endodontic failures.

INTRODUCTION

The fixed prosthesis restoration is now advancing significantly in terms of biomaterials, laboratory methods, and computer assistance. Nevertheless, the realization of fixed prostheses remains undoubtedly a delicate work requiring rigor and meticulousness during each step of the prosthetic chain.

When the clinical indication is well founded, and the therapeutic bases are globally respected, the fixed prosthesis will represent the prosthetic therapy of choice, and will make it possible to answer several objectives:

- To ensure the oral and masticatory functions of natural teeth
- Restore aesthetics
- To meet the comfort and psychic profile of the patients
- Guarantee the oral cavity components' health by respecting the integrity of the periapical and periodontal areas
- To ensure durability over time.

If the prosthesis fails to meet any of these objectives, it will be considered a failure.

The main objective of this study, through a survey conducted among dentists practicing in different Moroccan cities, was to have a global overview of the incidence and prevalence of the different types of failures encountered in fixed prostheses and their different manifestations.

MATERIALS AND METHODS

This is a national descriptive survey that was conducted among 100 dentists practicing in the

private and public sectors.

The survey mainly focuses on two aspects:

- First part 1: collecting general information about the practitioner (gender, place of study, nature of the practice, and years of experience)
- Second part 2: inspecting on the different types of failure, their prevalence, causes, and manifestations.

The survey includes an introduction that explains the purpose of the study while ensuring the participants' anonymity. It was designed to facilitate data collection and statistical analysis.

Three procedures were adopted in the collection of data:

- The first was a face-to-face interview. This procedure was the most efficient and reliable, as it saved a lot of time, and the interviewer was able to get more information about the subject of the survey from the various dialogues with the doctor.
- The second procedure was to drop off the questionnaire at the doctor's office and return to collect it within a week.
- The third procedure was an online form to fill, which was designed to reach a much larger sample of dentists practicing in different Moroccan cities (Rabat, Sala, Temara, Kenitra, Casablanca, Fez, Meknes, El Jadida, Tangiers, Tetouan, Oujda, Khenifra, Marrakech, Agadir, Laayoune, Dakhla). The questionnaire was written on a locked "Google Forms" page. We relied in this part on social media to spread the message about our project.

Off the 118 questionnaires completed by the dentists, 18 were not usable because they were not retrieved or contained a large amount of missing data. After cleaning up the data collected, our sample size was 100 dentists, which was considered satisfactory for representative results.

Statistical analysis of the data was carried out with the Statistic Package for Social Science (SPSS version 20) for Windows 7. Graphs were produced using Microsoft Office Excel 2016.

RESULTS

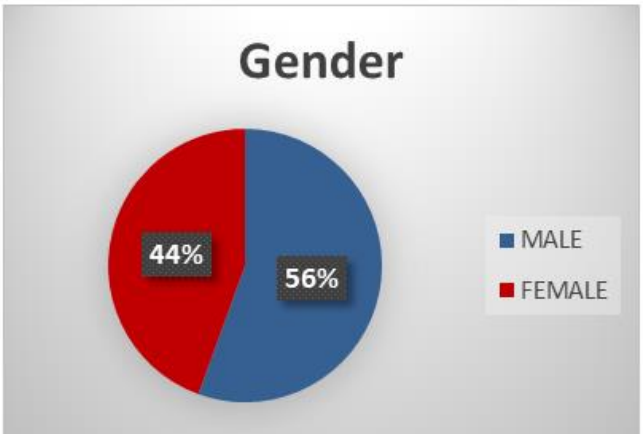

Figure 1: Graph showing the distribution of the sample by gender

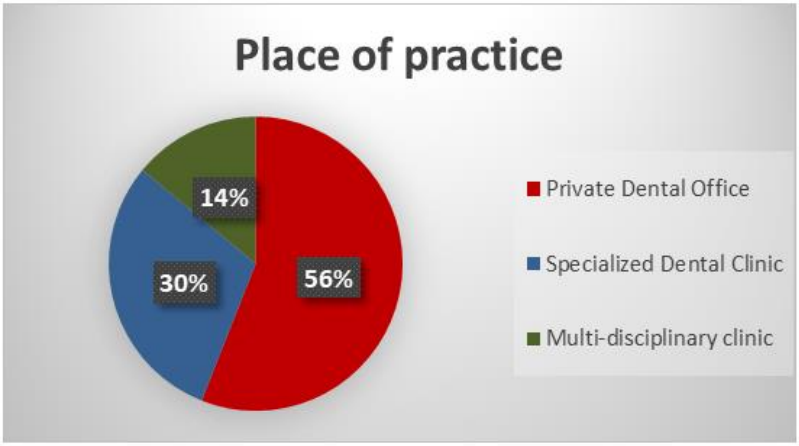

Figure 2: Graph showing the distribution of the sample by location of the practice

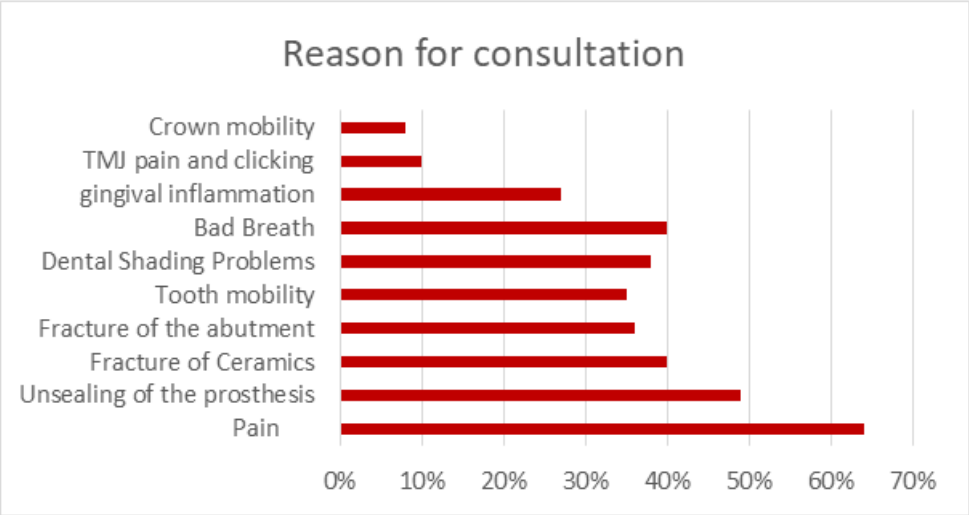

Figure 3: Graph showing the distribution of the sample according to the reason for consultation

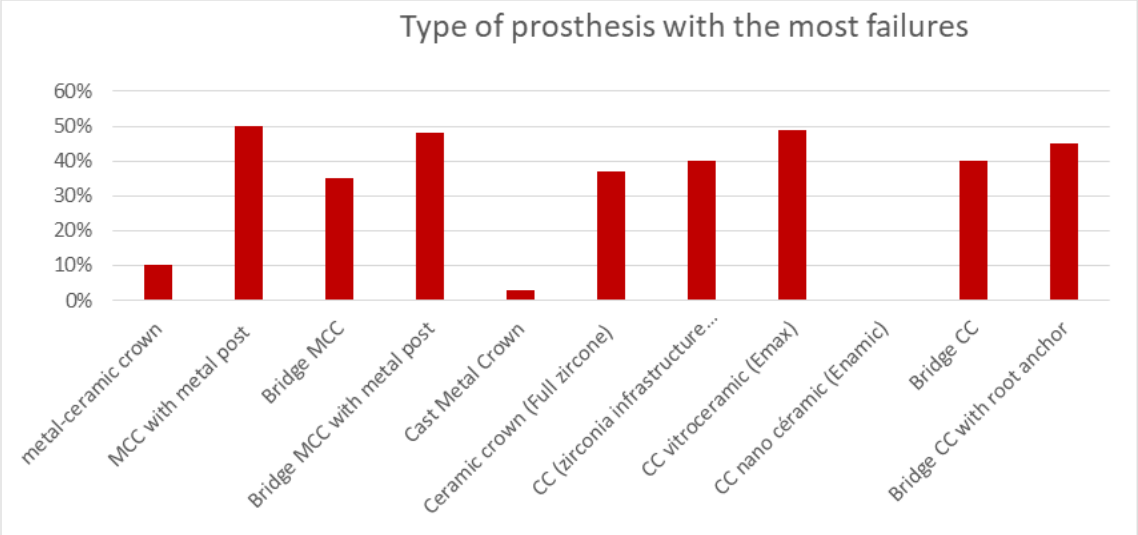

Figure 4: Graph showing the distribution of the sample according to the type of prosthesis with the most failures

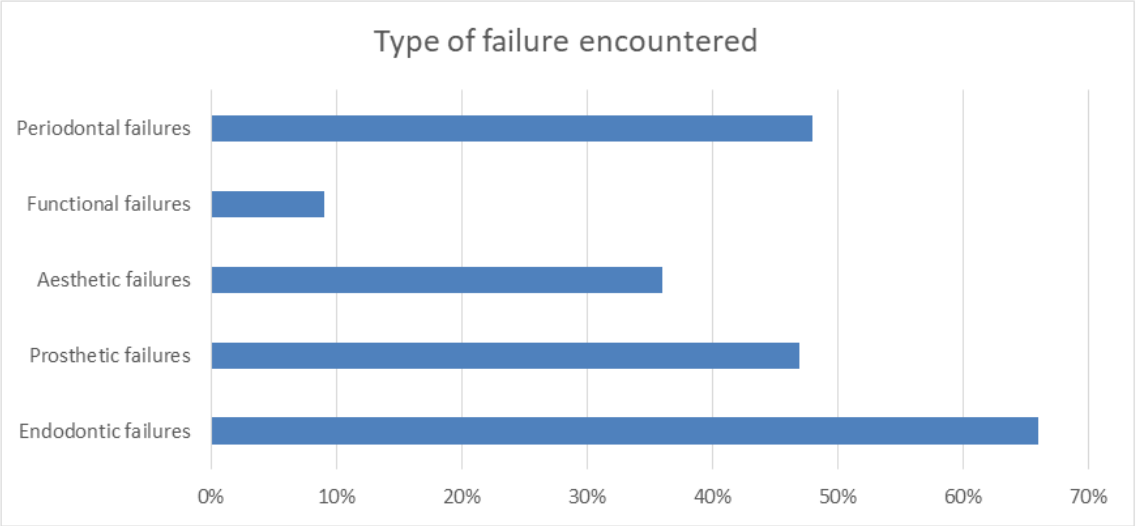

Figure 5: Graph showing the distribution of the sample according to the type of failure encountered

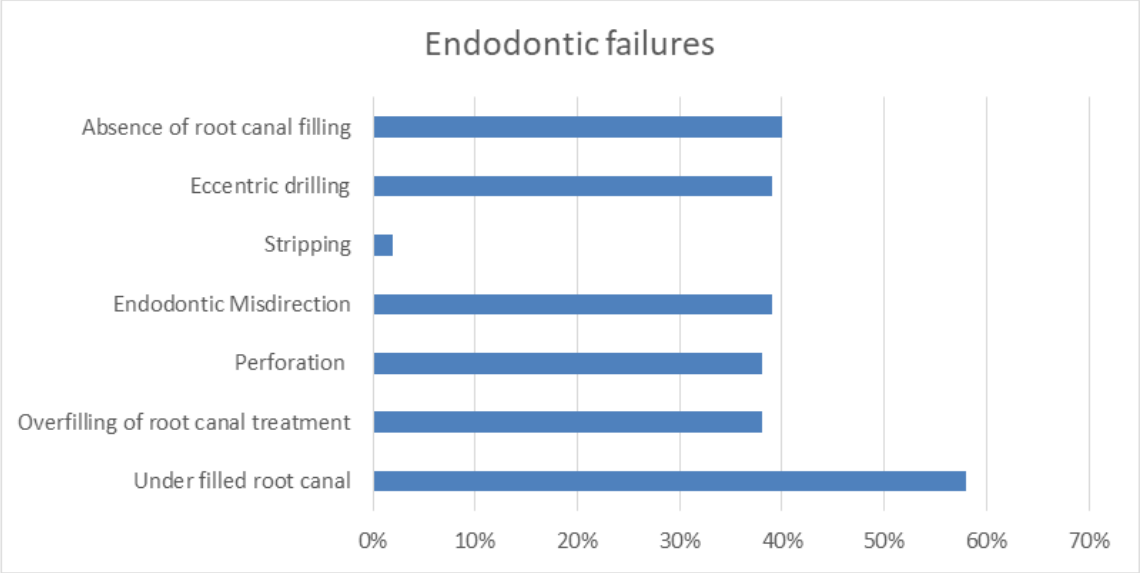

Figure 6: Graphical representation showing the distribution of the sample according to the endodontic failures encountered

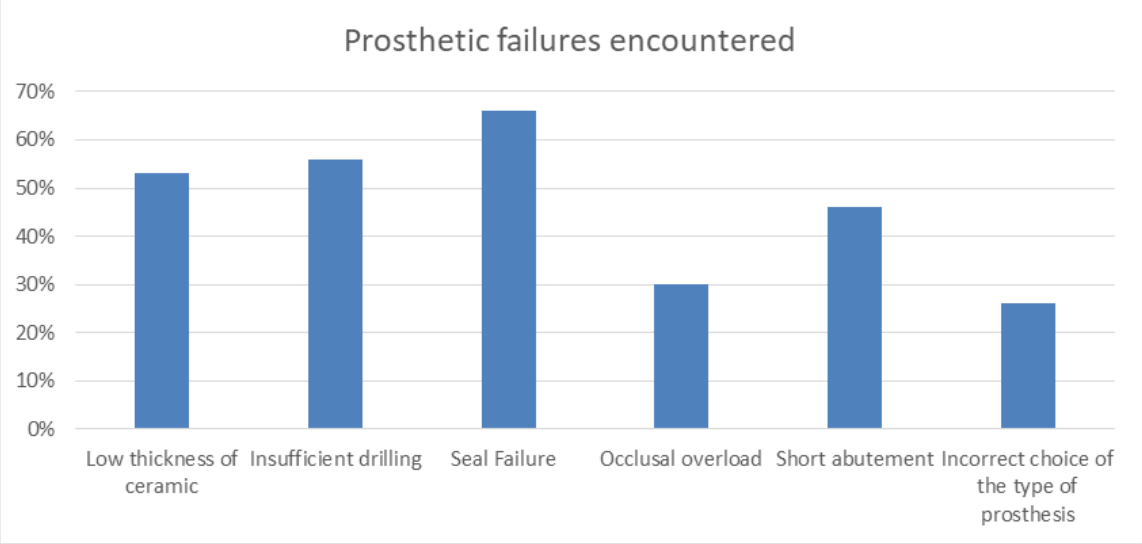

Figure 7: Graph showing the distribution of the sample according to the prosthetic failures encountered

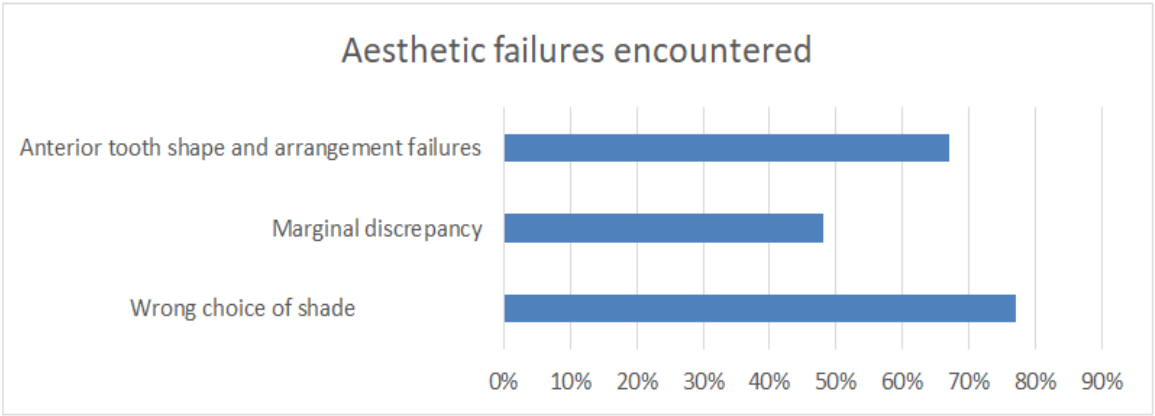

Figure 8: Graphical representation showing the distribution of the sample according to the aesthetic failures encountered

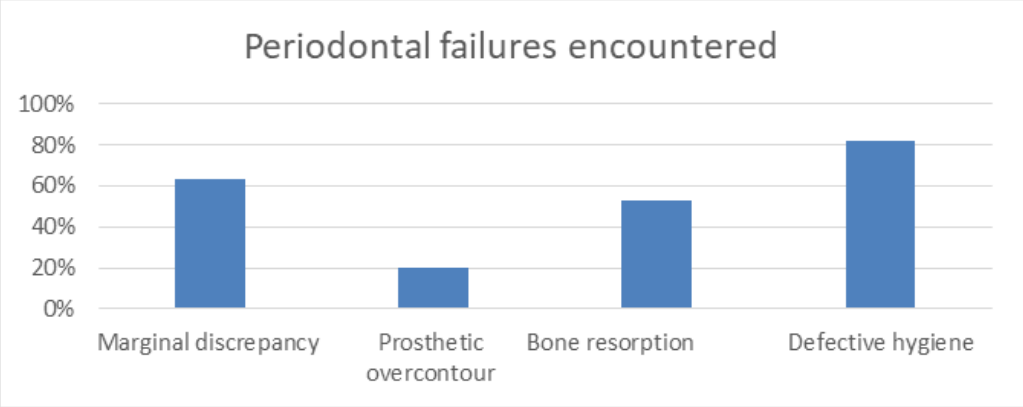

Figure 9: Graphical representation showing the distribution of the sample according to the periodontal failures encountered

DISCUSSION

The fixed prosthesis reveals many prosthetic complications, which occur most often by not respecting the appropriate means of approach. This error concerns both the clinic and the laboratory additionally it may be due to simply not knowing the right criteria of the different prosthetic conceptions.

Failures and reason for consultation:

The results of our study reported that pain was the most frequent reason for consultation with a percentage of 63%. These results can be explained by the particularly unpleasant character of dental pain and its repercussions on the social and professional life of the subject. Indeed, the high frequency and intensity of dental pain make it almost unbearable, which leads patients to seek emergency treatment.

Robin and coll. carried out a survey in 1996 in the dentistry department of the Hospices de Lyon over 4 months; pain constituted 51% of the reasons for consultation [1].

Another study was carried out in 2001 by FEHRY and coll. at the Casablanca dental consultation and treatment center reported that pain was the main reason for consulting patients with a rate of 58% [2].

The study was carried out at the Dijon University Hospital in 2002 by Ahossi and coll. described that 45% of patients came to the consultation center for pain management.

In addition to pain, loosening of the prosthesis also represents a considerable rate in the results of our study with a rate of 49%. This may be due to this problem's significant aesthetic and functional damage, prompting urgent patient consultation.

In 2019, Diallo and coll. in Bamako reported that loss of retention was the most represented reason for consultation with 64.29% of cases [4]. According to the same authors, inadequate preparation, sealing failure, or bad conception are the main causes of loosening fixed prostheses. Similarly, Benhamou and coll. reported that loss of retention was the most common failure among the technical complications studied [5].

Failures and type of prosthesis:

Our study showed us that failures of fixed prostheses occur most frequently on metal-ceramic crowns with a metal post at a rate of 50%. This can be attributed to the fact that root anchorage weakens the root and increases the risk of endodontic complications.

Our surveyed dentists say prosthetic restorations with metal-ceramic single crowns have the lowest failure rate, not exceeding 10%.

According to the study by Ferrari and coll. in 2017, the survival rate of metal-ceramic crowns with a value of more than 50% residual coronal substitute reached 90% [6].

Our results are in agreement with those of Bernd and coll. in 2016 who studied the long-term survival rate of metal-ceramic crowns. The failures studied were loss of the prosthesis or tooth and defects in the metal-ceramic joint. The survival rate of CCMs was over 80% for up to 11 years [7].

The dentists surveyed said the failure rate with ceramic crowns was 16%. Our results are in agreement with the study by Irena and coll. in 2015 where they reported a survival rate of single ceramic crowns (Leucite or lithium disilicate reinforced glass ceramic 96.6%; Glass infiltrated alumina 94.6%; Densely sintered zirconia 96%) close to that of metal-ceramic crowns (94.7%) [8].

3-3 Types of failure in fixed prosthesis:

Our study revealed that endodontic failures were the most common problem encountered by dentists with a rate of 66%. Periodontal failures came second with a percentage of 54%.

Prosthetic problems were in third place with a rate of 47%. Aesthetic failures accounted for 36% of the failures reported. Functional failures were in the last position and represented only 9% of failures.

This important preponderance of endodontic failures can be explained by the difficulty of carrying out endodontic treatment, particularly when it is a plural prosthesis comprising several pillars, for which root canal treatment becomes an unpleasant and tiring act.

On the other hand, the difficulty of maintaining a clean and bacteria-free intra-canal state is also an important factor in the non-success of endodontic treatment. The bacterial germs coming from an unsealed operating field, from secondary canals that are not accessible, or from contaminated instruments, are enclosed in an anaerobic environment that favors their development over time, which leads to the generation of periapical reactions.

In the study by Backer and coll. on the survival rate of bridges, endodontic complications accounted for only 3% of all complications during the 6-year evaluation period [9]. This rate is significantly lower than in our study because the results of this survey only included irreversible bridge complications, including loosening, fractured bridges, and caries in abutment teeth. These complications are often the cause of permanent bridge loss. However, in the event of an endodontic complication, the bridge is often preservable and it is possible to treat a periapical problem surgically or coronally by carefully removing the bridge using removal techniques while preserving the integrity of the dental organ and periodontium, as well as the prosthetic component so that the bridge can be resealed.

A study conducted at LAHORE University in Pakistan in 2013, reported that endodontic problems constituted the majority of observed complications with a percentage of about 20% [10].

Endodontic problems are ranked second only to caries treatment, with a rate of 11%, according to statistical assessments conducted by many authors in California over the past 50 years. [11].

The results closest to our survey are those of the Finnish study, which included 41 dental abutments intended to receive a metal-ceramic bridge, and which had pre-prosthetic endodontic treatment. The results concluded that the most frequent complications and failures were endodontic (73%), and were most often related to inadequate root canal preparation [12].

Periodontal failures also represent a considerable rate, up to 54%. This high percentage can be explained by the defective hygiene of patients with fixed prostheses, and by the neglect of the use of secondary means of plaque control, as well as by the absence of periodontal maintenance sessions, since the periodontium in the presence of a fixed prosthesis, are more likely to develop gingival inflammation in the absence of regular control and correct hygiene.

The study conducted in the Faculty of Dentistry in JEDDAH reported results close to our study regarding the prevalence of periodontal disease affecting the abutment teeth of the fixed prosthesis with a rate of 38% [13].

According to the study by Pjetursson and coll. in 2015, the annual failure rate due to periodontal disease, out of 2096 fixed prostheses studied, was 0.23% [14].

According to the dentists surveyed, the rate of aesthetic failures was 36%. Our results were in contradiction with those obtained by Aimano and coll. in 2011. The latter authors noted an unsatisfactory aesthetic result in more than 60% of their sample [13].

These results were explained by the use of the wrong light source during shade determination.

CONCLUSION

Fixed prosthetics is certainly one of the areas of dentistry which clinical and laboratory realizations are the most delicate. To satisfy the patient's biological, functional, aesthetic, and comfort needs, a global approach is needed [15].

It is important to evaluate the teeth supporting the prosthesis, their periodontal environment, as well as their interactions with the adjacent and antagonistic teeth, to ensure the appropriate morphology for an adequate occlusal scheme.

Regarding aesthetics, the focus is on a careful analysis of the shape and shade of the future prosthesis, based on detailed communication with the patients regarding their wishes and expectations, which must be faithfully transmitted to the laboratory.

In the case of pre-prosthetic endodontic treatment, strict adherence to the steps of endodontic therapy is imperative. The realization of a fixed prosthesis on a vital tooth also requires respect of biological criteria and the correct handling of the biomaterials in order to minimize postoperative sensitivities.

The patient must be aware of his role in the maintenance of the prosthesis, by good hygiene motivation, and periodic medical check-up.

From the study, we can conclude that the prevalence of failures associated with fixed prostheses is quite high, and endodontic complications account for most of these failures.

The point of these results is the search for appropriate solutions for improving the success and survival of fixed prostheses, improving patient hygiene awareness, and inventing effective methods to avoid periodontal and endodontic diseases.

Additionally, practitioners need to continuously update their clinical skills, biomaterials knowledge, and laboratory procedures.

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