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"FACTORS LEADING TO IMBALANCE IN REMOVABLE PARTIAL METAL PROSTHESES IN ANTANANARIVO AND MAHAJANGA MADAGASCAR."

FACTORS LEADING TO IMBALANCE IN REMOVABLE PARTIAL METAL PROSTHESES IN ANTANANARIVO AND MAHAJANGA MADAGASCAR

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ABSTRACT

The metal partial denture (MPD) is defined as a metal device that restores a partially edentulous arch. It provides dual support for hard (dental) and soft (mucosal) tissues. The aim of this study was to identify the sources of imbalance in the MPD.

An analytical study of 92 practitioners in Antananarivo and Mahajanga, making dental prostheses was carried out in 2023.

It was shown that 38% of the practitioners surveyed had already experienced prosthetic instability at least once.

Several factors were found to be responsible for this imbalance in the MPD, such as: professional status (p=0.02), number of years in practice (p=0.001), practitioners not casting the model (p=0.002), not having a paralleling machine in the dental practice (p=0.001), not tracing the framework (p=0.01), and so on.

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In the future, in order to improve the analysis, the sample should be extended to make it more representative.

Key words: Retention, stabilisation, sustentation, metal partial denture

Introduction

Despite constant developments in fixed and implant prosthetics, the removable metal partial dentures (RMPD) remains a useful and necessary treatment option for many of our patients, particularly those with limited financial resources [1, 2, 3]. However, several clinical studies have highlighted the high failure rate of MPD, notably due to a lack of retention and the presence of deleterious effects on the teeth supporting the clasps [4,5]. This is why the prognosis of MPD depends on the prosthetic design carried out by the practitioner.

Practitioners must rationally manage the complexity of the clinical situation in order to obtain an optimal prosthetic design that meets the requirements of the Housset triad: retention, support and stabilisation [6-8].

Retention is the action that opposes the vertical forces that tend to move the prosthesis away from its bearing surfaces. Sustentation is the action that opposes the vertical forces that tend to push the prosthesis away from the bearing surfaces. Finally, stabilisation is the action that counteracts the horizontal rotational forces to which the prosthesis is subjected. These three criteria apply to all types of prosthetic restoration but take on particular importance in partial removable prostheses, which are more exposed to the various factors of imbalance. Ensuring the stabilitý and oral integration of a MPD involves finding a satisfactory balance between these three principles. If one of them is not ensured, this compromises the action of the other two: it is the balance and therefore the durabilitý of the prosthesis that risks being compromised. Hence the interest of the present study with the objective of determining the factors of MPD imbalance.

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Material and methods

This study was carried out in dental surgeries in the city of Antananarivo, Madagascar, among 92 practitioners making dental prostheses. This was a cross-sectional analytical study.

Apart from the socio-professional profile of the practitioners, the variables linked to the different stages in the production of the MPD were studied. Practitioners were asked whether they had ever had a case of prosthetic imbalance. In order to identify any manufacturing errors, the MPD manufacturing steps described in the MPD manufacturing guide described by J Schittly, Exbrayat and Borel were used as a reference [9].

Results

Table I:Distribution of practitioners by socio-professional characteristics

socio-professional characteristics	n	%
Gender		
Male	62	67.4
Female	30	32.6
Professional		
General practitionner	80	87,0
Specialist	12	13,0
Number of years of service		
Less than or equal to 15 years	48	52,2
16 and over	44	47,8
Total	92	100,0

Sex ratio = 2.07

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Table I provides information on the socio-professional characteristics of the practitioners. In terms of gender, males predominated, with a sex ratio equal to 2.07. In terms of professional status, general practitioners predominated at 87%. In terms of year of practice, those who had worked for less than 15 years predominated at 52.2%.

Table II: Distribution of practitioners according to the existence of a prosthetic imbalance and professional status, year of practice, possession of a paralleling device in the dental practice and drawing of the framework

Variables	Proportion of practitionners with prosthetic imbalance	p value	Odds Ratio (OR) [$CI_{95\ \%}$]
Professional status			
General praticionner	42,5	0,02	0,06 [0,01 – 0,54]
Spcialist	8,3		
Year of practise			
< 15 years	22,9	0,001	4,04 [1,65 -9,90]
15 years and more	54,5		
Possession of a paralleling device in the dental practice			
Yes	22,2	0,01	0,15 [0,05- 0,52]
No	64,86		
Drawing of the framework by practitionner			
Yes	25	0,002	0,15 [0,04- 0,54]
No	75		

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Discussion

According to professional status, there was a significant difference between general practitioners (GP) and specialists in terms of the existence of prosthetic imbalance. GPs in particular had more prosthetic imbalance ($p = 0.02$ and $OR = 0.06$ with $CI_{95\,\%}$ = [0.01 - 0.54]. This result may be explained by the fact that specialist practitioners receive more training in the preparation of the MPD. In fact, they have mastered the various techniques involved in all the stages of making the MPD.

Practitioners with 15 years'experience or more had more prosthetic imbalance compared with those with less than 15 years' experience. This result is very significant. This finding could be due to the effect of the possible routine that can happen to practitioners with more years of practice.

The possession of a paralleling device in the dental practice and the drawing of the framework by the practitioner are factors that prevent the occurrence of prosthetic imbalance with respective p and OR values of $p = 0.01$ and $OR = 0.15$ with an IC95% = [0.05- 0.52] and $p = 0.002$ and $OR = 0.15$ with an IC95% = [0.04- 0.54].

Parallelogram analysis and frame tracing are an essential part of the practitioner's duties. After taking a complete medical and dental history, carrying out a full oral examination and performing a diagnostic set-up, the practitioner can make a fully reasoned choice based on the aids available [10].

The practitioner needs a simple parallelogram that allows accurate analysis of the study models, because the parallelogram is an essential tool for choosing the insertion axis [11]. The choice of insertion axis is one of the most important phases of the preprosthetic clinical examination, because it is much more than an axis of insertion and disinsertion. It is also an area for studying the elements involved in supporting the prosthesis, and for preparing the remaining teeth and osteomucosal elements. Finally, it is the axis of prosthetic construction [12]. It is very rare that, at the end of an uncompensated partial edentulous treatment, the existing conditions can be

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used without modification. The absence of intervention risks perpetuating or aggravating a pre-existing situation of imbalance. The practitioner must not allow himself to be imposed a prosthetic insertion axis by a given clinical situation without seeking, if necessary, to modify and adapt it to make possible the creation of a prosthesis with a therapeutic vocation. Hence the importance of using a paralleling device [11].

Unfortunately, these design and analysis stages are often delegated to the dental technician, despite his limited access to clinical data. Indeed, if the dental technician carries out the paralleling analysis, no coronoplasty can be performed [13-15].

Conclusion

Practitioners must follow each clinical step in the preparation of the PAPM. The use of appropriate equipment such as the parallelogram is essential in order to be able to analyse the clinical case in depth.

References

1. Buser D, Sennerby L, De Bruyn H. Modern implant dentistry based on osseointegration : 50 years of progress, current trends and open questions. Periodontol 2000. 2017;73(1):7□21

2. Silva LH da, Lima E de, Miranda RB de P, Favero SS, Lohbauer U, Cesar PF. Dental ceramics: a review of new materials and processing methods. Braz Oral Res 2017;31(1):133-46

3. Mericske-Stern R. Removable partial dentures. Int J Prosthodont 2009;22(5):508□11

4. Alageel O, Ashraf N, Bessadet M, Nicolas E, Tamimi F. Evaluation of the design-driven prediction of removable partial denture retention. J Prosthet Dent2020;124(3):357□64

5. Bilhan H, Erdogan O, Ergin S, Celik M, Ates G, Geckili O. Complication rates and patient satisfaction with removable dentures. J Adv Prosthodont 2012;4(2):109□15

6. Rudd RW, Rudd KD. A review of 243 errors possible during the fabrication of a removable partial denture: part I. J Prosthet Dent 2001;86(3):251□61

7. Campbell SD, Cooper L, Craddock H, Hyde TP, Nattress B, Pavitt SH, et al. Removable partial dentures: The clinical need for innovation. J Prosthet Dent 2017;118(3):273□80

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8. Escure S, Bertrand C, Braud A, Monod-Broca J, Cheherazade S. Rational design of the metal frame from concept to completion. Inf Dent 2008;(37):2098-2106

9. Schittly J, Schittly E. Partial removable prosthesis: clinic and laboratory. Published by CdP Groupe Liaisons: 2006 Paris:236

10. Schittly J, Schittly E. Partial removable prosthesis: clinical and laboratory. 3rd ed. Rueil Malmaison: Éditions CdP; 2020 :131-75

11. El Miloud Rahmani FB, Ahmed Abdedine, Salwa Berrada, Bouabid El Mohtarim. metal chassis. Les cahiers de prothèse. 2006;133:14-25.

12. Schittly J. Coronoplasty of supporting teeth in removable partial dentures. Inform Dent 1987;30:2557-2566.].

13. Nassani MZ, AlOtaibi MS. Quality of communicating design features for cobalt chromium removable partial dentures in Riyadh, Saudi Arabia. Eur Oral Res. 1 sept 2020;54(3):123□9

14. Lynch CD, Allen PF. A survey of chrome-cobalt RPD design in Ireland. Int J Prosthodont. Août 2003;16(4):362□4.

15. Lynch CD, Lynch D, Allen PF. Quality of written prescriptions and master impressions for fixed and removable prosthodontics: a comparative study. Br Dent J. 8 janv 2005;198(1):17□20