

## FUNCTIONAL EVALUATION OF ORAL REHABILITATION WITH REMOVABLE PARTIAL DENTURES AFTER FIVE YEARS

### AVALIAÇÃO FUNCIONAL DA REABILITAÇÃO ORAL COM PRÓTESE PARCIAL REMOVÍVEL APÓS CINCO ANOS

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#### ABSTRACT

**M**ost removable partial denture (RPD) wearers are satisfied with their prostheses, but the factors that influence satisfaction and acceptance are still not determined. Objective: This study explored technical, biological, and satisfaction variables for the functioning of RPDs after five years, and compared the evaluation by the patient and by the clinician. Materials and Methods: Fifty adults (39 females, 11 males) were re-examined after five years of RPD service. Data were collected through clinical examination and a structured questionnaire to record the conditions of supporting soft tissues, prosthesis acceptance and technical characteristics, mastication, esthetics, comfort, hygiene, and need for professional intervention. Data were analyzed by descriptive statistics and Spearman correlation. Results: More than 50% of patients classified their RPDs as excellent regarding retention, mastication, esthetics, comfort, and hygiene. In the professional evaluation, retention and stability were considered excellent in more than 66% of cases, and hygiene of teeth and prostheses was considered good in 52% and 46%, respectively. The metallic framework and acrylic base were considered adapted in 92% of cases. Prosthesis acceptance was associated with retention, mastication, esthetics, hygiene, and comfort evaluated by the patient, and with retention, stability, and condition of the framework evaluated by the clinician. Retention and mastication/comfort evaluated by the patient had moderate positive correlation with retention and stability measured by the clinician. There was no association of hygiene evaluation by the patient and by the clinician. Conclusions: After five years, the oral rehabilitation with RPDs was satisfactory for most cases. There was correspondence between retention/retention and mastication-comfort/stability variables evaluated by the patient and by the clinician. Oral and prosthesis hygiene were not related.

**Uniterms:** Removable partial denture; Dental prosthesis retention; Hygiene.

#### RESUMO

**A** maioria dos usuários de PPR mostra-se satisfeita com suas próteses, porém os fatores que influenciam a satisfação e aceitação não estão determinados. Objetivo: Este estudo explorou variáveis técnicas, biológicas e de satisfação no funcionamento de próteses parciais removíveis (PPRs) após cinco anos de uso, comparando a avaliação do paciente e do cirurgião-dentista. Materiais e Métodos: Cinquenta adultos (39 mulheres, 11 homens) foram reexaminados após cinco anos da instalação de PPR. Através de exame clínico e questionário estruturado, foram coletados os dados relativos às condições dos tecidos de suporte, aceitação e características técnicas da PPR, mastigação, estética, conforto, higiene e necessidade de intervenção profissional. Os dados foram analisados por estatística descritiva e por correlação de Spearman. Resultados: Mais de 50% dos pacientes classificaram suas próteses como excelente quanto à retenção, mastigação, estética, conforto e higiene. Na avaliação do profissional, retenção e estabilidade foram consideradas excelentes em mais de 66% dos pacientes, e a higiene dos dentes e da prótese foi considerada boa em 52% e 46% dos casos, respectivamente. As armações metálicas e bases acrílicas foram consideradas adaptadas em 92% dos casos. Aceitação da prótese foi associada com retenção, mastigação, estética, higiene e conforto avaliados pelo paciente, e com retenção, estabilidade e condição da armação metálica avaliadas pelo profissional. Retenção e mastigação/conforto, avaliados pelo paciente, mostraram correlação positiva moderada com retenção e estabilidade medidas pelo profissional. Não houve associação entre avaliação de higiene pelo paciente e pelo profissional. Conclusões: Após cinco anos, a reabilitação oral com PPR estava satisfatória na maioria dos casos. Houve correspondência entre as variáveis retenção/retensão e mastigação-conforto/estabilidade. Higiene oral e da prótese não mostraram associação.

**Unitermos:** Prótese parcial removível; Retensão em prótese dentária; Higiene.

## INTRODUCTION

Oral rehabilitation with fixed or removable partial dentures (RPDs) plays an important role in restoring oral and systemic health of edentulous patients. Compared to fixed partial dentures, the advantages of RPDs include lower cost and easier oral hygiene procedures<sup>4</sup>. Biological, mechanical, esthetic, and psychological factors are related to acceptance of prosthesis and, consequently, to the success of treatment. However, many controversies still exist about the determinants of RPD prognosis.

Satisfaction with RPDs has multifactorial dimensions involving technical and patient-related variables<sup>22,26</sup>. Success is judged differently by the patient and by the professional: the first judges personal satisfaction; the second judges biological and technical aspects<sup>26</sup>. Comfort, masticatory ability, esthetics, and retention seem to be the most important factors for prosthesis acceptance<sup>26</sup>. Personality, attitude towards RPD, previous experience, and motivation are dependent on the patient and may influence general satisfaction<sup>12,28</sup>.

Regular professional evaluation of technical aspects are important for the maintenance of RPDs. Approximately sixty percent of RPDs wearers have technical problems such as loss of integrity, excessive tooth wear, and loss of retention and stability<sup>19</sup>. Plaque accumulation and changes in the remaining teeth, such as caries, periodontal disease, and lesions of the mucosa, have been associated to RPD use<sup>8,16,23,24,27</sup>. These deleterious effects on dental and supporting tissues may be mitigated if a maintenance program is undertaken, including oral hygiene instruction and motivation<sup>2,3,18</sup> as well as regular check-up by the dentist.

Thus, many questions arise in the clinics: which are the most important variables for the functional evaluation of RPDs after placement? How long is it necessary to detect technical and biological problems? Is there any correspondence between patient and professional evaluation? The answers to these questions might help to determine which factors influence satisfaction and acceptance over time. Therefore, the aim of this cross-sectional study was to carry out an exploratory analysis to determine technical, biological, and satisfaction variables for the evaluation of RPDs after five years of delivery, comparing patient and professional assessments.

## MATERIALS AND METHODS

### Subjects

One hundred twenty-nine partially edentulous patients from the Removable Partial Denture Clinic, Dental School of the Lutheran University of Brazil, Canoas/RS, were contacted by phone and invited to participate in this study, from June to December 2002. The RPDs were constructed by fourth-year undergraduate students, following the principles and methods of RPD fabrication adopted by the institution (Kratchovil, 1963)<sup>17</sup>, during the second semester of 1997.

A convenience sample was selected within the five-year timespan and the patient's agreement to participate. The sample was composed of 50 patients, 11 males and 39 females, between 36 and 76 years old. Each subject had a maxillary or mandibular RPD to be evaluated in the study. Table 1 shows the demographic and clinical characteristics of the study sample.

### Procedures

Each subject received detailed explanation about the research procedures and signed an informed consent.

### Evaluation by the Patient

Data were collected using a structured questionnaire. The level of RPD acceptance was classified as "excellent", "good" or "bad". Retention, mastication, esthetics, hygiene and comfort variables were classified as "excellent", "good", "regular" or "bad".

### Evaluation by the professional

One examiner (EGR), a certified prosthodontist, carried out the clinical and prosthesis examination. The following variables were collected:

1- Oral and prosthesis Hygiene: Using a plaque disclosing solution, the patient's oral hygiene status were classified as "excellent" (visible plaque in up to 25% of the dental surfaces); "good" (25 to 75% of visible plaque); or "bad" (more than 75% of plaque) (adapted from Benson and Spolsky, 1979)<sup>1</sup>. Prosthesis hygiene status was classified in the same categories, evaluating the internal surface of acrylic bases (adapted from Tarbet, 1982)<sup>21</sup>.

2- Prosthesis retention: The level of retention was classified as "excellent" (resistance to vertical displacement); "good" (moderate resistance to vertical displacement); or "bad" (no resistance to vertical displacement)<sup>1</sup>.

3- Prosthesis Stability: The stability of RPDs was classified as "excellent" (stable to rocking movement and the occlusal rests were seated); "good" (stable, but some rests were not seated); or "bad" (displaced by rocking movement)<sup>1</sup>.

4- Metallic framework and acrylic base: The framework was classified as "well-fitting"; "with misfit in rests and clasps"; or "fractured". The adaptation of the base to the bearing mucosa was classified as "well-fitting"; "moderate misfit"; or "total misfit"<sup>1</sup>.

5- Prosthetic needs: The RPD was evaluated in relation to the need of relining, repair or new confection, being classified as "need of intervention" or "no intervention needed".

### Statistical Analysis

Data were analyzed by descriptive statistics and by Spearman's correlation tests at the 0.05% level of significance. Spearman's correlation coefficients ( $r_s$ ) tested the association between acceptance of RPD and variables evaluated by the patient and by the professional.

**RESULTS**

Table 2 shows the results of the evaluation of RPD-related variables by the patient. More than 70% of patients classified their prostheses as “excellent” for retention, mastication, and comfort. Esthetics and hygiene reached 54% and 62% of excellence, respectively.

Professional evaluation of RPD-related variables is shown in Table 3. Retention and stability had 98 and 96% of

approval, respectively (“excellent” and “good” categories). Oral and prosthesis hygiene evaluations were “bad” for 34 and 20% of cases, respectively. The framework was “well-fitting” in 92%, “misfit in rests and clasps” in 4% and “fractured” in 4% of subjects; acrylic base was “well-fitting” in 92%, “moderate misfit” in 6% and “totally misfit” in 2% (data not shown).

Spearman’s coefficients of correlation between patient’s RPD acceptance and other variables are shown in

**TABLE 1-** Demographic and clinical characteristics of the sample (n=50)

		<b>Absolute Frequency</b>	<b>Relative Frequency (%)</b>
Sex	Males	11	22
	Females	39	78
	Total	50	100
Age (years)	30 to 40	2	4
	41 to 50	11	22
	51 to 60	18	36
	more than 60	19	38
	Total	50	100
Dental arch with RPD	Maxilla	23	46
	Mandible	27	54
	Total	50	100
Dental status of the opposite arch	Complete Denture	12	24
	RPD	23	46
	Natural Teeth	15	30
	Total	50	100
Type of prosthesis	Dental-supported	15	30
	Dental-mucosa-supported	35	70
	Total	50	100
Kennedy Classification	Class 1	20	40
	Class 2	1	2
	Class 3	0	0
	Class 4	2	4
	Class 1 + modification	2	4
	Class 2 + modification	12	24
	Class 3 + modification	13	26
	Total	50	100

**TABLE 2-** Patient evaluation of retention, mastication, esthetics, hygiene and comfort variables

	<b>Patient Evaluation</b>				
	<b>Absolute Frequency (%)</b>				
	Excellent	Good	Regular	Bad	Total
Retention	36(72)	5(10)	8(16)	1(2)	50(100)
Mastication	37(74)	4(8)	7(14)	2(4)	50(100)
Esthetics	27(54)	12(24)	9(18)	2(4)	50(100)
Hygiene	31(62)	14(28)	4(8)	1(2)	50(100)
Comfort	36(72)	9(18)	3(6)	2(4)	50(100)

Table 4. Regarding patient evaluation, retention, mastication, esthetics, hygiene, and comfort were significantly associated with acceptance. For the professional evaluation, retention, stability and metallic framework condition showed a positive correlation with acceptance.

The responses by the patient and by the professional were compared using Spearman's coefficients of correlation (Table 5). Retention showed a positive correlation in both assessments. Mastication and comfort (patient evaluation) correlated positively with stability (professional evaluation). Hygiene evaluated by the patient had no association with oral hygiene evaluated by the professional, as well as prosthesis hygiene.

Regarding the relationship between RPD acceptance by the patient and the professional evaluation for need of intervention, 74% of subjects rated their satisfaction level as "excellent" even when intervention was considered needed.

**DISCUSSION**

In this exploratory study, technical and biological variables evaluated by the patient and by the professional were related to the success of treatment with RPDs after five years of placement, considering the association of those variables with the level of general acceptance.

Retention, chewing and comfort evaluated by the patient had an approval rate greater than 70%. Comfort, esthetics, prosthesis biomechanics and abutment prognosis must be considered by the clinician for the framework design<sup>6</sup>. Simplicity of RPD framework influences mechanical (retention and stability) and biological (health of oral tissues) factors and, consequently, general satisfaction<sup>15</sup>. Most patients who rated the comfort with their RPDs as "excellent" had prostheses supported by teeth and mucosa, which contradicts previous studies that reported a relationship between Kennedy Class I and Class II RPDs and discomfort<sup>7,22</sup>. However, in relation to masticatory evaluation, the results are in accordance with Gunne and Wall<sup>13</sup> (1985), who found that RPDs with distal extension do not negatively influence the subjective experience of mastication.

Excellence rates for retention (66%) and stability (70%) by the clinician were in accordance with the technical conditions of the framework and base (adequate adaptation

in 92% of patients). The major complications related to RPDs are mechanical failures such as fracture of connectors and occlusal rests and distortion of retentive clasps, besides misfit of bases and occlusal problems, which influences denture retention and stability<sup>5</sup>. Excessive force transmission to periodontal tissues and poor oral hygiene may increase the incidence of caries and periodontal disease in RPD users<sup>6</sup> but a cause-effect relationship has not been proved yet.

Previous studies have shown that most RPD wearers are satisfied with their prostheses<sup>11,12,25,28</sup>. The percentage of satisfaction also was high in this study. Seventy-four percent of patients rated their acceptance level as "excellent" even if an intervention was indicated by the professional evaluation. Van Waas, et al.<sup>22</sup> (1994) reported that masticatory performance increases with the addition of occlusal units to the RPD. About two thirds of subjects had distal extension RPDs (Kennedy Class I and II) and the large number of occlusal units may be responsible for this high level of

**TABLE 4-** Spearman's coefficients of correlation ( $r_s$ ) between patient acceptance and other variables

	$r_s$	p
<b>Patient Evaluation</b>		
Retention	0.508**	<0.001
Mastication	0.560**	<0.001
Esthetics	0.335*	0.017
Hygiene	0.365**	0.009
Comfort	0.787**	<0.001
<b>Professional Evaluation</b>		
Retention	0.313*	0.027
Stability	0.420**	0.002
Metallic Framework	0.321*	0.023
Acrylic Base	0.277	0.052
Oral Hygiene	0.069	0.633
Prosthesis Hygiene	0.214	0.135

\*\* Significant at the 0.01 level of significance.

\* Significant at the 0.05 level of significance.

**TABLE 3-** Professional evaluation of retention, stability, oral and prosthesis hygiene

	Professional Evaluation			
	Absolute Frequency (%)			
	Excellent	Good	Bad	Total
Retention	33(66)	16(32)	1(2)	50(100)
Stability	35(70)	13(26)	2(4)	50(100)
Oral Hygiene	7(14)	26(52)	17(34)	50(100)
Prosthesis Hygiene	17(34)	23(46)	10(20)	50(100)

acceptance. We found association between RPD acceptance and retention, chewing, comfort, esthetics, and hygiene (patient evaluation), and retention, stability, and metallic framework status (professional evaluation). Those variables are dependent on the RPD design showing the importance of adequate planning and RPD fabrication as predictors of patient satisfaction<sup>12</sup>.

Comparing the patient and the professional evaluations, there was correspondence between retention/retention and chewing comfort/stability variables. Oral and prosthesis hygiene did not show any relation. Other studies have compared patient and professional evaluations of fixed partial, complete, and implant-supported prostheses<sup>9,10,14,20</sup> but few are related to RPDs. Zlataric and Celebic<sup>26</sup> (2001) reported that the patient evaluation of RPD was opposite to the prosthodontist assessment: the more satisfied patients had lower rates in the professional evaluation, while the less satisfied patients showed higher professional rates. This may indicate that different dimensions are considered by the patient and by the professional to rate RPD clinical success.

The limitations of our study are the sample size and the fact that the study subjects cannot be considered representative of the entire population of RPD wearers'. Further epidemiological studies on RPD acceptance and professional-patient evaluation of long term functioning should include more subjects from different settings to increase external validity. Longitudinal studies would allow

the analysis of the evolution of technical, biological, psychological, and social aspects, assessed both by the professional and by the patient.

**CONCLUSION**

In this study, oral rehabilitation with RPD was considered satisfactory after five years of use by most patients. Even in the absence of regular recalls, patients classified their prosthesis as “excellent” in relation to technical and biological variables, which were associated with the level of general acceptance. The correspondence of ratings for technical aspects between patient and professional evaluations can be explained by the patients’ receptive attitude towards RPDs, which must be assessed by the clinician during all phases of the dental treatment to optimize the long term clinical success.

**REFERENCES**

1- Benson D, Spolsky VW. A clinical evaluation of removable partial dentures with I-bar retainers. Part 1. J Prosthet Dent. 1979;41:246-54.  
 2- Bergman B, Hugoson A, Olsson CO. Caries, periodontal and prosthetic findings in patients with removable partial dentures: a ten-year longitudinal study. J Prosthet Dent.1982;48:506-14.

**TABLE 5-** Spearman’s correlation coefficients ( $r_s$ ) between variables evaluated by the patient and by the professional

		Patient				Professional			
		Retention	Mastication	Hygiene	Comfort	Retention	Stability	Oral Hygiene	Prosthesis Hygiene
PATIENT	Retention	1.000	0.894** p< 0.001	0.617** p< 0.001	0.777** p< 0.001	0.409** p= 0.003	0.449** p= 0.001	0.044 p= 0.762	0.087 p= 0.546
	Mastication	---	1.000	0.626** p< 0.001	0.807 p< 0.001	0.350* p= 0.013	0.461** p= 0.001	0.028 p= 0.846	0.074 p= 0.609
	Hygiene	---	---	1.000	0.602** p< 0.001	0.402** p=0.004	0.445** p= 0.001	0.157 p= 0.275	0.227 p= 0.114
	Comfort	---	---	---	1.000	0.449** p= 0.001	0.559** p< 0.001	0.086 p= 0.552	0.221 p= 0.122
PROFESSIONAL	Retention	---	---	---	---	1.000	0.903** p< 0.001	0.173 p= 0.230	0.257 p= 0.072
	Stability	---	---	---	---	---	1.000	0.252 p= 0.077	0.381** p= 0.006
	Oral Hygiene	---	---	---	---	---	---	1.000	0.692** p< 0.001
	Prosthesis Hygiene	---	---	---	---	---	---	---	1.000

\*\* Significant at the 0.01 level of significance.  
 \* Significant at the 0.05 level of significance.



- 3- Bergman B, Hugoson A, Olsson CO. A 25 year longitudinal study of patients treated with removable partial dentures. *J Oral Rehabil.*1995;22:595-9.
- 4- Brunetti RF. *Odontogeriatrics: noções de interesse clínico.* São Paulo: Artes Médicas; 2002.
- 5- Budtz-Jorgensen E, Isidor F. A 5-year longitudinal study of cantilevered fixed partial dentures compared with removable partial dentures in a geriatric population. *J Prosthet Dent.*1990;64:42-7.
- 6- Budtz-Jorgensen E, Bochet G. Alternate framework designs for removable partial dentures. *J Prosthet Dent.*1998;80:58-66.
- 7- Celebic A, Knezovic-Zlataric D. A comparison of patient's satisfaction between complete and partial removable denture wearers. *J Dent.*2003;31:445-51.
- 8- Drake CW, Beck JD. The oral status of elderly removable partial denture wearers. *J Oral Rehabil.*1993; 20: 53-60.
- 9- Ettinger RL, Jakobsen JR. A comparison of patient satisfaction and dentist evaluation of overdenture therapy. *Community Dent Oral Epidemiol.*1997;25:223-7
- 10- Fenlon MR, Sherriff M, Walter JD. Agreement between clinical measures of quality and patients' rating of fit of existing and new complete dentures. *J Dent.*2002;30:135-9.
- 11- Frank RP, Milgrom P, Leroux BG, Hawkins NR. Treatment outcomes with mandibular removable partial dentures: a population-based study of patient satisfaction *J Prosthet Dent.*1998;80:36-45.
- 12- Frank RP, Brudvik JS, Leroux B, Milgrom P, Hawkins N. Relationship between the standards of removable partial dentures construction, clinical acceptability and patient satisfaction. *J Prosthet Dent.*2000;83:521-7.
- 13-Gunne HS, Wall AK. The effect of new complete dentures on mastication and dietary intake. *Acta Odontol Scand.*1985;43:257-68.
- 14- Heydecke G, Klemetti E, Awad MA, Lund JP, Feine JS. Relationship between prosthodontic evaluation and patient ratings of mandibular conventional and implant prostheses. *Int J Prosthodont.* 2003;16:307-12.
- 15- Hummel SK, Wilson MA, Marker VA, Nunn ME. Quality of removable partial dentures worn by the adult U.S. population. *J Prosthet Dent.*2002;88:37-43.
- 16- Kern M, Wagner B. Periodontal findings in patients 10 years after insertion of removable partial dentures. *J Oral Rehabil.*2001;28:991-7.
- 17- Kratochvil F. J.: Influence of occlusal rest position and clasp design on movement of abutment teeth. *J Prosthet Dent.*1963;13:114-24.
- 18- Polansky R, Haas M, Lorenzoni M, Wimmer G, Pertl C. The effect of three different periodontal pre-treatment procedures on the success of telescopic removable partial dentures. *J Oral Rehabil.*2003;30:353-63.
- 19- Redford M, Drury TF, Kingman A, Brown LJ. Denture use and the technical quality of dental prostheses among persons 18-74 years of age: United State, 1988-1991. *J Dent Res.*1996;75(sp issue):714-25.
- 20- Stipetic J, Celebic A, Jerolimov V, Vinter I, Kraljevic S, Rajic Z. The patient's and therapist's evaluation of bridges of different materials and age. *Coll Antropol.* 2000;24:25-9.
- 21- Tarbet WJ. Denture plaque: quiet destroyer. *J Prosthet Dent.* 1982; 48:647-52.
- 22- Van Waas M, Meeuwissen J, Meuwissen R, Kayser A, Kalk W, Van't Hof M. Relationship between wearing a removable partial denture and satisfaction in the elderly. *Community Dent Oral Epidemiol.* 1994;22:315-8.
- 23- Yeung AL, Lo EC, Chow TW, Clark RK. Oral health status of patients 5-6 years after replacement of cobalt-chromium removable partial dentures. *J Oral Rehabil.* 2000;27:183-9.
- 24- Yusof Z, Isa Z. Periodontal status of teeth in contact with denture in removable partial denture wearers. *J Oral Rehabil.* 1994;21:77-86.
- 25- Zlataric DK, Celebic A, Valentic-Peruzovic M, Celic R, Filipovic-Zore I, Baucic M. The satisfaction with the removable partial denture therapy in the Croatian adult population. *Coll Antropol.* 2000;24:485-94.
- 26- Zlataric DK, Celebic A. Treatment outcomes with removable partial dentures: a comparison between patient and prosthodontist assessments. *Int J Prosthodont.* 2001;14:423-6.
- 27- Zlataric DK, Celebic A, Valentic-Peruzovic M. The effect of removable partial dentures on periodontal health of abutment and non-abutment teeth. *J Periodontol.* 2002;73:137-44.
- 28- Zlataric DK, Celebic A, Valentic-Peruzovic M, Jerolimov V, Panduric J. A survey of treatment outcomes with removable partial dentures. *J Oral Rehabil.* 2003;30:847-54.