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Evaluation of Different Removable Denture Materials in Kennedy Class I Partially Edentulous Situation

Mostafa Abosrie[1], Maged El saadawy [2] *and* Mohamed Aboshama[3]

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Aadj@azhar.edu.eg

KEYWORDS

Dentures, Flexible, Pocket, Gingival Index

1. Associate Professor of Prosthodontics. Faculty of Dental Medicine, Al Azhar University (Asiut).
2. Lecturer of Prosthodontics Departement. Faculty of Dental Medicine, Al Azhar University (Assiut).
3. Associated Lecturer of Prosthodontics Departement. Faculty of Dental Medicine, Al Azhar University (Assiut).

ABSTRACT

BACKGROUND: Although Cast Chromium Cobalt alloy has been the material of choice for fabricating Removable Partial Dentures (RPDs) but it has certain drawbacks. New material like the flexible Nylon based Super Polyamide has been introduced to overcome these drawbacks. The present study compared the above two materials for three clinical parameters.

MATERIALS AND METHODS: The study was carried out on 15 patients, the selected cases were Kennedy Class I, with missing teeth first, second and third molars in each distal extension side**.** These fifteen patients received three RPDs; each one was used for six months. Three types of RPDs were made from different base materials; cobalt chromium alloy and thermoplastic denture base materials, **(Group A)**: RPDs made of cast Cr-Co alloy incorporating RPI clasping system with denture base made of heat cured acrylic resin. **(Group B):** RPDs made of flexible nylon based super polyamide resin incorporating flexible circumferential clasps and denture bases made of flexible nylon, with metal occlusal rests. **(Group C):** RPDs made of flexible nylon based super polyamide resin. After insertion of each denture, their Clinical performances were evaluated periodically for six months for the following parameters (Gingival index, plaque index and pocket depth).

RESULTS: Statistically significant results were obtained in favor of flexible RPDs, in the parameters of (Gingival index, plaque index and pocket depth).Both groups B and C showed less similar values for (Gingival index, plaque index and pocket depth). during usage' with the incidence being slightly higher for patients wearing the cast RPDs (Group A).

CONCLUSION: Based on the favorable results of this study, it can be summarized that the flexible RPDs is a viable alternative to cast RPDs in Kennedy class I partially edentulous situation in the short term.

INTRODUCTION

Removable partial dentures (RPDs) are provided to restore facial form and masticatory function after teeth loss. Chromium-Cobalt (Cr-Co) alloy has been traditionally used as the material of choice in the fabrication of definitive cast RPDs. [1]

Removable partial dentures (RPDs) are still extensively used for restoration of partially edentulous patients. However, these prostheses have been associated with poor patient acceptance, compromised function and esthetics, and an increased risk of caries and periodontal disease. [2-5] The design and maintenance of bilateral and unilateral distal extension partial dentures (Kennedy Class I and II) present challenges for clinicians, as these dentures require support from teeth, mucosa and underlying residual alveolar ridges. In particular, the distal extension removable partial denture (RPD) is subjected to vertical, horizontal and torsional forces that may have adverse effects during functional and Para functional activities. Variations in the design of the framework and denture base can be used to compensate, at least to some extent, for these forces, which may affect retention, stability and support of the denture. Nonetheless, displacement of the denture, especially in the area of the distal extension, is likely. [6]

An acrylic partial denture offers a relative ease of fabrication as compared to the metal frame one. The cast partial dentures require accurate tooth preparations for guide planes and placement of occlusal rest. Very accurate surveying is required on the diagnostic cast to help inform about the tooth preparation. [7] However, the main limitations from these materials come from a steady loss of function as the edentulous ridge undergoes a natural process of resorption and the obvious non-esthetic visible metal clasps. [8]

The appropriate and acceptable uses for a flexible partial denture include all cases of conventional partial denture indications plus the areas where conventional partials are limited or contra-indicated. There are virtually no cases where a conventional partial would work better than a flexible partial. Flexible denture materials like Valplast are available in five natural tissue shades as well as in additional unpigmented option for special applications. [9]

The use of RPDs made either from resin alone or a combination of resin and metal is now rapidly gaining popularity among general dentists and is considered to be superior to conventional metal-clasp retained RPDs with metal clasps in terms of both esthetics and comfort. [10]

MATERIALS AND METHODS

Fifteen females patients with Kennedy class I lower partially edentulous situation were be selected for this study from the out patients of the faculty of dental medicine Al-azhar University (assuit branch).

Patients are ranged from 25 to 45 years old, medically fit, having an average oral health status and free from any significant deleterious habits.

The selected cases were Kennedy Class I, with missing teeth first, second and third molars in distal extension side.

These fifteen patients were received three RPDs; each one is to be used for six months.

Three types of RPD were constructed for each patient, made from different base materials; conventional cobalt chromium alloy and thermoplastic denture base materials,

A- (Group A) Metallic RPDs: RPDs made of cast Cr-Co alloy incorporating RPI clasp system with denture base made of heat cured acrylic resin. fig.1 (a).

The cases were replaced with following design; lingual plate major connector, RPI clasp system on the second premolars (mesial rest +proximal plate + I bar clasp).

B- (Group B) Non-metal clasp denture (NMCD) with metal rests:

RPDs made of flexible nylon based super polyamide resin incorporating flexible circumferential clasps and denture bases made of flexible nylon, with metal occlusal rests.fig.1(b).

Fig.(1) a. The finished metallic RPDs . b. NMCD with metal rests. c. NMCD without metal elements.

C- (Group C) Non-metal clasp denture without metal elements:

RPDs made of flexible nylon based super polyamide resin. fig.1(c).

Method of evaluation:

After insertion of each denture, their clinical performances will be evaluated periodically for six months for the following parameters (Gingival index, plaque index and pocket depth).

Pocket depth, plaque index and gingival index scores in all groups showed increase through the follow-up period. This increase was attributed to the difference of RPD materials and the difficulty in maintaining a high level of oral hygiene.

RESULTS

I) Gingival index (GI) results:

The results of G.I. in each group are summarized in table (1) and figure (2).

Table (1) *The mean, standard deviation (SD) values of GI of different groups.*

Variables	Gingival index (GI)						
	Base line		After 3m		After 6m		*p-value*
	Mean	SD	Mean	SD	Mean	SD	
Group A	0.41 ^{bC}	0.12	0.73 ^{aB}	0.27	1.13 ^{aA}	0.36	**<0.001***
Group B	0.77 ^{aA}	0.40	0.55 ^{aB}	0.24	0.39 ^{bC}	0.19	**0.002***
Group C	0.39 ^{bA}	0.16	0.38 ^{bAB}	0.16 ^{b}	0.32 ^{bB}	0.12	**0.039***
p-value	**0.004***		**0.002***		**<0.001***		

*Means with different small letters in the same column indicate statistically significance difference, means with different capital letters in the same row indicate statistically significance difference. *; significant (p<0.05) ns; non-significant (p>0.05)*

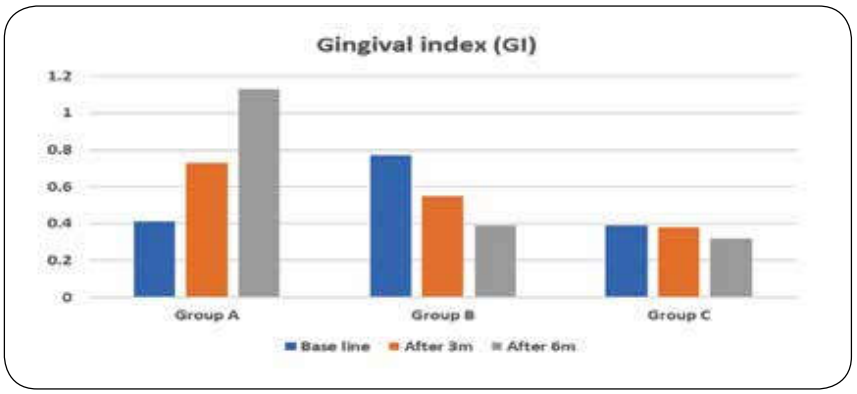

Fig.(2) Bar chart representing mean values of GI.

II) Plaque index (PI) results:

The results of P.I. in each group are summarized in table (2) and figure (3).

Table (2) *The mean, standard deviation (SD) values of PI of different groups.*

Variables	Plaque index						
	Base line		After 3m		After 6m		*p-value*
	Mean	SD	Mean	SD	Mean	SD	
Group A	0.73 ^{bC}	0.35	1.05 ^{aB}	0.28	1.32 ^{aA}	0.42	**<0.001***
Group B	1.14 ^{aA}	0.36	0.95 ^{aA}	0.33	0.63 ^{bB}	0.13	**0.001***
Group C	0.64 ^{bA}	0.21	0.52 ^{bB}	0.15	0.39 ^{cC}	0.19	**<0.001***
p-value	**0.001***		**<0.001***		**<0.001***		

*Means with different small letters in the same column indicate statistically significance difference, means with different capital letters in the same row indicate statistically significance difference. *; significant (p<0.05) ns; non-significant (p>0.05)*

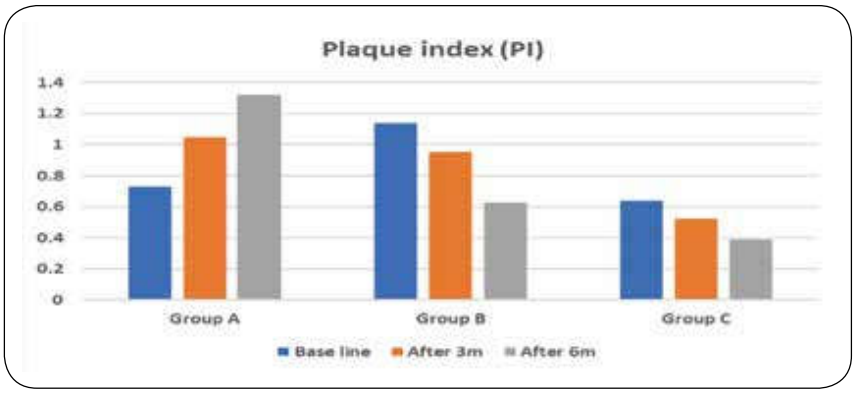

Fig.(3) Bar chart representing mean values of PI.

III) Probing pocket depth results:

The results of pocket depth in each group are summarized in table (3) and figure (4).

Table (3): *The mean, standard deviation values of pocket depth of different groups.*

Variables	Probing depth						
	Base line		After 3m		After 6m		*p-value*
	Mean	SD	Mean	SD	Mean	SD	
Group A	1.32 ^{bC}	0.50	1.71 ^{aB}	0.37	1.96 ^{aA}	0.41	**0.002***
Group B	1.93 ^{aA}	0.36	1.66 ^{aB}	0.29	1.39 ^{bC}	0.19	**<0.001***
Group C	1.41 ^{bA}	0.50	1.25 ^{bA}	0.28	1.07 ^{cB}	0.28	**0.015***
p-value	**0.002***		**0.001***		**<0.001***		

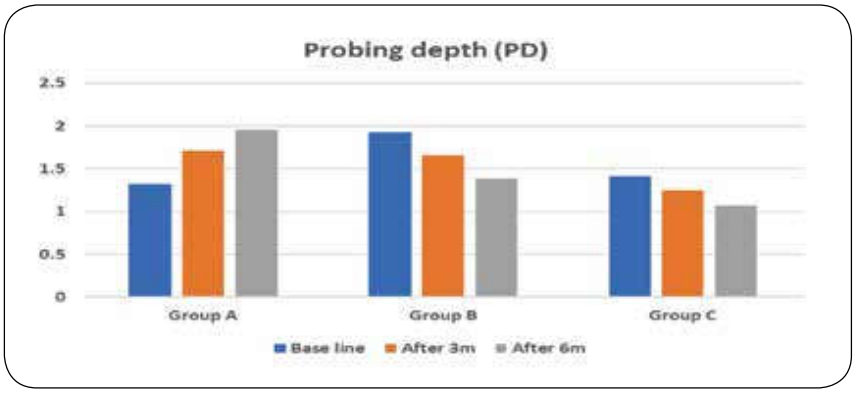

Fig.(4) Bar chart representing mean values of pocket depth by (mm).

DISCUSSION

The patients had no previous mandibular removable prosthetic experience in order to make sure that the results were not affected by previous restorations and they had normal jaw relationship to exclude the effect of different masticatory forces resulting from abnormal tooth relations.

At least a period of six months was elapsed after the extraction of teeth because bone resorption takes place rapidly in the first six months after extraction .

Premolars were chosen as anterior abutments because they are traditionally more resistant to rotational displacement and also equalize the changes that occur in all patients . They also resist anterior displacing forces due to the buttressing of bone anterior to. [11.12]

Adequate oral hygiene and systemic controls can improve periodontal health of patients with RPD.

The increase in probing depth noted in the present study suggest that this occurs because of the gingival oedema caused by dental biofilm accumulation and consequent gingival inflammation.

With regard to plaque index (PI), mean values increased significantly in the three groups. It was also observed that the control group presented higher values than others groups for both GI and PI.

Other studies have reported the occurrence of increased dental biofilm accumulation in the region surrounding abutment teeth, as well as gingival inflammation in regions covered by the RPD. This increased bleeding on probing associated with deeper probing depth in abutment teeth is closely related to quantitative alterations in the dental biofilm, thus increasing the risk of developing gingival inflammation and periodontitis.

CONCLUSION

The pocket depth, gingival index and Plaque index score was significantly higher in all groups with metallic RPD than nonmetallic one.

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