

## Bone Loss Evaluation for Kennedy Class I Partially Edentulous Patients with Acetal Resin Denture Base

Mohamed Kassem<sup>1</sup>, Mohamed Saief-Elnasr<sup>2</sup>, Yasser Baraka<sup>3\*</sup> and Mohamed A Helal<sup>2</sup>

<sup>1</sup>Assistant Lecturer, Removable Prosthodontic Department, Faculty of Dental Medicine, Al-Azhar University, Egypt

<sup>2</sup>Professor, Removable Prosthodontic Department, Faculty of Dental Medicine, Al-Azhar University, Egypt

<sup>3</sup>Assistant Professor, Removable Prosthodontic Department, Faculty of Dental Medicine, Sinai University, Egypt

**\*Corresponding Author:** Yasser Baraka, Assistant Professor, Removable Prosthodontic Department, Faculty of Dental Medicine, Sinai University, Egypt.

**Received:** February 12, 2020; **Published:** March 18, 2020

### Abstract

**Objective of the Study:** Objective was to evaluate the bone loss in Kennedy Class I partially edentulous subjects with acetal resin denture base at two and twelve months after denture insertion.

**Materials and Methods:** 24 subjects with lower Kennedy Class I were selected and randomly divided into 2 groups (12 subjects in each). Group I (GI): having 12 subjects, each one received metallic RPD. Group II (GII): having 12 subjects, each one received acetal resin RPD. The amount of bone loss in residual ridge was assessed using panoramic radiograph.

**Results:** After two months of denture insertion, the mean value of average bone loss in residual ridge at right side was 0.422 mm and 0.5 mm for group one and two respectively. While the mean value of average bone loss in residual ridge at left side was 0.63 mm and 0.65 mm for GI and GII respectively. After twelve months of denture insertion, the mean value of average bone loss in residual ridge at right side was 0.92571 mm and 1.391429 mm for GI and GII respectively. While at the left side the mean value of average bone loss in residual ridge was 1.24676 mm and 1.481429 mm for GI and GII respectively.

**Conclusion:** The metallic RPD appears to make less adverse effect on the residual ridge in Kennedy Class I partially edentulous patients.

**Keywords:** Bone Loss; Kennedy Class I; Edentulous Patients; Acetal Resin Denture Base

### Introduction

The RPDs design of free end saddles cases that will maintain the abutment teeth, hard and soft tissues of the saddle has taxed the ingenuity of prosthodontists for decades during management of medical compromised cases. Such form of RPDs take their support from the abutments and the soft tissues of the edentulous ridge. These different types of tissues having different degrees of resiliency [1].

The resiliency of the soft tissue overlying the ridges is 25 times more than that of periodontal ligaments of the teeth, so the stress distribution would be different [2].

Increase the adaptation of the denture base to the underlying soft tissues with maximum coverage leads to better stress distribution. The RPD design must be having ability to distribute and decrease these stresses [3,4].

In last years the metallic RPDs were used as definitive removable appliance. Nowadays thermoplastic flexible resin was used for constructions of RPDs as an alternative metallic RPDs that having many advantages as provide comfort, esthetics, good physical mechanical properties, lightweight, flexible and from which the denture base and clasps can be constructed instead of using cobalt-chromium (Co-Ch) [2].

Extensive residual ridge resorption after teeth extraction is considered as big dilemma that meet the prosthodontists in prosthetic dentistry rehabilitation [5].

There are many factors that affecting rate of the ridge resorption after teeth extraction, these factors may be local or systemic factors. The local factors as quality, quantity and shape of the ridge, biting force, and the systemic factors as patient's age, sex, and any systemic disease that affecting the bone.

The lower jaw cannot withstand the stresses under the denture base [7]. While the upper jaw is less subjected to bone resorption due to increase denture base surface that lead to wide distribution of the force [7,8].

Bone loss is detected in free end saddles cases after one year of wearing RPDs. Also 10% of cases who wearing RPDS are subjected to bone resorption of the ridge after 2 months. Moreover, bone loss is reported under the mucosa support denture as complete denture, also under tooth or mucosa support RPDs [8-12].

The dentures constructed from materials that having modulus of elasticity lower than that of PMMA are easily deformed and it may be lead increase the stresses transmitted onto the underlying mucosa [16].

Many studies had been carried out to compare the retentive force and deformation of acetal resin and Co-Ch clasps [17-19]. Others used the acetal resin as denture base material [20]. In the same time others compared the wear resistance of both the acetal resin denture base material and PMMA denture base [21].

The resiliency of the major connector of the flexible RPD is act as stress breaker to distribute the stress between the abutments and edentulous ridge without harmful effect on the abutment teeth especially in cases of the tissue supported saddles [22].

This study was conducted to evaluate the bone loss for Kennedy Class I partially edentulous subjects with acetal resin denture base after two and twelve months.

### Materials and Methods

The present clinical report contains a detailed bone loss of Kennedy Class I partially edentulous subjects with acetal resin denture base after two and twelve months based on a previously published study by Kassem, *et al* [20]. In short, 24 partially edentulous subjects with mandibular Kennedy Class I were randomly selected in this randomized clinical study. The subjects were divided into two equal groups:

- **Group I (GI):** Contained 12 subjects, each one was received Co-Ch RPD. [Dentorium™ products Co., INC. New York] (Figure 1a).
- **Group II (GII):** contained 12 subjects, each one was received acetal resin RPD. [BIOCETAL® - Thermoplastic Acetal - Roko® - Poland] (Figure 1b).

The amount of bone loss in residual ridge was assessed in radiographs in GI and GII by using panoramic radiograph with conjunction with custom made stent which fabricated for each patient and incorporated by wire with two bending point for demarcation of area of determining bone loss. One point located near the abutment and the other located far from this point. Radiographs were taken at two and twelve months after denture insertion. The statistical analysis was done by using Mann-Whitney test and SPSS soft-ware.

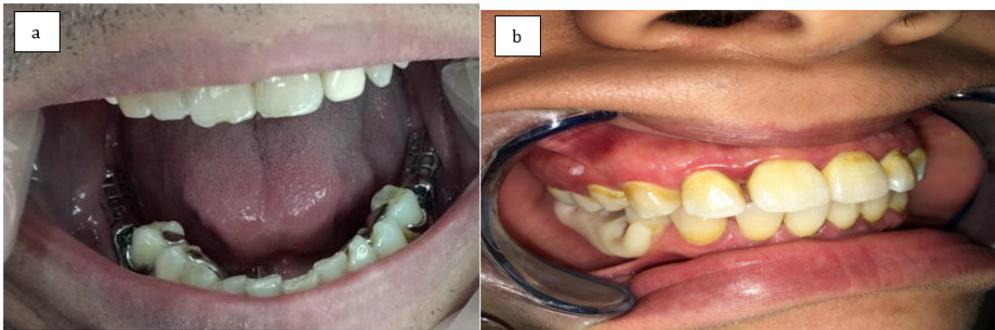


Figure 1: a) Metal framework, b) Acetal resin framework.

**Results**

**Residual ridge loss after two months:**

- A) **Right side:** Mean value of average bone loss in residual ridge at this side was 0.422 mm and 0.5 mm for GI and GII respectively. Mann-Whitney test showed no significant difference between the mean values of both groups ( $P \geq 0.05$ ).
- B) **Left side:** Mean value of average bone loss in residual ridge at this side was 0.63 mm and 0.65 mm for GI and GII respectively. Mann-Whitney test showed no significant difference between the mean values of both groups ( $P \geq 0.05$ ).

	Right		Left	
	Group I	Group II	Group I	Group II
Mean	0.422857	0.5	0.632857	0.658571
SD	0.117	0.120	0.136	0.20
P-value	0.25		0.8	
Sig	N.S		N.S	

Table 1: Comparison between both groups according to average bone loss in the residual ridge at 2 months.

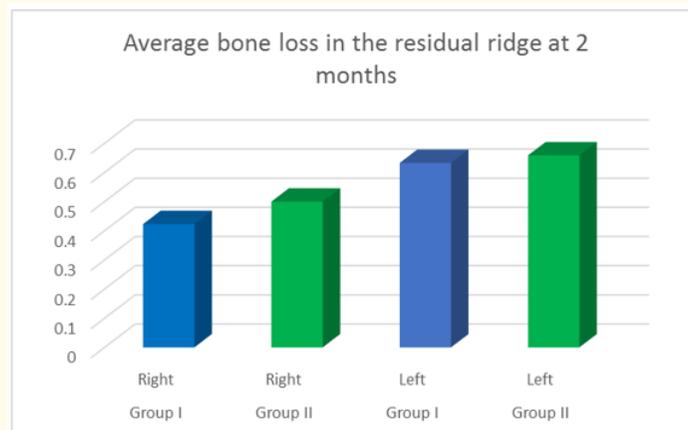


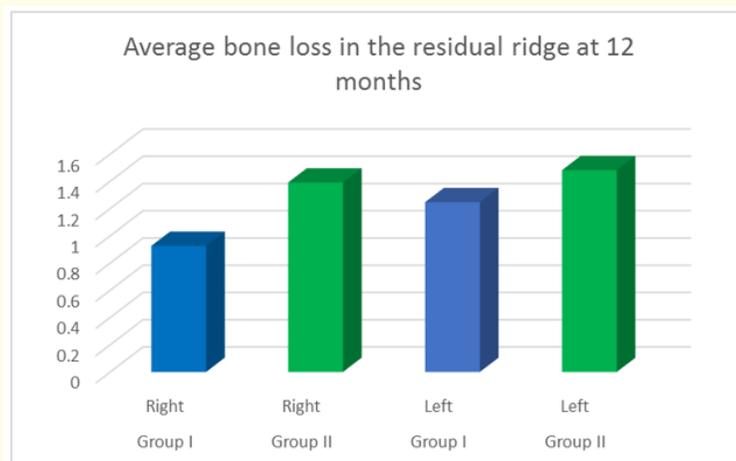
Figure 2: Average bone loss in the residual ridge at 2 months.

Residual ridge loss around abutment after 12 months:

- A) **Right side:** Mean value of average bone loss in residual ridge at this side was 0.92571 mm and 1.391429 mm for group one and two respectively. Mann-Whitney test showed significant difference between the mean values of both groups ( $P < 0.05$ ).
- B) **Left side:** Mean value of average bone loss in residual ridge at this side was 1.24676 mm and 1.481429 mm for group one and two respectively. Mann-Whitney test showed significant difference between the mean values of both groups ( $P < 0.05$ ).

	Right		Left	
	Group I	Group II	Group I	Group II
Mean	0.92571	1.391429	1.24676	1.481429
SD	0.143	0.268	0.219	0.165
P-value	0.001		0.043	
Sig	SIG		SIG	

**Table 2:** Comparison between both groups according to average bone loss in the residual ridge at 12 months.



**Figure 3:** Average bone loss in the residual ridge at 12 months.

### Discussion

The preservation of abutment teeth and the residual ridge is a main goal in RPD construction and a key factor for the longevity of the dentures [13]. The application of force to bone stimulates bone remodeling, but stresses beyond the physiological tolerance of bone may lead to interference with the blood supply leading to reduction in abutments’ marginal bone and crestal bone height that were evident throughout the study period [14].

Panoramic radiography is a readily available diagnostic modality in many dental offices and provides broad anatomical coverage of the maxillofacial region and thus is often used as an initial screening tool for patients. Although Cone Beam Computerized Tomography is a gold standard for the evaluation of alveolar bone loss, but it is expensive, not feasible and has more exposure as compared to panoramic radiograph. So, to evaluate alveolar bone loss digital panoramic radiography was used in this study [15].

The statistical analysis showed significant difference in bone loss of the residual ridge between GI and GII at 12 months. GI recorded a significant lesser bone loss around the along residual ridge than GII, this results revealed that the thermoplastic acetal resin denture base

is significant increased the bone loss of the residual ridge more than metallic RPD, this was in accord with others [16] who mentioned that the dentures constructed from materials that having modulus of elasticity lower than that of PMMA are easily deformed and it may be lead increase the stresses transmitted onto the underlying mucosa [16]. Moreover, the others [17] mentioned that flexibility of the acetal resin reduced the load on the abutments, also the flexible RPDs having as a stress breaking action on the abutment teeth [18].

This study suggests long term study for the bone loss of the residual ridge of partially edentulous subjects with metallic and fixable RPDs for further investigation.

### Conclusion

Within the limitation of this study the following could be concluded, the metallic partial denture appear to make less adverse effect on the residual ridge in Kennedy Class I partially edentulous patients.

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### Volume 19 Issue 4 April 2020

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