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Comparison Between Flexible And Skeletal Implant Supported Mandibular Removable Partial Overdenture In Kennedy Class I Situation

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ABSTRACT

Aim: to compare between the flexible implant supported removable partial over denture and skeletal implant supported removable partial over denture in accordance of clinical parameters and masticatory efficiency for both abutment and implant. **Subjects and Methods:** ten female patients were selected with partially edentulous mandible Kennedy class I; two implants inserted in the second molar area bilaterally. After healing stage of implant insertion site, these patients divided into two groups group A: (flexible partial denture constructed and supported by the implants) and group B:(skeletal RPD) constructed and supported by the implants. Clinical parameters for both the abutment and the implant have been evaluated immediately after insertion of partial denture and after 4,8,12 months of loading the RPD including gingival index, plaque index, and pocket depth. Masticatory efficiency for the prosthesis also is evaluated. data collected and statistically analyzed. **Results:** Clinical parameters for both the abutment and the implant showed variant statistically significant difference between (Group A) and (Group B) in base line and 4 ,8 and 12 m readings**.** While in Masticatory efficiency for both the abutment and the implant, no statistically significant difference was found Between (Group A) and (Group B) in all time interval. **Conclusion:** It was found that there was difference in gingival index, plaque index and pocket depth between the two groups, which was negative in-group (A) in compares to group (B) for both the implants and abutments. Also, for both types, there was no difference in the result of masticatory efficiency.

KEYWORDS

Skeletal implant supported partial overdenture, flexible implant supported partial overdenture, plaque index, gingival index, pocket depth, Masticatory efficiency

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INTRODUCTION

In adults, partial edentulism refers to the loss of one or more permanent teeth in the lower or upper jaw dental arch. It is most commonly caused by caries, periodontal problems, trauma, or tumors. [(1)] Although complete edentulsim has decreased, the number of partially edentulous individuals have risen, possibly because of the worldwide aging population and oral health – related prevention policies. [(2)] Various types of prosthetic options are available for the rehabilitation of the partially edentulous condition to restore the missing teeth, including

removable partial denture (RPD), tooth-supported fixed partial denture, implant-supported partial denture, flexible denture. How will this prosthesis restore and maintain the function of natural teeth depends on a large extent on the numbers and rotation of the missing teeth [3].

Clinical, dental, and patient considerations all impact the decision to replace lost teeth with one of various treatment approaches. One of the most essential demands for patients to restore aesthetics and function is the replacement of missing teeth.[4] The loss of posterior teeth affects masticatory performance [5], which is proportional to the number of occlusal units remaining.[6] They compensate their masticatory impairment by increasing the number of chewing cycles before swallowing, so chewing their food takes them longer than others with a full dentition. [7]

Providing a removable partial denture (RPD) is one of the means available for restoring function and esthetics in patients with bilateral mandibular posteriorly unbounded saddles. Biomechanical origin is the main issue with bilateral mandibular distal extension RPDS. Occlusal forces move the saddles in the direction of a tissue ward because distal support is absent, compromising the anterior abutment teeth as well as potentially destructive rotational forces. Long-term RPD use is linked to inadequate retainer adaptation, occlusal disharmony, discomfort, periodontal disease, and continued resorption. From implant support to RPDS, there has been evidence of less stress on teeth and oral mucosa, as well as increased patient comfort.[8-10] With the introduction of flexible partial denture which have the advantages of being pressed into one piece including clasps, minor and major connectors and denture bases. [11] However, these non-rigid denture designs are discussed controversially since flexible bases may cause higher displacement of soft tissue and their influence on ridge resorption is not yet fully understood. [12] Because RPD should maintain and preserve remaining tissues in this study implant supported over RPD will be used firstly cast metal design on an implant and flexible.

Implant supported RPD used posterior implant to resolve the biological issue to convert a Kennedy class I into a tooth and implant-assisted removable partial denture (IARPD) or pseudo-kennedy class III, it was recommended that two implant abutments be placed distally in the mandible. [13,14]

Implants were first used in the early 1970s in conjunction with Kennedy Class I removable partial dentures, and since then, clinical trials have shown good survival rates for implants. [15]

Mijiritsky et al.[14] Reported Improved chewing capacity and greater patient satisfaction were recorded by IARPD wearers. It is also well recognized that the use of implants to stabilize and promote mandibular prosthesis can boost maximum muscle function. [13,16,17]. In some studies, however, complications such as screw loosening, framework fracture, healing cap loosening, framework fracture and acrylic denture bases have been notified. [18-20].

MATERIALS AND METHODS

In overall, ten female patients have been selected with mandibular Kennedy class one distal extension cases.

These patients will be selected according to the following criteria:

- Age: 25 to 45 years old.
- The volume of the bone distal from the abutment allows the insertion of an implant with the suitable length and acceptable diameter.
- All biological and mechanical considerations of RPD and constructions were followed.
- Before prosthetic treatment mouth preparation is done including periodontal and restorative treatment.
- The patient is capable of understanding and giving informed consent .

After fulfilling the above-mentioned criteria, two implants will be inserted in the molar region

bilaterally after healing stage of implant insertion these patients will be divided into two groups Group A & Group B . Group A flexible partial overdenture will be constructed with attachment supported on the implant while Group B skeletal partial overdenture will be constructed and supported by the implants. Baseline data are recorded immediately after partial denture insertion.

RPD Design:

The selected cases were Kennedy Class I, with missing first, second and third molars in distal extension side bilaterally implants will be placed this edentulous area with width # 3.75 m and 8.5mm height

A- (group A) flexible implant supported removable partial overdenture.

Flexible RPD made of thermoplastic resin were constructed with attachment supported bilaterally on the implants in the second molar region Fig (1).

B- (group B) skeletal implant supported removable partial overdenture.

RPD made of cast Cr – co alloy incorporating RPI clasp with combined denture base made of metal and heat cured acrylic resin were constructed with attachment supported bilaterally on the implants in the second molar region Fig (2).

Fig. (1) Insertion of the metallic partial overdenture.

Fig. (2) Insertion of flexible partial overdenture.

Clinical parameters for both the implant and the abutment evaluated at baseline of loading the RPD including gingival index, plaque index, pocket depth and masticatory efficiency for the prosthesis also evaluated Statistical research has been carried out to show difference between the baseline 4, 8,12, month data after insertion.

Specimens were prepared from Trident Gums in the flavors 'Watermelon Twist' (red colour) and flavors 'srawberry' (white colour). Strips of 30 mm length from both colours manually stuck together, so that the test strip presented is 30 mm length,12 mm width and 6 mm thickness the specimens were then flattened on glass slide to a wafer of 1 mm thickness the wafers were scanned. from both sides with resolution of 300 dots per inch. The scanned image was copied into an image of fixed size (1175·925 pixels) and stored in Adobe Photoshop format (*.psd). As a reference scale a scanned piece of unmixed gum was copied in each image (area of 4485 pixels). Then the 'magic wand' tool was used (tolerances 20, 25, 30) to select the unmixed red parts of the image. The numbers of selected pixels were recorded from the histogram for each side and each tolerance and mean of those figures calculated. Subsequently a ratio was computed for the Unmixed Fraction (UF) using the following formula:

(Pixels side a + Pixels side b) -2 * Pixels of scale divided by 2 * Pixels all

RESULTS

Flexible partial dentures in points of preserving the remaining tissues, show negative feedback in clinical parameters in reference to the periodontium.

Gingival index in relation between the two groups in base line and 4 m readings, there was no statistically significant difference between (Group A) and (Group B) where (p=0.138). While in 8 m readings; There was a statistically significant difference between (Group A) and (Group B) where (p=0.001). In 12 m readings ; There was a statistically significant difference between (Group A) and (Group B) where (p=0.019).

Plaque index baseline, 4 m and 8 m readings show in relation between the two groups that, there was a statistically significant difference between (Group A) and (Group B) where (p=0.001). Also, in 12m, there was a statistically significant difference between (Group A) and (Group B) where (p=0.019).

Pocket depth base line reading in relation between the two groups.

There was no statistically significant difference between (Group A) and (Group B) where (p=1). while in 4m reading; There was a statistically significant difference between (Group A) and (Group B) where (p=0.019). in 8 m; There was a statistically significant difference between (Group A) and (Group B) where (p=0.001). in 12 m; There was a statistically.

Significant difference between (Group A) and (Group B) where, (p=0.001).

Masticatory efficiency in relation between the two groups shows that, in the baseline, 4m and 8m and 12 m readings; There were no statistically significant difference between (Group A) and (Group B) where (p=0.099) , (p=0.923), (p=0.270), where (p=0) .

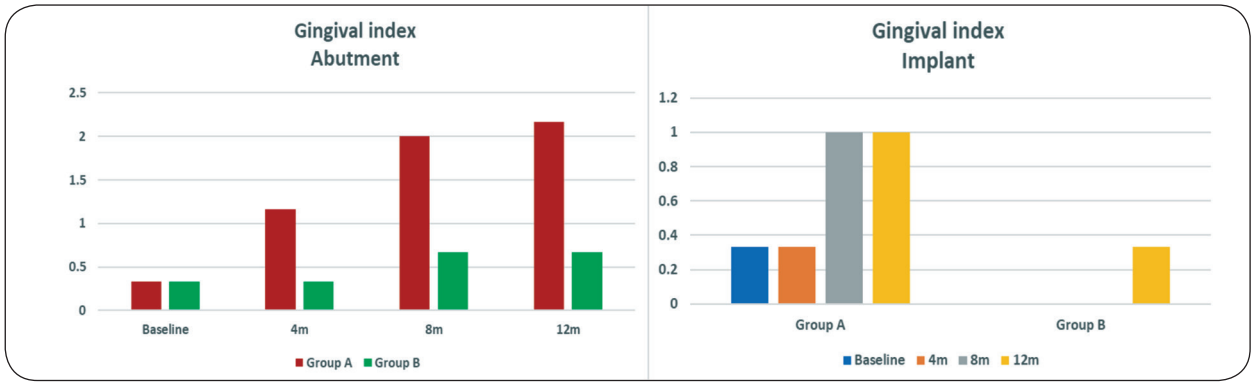

Fig. (3) Bar chart representing Gingival index for different abutment and implant groups.

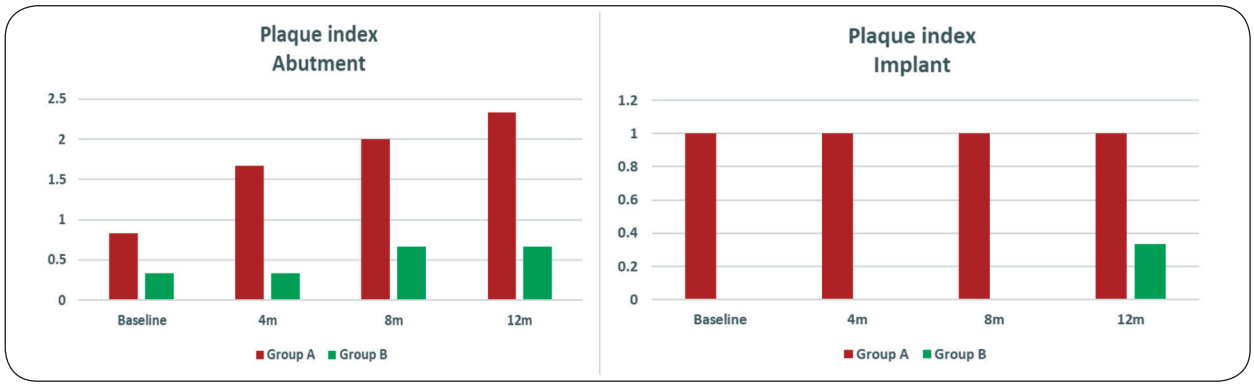

Fig. (4) Bar chart representing Plaque index for different abutment and implant groups.

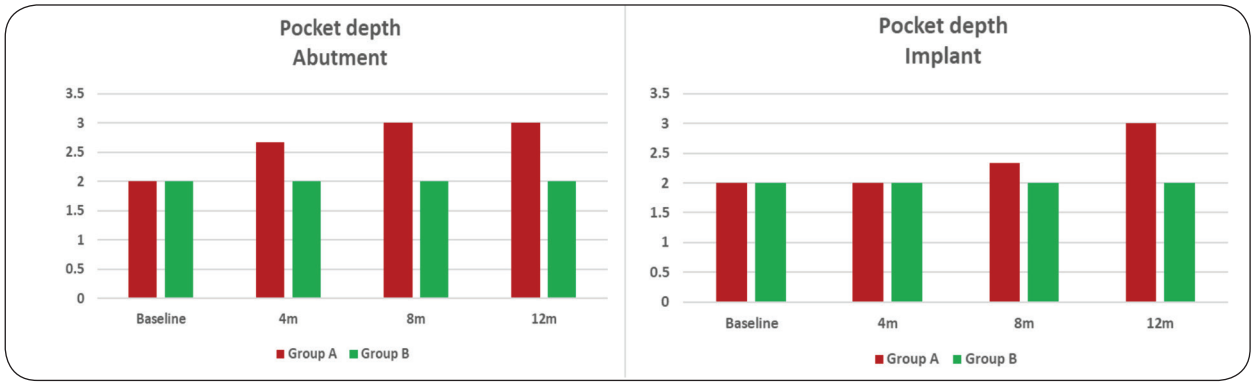

Fig. (5) Bar chart representing Pocket depth for different abutment and implant groups

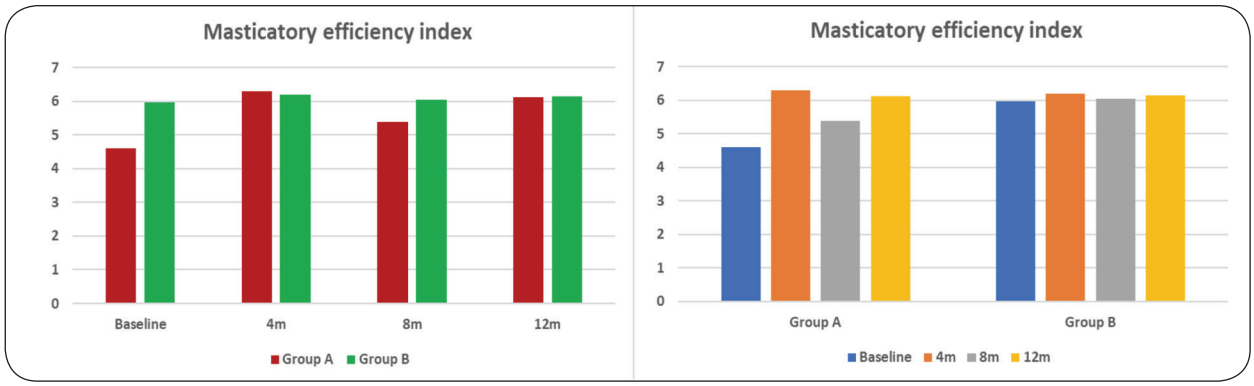

Fig. (6) Bar chart representing Masticatory efficiency index for different groups

DISCUSSION

RPD is a versatile, cost-effective, and reversible treatment option for edentulous individuals who are missing teeth. [21] Removable dentures are still an important prosthetic consideration in many cases of oral rehabilitation, particularly when restoring edentulous spaces posterior to the remaining teeth.[22] Usage of the RPDs made either from resin alone or mixture 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.[23] Yet studies of removable partial dentures suggest that insertion of a partial denture constitutes a risk factor for periodontal health Nevertheless, studies of removable partial dentures show that partial denture insertion is a risk factor for periodontal health and supporting alveolar bone of the remaining teeth .[24]

According to Akaltan et al. [25] The periodontal health of patients with RPD can be improved by proper oral hygiene and systemic controls. The incidence of increased dental biofilm accumulation in the area surrounding abutment teeth as well as gingival inflammation has been documented in other studies in regions covered by the RPD.

The incidence of increased dental biofilm accumulation in the area surrounding abutment teeth as well as gingival inflammation has been documented in other studies in regions covered by the RPD. [26]

Other studies have found increased dental biofilm deposition in the area surrounding abutment teeth, as well as gingival irritation in RPD-affected areas. Increased probing blood associated with deeper probing depth in abutment teeth is linked to quantitative changes in the dental biofilm, which increases the risk of gingival inflammation and periodontitis. [27] Implant-assisted removable par-

tial dentures were presented as an adjunctive use of dental implants with or without retentive features to reduce some of the limitations of clasp-retained detachable partial dentures. [28]

Other studies revealed that Implant supported removable partial denture provide patients with stable, long term predictable prostheses but strict maintenance and follow up protocol are recommended to obtain satisfactory results [29] Other studies showed that after conversion of traditional removable partial denture to implant-assisted removable partial denture, masticatory performance significantly improved . [30]

Other studies revealed that patients reported improved oral health following conversion from RPD to ISRPD.[31]

Clinical parameters including; the gingival index, plaque index and pocket depth for both the implant and abutment in group A was a statistically significant difference between (base line),(4m),(8),and (12m),this is due to slightly rough surfaces of flexible RPD which will lead to accumulation of food in small areas related to the the implant and abutment even the patient s have been instructed for proper oral hygiene. And even the denture smoothening was clinically accepted areas where food accumulated had slight inflammation and subsequently effect of the periodontium of the abutment and mucositis of the crestal part of bone around the implant (peri implantitis). Some studies revealed that in cases where flexible acrylic clasp was used instead of metal clasp assembly challenge abutment tooth hygiene and may be a risk for future periodontitis. [32]

This increased gingival index 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. This finding is important, as retainers receive denture elements and are more susceptible to accumulate greater amounts of dental biofilm, besides impairing the self-cleansing action performed by saliva, tongue, and cheeks. Hence, if patients are not aware and motivated about oral hygiene, they may be at high risk for developing periodontal diseases and dental caries. Some investigators approved that both conventional and flexible dentures induced changes in palatal micro flora and formation of dental plaque, but flexible denture were more because of porosity which act like niches in which microorganisms were protected even from sheer forces and oral hygiene measures. [33]

While the other group (skeletal RPD) show much better results related to the the implants and abutment this is due to precise designing beside function related component and highly finished and polished skeletal RPD rest which represent the support element reduce any harmful effect on the abutment. Aiding in achievement of objectives of removable partial denture represented in preservation of the remaining tissues considering it the primary purpose of RPD and preservation of the health of the remaining teeth. In addition to preservation of the residual ridge by preventing bone resorption. While other studies revealed that thermoplastic mandibular distal extension removable partial denture material was superior to vitallium regarding to preservation of abutment alveolar bone. [34]

Other in - vitro photo elastic analysis revealed that acetal partial denture frame works are preferred to use with implant supported RPD when compared with metal partial denture frame works for preservation of bone around implant. [35]

The usage of the color-changeable chewing gum is a good indicator of masticatory efficiency. The application of chewing gum together the image analysis aimed to improve the conventional technique, where the mixture of colors was verified visually, without specific equipment. A color scale was developed for visual assessment of the gum to evaluate masticatory efficiency.

Masticatory efficiency was equal in relation to the flexible group and the skeletal group due to presence of the implant and the short span between the last abutment and the implant make them much closer to be fixed than removable as it is considered only missing one tooth. this agrees with study reveal that increase the flexibility of the denture base material decrease chewing efficiency. (36) Which in turn leads to increasing patient comfort and satisfaction.

Both two groups were designed not only to be supported by the implant but also to be retentive by ball and socket attachment increasing retentive quality of the prosthesis giving it more stabilization beside the extension of the flanges. (37)

Locking design result in quadrilateral retention taking retention anteriorly from the abutment and posteriorly from the ball and socket attachment reducing dove tail movement of the RPD in both groups, increase stability, promoting biomechanical properties of the RPD. (38)

CONCLUSION

The research be deduced that, clinical parameters there were a statistically significant difference between the two groups: group A (flexible implant supported removable partial denture) and group B (skeletal implant supported removable partial denture) in which flexible partial dentures have negatively affected the implant and the abutment. However, there was no statistically significant difference between group A) and (group B) according to masticatory efficiency.

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مقارنة بين الأطقم الجزئية المتحركة المرنة والهيكلية المحملة على غرسات بالفك السفلي في التصنيف الاول لكينيدي

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الملخص:

الهدف: للمقارنة بين الأطقم الجزئية المتحركة المرنة والهيكلية المحملة علي غرسات لقييم المعايير الإكلينيكية (مؤشر اللثة ومؤشر الترسبات وعمق الجيوب) لكل من الغرسات والسنه الداعمة وتم تقييم كفاءة المضغ في فترات زمنيه مباشرة عند الاستلام وعند 4 , 8 و 12 شهر.

المواد والاساليب: تم إختيار عشرة مريضة من التصنيف الأول لكندي بالفك السفلي وتم عمل غرستين في مكان الضرس الثاني بالناحيتين وبعد الالتئام تم تقسيم الحالات الي مجموعتين مجموعه (أ) الأطقم الجزئية المتحركة المرنة مجموعة (ب) الأطقم الجزئية الهيكلية. تم تقييم المعايير الإكلينيكية (مؤشر اللثة ومؤشر الترسبات وعمق الجيوب) لكل من الغرسات والسنه الداعمة وتم تقييم كفاءة المضغ. ومتابعة الحالات على فترات زمنيه مباشرة عند الاستلام وعند 4 , 8 و 12 شهر للمجموعتين على هذه الفترات. كماتم تجميع وتحليل النتائج إحصائيا.

النتائج: وجد اختلاف في المعايير الإكلينيكية لكل من الغرسات والداعمة لمجموعه أ و ب في فترات زمنيه مباشرة عند الاستلام وعند 4 , 8 و 12 شهر. و لا اختلاف واضح في كفاءة المضغ لكلا المجموعتين في فترات زمنيه مباشرة عند الاستلام وعند 4 , 8 و 12 شهر.

الخلاصة: يوجد اختلاف في مؤشر اللثة ومؤشر الترسبات وعمق الجيوب بين المجموعتين والتي كانت سلبية في المجموعة أ (الاطقم المرنة) مقارنة بالمجموعة ب (الأطقم الهيكلية) كما وجد أنه لا اختلاف في نتائج كفاءة المضغ بين المجموعتين.

الكلمات المفتاحية : الاطقم المرنه، الاطقم الهيكليه، كفاءة المضغ، مؤشر اللثه، ومؤشر الترسبات ، وعمق الجيوب