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Effect Of Two Different Attachments In Mandibular Over Denture On Supporting Structures

Ahmed Mohamed hashem MSc [(1)], Amira El Amir Youssef [(2)]

1-Ass.Lecturer, Prosthodontics, Medical Military Academy.
2- Prosthodontics, Ministry of health.

Abstract

Objectives: *This study was conducted to evaluate and compare the pocket depth and gingival index of abutments with OT cap equator and ball and socket attachment in tooth retained mandibular over denture.*

Materials & methods: *Twelve male patients with partially edentulous ridge with two remaining canines were selected and randomly divided into two equal groups according to type of attachment used for overdenture retention, both groups received tooth supported mandibular overdenture.*

- *Group I: with "ball and socket" resilient attachment.*
- *Group II: with "OT Cap equator" resilient attachment.*

Evaluation by measuring pocket depth and gingival index was made at the time of insertion, after six, twelve and eighteen months.

Results: *The group with OT Cap equator attachment has shown better effect on gingival health (pocket depth and gingival index) for the patients than ball and socket attachment.*

Conclusion: *using tooth supported mandibular overdenture with OT Cap equator attachment provides better effect for gingival health (pocket depth and gingival index) for abutments and supporting structures than using ball and socket attachment.*

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I. Introduction: -

Over-denture retention is enhanced by introducing different types of attachments. The most commonly used attachments are studs, bars magnets, intra- radicular and telescopic crowns [(1)] .

A reasonable success rate has been recorded for ball attachments as retainers for mandibular over-dentures. They are considered among the simplest of all attachments and were widely used because of ease of handling, oral hygiene access and minimal chair- side time requirements. However, there were some limitations regarding the use of this attachment, such as the need for a minimum space of 6-7mm which might be absent in some of the cases. [(2,3)]

OT Cap Equator is an extra –radicular ball and socket resilient attachment. it was introduced to save this problem to change the friction concept into retention concept using an elastic cap instead of rigid clip, sphere in titanium also designed as a top and bottom portion of the sphere have been cut off incurred to maintain exclusively the control portion, the sphere of the equator which is the real wording retentive area this way we have reduced the vertical dimension of the sphere without compromising full function so, there is need for

inter-arch space less than that needed for classical ball and socket attachments and subsequently leed to proper vertical dimension level adjustment .[4]

II. Materials and Methods

Twelve male patients with only remaining two lower canines were selected from the out patient's clinic of Kobry El-Koba Military Hospital, with ages ranges from (50-65) Each Patient had received a mandibular tooth supported over denture with two attachments placed in their endodontically treated lower canines which randomly classified into two groups.

- Group I: patients in this group received "ball and socket" resilient attachment.
- Group II: patients in this group received "OT Cap equator" resilient attachment.

Mouth preparation:

-Endodontic therapy for both canines in each group

-Reduction of the crown in height with all surface inclination to create dome shape leaving from 2 to 3 mm above the gingival margin

-Metal copings were cemented to the abutments after making post, core and head of the attachment as a one unit

Prosthetic procedures:

-Impressions were taken and conventional steps of denture construction were followed

-The attachments were cemented inside prepared root canals (Fig.1)

Fig.1.Preparation for direct pick-up technique of OT Equator attachment

- Processing of upper denture and lower over denture following the conventional procedures then it is properly finished and polished and delivered in usual manner.

-Direct pick-up technique used to fix the metal housing in the denture fitting surface for each type of attachment. (Fig.2,3)

Fig.2. Preparation for direct pick-up technique for ball and socket attachment

Fig.3. The metal housing embedded in the fitting surface of the denture

Post insertion evaluations:

The following data were collected before dismissing the patient at the insertion appointment (considered as zero readings), six, twelve- and eighteen-months post insertion:

(I) Pocket depth

- In each record, William's periodontal graduated probe was placed, with light pressure, parallel to the long axis of the tooth until resistance was felt. [5,6]
- The values were added and the means were obtained for each tooth.
- The amount of pocket depth changes was calculated by subtracting the mean value of pocket depth at time of denture insertion, six, twelve- and eighteen-months post insertion.

(II) Gingival index

The condition of the gingival tissues around the teeth was evaluated according to gingival index score as follows [7]:

-Grade (0): Normal gingiva.

-Grade (1): Mild inflammation, slight changes in color, slight edema and no bleeding on probing.

-Grade (2): Moderate inflammation, redness, edema and glossing with bleeding on probing.

-Grade (3):

-Severe inflammation, marked redness, edema, ulceration and tendency to spontaneous bleeding.
-After dryness and isolation of the gingiva, gingival index was scored from all aspects of the teeth of the two groups for successive follow ups every six months from denture insertion.

III. Results:

(I) Pocket depth: -

Comparison between group I (ball and socket attachment) and group II (OT cap attachment)

Table (1), show that the mean values of pocket depth change around the abutments at time of denture insertion were found 1.42 and 1.40 mm for group I and II, respectively.

At the end of six months follow up period the mean values of pocket depth change around the teeth were found to be 2. 29 and 2.05 mm for group I and II, respectively. Statistical analysis of the data revealed significant difference between the two studied groups (p<0.05).

At the end of twelve months follow up period the mean values of pocket depth change around the teeth were found to be 3.29 and 3.00 mm for group I and II, respectively. Statistical analysis of the data revealed significant difference between the two studied groups (p<0.05).

At the end of eighteen months follow up period the mean values of pocket depth change around the teeth were found to be 4. 35 and 4.02 mm for group I and II, respectively. Statistical analysis of the data revealed significant difference between the two studied groups (p<0.05).

Independent test showed increased pocket depth for group I in comparison to group II and difference was significant at six, twelve and eighteen months.

Table (1) Mean, standard deviation and student t-test for pocket depth values for group I (ball and socket attachment) and group II (OT cap attachment)

Time	Groups	Mean	Std. Deviation	P value
Insertion	group I	1.4250	.50064	0.823
	group II	1.4000	.49614	
6months	group I	2.2925	.49010	0.032*
	group II	2.0500	.50383	
12months	group I	3.2875	.51748	0.016*
	group II	3.0000	.53109	
18months	group I	4.3500	.54538	0.01*
	group II	4.0250	.55412	

***** Significant difference at $p < 0.05$

(II) Gingival index: -

Comparison between group I (ball and socket attachment) and group II (OT cap attachment)

Fig (4), show that the mean values for the score of gingival index at time of denture insertion for group I and group II were 2.8 and 2.5 ,respectively. Statistical analysis of the data revealed insignificant difference between the two studied groups (p>0.05).

After six months of denture insertion the mean values for the score of gingival index for group I and group II were 2.5 and 2.2 ,respectively. Statistical analysis of the data revealed insignificant difference between the two studied groups (p>0.05).

After twelve months of denture insertion the mean values for the score of gingival index for group I and group II were 2.3 and 1.4, respectively. Statistical analysis of the data revealed significant difference between the two studied groups (p<0.05).

After eighteen months of denture insertion the mean values for the score of gingival index for group I and group II were 1.6 and 1.00, respectively. Statistical analysis of the data revealed significant difference between the two studied groups (p<0.05).

Independent test showed increased value of gingival index score for group I in comparison to group II and difference was significant at twelve and eighteen months (gingival index score 0 is the best gingival condition and 3 is worst).

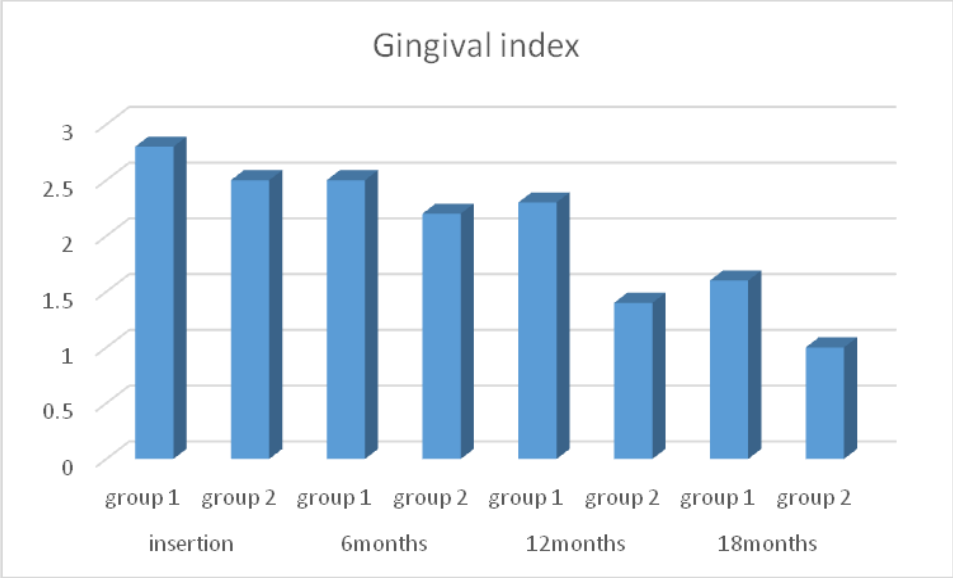

Fig. (4). Gingival index changes for the two groups

IV. Discussion

Discussion of methodology:

Increase in sulcular depth around natural teeth is related to periodontal disease and bone loss. William's graduated periodontal probe was used to determine pocket depth around the abutments and implants. Fixed reference points on the abutments were used to standardize the measurements during follow up period. Using the gingival margin as a reference point is not reliable method as gingival recession or hypertrophy may occur that affects the pocket depth recorded (pseudo-pocket formation).[8]

Gingival index is scoring system provides an accurate assessment of peri-implant condition and it gives considerable readings about the soft tissues that surrounds the implants and it gives the ability to manage any future inflammatory processes in the tissues surrounding the implants like peri-implant mucositis and peri-implantitis which could be managed to avoid implant failure and loss [9-11]

V. Discussion of results:

Hypertension, diabetes, anemia, nutritional disorders, history of chemotherapy, radiotherapy and/or hormonal therapy have a deleterious effect on the vascular supply and soft tissue quality under removable prosthesis. A positive relationship exists between the rate and amount of bone loss, thickness of the mucosa and the presence of systemic disease. Failure may arise from impaired host healing, infection and disruption of a weak bone-to-implant interface. [12]

Wearing a removable partial denture complicates the oral environment and restricts the flow of food

and the self-cleaning action of the buccal mucosa and tongue, which results in the accumulation of the dental plaque on the prosthesis and surrounding tissue, the control of dental plaque is important to obtain good denture prognosis and performance for a long period.(13)

The good retention properties provided by OT cap attachment lead to better biomechanics of the final overlying prosthesis which lead to proper load distribution on underlying abutments which in turn leads to decreased amount of harm full stresses on periodontal tissues of supporting abutments and finally maintain good gingival health of this group rather than group using conventional ball and socket attachment. (14)

using an elastic cap instead of rigid clip, sphere in titanium also designed as a top and bottom portion of the sphere have been cut off incurred to maintain exclusively the control portion, the sphere of the equator which is the real wording retentive area this way we have reduced the vertical dimension of the sphere without compromising full function

Smaller size of OT cap attachment and housing lead to decreased amount of accumulated food debris and subsequently less amount of plaque accumulation around abutments which allow proper cleansing which lead to better gingival health and that may affect biologic width of this group positively. (14)

Biologic width refers to the area of periodontal and soft-tissue structures such as the gingival sulcus, the junctional epithelium and the supra-crestal connective tissues. Not only does this width progress apically (along the vertical axis), but also a horizontally about 1-1.5 mm. Biological width may explain *significant difference* in pocket depth change around the teeth in both groups. (15)

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