

Comparison of Types of Attachments on Mandibular Over denture Abutments- An Original Research

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ABSTRACT:

Introduction: Rehabilitation of patient with few remaining natural teeth with overdenturehas the advantage of lowering the progressive resorption of the residual alveolar ridge. Hence we aimed to compare the effect of two different types of attachments on mandibular overdenture abutments crestal bone height

Material and methods: Twenty totally edentulous patients with 2 remaining mandibular canines were selected. They were equally divided to Group I - magnetic attachment mandibular overdenture. Group II - ball and socket attachments mandibular overdenture. Mandibular overdentures with the maxillary complete dentures was done.

Results: No significant effect on bone height was seen in either of the group.

Conclusion: The use of magnet attachments may be valuable to solve a situation pushing the dentist to override the benefits of its use to prevent the dangerous effects of its horizontal stresses that may be transmitted to the overdenture abutments.

Keywords: Mandibular Overdenture, Attachments, Comparison

Introduction

Rehabilitation of patient with few remaining natural teeth with overdenture has the advantage of lowering the progressive resorption of the residual alveolar ridge. The mechanism of alveolar ridge maintenance through root retention occurs because of the root's ability to express the compressive force to the denture bearing into tensile force to the bone via periodontal ligament⁽¹⁾.

Overdenture abutments are compromised teeth; to continue serviceable, even in their new form these teeth must sustain forces of restricted magnitude and favorable vector. Magnetic retention is ideal for these cases. It is self-limiting because the force the magnets exert on supporting roots can not surpass their optimum retention value for vertical displacement.^(2,3) A ball and socket stud attachment is an attachment that is located on the root. This attachment consists of two components, solder base with a sphere (the male unit) that allows rotational movement, a spacing ring that provides for 0.4 mm vertical movement and an adjustable housing (the female unit) with four lamellae that provide the retention. The lamellae are enclosed by a PVC ring assuring their action. If the attachment is to work without harming the abutment tooth, movement of the denture must be deliberated⁽⁴⁾. Hence we aimed to compare the effect of two different types of attachments on mandibular overdenture abutments crestal bone height.

Material and methods

Twenty patients having completely edentulous maxillary ridges and partially edentulous mandibular ridges retaining canines were designated. Patients with lower flat or knife edge ridge, parafunctional habits, abnormal ridge relation, oral pathology or history of periodontal diseases were not included in this study. Patients with adequate interarchspace were chosen to house the length of the both of magnetic and ball & sockets attachments. The abutment teeth were root canal treated. Overdentures were constructed on the abutment teeth later. According to the type of the used attachments, the subjects were divided randomly into two equal groups. Group A: Closed field magnetic attachment treated subjects (DYNA MAGNET NS, Korenbeursstraat 26, Netherlands). Group B: Ball and socket attachments treated subjects (TUT DENTAL IMPLANTS, Nasr city, Cairo, Egypt). Radiographic assessment was done at the time of denture insertion, three, six, nine and twelve months after denture insertion.

Results

Assessment between mean values of the right and left canine abutments in both magnetic attachment and ball and socket attachment group for the Crestal height showed statistical not significant values. So, the mean values for both the right and left abutments were pooled together for all the assessment measures.

The Effect of Attachment Retained Overdentures on Height of the Crestal Bone

Evaluation between the calculated mean values for the change in crestal bone height for both the magnetic and ball & socket attachment groups between each two consecutive follow-up periods were carried out using student t-test as clear in table (1) The t-value for the variation in the calculated means for crestal bone loss proximal to the magnetic compared to ball & socket attachment was found to be not statistically significant ($P \geq 0.05$) at the time period between insertion-3 months and 9- 12 months follow-up periods. Though, a significant difference

between the two groups at $P \leq 0.001$ at the 3-6 months interval and at $P \leq 0.01$ at the 6-9 months follow-up period was noted. By the end of the study period the difference in crestal bone loss in between the magnetic and ball & socket attachments groups were noted to be statistical significant ($P \leq 0.01$).

Table (1): Comparison between the two attachment systems for the bone height.

Time	Magnetic group	Ball & Socket group		
	Mean \pm SD	Mean \pm SD	t-value	P-value
Insertion- Month.	1.718 \pm 0.418	1.635 \pm 0.117	0.600	NS
3-6 Month.	1.688 \pm 0.109	1.473 \pm 0.077	5.085	***
6-9 Month.	1.750 \pm 0.355	1.510 \pm 0.029	2.130	**
9-12 Month.	1.420 \pm 0.397	1.543 \pm 0.061	-0.964	NS
Insertion-12 Month.	6.575 \pm 0.426	6.160 \pm 0.191	2.811	**

DISCUSSION

Care of the abutment supporting structures is measured as a key factor to the success of overdenture treatment. Infrequently overdenture wearers may face breakdown of the abutment supporting structures, which are of grave importance of the maintenance and success of these treatments^(5,6). In order to lower the harmful effect of horizontal forces, magnetic and ball & socket attachments were applied in our study. Abutment reactions in term of the bone height were assessed. The minor amount of alveolar bone loss proximal to magnetic compared to ball & socket attachments during the insertion- three months period may be clarified by the fact that incidences of periodontal proprioceptive nerve endings provide an impulses to the neuromuscular mechanism, which is in turn deliver an improved neuromuscular performance. This led to more precise functional jaw movement and averts deviation of the mandible during closure, thus lowering the possibility of cuspal interference⁽⁷⁾. Also, stability of the overdentures ensuing from the use of magnetic and ball & socket attachments reduces the destructive horizontal and rotational occlusal forces by directing them more axially and less traumatically on the abutments. This stops shifting of the denture base and the succeeding development of deflective occlusal contacts as both attachments were acknowledged clinically from the patients for the stability of the dentures during function^(8,9). The steady increase in the alveolar bone loss proximal to the abutments during the different follow-up periods was in agreement with the results of other studies^(10,11). The investigators found an average bone loss of 0.9 mm in abutment supporting overdenture after one year. They connected this finding to the nature of the overdenture support which lets stress to be dispersed between the abutments and the residual alveolar ridge. The abridged loss of marginal bone height could not be understood as a pathological change, but it could be due to bone reaction to the newly familiarized prosthesis⁽¹²⁾. From the mechanical point of view many authors stated that the use ball and socket may create horizontal component of forces which is very destructive to denture stability^(13,14). While the present study is in disagreement with these studies. These horizontal destructive forces were found very hazardous on the integrity of the periodontal support of abutments retaining and/or supporting the overdentures. The results of the comparison between the two groups as related to crestal bone loss changes exposed that there was increased in crestal bone loss in the group of magnetic attachment rather than the group of ball & socket attachment. This may be due to magnetic field and its affection to the version circulation of the bone, or due to the size of alloy

keeper not harmony with the size of root as the size of the alloy keeper is smaller than the size of the root of the abutment and the shape of the alloy keeper is dissimilar as it is in the form of cylinder whereas the shape of the abutment is oval, so the alloy keeper was anticipated out of the root of the abutment that would amass plaque between the alloy keeper and the root of the abutment causing to gingival inflammation and escalation of the bone destruction. The third reason of increase bone loss in magnetic attachment was to non-equal load distribution that related to length limited of the post of the alloy keeper inside the root canal orifice, whereas the length of the post of the ball attachment direct the load along the long axis of the abutments and the load would be applied to the bone rather than to the mucosa.

Conclusion

The use of magnet attachments may be valuable to solve a situation pushing the dentist to override the benefits of its use to prevent the dangerous effects of its horizontal stresses that may be transmitted to the overdenture abutments. The results of this study were in controversy with that recorded by another researcher⁽¹⁴⁾. Finally, more study is suggested to search about the exact reason of the increased crestal bone loss with magnetic attachment.

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