

# Comparison Between Mainly Mucosa-Supported and Combined Mucosa–Implant-Supported Mandibular Overdentures

Ahmed S. Assad, BDS, MDS, DDS,\* Mohamed A. Abd El-Dayem, BDS, MDS, DDS,† and Magdy M. Badawy, BDS, MDS, DDS‡

An implant-retained overdenture is an alternative form of treatment to the fixed-implant prosthesis. The overdenture is retained by one of many types of mechanical retention. The denture may be attached to a cast bar fixed to the abutments, or it may be attached to individual abutments. An overdenture provides an acceptable partial tissue support that requires fewer fixtures, abutments, and prosthetic components. This lowers the cost of treatment. Other advantages include less component stress and breakage and a simplified technique in most situations.<sup>1</sup>

The implant-retained overdenture was classified into 3 designs, which are: 1) mainly mucosally supported, 2) a combined mucosa–implant-supported, or (3) an implant-supported overdenture, depending on the number and location of the implants.<sup>2–5</sup>

The mainly mucosa-supported overdenture is attached to 2 implants by means of resilient stud attachments or magnets. This type of attachment allows for rotation and translation of the overdenture. It is indicated for patients who have a retention problem and when new dentures without implants will not adequately solve the problem.<sup>5,6</sup>

The combined mucosa–implant-supported overdenture is defined as an

*The purpose of this study is to compare mainly mucosa-supported and combined mucosa–implant-supported complete mandibular overdentures. Ten completely edentulous patients received 20 press-fit dental implants at the canine regions of the mandible. Each patient received 2 implants, which were left submerged and unloaded for 4 months. The patients were divided into 2 groups: group I patients received mandibular overdentures retained by a magnet attachment (mainly mucosa-supported overdenture). Group II patients received mandibular overdentures retained by a bar attachment (combined mucosa–implant-supported overdenture). The patients were evaluated clinically and radiographically immediately after overdenture delivery and after 6 months, 12 months, and*

*18 months. The results showed that the mainly mucosa-supported overdentures had less bone resorption distal to the implant in comparison to the combined mucosa–implant-supported overdentures. Plaque index score was significantly high in the group treated with magnet-retained overdentures. After 18 months follow up, the group treated with combined mucosa–implant-supported overdentures showed a significant increase in gingival inflammation when compared with the other group. The type of attachment or support may affect gingival inflammation or plaque accumulation. Increased functional load may affect bone density and resorption. (Implant Dent 2004;13:386–394)*

**Key Words:** dental implant, overdenture, support, attachment

overdenture retained by 2 to 4 implants positioned in the anterior region of the mandible and connected with a bar. Retentive clips or a retentive sleeve are constructed in such a way that permits rotation around the bar. This overdenture approach is indicated in case of a retention problem resulting from a severely resorbed mandible with relatively short implants.<sup>7–9</sup>

The stress transferred to both implants in the bar/clip attachment is higher and produces high bending moments. The vertical force applied to the bar/clip attachment creates immediate stress patterns of greater magni-

tude and concentration on both implants.<sup>10</sup>

Therefore, a number of studies have reported the influence of various overdenture techniques on soft and hard tissues. The literature has provided insufficient data about the difference in tissue changes after wearing of an overdenture supported by a magnet or by bar attachments.<sup>10,11</sup> The aim of this study was to compare mainly mucosa-supported (magnet attachment) and combined mucosa–implant-supported (bar attachment) complete mandibular overdentures opposing maxillary complete dentures.

\*Assistant Professor of Removable Prosthodontics, Faculty of Dental Medicine Al-Azhar University, Cairo, Egypt.  
†Dental consultant, Zagazig University, Egypt.  
‡Professor and Head of Removable Prosthodontics, Faculty of Dental Medicine Al-Azhar University, Cairo, Egypt.

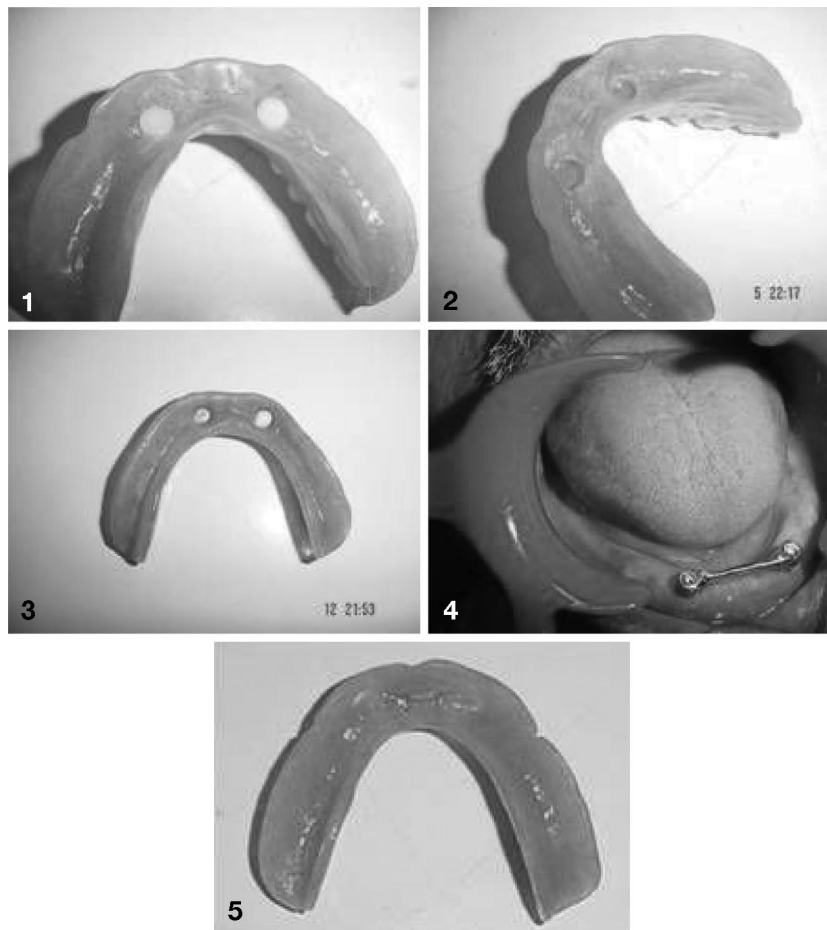
## MATERIALS AND METHODS

Ten completely edentulous patients received 20 press-fit dental implants (Dyna dental implant; Dyna Dental Engineering, Bergen op zoom, The Netherlands) with 13 mm length and 3.6 mm diameter. The patients were selected from the prosthetic clinic of the Faculty of Dental Medicine, Al-Azhar University. The ages ranged between 48 and 60 years (8 men and 2 women). All patients were selected free from any systemic or local disease that might contraindicate the placement of the implant. Each patient received 2 implants, 1 on each side in the canine regions of the mandible. The implants were left submerged and unloaded for healing and an osseointegration period of 4 months.

The patients were divided into 2 groups, 5 patients each. Group I patients received mandibular overdentures retained by a magnet attachment (mainly mucosa-supported overdenture). For this group, the complete denture was constructed as usual. However, spaces for the magnets were created in the lower denture opposite the abutments by using magnet analogs (Figs. 1 and 2). The magnets were attached to the denture at the time of delivery by a chairside resilient magnet bond (Dyna I.M.P. system; Dyna Dental Engineering) (Fig. 3). The use of a resilient magnet bond reduces the load transmitted to the implant and transmits most of the vertical load to mucosa.

Group II patients received mandibular overdentures retained by a bar attachment (combined mucosa-implant-supported overdenture). The bar was cast in chrome cobalt alloy and screwed onto the abutments (Fig. 4). The denture was constructed with enough space in the anterior part of the fitting surface for the bar and abutments. The metal housing with the plastic clip was secured to the fitting surface of the denture at the area between the 2 bar abutments to permit rotation around the bar (Fig. 5).

Both groups were supplied with conventional maxillary complete dentures. The patients were evaluated clinically and radiographically immediately after overdenture delivery and



**Fig. 1.** Magnet analogue in its place in denture-bearing area in canine region.

**Fig. 2.** The magnet analog was removed.

**Fig. 3.** Magnet in place.

**Fig. 4.** Metal bar in the patient's mouth.

**Fig. 5.** Plastic clip inside metal housing fixed to the fitting surface of the denture.

after 6 months, 12 months, and 18 months.

### Clinical Evaluation

**Implant mobility.** The supragingival portion of each implant was subjected to alternative pressure in different directions. Any degree of movement was considered failure of osseointegration.<sup>13</sup>

**Pocket depth.** The pocket depths for each implant were measured by sensor probe on 4 surfaces (mesially, labially, distally, and lingually) at each time. Measurements of the 4 surfaces were added; the mean values of the right and left implants were added and their mean was calculated to obtain the average of pocket depth.

**Gingival index.** The gingival index score for each implant was recorded on 4 surfaces (mesially, labi-

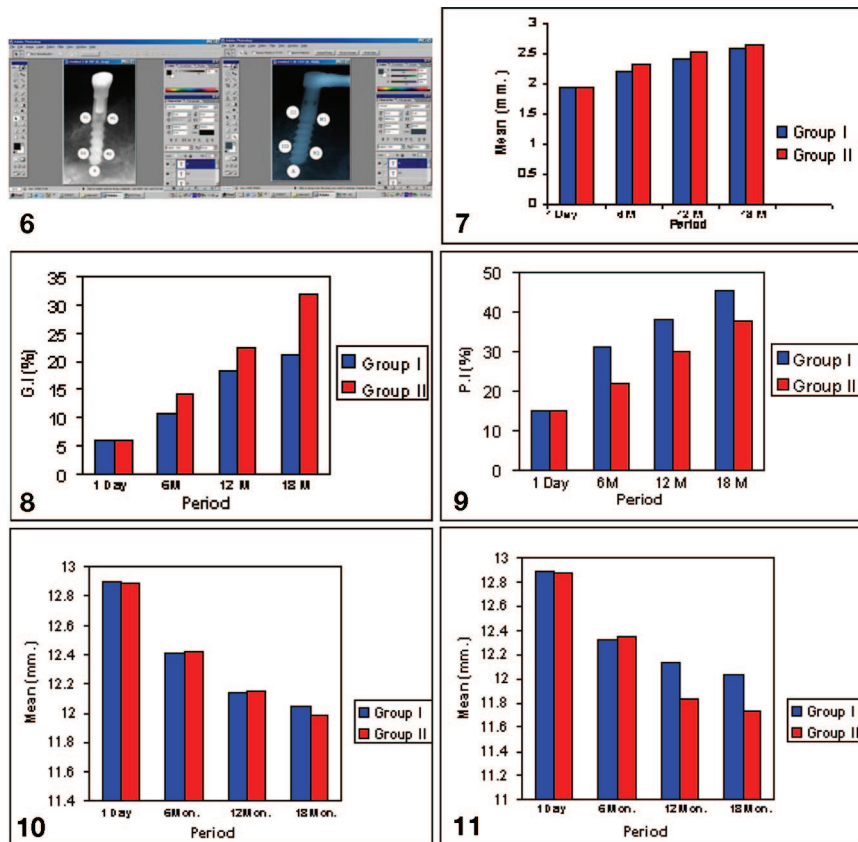
ally, distally, and lingually) according to Loe and Silness.<sup>14,15</sup> The mean values of the right and left implants were added and the mean was calculated.

**Plaque index.** According to Mombelli et al.,<sup>16</sup> the plaque index scores were obtained from collecting the affected surfaces of the supragingival part of the implant.

### Radiographic Evaluation

The radiographic evaluation included measuring the marginal bone height and bone density. Panoramic radiographs and standardized long cone paralleling technique with radiographic template were used to obtain serial periapical radiographs for each implant for measuring mesial and distal marginal bone height, and bone density.

The processed periapical radio-



**Fig. 6.** Computer program showing the 5 selected points to assess bone density (M, mesial; D, distal; A, apical).  
**Fig. 7.** Pocket depth in group I and group II at different follow-up periods.  
**Fig. 8.** Gingival index for group I and group II at different follow-up periods.  
**Fig. 9.** Plaque index for group I and group II at different follow-up periods.  
**Fig. 10.** Mesial marginal bone height in both groups at different follow-up periods.  
**Fig. 11.** Distal marginal bone height in both groups at different follow-up periods.

graphs were digitalized and analyzed using special graphic computer software to trace the bone density and detect changes in the gray level according to Wenzel,<sup>17</sup> Karin et al.,<sup>17</sup> and El-Guindy et al.<sup>18</sup>

For determining the values of bone density, 5 points were drawn on different locations in close proximity to the implant threads: 2 mesial, 2 distal, and 1 apical to inferior border of the implant (Fig. 6). The mean of the 2 (mesial or distal) points of each implant was considered the mean for (mesial or distal) bone density. The mean value of right and left implants was added and the mean was calculated.

Statistical analysis of the obtained data was done using SPSS (Statistical Package for Social Science) version 8 software program at a level of significance of  $<.05$ .

## RESULTS

### Clinical Findings

The results of the study showed no implant mobility, and the patients were satisfied with their dentures in both groups. The results of pocket depth are presented in Tables 1 and 2 and Figure 7. There was no significant difference between the 2 groups during the follow-up periods at  $P < .05$ . Both groups showed insignificant difference between 1–6 and 1–12 months. However, between 1–18 months, there was a significance difference at  $P < .05$ .

Statistically, as shown in Table 3 and Figure 8, there was no significant difference between both groups regarding the gingival index during the first year of follow-up, whereas after 18 months, there was a high significant difference between group I and group II.

The results of plaque index are summarized in Table 4 and Figure 9. There was no significant difference between both groups at the day of denture delivery, after 6 months, and after 12 months. However, after 18 months, group I (mainly mucosa support) showed a significant increase in the plaque index ( $P < .05$ ).

It was proved that there was no statistically significant difference in marginal bone height between group I and group II in the mesial aspect (the area located between the 2 implants) during all follow-up periods.

The distal aspect showed no statistically significant difference between both groups at the time of denture delivery and after 6 months. However, distal marginal bone height showed highly significant difference after 12 months ( $P < .01$ ) and a very highly significant difference after 18 months between group I and group II ( $P < .001$ ).

### Results of Radiographic Evaluation

Results of radiographic evaluation are presented in Tables 5–10 and Figures 10 and 11.

The mesial marginal bone height in group I showed highly significant differences between 1 day and 18 months.

The mesial marginal bone height in group II showed highly significant difference between 1 day and 6 months, whereas it showed a very highly significant difference between 1 day and 12 months, and between 1 day and 18 months. The distal marginal bone height in group I and group II showed a very highly significant difference between 1 day to 6 months, 1 day to 12 months, and 1 day to 18 months.

Statistically, there was no significant difference between both groups regarding the bone density during all follow-up periods in mesial and apical aspects, although the bone density of the distal aspect showed no statistically significant difference between both groups during the first 6 months. However, it showed significant differences ( $P < .05$ ) after 12 months and a highly significant difference ( $P < .001$ ) after 18 months.

**Table 1.** Pocket Depth (mm) for Both Groups at Different Follow-Up Periods

Period	Group (I)		Group (II)		F	P	Sig
	Mean	SD	Mean	SD			
1 Day	1.94	0.122	1.95	0.095	0.016	>0.05	NS
6 M	2.2	0.107	2.31	0.183	0.544	>0.05	NS
12 M	2.41	0.185	2.54	0.243	2.663	>0.05	NS
18 M	2.57	0.145	2.63	0.209	0.209	>0.05	NS

M, month; SD, standard deviation; F, Fisher's test; P, probability; Sig, significant; NS, not significant.

**Table 2.** Pocket Depth (mm) for Both Groups at Different Follow-Up Periods

	Interval	F-Value	P	Sig
Group I	2.154	>0.05	NS	2.154
	6.597	>0.05	NS	6.597
	20.399	<0.05	S	20.399
Group II	6.057	>0.05	NS	6.057
	6.893	>0.05	NS	6.893
	9.013	<0.05	S	9.013

M, month; F, Fisher's test; P, probability; Sig, significance; NS, not significant; S, significant.

## DISCUSSION

The greatest problems of the complete denture are seen most frequently in the mandible. There are treatment alternatives that aid in increasing retention and stability when conventional denture therapy is inadequate. The implant overdenture is an especially attractive treatment because of its relative simplicity, minimal invasiveness, and economy. The implant overdenture is supported by both implant and mucosa so that fewer implants are necessary than for the prosthesis that is supported only by implants.<sup>19</sup> A mandibular 2-implant overdenture opposed by a maxillary

conventional denture is a more satisfactory treatment than conventional dentures for edentulous adults.<sup>20</sup>

In evaluating the results of oral rehabilitation by means of dental implants, one cannot depend on intraoral observations alone. Clinical variables such as peri-implant health do not necessarily reflect the actual status of the implant, nor does the absence of mobility of the implant.<sup>21</sup> However, gingival index as well as the pocket depth around the implant were considered to be a reflecting mirror of the periodontal condition of the implant, which in turn highlights its success or failure.<sup>22,23</sup> The cases were followed up

for 18 months, because the maximum bone changes occur mostly during the first year after implant installation.<sup>24</sup>

All cases in both groups showed success of osseointegration as shown by the clinical and radiographic results. There was no lateral mobility, and a limited sign of gingival inflammation as well as little amount of bone resorption were noted. This result agrees with Burns<sup>24</sup> who concluded that the success of dental implants in the anterior mandible is generally excellent as a result of the high bone quality of this area.

The results of the gingival status showed little signs of inflammation in both groups. However, the group treated with combined mucosa-implant-supported overdentures showed a significant increase in gingival inflammation after 18 months. This could be attributed to the hyperplasia of the gingival tissues under the bar and around the abutments trying to fill the space between and under the denture. This critical area needs great care from the clinician regarding the amount of relief done and from the patient following strict oral hygiene measures to control plaque accumulation around the implant. These results agree with the results of Akagawa et al.,<sup>25</sup> Burns et al.,<sup>20</sup> and Naert et al.<sup>26</sup> They stated that hyperplasia was observed around the implant in 25% of the patients. However, in this study, only a slight amount of hyperplasia was observed in the group treated with

**Table 3.** Gingival Index in Group I and Group II at Different Follow-Up Periods

Period	Group I			Group II			P	Sig
	Mean	SD	%	Mean	SD	%		
1 Day	0.232	0.352	5.9	0.231	0.271	5.83	1	NS
6 M	0.429	0.159	10.8	0.561	0.159	14.16	0.570	NS
12 M	0.728	0.143	18.4	0.898	0.164	22.45	0.095	NS
18 M	0.830	0.179	20.95	1.430	0.705	31.8	<0.01	HS

M, month; SD, standard deviation; %, percent of changes; P, probability; Sig, significance; NS, not significant; HS, highly significant.

**Table 4.** Plaque Index in Group I and Group II at Different Follow-Up Periods

Period	Group I			Group II			P	Sig
	Mean	SD	%	Mean	SD	%		
1 Day	0.594	0.139	14.9	0.594	0.139	14.9	1	NS
6 M	1.231	0.313	31.1	0.864	0.176	21.8	0.299	NS
12 M	1.529	0.233	38.2	1.198	0.231	30.25	0.252	NS
18 M	1.796	0.176	45.3	1.497	0.324	37.8	<0.05	S

M, month; SD, standard deviation; %, percent of changes; P, probability; Sig, significance; NS, not significant; S, significant.

**Table 5.** Marginal Bone Height (mm) in Groups I and Group II

Surface	Group (I)			Group (II)		t test		
	Period	Mean	SD	Mean	SD	t-vale	P	Sig
Mesial	1 Day	12.9	±0.149	12.89	±0.137	1	>0.05	NS
	6 M	12.41	±0.159	12.42	±0.168	0.318	>0.05	NS
	12 M	12.14	±0.212	12.15	±0.135	0.183	>0.05	NS
	18 M	12.05	±0.143	11.99	±0.173	1.327	>0.05	NS
Distal	1 Day	12.89	±0.129	12.88	±0.139	0.190	>0.05	NS
	6 M	12.32	±0.199	12.35	±0.135	0.709	>0.05	NS
	12 M	12.13	±0.205	11.83	±0.205	4.108	<0.01	HS
	18 M	12.03	±0.142	11.73	±0.226	6.364	<0.001	VHS

M, month; SD, standard deviation; t-vale, t test; P, probability; Sig, significance; NS, not significant; S, significant; HS, highly significant; VHS, very highly significant.

**Table 6.** Mesial Marginal Bone Height at Different Interval for Group I and Group II

	Interval	F	P	Sig
Group I	1 Day–6 M	61.37	<0.001	VHS
	1 Day–12 M	16.75	<0.01	HS
	1 Day–18 M	30.48	<0.001	VHS
Group II	1 Day–6 M	18.84	<0.01	HS
	1 Day–12 M	28.112	<0.001	VHS
	1 Day–18 M	65.79	<0.001	VHS

M, month; F, Fisher's test; P, probability; Sig, significance; NS, not significant; HS, highly significant; VHS, very highly significant.

**Table 7.** Distal Marginal Bone Height at Different Interval for Group I and Group II

	Interval	F	P	Sig
Group I	1 Day–6 M	69.24	<0.001	VHS
	1 Day–12 M	38.25	<0.001	VHS
	1 Day–18 M	40.016	<0.001	VHS
Group II	1 Day–6 M	78.01	<0.001	VHS
	1 Day–12 M	135.02	<0.001	VHS
	1 Day–18 M	103.64	<0.001	VHS

M, month; F, Fisher's test; P, probability; Sig, significance; HS, highly significant; VHS, very highly significant.

combined mucosa–implant-supported overdentures.

Plaque index score in group I was significantly higher than that of group II. However, both groups showed high plaque index scores after 18 months.

The reason for these high scores may be attributed to the magnetic field, which may account for this observation. Also, the group treated with bar attachments may face difficulty in cleaning the gingiva under and around

the bar. These results agree with the results of Naert et al.,<sup>27</sup> who concluded that the incidence of plaque on abutments carrying a magnet is slightly higher; and also with Behneke et al.,<sup>28</sup> who stated that the increasing incidence of remarkable plaque deposits represented the difficulty of the patients in maintaining a high level of oral hygiene.

The result of pocket depth in this study showed insignificant differences between both groups during the whole follow-up periods, although there was a significant difference during the intervals in the same group. This result agrees with Naert et al.<sup>29</sup> This may be attributed to the presence of local disease or the decrease in the bone height around the implant.

The result of this study showed a significantly high bone resorption and increase in its density at the distal aspect of all implants after 12 and 18 months in group II (combined mucosa–implant-supported overden-

**Table 8.** Mesial Bone Density Expressed by Pixels at Different Follow-Up Periods in Group I and Group II

Time	Group (I)		Group (II)		Paired t	P	Sig.
	Mean	SD	Mean	SD			
1 Day	86.02	±3.79	81.32	±20.17	0.724	>0.05	NS
6 M	93.87	±3.42	89.41	±11.24	0.395	>0.05	NS
12 M	95.91	±3.68	88.03	±18.31	0.428	>0.05	NS
18 M	97.33	±3.87	93.47	±13.59	0.283	>0.05	NS

M, month; SD, standard deviation; Paired t, t test; P, probability; Sig, significance; NS, not significant.

**Table 9.** Distal Bone Density Expressed by Pixels at Different Follow-Up Periods in Group I and Group II

Time	Group (I)		Group (II)		Paired t	P	Sig
	Mean	SD	Mean	SD			
1 Day	86.18	±3.59	82.79	±18.68	0.565	>0.05	NS
6 M	93.77	±3.94	89.92	±4.83	1.954	>0.05	NS
12 M	96.72	±3.58	115.64	±13.89	-4.149	<0.05	S
18 M	104.21	±3.97	124.39	±5.77	-9.172	<0.01	HS

M, month; SD, standard deviation; Paired t, t test; P, probability; Sig, significance; NS, not significant; HS, highly significant.

**Table 10.** Apical Bone Density Expressed by Pixels at Different Follow-Up Periods in Group I and Group II

Time	Group I		Group II		Paired t	P	Sig
	Mean	SD	Mean	SD			
1 Day	102.16	±3.92	101.43	±4.13	0.9125	>0.05	NS
6 M	109.08	±4.12	113.19	±8.32	-1.402	>0.05	NS
12 M	122.16	±3.99	119.06	±5.68	1.412	>0.05	NS
18 M	125.73	±4.35	123.55	±6.82	0.855	>0.05	NS

M, month; SD, standard deviation; Paired t, t test; P, probability; Sig, significance; NS, not significant.

ture) compared with group I (mainly mucosa-supported overdenture). These results may be attributed to the difference in the type and amount of load transmitted to the supporting structures by splinted (group II) and unsplinted (group I) implant-retained mandibular overdentures. These results agree with Naert et al.<sup>27</sup> and Wörmann et al.<sup>30</sup> They concluded that the forces transmitted to the underlying edentulous ridge area with splinted implants will be more than those with separate implants, which is considered as physiological massaging and stimulation of the underlying bone.

## CONCLUSIONS

The following points were concluded from this study:

- The mainly mucosa-supported overdentures showed less bone resorption distal to the implants in comparison to the combined mucosa-implant-supported overdentures.
- Plaque index scores were significantly high in the group treated with magnet-retained overdentures.
- After 18 months follow up, the group treated with a bar attachment (combined mucosa-implant-supported overdentures) showed a significant increase in gingival inflammation when compared with the magnet group.
- Increased functional load may affect bone density and resorption.

## DISCLOSURE

The authors claim to have no financial interest in any company or any of the products mentioned in this article.

## REFERENCES

1. Fredrickson EJ, Stevens PJ, Gress ML. *Implant Prosthodontics. Clinical and Laboratory Procedures*. St. Louis: Mosby; 1995:114–133.
2. Van Waas MA, Denissen HW, De Koomen HA, et al. Dutch consensus on guidelines for superstructures on endosseous implants in the edentulous mandible. *J Oral Implantol*. 1991;17:390–392.
3. Batenburg RHK, Van Oort RP, Reintsema H, et al. Overdentures supported by two IMZ implants in the lower jaw; a retrospective study of peri-implant tissues. *Clin Oral Implants Res*. 1994;5:207–212.
4. Wismeijer D, Van Waas MAJ, Kalk W. Factors to consider in selecting an occlusal concept for patients with implants in the edentulous mandible. *J Prosthetic Dent*. 1995;74:380–384.
5. Wismeijer D, Van Waas MAJ, Mulder J, et al. Clinical and radiological results of patients treated with three treatment modalities for overdentures on implants of the ITI dental implant System. *Clin Oral Implants Res*. 1999;10:297–306.
6. Stern MR. Clinical evaluation of overdenture restoration supported by osseointegrated titanium implants: a retrospective study. *J Oral Maxillofac Implants*. 1990;5:375–383.
7. Block MS, Kent JN, Finger IM. Use of the integral implant for overdenture stabilization. *Int J Oral Maxillofac Implants*. 1990;5:140–147.
8. Cranine AN, Klein M, Simson A. *Atlas of Oral Implantology*. New York: Theme Medical Publishers, Inc; 1993:42–43.
9. Meijer HJ, Starmans FJ, Steen WH, et al. Location of implants in the interforaminal region of the mandible and the consequences for the design of the superstructure. *J Oral Rehabil*. 1994;21:47–56.
10. Block MS, Kent JN. *Endosseous Implants for Maxillofacial Reconstruction*, 1st ed. Philadelphia: WB Saunders Co; 1995:158–192.
11. Tokuhisa M, Matsushita Y, Koyano K. In vitro study of a mandibular implant overdenture retained with ball, magnet, or bar attachments: comparison of load transfer and denture stability. *Int J Prosthodont*. 2003;16:128–134.
12. Behrman SJ. The implantation of

magnets in the jaw to aid denture retention. *J Prosthet Dent*. 1960;68:807–841.

13. Laird WRE, Smith GA, Grant AA. The use of magnetic forces in prosthetic dentistry. *J Dentistry*. 1981;9:328–335.

14. Abdel-Monem AM. Ball and silicone socket attachments for implant-retained overdentures: a prosthetic management of peri-implant bone resorption. *Egyptian Dental J*. 1998;44:2713–2717.

15. Loe H, Silness J. Periodontal disease in pregnancy. Prevalence and severity. *Acta Odontologica Scand*. 1963;21:533–551.

16. Mombelli A, Buser D, Lang NP. Colonization of osseointegrated titanium implants in edentulous patients. Early results. *Oral Microbiol Immunol*. 1988;3:113–120.

17. Wenzel A. Effect of image enhancement for detectability of bone lesion in digitized intraoral radiographs. *Scand J Dent Res*. 1991;46:199–205.

18. El-Guindy M, El-Tonsy M, Abdel Razzak Y. Longitudinal evaluation of tricalcium phosphate ceramic combined with tetracycline HCL root conditioning in treatment of periodontal osseous defects. *Med Cairo Univ*. 1996;64:195–205.

19. Awad MA, Lund JP, Dufresne E, et al. Comparing the efficacy of mandibular implant-retained overdentures and conventional dentures middle aged edentulous patients: satisfaction and functional assessment. *J Prosthet Dentistry*. 2003;89:93–96.

20. Burns DR, Unger JW, Elswick RK, et al. Prospective clinical evaluation of mandibular implant overdentures. Part II: patient satisfaction and preference. *J Prosthet Dentistry*. 1995;73:364–369.

21. Dewijs FLJA, Cune MS, De Putter C. Delayed implants in the anterior maxilla with the IMZ-implant system. *J Oral Rehabil*. 1995;22:319–325.

22. Abou El-Fotau H, Zekry K. Two-year study of unilateral subperiosteal implant. *Egyptian Dent J*. 1988;34:287–292.

23. Johns RB, Jemt T, Heath MR, et al. A multicenter study of overdenture supported by Brånemark implants. *Inter J Oral Maxillofac Implants*. 1992;7:513–522.

24. Burns DR. Mandibular implant overdenture treatment: consensus and controversy. *J Prosthodont*. 2000;9:37–46.

25. Akagawa Y, Ichikawa Y, Nikai H, et al. Interface histology of unloaded and early loaded partially stabilized zirconia en-

osseous implant in initial bone healing. *J Prosthet Dentistry*. 1993;69:599-604.

26. Naert I, Quirynen M, Theuniers G, et al. Prosthetic aspects of osseointegrated fixtures supporting overdentures. A 4-year report. *J Prosthet Dentistry*. 1991; 65:671-680.

27. Naert I, Gizani S, Vuylsteke M, et al. A 5-year randomized clinical trial on the influence of splinted and unsplinted oral implants in the mandibular overdenture therapy. Part I: peri-implant outcome. *Clin Oral Implants Res*. 1998;9:170-177.

28. Behneke A, Behneke N, d'Hoedt B. A 5-year longitudinal study of the clinical effectiveness of ITI solid-screw implants in the treatment of mandibular edentulism. *J Dent Res*. 2003;82:53-58.

29. Naert I, Quirynen M, Hooghe M, et al. A comparative prospective study of splinted and unsplinted Brånemark implants in mandibular overdenture therapy: a preliminary report. *J Prosthet Dentistry*. 1994;71:486-492.

30. Wowern N Von, Hjørtning-Hansen E. The mandibular bone mineral content in

relation to vestibular sulcoplasty. A 2-year follow-up. *J Prosthet Dentistry*. 1991;65: 804-808.

Reprint requests and correspondence to:

Dr. Ahmed S. Assad  
21 Mohamed Shafik Street  
Heliopolis, Cairo, Egypt  
Phone: + 2 02 6393709- +2 02 6444573  
Mobile: +2 010 6609093  
Fax: +2 02 6320222  
E-mail: ahmed.assad@link.net.com



## Abstract Translations [German, Spanish, Portugese, Japanese]

**AUTOR(EN):** Ahmed S. Assad, B.D.S., M.D.Sc., D.D.S.\*, Mohamed A. Abd El-Dayem, B.D.S., M.D.Sc., D.D.S.\*\*\*, Magdy M. Badawy, B.D.S., M.D.Sc., D.D.S.\*\*\*. \*Assistenzprofessor für herausnehmbare Prothetik, Zahnmedizinische Fakultät der Al-Azhar Universität, Kairo, Ägypten. \*\* Zahnmedizinischer Berater, Zagazig Universität, Ägypten. \*\*\* Professor und Leiter der Abteilung für herausnehmbare Prothetik, Zahnmedizinische Fakultät der Al-Azhar Universität, Kairo, Ägypten. Schriftverkehr: Dr. Ahmed S. Assad, 21 Mohamed Shafik Street, Heliopolis, Kairo, Ägypten. Telefon: +202 6393709 - +202 6444573, Mobiltelefon: +20106609093, Fax: +202 6320222. eMail: ahmed.assad@link.net.com

### **Vergleichsstudie zwischen Deckprothesen im Unterkiefer: Ansatz mit hauptsächlichem Schleimhautunterbau bzw. kombinierter Schleimhaut-Implantat-Unterstützung**

**ZUSAMMENFASSUNG:** Zielsetzung: Die vorliegende Studie zielte darauf ab, zwei unterschiedliche Ansätze bei der Erstellung vollständiger Unterkieferdeckprothesen zu vergleichen: a) den hauptsächlich auf Schleimhautunterbau basierenden Ansatz und b) die kombinierte Methode mit gleichzeitiger Schleimhaut- und Implantatstütze. Materialien und Methoden: 10 vollständig zahnlosen Patienten wurden 20 Aufsteckimplantate im Eckzahnbereich des Unterkiefers eingesetzt. Jeder der Patienten wurde mit 2 Implantaten ausgestattet, die für den Zeitraum von 4 Monaten versenkt und unbelastet blieben. Die Patienten wurden in 2 Untergruppen unterteilt: den Patienten der Gruppe I wurden Unterkieferdeckprothesen eingesetzt, die zur Halterung über eine magnetische Befestigung verfügen (Deckprothese mit schwerpunktmäßiger Schleimhautunterstützung). Patientengruppe II erhielt Deckprothesen, die durch Bügelbefestigung gehalten werden (Deckprothese mit kombiniertem Schleimhaut-Implantatunterbau). Unmittelbar nach Anbringung der Deckprothesen, 6 Monate nach dem Einsatz sowie 12 und 18 Monate nach Erhalt der Deckprothesen wurden die Patienten klinisch und röntgenologisch untersucht. Ergebnisse: Die Ergebnisse weisen aus, dass die hauptsächlich über Schleimhautunterbau operierenden Deckprothesen einen geringeren Grad an distaler Knochengewebsresorption aufweisen als die Deckprothesen mit kombinierter Schleimhaut-Implantatstütze. Die Patienten der Gruppe I (Deckprothesen mit Magnetbefestigung) verzeichneten ein hohes Maß an Plaqueansammlungen. Bei der 18 Monate nach dem Erhalt der Deckprothese durchgeführten Nachuntersuchung wurde bei Gruppe II (Deckprothesen mit kombiniertem Schleimhaut-Implantatunterbau) ein vergleichsweise hoher Anstieg der Zahnfleischentzündungsrate beobachtet. Schlussfolgerungen: Die Art der Halterung oder Stütze einer Deckprothese kann zu Zahnfleischentzündungen oder Plaqueansammlungen führen. Knochendichte und -resorption können durch eine verstärkte funktionelle Belastung beeinflusst werden.

**SCHLÜSSELWÖRTER:** Zahnimplantat, Deckprothese, Stütze, Befestigung

**AUTOR(ES):** Ahmed S. Assad, B.D.S., M.D.Sc., D.D.S.\*, Mohamed A. Abd El-Dayem, B.D.S., M.D.Sc., D.D.S.\*\*\*, Magdy M. Badawy, B.D.S., M.D.Sc., D.D.S.\*\*\*  
\*Profesor Asistente de Prosthodontia Removable, Facultad de Medicina Dental, Universidad Al-Azhar, El Cairo, Egipto. \*\*Consultor Dental, University Zagazig, Egipto. \*\*\*Profesor y Jefe de Prosthodontia Removable, Facultad de Medicina Dental, Universidad Al-Azhar, El Cairo, Egipto. Correspondencia a: Dr. Ahmed S. Assad, 21 Mohamed Shafik Street, Heliopolis, Cairo, Egypt. Teléfono: 2 02 6393709, 2 02 6444573, Celular: 2 010 6609093, Fax: 2 02 6320222. Correo electrónico: [ahmed.assad@link.net.com](mailto:ahmed.assad@link.net.com)

**AUTOR(ES):** Ahmed S. Assad, Bacharel em Odontologia, Mestre em Ciências, Cirurgião-Dentista\*, Mohamed A. Abd ElDayem, Bacharel em Odontologia, Mestre em Ciências, Cirurgião-Dentista\*\*, Magdy M. Badawy, Bacharel em Odontologia, Mestre em Ciências, Cirurgião-Dentista\*\*\*. \*Professor Assistente de Prosthodontia Removível, Faculdade de Odontologia, Universidade Al-Azhar, Cairo, Egipto. \*\* Consultor Odontológico-Universidade Zagazig, Egipto. \*\*\* Professor e Chefe de Prosthodontia Removível, Faculdade de Odontologia, Universidade Al-Azhar, Cairo, Egipto. Correspondência para: Dr. Ahmed S. Assad, 21 Mohamed Shafik Street, Heliopolis, Cairo, Egypt. Telefone: +2 02 6393709, Celular: +2 010 6609093, Fax: +2 02 6320222. E-mail: [ahmed.assad@link.net.com](mailto:ahmed.assad@link.net.com)

### **Comparación entre sobredentaduras apoyadas principalmente en la mucosa y apoyadas en una combinación de mucosa e implantes**

**ABSTRACTO:** Propósito: El propósito de este estudio es comparar sobredentaduras mandibulares completas apoyadas en una combinación de mucosa e implantes y principalmente en la mucosa. Materiales y métodos: Diez pacientes completamente edentulosos recibieron veinte implantes dentales a presión en las regiones caninas de la mandíbula. Cada paciente recibió dos implantes que fueron sumergidos y sin cargar durante cuatro meses. Se dividió a los pacientes en dos grupos. Los pacientes del grupo I recibieron sobredentaduras mandibulares retenidas por accesorios de imanes (una sobredentadura apoyada principalmente en la mucosa). Los pacientes del grupo II recibieron sobredentaduras retenidas por accesorios de barras (sobredentadura apoyada en una combinación de mucosa e implantes). Los pacientes fueron evaluados clínicamente y radiográficamente inmediatamente después de la colocación de la sobredentadura y después de seis meses, doce meses y dieciocho meses. Resultados: Los resultados demostraron que las sobredentaduras apoyadas principalmente en la mucosa tuvieron menos reabsorción distal del hueso al implante comparada con la sobredentaduras apoyadas en mucosa e implantes. El puntaje del índice de placa fue significativamente más alto en el grupo tratado con la sobredentadura retenida con un imán. Después del seguimiento de 18 meses, el grupo tratado con las sobredentaduras apoyadas en una combinación de mucosa e implantes demostraron un aumento significativo en la inflamación gingival cuando se lo compara con el otro grupo. Conclusiones: El tipo de accesorio o apoyo podría afectar la inflamación gingival o acumulación de placa. Un aumento en la carga funcional podría afectar la densidad del hueso y la reabsorción.

**PALABRAS CLAVES:** implante dental, sobredentadura, soporte, accesorio

### **Comparação Entre Sobredentaduras Mandibulares Apoiadas Principalmente por Mucosa e por Implante de Mucosa Combinada**

**RESUMO:** Propósito: o propósito deste estudo é comparar sobredentaduras mandibulares completas apoiadas principalmente por mucosa e por implante de mucosa combinada. Materiais e Métodos: Dez pacientes completamente desdentados receberam vinte implantes dentários ajustados por prensa nas regiões caninas da mandíbula. Cada paciente recebeu dois implantes que foram deixados submergidos e descarregados por quatro meses. Os pacientes foram divididos em dois grupos: os paciente do Grupo I receberam sobredentaduras mandibulares retidas por "attachment" em ímã (sobredentadura apoiada principalmente por mucosa). Os pacientes do Grupo II receberam sobredentaduras mandibulares retidas por "attachment" em barra (sobredentadura apoiada por implante de mucosa combinada). Os pacientes foram avaliados clínica e radiograficamente logo após a entrega da sobredentadura e após seis meses, doze meses e dezoito meses. Resultados: os resultados mostraram que as sobredentaduras apoiadas principalmente por mucosa tiveram menos reabsorção óssea distal ao implante em comparação com as sobredentaduras apoiadas por implante de mucosa. O escore de índice de placas foi significativamente alto no grupo tratado com sobredentadura retida por ímã. Após 18 meses de acompanhamento, o grupo tratado com sobredentaduras apoiadas por implante de mucosa combinada mostrou um aumento significativo da inflamação gengival quando comparado com o outro grupo. Conclusões: o tipo de "attachment" ou suporte pode afetar a inflamação gengival ou o acúmulo de placas. A carga funcional aumentada pode afetar a densidade e reabsorção óssea.

**PALAVRAS-CHAVE:** implante dentário, sobredentadura, suporte, "attachment".



**主に粘膜で保持された下顎オーバーデンチャーと粘膜とインプラントで保持された下顎オーバーデンチャーの比較**

**著者:** アーメッド・S・アッサド、BDS、MDS、DDS\*、モハメッド・A・アブド・エル・ダイエム、BDS、MDS、DDS\*\*、マグディー・M・バダウィー、BDS、MDS、DDS\*\*\*

**概要:**

**目的:** 本研究の目的は、主に粘膜で保持された全下顎オーバーデンチャーと粘膜とインプラントの組み合わせで保持された全下顎オーバーデンチャーを比較することにあつた。

**方法:** 完全無歯の10人の患者の下顎犬歯部に20の圧着デンタルインプラントが植立された。インプラントは各患者に2本ずつ植立され、それらは4ヶ月間埋没されて非加重状態に置かれた。患者は2つのグループに分けられ、グループ1には磁石アタッチメントで保持された下顎オーバーデンチャー（主に粘膜で保持されたオーバーデンチャー）が、グループ2にはバーアタッチメントで保持された下顎オーバーデンチャー（粘膜とインプラントの組み合わせで保持されたオーバーデンチャー）が設けられた。患者はオーバーデンチャー設置直後、6ヶ月後、12ヶ月後、18ヶ月後に、臨床的、X線学的評価を受けた。

**結果:** 主に粘膜で保持されたオーバーデンチャーでは、粘膜とインプラントの組み合わせで保持されたオーバーデンチャーと比べてインプラントの遠方向により少ない骨吸収が見られた。プラークインデックススコアは、磁石で保持されたオーバーデンチャーで処置されたグループの方が有意に高かった。18ヶ月後の追跡調査では、粘膜とインプラントの組み合わせで保持されたオーバーデンチャーで処置されたグループに、歯肉炎が他のグループより有意に多く見られた。

**結論:** アタッチメントや保持方式の違いによって、歯肉炎症やプラーク蓄積の違いが生ずる。Functional loadの増大は、骨密度と吸収に影響を与える。

**キーワード:** デンタルインプラント、オーバーデンチャー、保持、アタッチメント

\*アーメッド・S・アッサド (BDS, MDS, DDS) アル・アズハー大学歯学部着脱補綴学助教授 (エジプト、カイロ)

\*\*モハメッド・A・アブド・エル・ダイエム (BDS, MDS, DDS) サガジグ大学歯科コンサルタント (エジプト、カイロ)

\*\*\*マグディー・M・バダウィー (BDS, MDS, DDS) アル・アズハー大学歯学部着脱補綴学長・教授 (エジプト、カイロ)

問い合わせ先: Dr. Ahmed S. Assad, 21 Mohamed Shafik Street, Heliopolis, Cairo, Egypt.

電話: +2-02-6393709、+2-02-6444573 モバイル: +2-010-6609093

ファックス: +2-02-6320222 Eメール: ahmed.assad@link.net.com