



Comparison of Prefabricated and Custom-Made Bars Used for Implant-Retained Mandibular Complete Overdentures

Mohamed A. Abd El-Dayem, BDS, MDSc, DDS,* Ahmed S. Assad, BDS, MDSc, DDS,†
Mohamed Essam Eldin Sanad, BDS, MDSc, DDS,† and Sayed Abd Al-hady Mahmoud Mogahed, BCh, MDSc, DDS‡

The major problem facing dentistry is that approximately 20% of the adult populations are edentulous.¹ An excessive loss of the residual alveolar ridge makes it difficult to provide prostheses that meets the needs of these dental patients. To help patients in their quest for a stable and comfortable complete denture, many remedies have been tried; that is, denture adhesives, cushions, and soft liners. These attempts have been met with limited success. Where the alveolar ridge is minimal, a procedure offering a functional, stable, and retentive complete denture is the implant-retained overdenture.¹⁻³

Dental implants have become an increasingly common treatment option for missing dentition.⁴⁻⁷ To date, there is up to 100% survival of all implants and they all retain functioning prostheses.^{8,9} For mandibular edentulism, an implant-retained overdenture should be considered a first choice for prosthodontic care. Several attachments can be used with implant-assisted overdentures: ball

Purpose: To compare prefabricated and custom-made bars used for implant-retained mandibular complete overdentures.

Materials: Ten completely edentulous patients were selected for replacement with dental implants. Each patient received 2 (press-fit) dental implants, 1 implant on each side in the canine regions of the mandible. The implants were left submerged (unloaded) for a healing osseointegration period of 4 months. The patients were divided into 2 groups, 5 patients in each. Group I patients received maxillary conventional dentures and a mandibular overdenture retained by a cast bar. Group II patients received a maxillary conventional denture and a mandibular overdenture retained by a prefabricated bar. All patients were evaluated clinically and radiographically immediately after overdenture delivery and after 6, 12, and 18 months.

Results: There was more pronounced bone resorption in cast bar group more than the prefabricated bar group and minimal marginal bone loss in the group treated with prefabricated bar.

Conclusion: The prefabricated bar overdentures showed less bone resorption distal to the implants in comparison with the cast bar implant-retained overdentures. Both the gingival index and the plaque index score were significantly higher in the group treated with the cast bar retained overdenture. The prefabricated bar implant-retained overdenture showed low significant reduction in the bone height after 1 year, and a very highly significant reduction after 18 months. (Implant Dent 2009;18:501-511)

Key Words: dental implant, prefabricated bar, cast bar, mandibular overdenture

and socket attachments, bar attachments, and magnetic attachments.¹⁰⁻¹²

The bar used with overdentures may be cast (the bar was cast in chrome cobalt alloy and screwed onto the abutment after preparing it from burning out plastic bar and sleeves) or prefabricated (the bar consisted of universal bar joints, extension abutment, round-shaped bar, and universal fixation screws).

Bar and clip attachments provide greater retention and stability, permit splinting of implants, and can mask excessive residual ridge atrophy.¹³⁻¹⁷

In the mandible, prefabricated bars are preferred to milled or custom bars because they are far less expensive and more solid with an equal cross-section.¹⁸ Round bars allow greater distal vertical movement of the denture base (for instance, as consequence of mucosal resiliency and/or bone resorption) and produce less torque on the implants than the u-shaped bars.¹⁹ Some research has studied the effect of a cast bar on implant-retained mandibular complete overdentures.²⁰⁻²³ However, the

*Lecturer of Removable Prosthodontics, Faculty of Oral and Dental Medicine Misr International University, Cairo, Egypt.

†Professor of Removable Prosthodontics, Faculty of Oral and Dental Medicine, Misr International University, Cairo, Egypt.

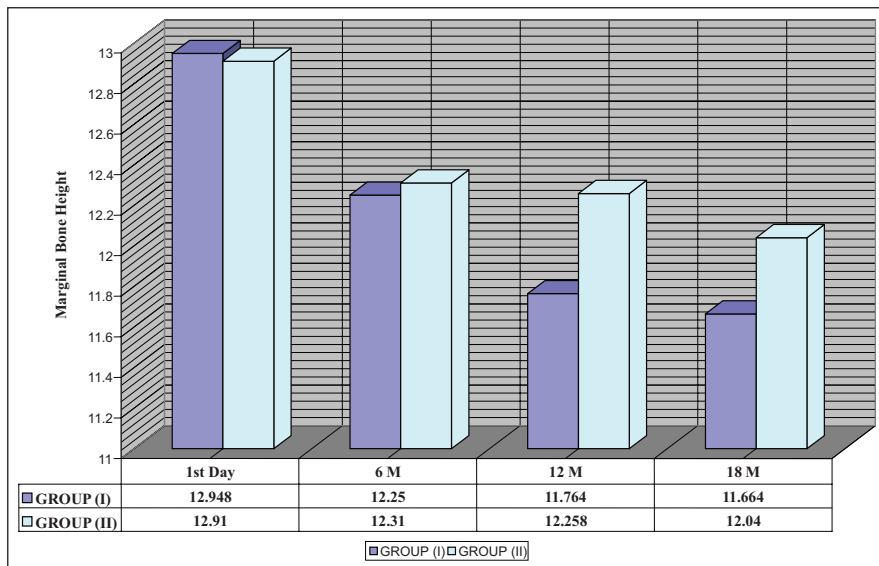
‡Dental Consultant, Mansoura Hospital, Egypt.

Reprint requests and correspondence to: Mohamed A. Abd El-Dayem, BDS, MDSc, DDS, 5 Abbas Elakkad St, Nasr City, Cairo, Egypt 11371, Phone: +2 02 24027181, +2 02 22639407, E-mail: abdeldayem_ma@yahoo.com

Table 1. Mesial Marginal Bone Height (mm) in Group I and Group II

Period	Group I			Group II			F	t	Sign
	Mean	SD	SEM	Mean	SD	SEM			
1 st d	12.9480	0.5263	0.02354	12.9100	0.07416	0.03317	0.174	0.934	NS
6 mo	12.2500	0.11180	0.05000	12.3100	0.21622	0.09670	2.425	0.367	S
12 mo	11.7640	0.05177	0.02315	12.2580	0.21335	0.09541	10.373	5.031	HS
18 mo	11.6640	0.05177	0.02315	12.0400	0.20736	0.09274	9.653	2.888	HS

t indicates t test; F, Fisher-test; Sign, significance (S \leq 0.05); NS, not significant; HS, highly significant (HS \leq 0.001).

**Fig. 1.** Mesial marginal bone height (mm) in groups I and II.

prefabricated bar has not been investigated. In this study, the prefabricated bar (Dyna Instant Adjusting Bar developed by Dyna Industries) was evaluated, and the results were compared with that of a cast bar.

MATERIALS AND METHODS

Ten completely edentulous patients (5 men and 5 women) with age ranged from 51 to 67 years old were selected. The patients were free from any systemic or local disease that make the placement of the dental implants contraindicated, each patient received 2 (press-fit) dental implant (Dyna Dental Implant, Dyna Dental Engineering, Bergen op Zoom, The Netherlands) Titanium implants with ϕ 3.6 mm diameter and 13 mm length 1 implant each side in the canine regions of the mandible. The implants were left submerged unloaded for a healing and osseointegration period of 4 months.

After 4 months from the first surgery, the implants were uncovered, and the screw was replaced with the healing abutment. Selected patients in this study were randomly divided into 2 groups, 5 patients in each group to receive either sequence:

Group I: this group was provided with mandibular overdentures retained by cast bar and 2 clips.

Group II: patients in this group were provided with mandibular overdenture retained by prefabricated bar (Dyna Instant Adjusting Bar) and 2 clips.

Patients of both groups were received with conventional maxillary denture. All patients were evaluated clinically and radiographically immediately after overdenture delivery and after 6, 12, and 18 months.

Clinical Evaluation

Implant mobility. The supragingival of each implant was subjected to alterna-

tive pressure in different directions. Any degree of mobility considered failure of osseointegration.²⁴

Gingival index. The gingival index (GI) score of each implant was recorded on surfaces (mesially, distally, buccally, and lingually) according to Loe and Silness.^{25,26} The mean value of the right and left implants were added and the mean was calculated.

Plaque index. According to Mombelli et al,²⁷ the plaque index (PI) score were obtained from collecting the affected surfaces of the abutments.

Radiographic evaluation. The radiographic evaluation includes 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 radiographs were digitalized and analyzed using special graphic computer software to trace the bone density and detect changes in gray level according to Wenzel²⁸ and El-Guindy et al.²⁹

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. The mean of the 2 (mesial or distal) 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 version 8 software program at a level of significance of <0.05 .

Table 2. Distal Marginal Bone Height (mm) in Groups I and Group II

Period	Group I			Group II			F	t	Sign
	Mean	SD	SEM	Mean	SD	SEM			
1 st d	12.8840	0.12759	0.05706	12.8500	0.10000	0.04472	0.308	0.469	NS
6 mo	12.4000	0.14577	0.06519	12.7420	0.05630	0.02518	1.588	4.894	NS
12 mo	12.1000	0.15811	0.07071	12.3960	0.19373	0.08664	0.168	2.647	S
18 mo	11.3400	0.39115	0.17493	12.1000	0.15811	0.07071	8.476	4.028	HS

t indicates t test; F, Fisher-test; Sign, significance (S ≤0.05); NS, not significant; HS, highly significant (HS ≤0.001).

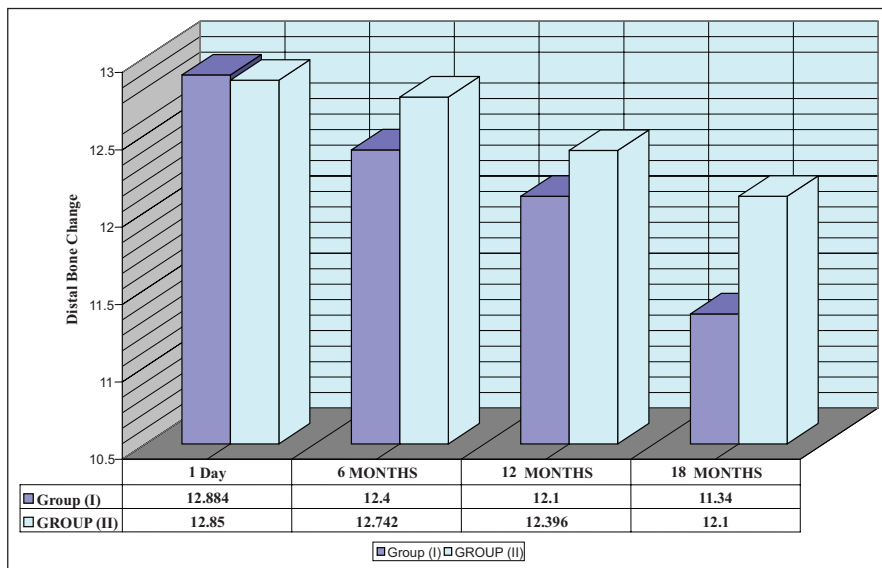


Fig. 2. Distal marginal bone height (mm) in groups I and II.

RESULTS

Results of Clinical Evaluation

During the follow-up periods, all patients in both groups were satisfied with their prostheses, regarding denture stability, retention esthetics, and occlusion.

No movement was found in the implants of both groups as detected clinically.

Gingival index. It was revealed that there were no statistically significant difference between both groups at the first day of denture delivery, and after 6 months, however, it was significant after 12 and 18 months, the GI was significantly high in group I that used mandibular overdenture on cast bar.

Results of plaque index It was revealed that there was no statistically significant difference between cast bar group I and prefabricated bar group II at the time of denture insertion and after 6 months. On the other hand, there was a statistically highly significant differ-

ence between both groups after 12 months and 18 months after denture insertion.

Results of Radiographic Evaluation

Results of marginal bone height. The results of the mesial and the distal marginal bone height for both groups at the different follow-up periods are summarized in Tables 1 and 2 and Figures 1 and 2).

Mesial aspect. It was revealed that there was a statistically nonsignificant difference in the mesial bone height between both groups at the first day of denture delivery. However, there was a significant difference after 6 months and highly significant difference after 12 and 18 months between the both groups.

Distal aspect. It was revealed that there was a statistically nonsignificant difference in the distal bone height between group I and group II at the first day of denture delivery. After 6

months, there was a significant difference after 12 months and highly significant difference after 18 months.

Results of bone density.

Mesial aspect. The results of bone density in both groups at the different follow-up periods are summarized in Table 3 and Figure 3. It was revealed that there was a statistically nonsignificant difference between both groups at the first day of denture insertion, significant difference after 6 and 12 months and highly significant difference after 18 months.

Distal aspect. The results of distal bone density in both groups at the different follow-up periods are summarized in Table 4 and Figure 4. It was revealed that there were a statistically nonsignificant difference between both groups at the first day of denture insertion and after 6 months but there was highly significant difference after 12 months and after 18 months.

Apical aspect. The results of bone density in both groups at the different follow-up periods are summarized in Table 5 and Figure 5. It was revealed that there were a statistically nonsignificant difference between both groups at the first day of denture insertion. However, there was a significant difference after 6 months and highly significant difference after 12 months and after 18 months.

DISCUSSION

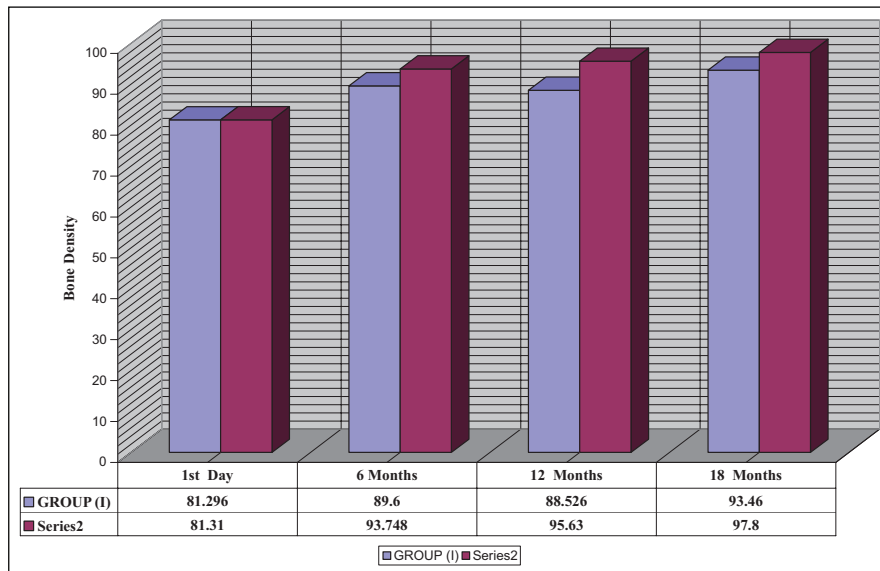
GI around the dental implant is considered as a mirror of the periodontal condition of an implant, which in turn highlights its success or failure.²¹

The results of GI showed statistically significant difference between the groups treated with cast and prefabricated bar. These results agree with the results of Akagawa et al,³⁰

Table 3. Mesial Bone Density Expressed by Pixels at Different Follow-up Periods in Group I and Group II

Period	Group I			Group II			F	t	Sign
	Mean	SD	SEM	Mean	SD	SEM			
1 st d	81.296	0.11283	0.05046	81.310	0.34713	0.15524	2.221	-0.086	NS
6 mo	89.600	1.74642	0.78102	93.748	0.99477	0.44488	1.488	-4.615	S
12 mo	88.526	0.85081	0.38049	95.630	0.54704	0.24464	0.918	-15.704	S
18 mo	93.460	1.32778	0.59380	97.800	0.55678	0.24900	8.345	-6.740	HS

t indicates t test; F, Fisher-test; Sign, significance (S \leq 0.05); NS, not significant; HS, highly significant (HS \leq 0.001).

**Fig. 3.** Mesial bone density expressed by pixels at different follow up periods in groups I and II.

Burns et al,³¹ and Naert et al⁸ who stated that hyperplasia was observed around the implant in 25% of the patients. However, in this study, only a small amount of hyperplasia was observed in the prefabricated bar group.

After 12 and 18 months, the group treated with cast bar showed moderate inflammation in the gingival tissues surrounding some implants (score ranged between 1 and 2), whereas the group treated with prefabricated bar showed slight inflammation in the gingival tissues surrounding the implants (score ranged between 0 and 1). The increase in inflammation in the group treated with cast bar may be attributed to the presence of hyperplasia of the gingival tissues under the bar and around the abutments trying to fill the space between the alveolar ridge and the bar. Moreover, in the group II treated with prefabricated bar, the slight inflammation in the gingival tissues surrounding the implants may be attributed to the fact that the prefabricated bar was fully

titanium fabricated and has smooth homogenous surface, which allow the patient to follow strict oral hygiene measures to control plaque accumulation around the implant.

PI score in this study ranged between 5.95% and 38% for cast bar group I and between 5.9% and 22.5% for prefabricated bar group II. The reason for this high score in cast bar group I may be attributed to the fact that the group treated with bar attachment may have had difficulty in cleaning the gingiva under and around the bar, and there are irregularities of the bar. These results agree with the results of Behneke et al,³² who noted that the increasing incidence of remarkable plaque deposits represented the difficulty of the patients in maintaining a high level of oral hygiene.

The reason for low score of PI in prefabricated bar group II may be attributed to the smooth homogenous surface of the fully titanium prefabricated bar, which allows the patient to

follow strict oral hygiene measures to control plaque accumulation around the implant and/or the remnants of food do not stagnate below it.

Reduction of the marginal bone height around the fixture abutments could, thus, be partly due to the healing phase because of the surgical trauma and bone removal during drilling.³³

The results of the bone height in this study showed a significant difference in mesial side and highly significant difference in distal aspects between both tested groups after 12 months, and there was a highly significant difference between both groups in mesial and distal aspects. However, the amount of bone loss in both groups was still within the acceptable range.

Radiographs were obtained immediately after overdenture insertion and periodically after 6, 12, and 18 months, to start the measurements of marginal bone levels with the threads of the implant as references.³⁴

These results were accepted on the basis of the findings of Albrektsson et al,³⁵ Smith and Zarb,³⁶ and Patsiatzi et al³⁷ who documented average loss of bone height adjacent to the fixtures of not more than 1.2 mm at the end of the first year and average of 0.2 mm annually thereafter as a radiographic criterion of implant success.

The increase in bone loss in cast bar group more than prefabricated bar group may be attributed to the accuracy in fabrication of the prefabricated bar, where it has high-polished surface, precision, stress-free properties and it adjusts itself automatically to the implants up to angulations of 18°, when threading the fixation screws.

It was observed that bone loss at the mesial surface was less than that in the distal surface in both groups at the

Table 4. Distal Bone Density Expressed by Pixels at Different Follow-Up Periods in Group I and Group II

Period	Group I			Group II			F	t	Sign
	Mean	SD	SEM	Mean	SD	SEM			
1 st d	82.918	0.13274	0.05046	82.996	0.48278	0.21591	4.064	-0.348	NS
6 mo	90.744	1.70138	0.78102	92.734	2.53619	1.13422	0.545	-1.457	NS
12 mo	117.028	0.96898	0.43334	97.004	0.21698	0.09704	6.129	45.092	HS
18 mon	126.608	1.27227	0.56898	104.842	1.18314	0.52912	0.003	28.014	HS

t indicates t test; F, Fisher-test; Sign, significance (S ≤0.05); NS, not significant; HS, highly significant (HS ≤0.001).

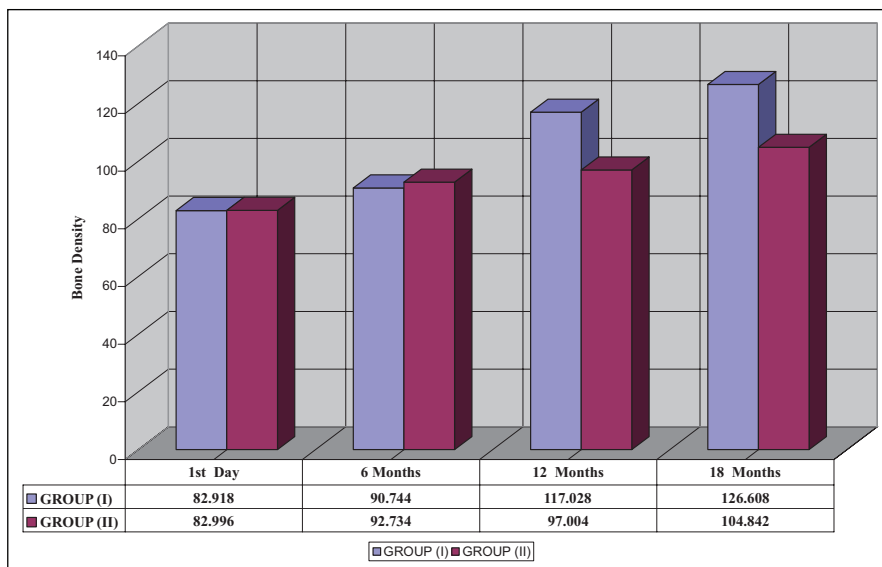


Fig. 4. Distal bone density expressed by pixels at different follow up periods in groups I and II.

same intervals. These results agree with Eckert and Laney³⁸ who suggested that overdentures might cause bone resorption in the areas distal to the last abutment where compressive forces are transmitted to the bone.

Also, these results may be attributed to the difference in the amount of load transmitted to the supporting structures by rigid cast bar unit group I and a relatively flexible prefabricated bar joint group II used to retain the mandibular overdentures. These results agree with Naert et al and⁸ Von Wowerm and Hjorting-Hansen³⁹ who concluded that the force transmitted to the underlying edentulous ridge area in splinted implants with rigid cast bar will be more than separate implants, which is expressed as physiological massaging and stimulation of the underlying bone.

It is interesting that changes in both bone height and density came parallel to the biological findings in the 2 studied groups as evident from

the results of this study. These results were accepted based on the findings of Albrektsson et al³⁵ and Patsiatzi et al.³⁷

Summary

Ten completely edentulous patients received 20 push inform titanium Dyna dental implants, with 13 mm length and 3.6 mm diameter.

Patients sharing in this study were randomly divided into 2 equal groups, each containing 5 edentulous patients. Both groups had stage 1 surgery for placing 2 dental implant fixtures, 1 implant on each side anterior to the mental foramina.

Group I: Cast Bar Group

Patients in this group received conventional maxillary complete denture and mandibular bar-retained overdenture supported by 2 endosseous implants that remained submerged for a period of 4 months. The implants were uncovered, and after 1 week, the

steps for construction of mandibular bar overdenture were started.

Group II: Prefabricated Bar Group

Patients in this group received conventional maxillary complete denture and mandibular prefabricated bar-retained overdenture supported by 2 endosseous implants that remained submerged for a period of 4 months. The implants were uncovered, and after 1 week, the steps for construction of mandibular bar overdenture were started.

The patients were evaluated clinically and radiographically immediately after overdenture delivery, after 6 months, 12 months, and 18 months.

Clinical evaluation of the patients included recording of GI scores, PI scores, probing depth using implant mobility, and percussion.

All patients were satisfied with their dentures, no mobility was detected in both groups and all implants gave a solid ringing sound on percussion indicating direct contact between the bone and implants i.e., successful osseointegration.

GI scores and PI scores in both groups showed increase through the 18 months follow-up period. This increase was attributed to the difficulty the patients found in maintaining a high level of oral hygiene. There was statistical significant difference between the 2 groups regarding the effect of treatment.

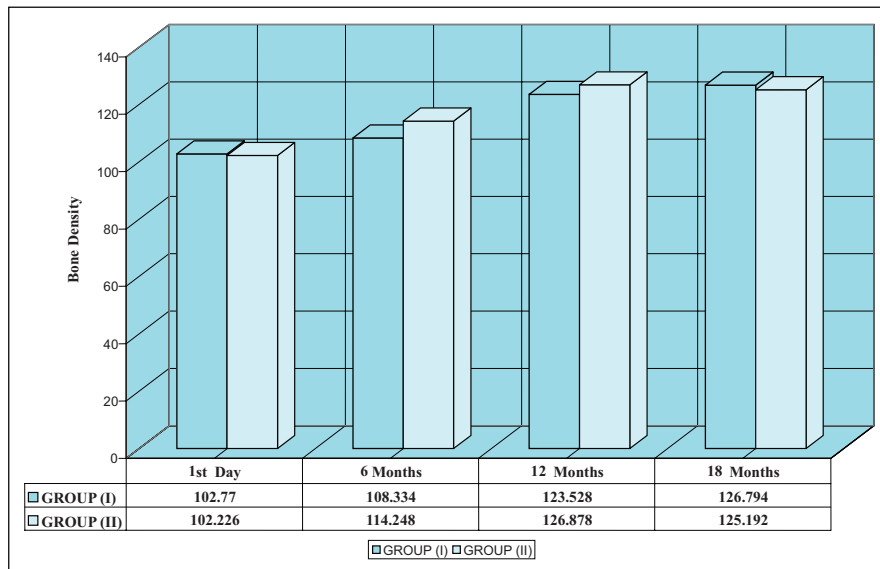
PI score was significantly higher in group I (cast bar) after 18 months than in group II (prefabricated bar).

Radiographic assessment of the mesial and distal alveolar bone heights around dental implants was performed using the cephalometric x-ray (sides). The results of the study showed minimal marginal bone loss in the group treated with prefabricated

Table 5. Apical Bone Density Expressed by Pixels at Different Follow-Up Periods in Group I and Group II

Period	Group I			Group II			F	t	Sign
	Mean	SD	SEM	Mean	SD	SEM			
1 st d	102.770	0.36715	0.16420	102.226	.77128	0.34493	1.067	1.424	NS
6 mo	108.334	0.85351	0.38170	114.248	1.60654	0.71847	1.585	-7.269	S
12 mo	123.528	0.84942	0.37987	126.878	1.02253	0.45729	0.002	-5.635	HS
18 mo	126.794	0.68376	0.30579	125.192	0.38114	0.17045	1.552	4.576	HS

t indicates t test; F, Fisher-test; Sign, significance (S \leq 0.05); NS, not significant; HS, highly significant (HS \leq 0.001).

**Fig. 5.** Apical bone density expressed by pixels at different follow up periods in groups I and II.

bar, which did not exceed a mean of 0.87 mm, at the end of 18 months follow-up period.

According to the bone density, there was a statistically significant difference between the 2 groups in mesial and apical aspect after 18 months.

CONCLUSIONS

The following points were concluded from this study.

1. From the clinical point of view, satisfactory results were obtained when 2 implants and bar attachment were used to retain mandibular overdenture.
2. Both the GI and PI scores were significantly higher in the group treated with 2 implants and the cast bar retained mandibular overdenture compared with the prefabricated bar.
3. The prefabricated bar overdentures showed significant less bone re-

sorption distal to the implant in comparison with the cast bar implant-retained overdentures.

Disclosure

The author(s) claim to have no financial interest in any company or any of the products mentioned in this article.

REFERENCES

1. Branemark PI. Osseointegration and its experimental background. *J Prosthetic Dent.* 1983;50:399-405.
2. Trakas T, Michalakis K, Kang K, et al. Attachment system for implant retained overdentures: A literature review. *Impl Dent.* 2006;15:24-34.
3. Kimoto K, Garrett NR. Effect of mandibular ridge height on masticatory performance with mandibular conventional and implant-assisted overdentures. *Int J Oral Maxillofac Implants* 2003;18:523-530.
4. Straioto FG, de Azevedo AM, Do Prado CJ, et al. Rehabilitation of maxillary edentulism with implant-supported milled-bar prostheses. *Implant Dent.* 2006;4:366-371.

5. Stanford CM. Application of oral implants to the general dental practice. *J Am Dent Assoc.* 2005;8:1092-1100.

6. Cho SC, Froum S, Tai CH, et al. Immediate loading of narrow-diameter implants with overdentures in severely atrophic mandibles. *Pract Proced Aesthet Dent.* 2007;19:167-174.

7. Rustemeyer J, Bremerich A. Patients' knowledge and expectations regarding dental implants: Assessment by questionnaire. *Int J Oral Maxillofac Surg.* 2007;9:814-817.

8. Naert I, Alsaadi G, Van Steenberghe D, Quirynen M. A 10-year randomized clinical trial on the influence of splinted and unsplinted oral implants retaining mandibular overdentures: Peri-implant outcome. *Int J Oral Maxillofac Implants.* 2004;5:695-702.

9. Meijer HJ, Raghoobar GM, van't Hof MA. Implant-retained overdentures compared with complete dentures with or without preprosthetic surgery: A prospective study followed over 10 years. *Ned Tijdschr Tandheelkd.* 2005;1:7-12.

10. Allen EP, Bayne SC, Brodine AH, et al; Committee on Scientific Investigation of the American Academy of Restorative Dentistry. Annual review of selected dental literature: Report of the Committee on Scientific Investigation of the American Academy of Restorative Dentistry. *J Prosthet Dent.* 2002;88:60-88.

11. Doundoulakis JH, Eckert SE, Lindquist CC, et al. The implant-supported overdenture as an alternative to the complete mandibular denture. *J Am Dent Assoc.* 2003;134:1455-1458.

12. Mijiritsky E. Implants in conjunction with removable partial dentures: A literature review. *Impl Dent.* 2007;16:146-154.

13. Nedir R, Bischof M, Szmukler-Moncler S, et al. Prosthetic complications with dental implants: From an up-to-8-year experience in private practice. *Int J Oral Maxillofacial Implants.* 2006;6:919-928.

14. Heydecke G, Thomason JM, Lund JP, et al. The impact of conventional and implant supported prostheses on social and sexual activities in edentulous adults: Results from a randomized trial 2 months after treatment. *J Dent.* 2005;8:649-657.

15. Geertman ME, Van Waas MA, Van't Hof MA, et al. Denture satisfaction in a comparative study of implant-retained mandibular overdentures. A randomized clinical trial. *Int J Oral Maxillofac Implants*. 1996;11:194-200.
16. Waddell JN, Payne AG, Swain MV. Physical and metallurgical considerations of failures of soldered bars in bar attachment systems for implant overdentures. A review of the literature. *J Prosthet Dent*. 2006;4:283-288.
17. Walton JN, Rose ND. In vitro changes in clips and bars used to retain implant overdentures. *J Prosthet Dent*. 1995;74:482-486.
18. Biesaga RK. *Manual Dyna Instant Adjusting Bar*. Bergen op zoom, Netherlands: Dental Engineering; 2004: 4-6.
19. De Baat C, Cune MS, Carlsson GE. A survey of implant-retained superstructure types in the edentulous mandible in The Netherlands. *Ned Tijdschr Tandheelkd*. 2005;10:363-367.
20. Jemt T, Book K, Linden B. Failure and complication in 92 consecutively inserted overdentures supported by Brånemark implants in severely resorbed edentulous maxillae: A study from prosthetic treatment to first annual check up. *Int J Oral Maxillofac Implants*. 1992;7: 162-167.
21. Johns RB, Jemt T, Heath MR, et al. A multicenter study of overdenture supported by Brånemark implants. *Int J Oral Maxillofac Implants*. 1992;7:513-522.
22. Meijer HJ, Starmans FJ, Steen WH. Location of implants in the interforaminal region of the mandible and the consequences for design of the superstructure. *J Oral Rehabil*. 1994;21:47-56.
23. Naert I, Gizani S, Vuylsteke M, et al. A 5-year prospective randomized clinical trial on the influence of splinted and unsplinted oral implants retaining a mandibular overdenture: Prosthetic aspects and patient satisfaction. *J Oral Rehabil*. 1999; 26:195-202.
24. Laird WRE, Smith GA. The use of magnetic forces in prosthetic dentistry. *J Dent*. 1981;9:328-335.
25. Abdel-Monem AM. Ball and silicone socket attachments for implant-retained overdentures: a prosthetic management of peri-implant bone resorption. *Egyptian Dent J*. 1998;44:2713-2717.
26. Loe H, Silness J. Periodontal disease in pregnancy. Prevalence and severity. *Acta Odontol Scand*. 1963;21:533-551.
27. Mombelli A, Buser D, Lang NP. Colonization of osseointegrated titanium implants in edentulous patients. Early results. *Oral Microbiol Immunol*. 1998;3: 113-120.
28. Wenzel A. Effect of image enhancement for detachability of bone lesion in digitized intraoral radiographs. *Scand J Dent Res*. 1991;46:199-205.
29. 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.
30. Akagawa YI, Chikawa Y, Nikai H, et al. Interface histology of unloaded and early loaded partially stabilized zirconia endosseous implant in initial bone healing. *J Prosthet Dent*. 1993;69:599-604.
31. Burns DR, Unger JW, Elswick RK, et al. Prospective clinical evaluation of mandibular implant overdentures. Part I. Retention, Stability and tissue response. *J Prosthet Dent*. 1995;73:354-363.
32. 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;1:53-58.
33. Stephan G, Vidot F, Noharet R, et al. Implant-retained mandibular overdentures. A comparative pilot study of immediate loading versus delayed loading after two years. *J Prosthet Dent*. 2007;97: S138-S145.
34. Steflik DE, Koth DL, McKinney RV Jr. Human clinical trials with the single crystal sapphire endosteal dental implant, three year results, statistical analysis, and validation of an evaluation protocol. *J Oral Implantol*. 1987;13:39-53.
35. Albrektsson T, Zarb GA, Worthington P, et al. The long-term efficacy of currently used dental implants: A review and proposed criteria of success. *J Oral Maxillofac Implants*. 1986;1:11-25.
36. Smith DE, Zarb GA. Criteria of success of osseointegrated endosseous implants. *J Prosthet Dent*. 1989;62:567-572.
37. Patsiatzi E, Malden N, Ibbetson R. A radiographic review of bone levels around Calcitek dental implants supporting mandibular overdentures: Preliminary results at 3 to 6 years. *Eur J Prosthodont Restor Dent*. 2006;4:169-173.
38. Eckert SE, Laney WR. Patient evaluation and prosthodontic treatment planning for osseointegrated implants. *Dent Clin North Am*. 1989;33: 599-618.
39. Von Wowern N, Hjorting-Hansen E. The mandibular bone mineral content in relation to vestibular sulcoplasty: A 2-year follow up. *J Prosthetic Dent*. 1991;65:804-808.



Abstract Translations

GERMAN / DEUTSCH

AUTOR(EN): Mohamed A. Abd El-Dayem, BDS, MDS, DDS, Ahmed S. Assad, BDS, MDS, DDS, Mohamed Essam Eldin Sanad, BDS, MDS, DDS, Sayed Abd Al-hady Mahmoud Mogahed, BCh, MDS, DDS.

Vergleich zwischen vorgefertigten und individuell angepassten Leisten für Implantatgestützte komplette Deckprothetik im Unterkiefer

ZUSAMMENFASSUNG: Zielsetzung: Es sollte ein Vergleich zwischen vorgefertigten und individuell angepassten Leisten für Implantatgestützte komplette Deckprothetik im

Unterkiefer gezogen werden. **Materialien und Methoden:** 10 komplett zahnlose Patienten wurden dazu ausgewählt, sich einer Wiederherstellungsbehandlung mit Zahnimplantaten zu unterziehen. Jedem Patienten wurden zwei (Druckeingepasste) Zahnimplantate eingepflanzt. Dabei wurde jeweils ein Implantat auf jeder Seite im Eckzahnbereich des Unterkiefers gesetzt. Die Implantate wurden für eine Heilungsphase zur Knochengewebsregeneration von vier Monaten eingetaucht, d. h. ohne Belastung, gelassen. Die Patienten wurden in zwei Gruppen mit jeweils 5 Teilnehmern eingeteilt. Die Patienten der Gruppe I erhielten einen konventionellen Zahnersatz für den Oberkiefer sowie eine durch eine gegossene Leiste ge-

haltene Stützprothese im Unterkiefer. Die Patienten der Gruppe II wurden mit einem konventionellen Zahnersatz für den Oberkiefer sowie mit einer durch eine vorgefertigte Leiste gehaltene Stützprothese im Unterkiefer ausgestattet. Alle Patienten wurden klinisch und radiologisch zum einen direkt nach Einsetzen der Prothese und dann nach 6, 12 und 18 Monaten untersucht und beurteilt. **Ergebnisse:** In der Gruppe mit der gegossenen Leiste war eine ausgeprägtere Knochenresorption festzustellen als in der Gruppe, deren Deckprothese mit einer vorgefertigten Leiste bestückt worden war. Außerdem ließ sich ein minimaler marginaler Knochengewebverlust in der mit der vorgefertigten Leiste behandelten Gruppe feststellen. **Schlussfolgerungen:** Die Deckprothesen mit vorgefertigter Leiste wiesen distal zu den Implantaten eine geringere Knochenresorption als die Implantatgestützten Prothesen mit gegossener Leiste. Die Werte für sowohl den Zahnfleisch-Index als auch den Plaque-Index waren in der Versuchsgruppe um einiges höher, die eine Prothese mit gegossener Leiste erhalten hatten. Nach einem Jahr wiesen die Implantatgestützten Deckprothesen mit vorgefertigter Leiste eine nur geringfügige Verringerung der Knochenhöhe auf. Nach 18 Monaten allerdings war die Reduktion überaus bedeutsam erhöht.

SCHLÜSSELWÖRTER: Zahnimplantat, vorgefertigte Leiste, Gussleiste, Deckprothese im Unterkiefer

SPANISH / ESPAÑOL

AUTOR(ES): Mohamed A. Abd El-Dayem, BDS, MDS, DDS, Ahmed S. Assad, BDS, MDS, DDS, Mohamed Essam Eldin Sanad, BDS, MDS, DDS, Sayed Abd Al-hady Mahmoud Mogahed, BCh, MDS, DDS.

Comparación del uso de barras prefabricadas y fabricadas especialmente para sobredentaduras mandibulares completas retenidas con implantes

ABSTRACTO: Propósito: Comparar barras prefabricadas y fabricadas especialmente para sobredentaduras mandibulares completas retenidas con implantes. **Materiales y Métodos:** Se seleccionaron diez pacientes sin dientes para la colocación de implantes dentales. Cada paciente recibió dos implantes dentales (fijado a presión), un implante en cada costado de las regiones caninas de la mandíbula. Los implantes quedaron sumergidos (sin cargar) durante un período de curación y oseointegración de 4 meses. Se dividieron a los pacientes en dos grupos, de cinco pacientes cada uno. Los pacientes del Grupo I recibieron dentaduras convencionales en el maxilar y una sobredentadura mandibular retenida por una barra fabricada especialmente. Los pacientes del Grupo II recibieron una dentadura convencional en el maxilar y una sobredentadura mandibular retenida por una barra prefabricada. Se evaluaron a todos los pacientes clínica y radiográficamente inmediatamente después de la entrega de la sobredentadura y después de 6, 12 y 18 meses. **Resultados:** Existió una reabsorción del hueso más pronunciada en el grupo de la barra

fabricada especialmente, más que el grupo de la barra prefabricada y una pérdida mínima del hueso marginal en el grupo tratado con la barra prefabricada. **Conclusión:** Las sobredentaduras con la barra prefabricada demostró menos absorción del hueso distal a los implantes comparado con las sobredentaduras retenidas con implantes y barras fabricadas especialmente. Ambos el índice gingival y el índice de sarro fueron muchos más altos en el grupo tratado con la sobredentadura retenida con la barra fabricada especialmente. La sobredentadura retenida con implantes y barra prefabricada demostró una reducción poco significativa en la altura del hueso luego de un año y una reducción muy significativa después de los dieciocho meses.

PALABRAS CLAVES: implante dental, barra prefabricada, barra fabricada especialmente, sobredentadura mandibular

PORTUGUESE / PORTUGUÊS

AUTOR(ES): Mohamed A. Abd El-Dayem, Bacharel em Ciência Dentária, Mestre em Ciência, Cirurgião-Dentista, Ahmed S. Assad Bacharel em Ciência Dentária, Mestre em Ciência, Cirurgião-Dentista, Mohamed Essam Eldin Sanad, Bacharel em Ciência Dentária, Mestre em Ciência, Cirurgião-Dentista, Sayed Abd Al-hady Mahmoud Mogahed Bacharel em Cirurgia, Mestre em Ciência, Cirurgião-Dentista.

Comparação de Barras Pré-fabricadas e Feitas sob Medida para Sobredentaduras Mandibulares Completas Retidas por Implante

RESUMO: Objetivo: Comparar barras pré-fabricadas e feitas sob medida para sobredentaduras mandibulares completas retidas por implante. **Materiais e Métodos:** Dez pacientes completamente desdentados foram selecionados para substituição por implantes dentários. Cada paciente recebeu dois implantes dentários (press-fit), um implante de cada lado nas regiões caninas da mandíbula. Os implantes foram deixados submersos (descarregados) por um período de cura por oseointegração de 4 meses. Os pacientes foram divididos em dois grupos, cinco pacientes em cada. Os pacientes do Grupo I receberam dentaduras maxilares convencionais e uma sobredentadura mandibular retida por uma barra fundida. Os pacientes do Grupo II receberam uma dentadura maxilar convencional e uma sobredentadura retida por uma barra pré-fabricada. Todos os pacientes foram avaliados clínica e radiograficamente imediatamente após a entrega da sobredentadura e após 6, 12 e 18 meses. **Resultados:** Houve reabsorção de osso mais pronunciada no grupo da barra fundida; mais do que o grupo de barra pré-fabricada e perda de osso marginal mínima no grupo tratado com barra pré-fabricada. **Conclusões:** As sobredentaduras de barra pré-fabricada mostraram menos reabsorção de osso distal em relação aos implantes em comparação com as sobredentaduras retidas por implante de barra fundida. Tanto o índice gengival quanto o resultado do índice de placa foram significativamente mais altos no grupo tratado com a sobredentadura retida por barra

fundida. A sobredentadura retida por implante de barra pré-fabricada mostrou baixa redução significativa na altura do osso após um ano e uma redução altamente significativa após dezoito meses.

PALAVRAS-CHAVE: implante dentário, barra pré-fabricada, barra fundida, sobredentadura mandibular

RUSSIAN / РУССКИЙ

АВТОРЫ: Mohamed A. Abd El-Dayem, бакалавр хирургической стоматологии, магистр естественных наук в области медицины, доктор хирургической стоматологии, Ahmed S. Assad, бакалавр хирургической стоматологии, магистр наук в области медицины, доктор хирургической стоматологии, Mohamed Essam Eldin Sanad, бакалавр хирургической стоматологии, магистр естественных наук в области медицины, доктор хирургической стоматологии, Sayed Abd Al-hady Mahmoud Mogahed, бакалавр химических наук, магистр наук в области медицины, доктор хирургической стоматологии

Сравнение готовых и изготовленных на заказ дуг имплантатов для использования на нижнечелюстных полных съемных протезах, фиксируемых на имплантатах

РЕЗЮМЕ: Цель. Сравнить готовые и выполненные на заказ дуги имплантатов, используемые на нижнечелюстных полных съемных протезах, фиксируемых на имплантатах. **Материалы и методы.** Для установки зубных имплантатов было отобрано десять пациентов, полностью лишенных зубов. Каждому пациенту установили два зубных имплантата со способом крепления press-fit, по одному с каждой стороны в области нижних клыков. Имплантаты оставили заглубленными (не нагруженными) на 4 месяца для дальнейшей остеоинтеграции. Пациентов разделили на две группы, по пять человек в каждой. Пациентам из группы I установили традиционные протезы на верхнюю челюсть и съемные протезы, фиксируемые литой дугой, на нижнюю челюсть. Пациентам из группы II установили традиционные протезы на верхнюю челюсть и съемные протезы, фиксируемые готовой дугой, на нижнюю челюсть. Сразу после установки протеза, а также через 6, 12 и 18 месяцев проводилась клиническая и рентгенографическая оценка всех пациентов.

Результаты: В группе пациентов, которым устанавливался протез, фиксируемый на литой дуге, наблюдалась более выраженная резорбция костной ткани; больше, чем в группе с готовыми дугами, и минимальная потеря маргинальной кости в группе пациентов, которым устанавливался протез на готовых дугах. **Вывод.** У пациентов, которым устанавливался протез на готовых дугах, наблюдалась

меньшая резорбция костной ткани рядом с имплантатами по сравнению с пациентами, которым устанавливались зубные протезы, фиксируемые литыми дугами. В группе пациентов, которым установили протезы, фиксируемые на литых дугах, оказалось значительно выше значение как десенного индекса, так и индекса зубного камня. У пациентов, которым установили съемные протезы, фиксируемые на готовых дугах, было отмечено незначительное уменьшение высоты костной ткани через год и значительное уменьшение костной ткани через восемнадцать месяцев.

КЛЮЧЕВЫЕ СЛОВА: зубной имплантат, готовая дуга, литая дуга, нижнечелюстной съемный протез.

TURKISH / TÜRKÇE

YAZARLAR: Mohamed A. Abd El-Dayem, BDS, MSc, DDS, Ahmed S. Assad, BDS, MSc, DDS, Mohamed Essam Eldin Sanad, BDS, MSc, DDS, Sayed Abd Al-hady Mahmoud Mogahed, BCh, MSc, DDS.

İmplant ile Tutulan Tam Alt Çene Örtük Protezlerinde Kullanılan Prefabrike ve Özel Yapım Çubuklarının Karşılaştırması

ÖZET: Amaç: İmplant ile tutulan komple alt çene örtük protezlerde kullanılan prefabrike ve özel imal edilmiş çubukların karşılaştırması. **Gereç ve Yöntem:** Tamamen dişsiz on hasta, dental implant ile dişsizliğin giderilmesi için seçildi. Hastaların her birinde iki adet (press-fit) dental implant, implantların her biri alt çenenin iki tarafında köpek dişi bölgesinde olmak üzere yerleştirildi. İmplantlar, 4 aylık iyileşme ve osseointegrasyon döneminde gömülü (yüksüz) bırakıldı. Hastalar, her bir grupta beş hasta olmak üzere iki gruba ayrıldı. I. Grup hastalarına, konvansiyonel maksiller protez ve döküm bir çubukla tutulan bir alt çene örtük protezi (overdenture) uygulandı. II. Grup hastalarına ise, konvansiyonel maksiller protez ve prefabrike bir çubukla tutulan bir alt çene örtük protezi (overdenture) uygulandı. Tüm hastalar örtük protezin yerleştirilmesinden hemen sonra ve 6, 12 ve 18 ay sonra klinik ve radyografik olarak değerlendirildi.

Bulgular: Döküm çubuk grubunda, prefabrike çubuk grubuna göre daha fazla kemik rezorpsiyonu görüldü. Prefabrike çubuk uygulanan grupta çok az marjinal kemik kaybı vardı. **Sonuç:** Döküm çubuklu implant ile tutturulan örtük protezlere göre, prefabrike çubuklu örtük protezler implantın distalinde daha az kemik rezorpsiyonu gösterdi. Döküm çubukla desteklenen örtük protez grubunda diş eti ve plak indeksleri anlamlı derecede daha yüksekti. Bir yıl sonra prefabrike çubuklu implant ile desteklenen overdenture kemik yüksekliğinde düşük derecede azalma gösterdi ve onsekiz ay sonra bu azalma önemli derecede yüksekti.

ANAHTAR KELİMELELER: dental implant, prefabrike çubuk, döküm çubuk, alt çene örtük protezi (overdenture)

JAPANESE / 日本語

インプラント支台下顎骨コンプリートオーバーデンチャーに使用する既製とカスタムメイドバーの比較

共同研究者氏名: モハメド・A・アブドエルーダイェム (Mohamed A. Abd El-Dayem) BDS, MSc, DDS, アメド・S・アサッド (Ahmed S. Assad) BDS, MSc, DDS, モハメド・エッサム・エルディン・サナド (Mohamed Essam Eldin Sanad), BDS, MSc, DDS, サイエド・アブド・アルーハディ・マモウド・モガヘッド・B・Ch (Sayed Abd Al-hady Mahmoud Mogahed B. Ch.) M.D.Sc, DDS

研究概要:

目的: インプラント支台下顎骨コンプリートオーバーデンチャー用の既製バーとカスタムメイドバーを比較した。

素材と方法: デンタルインプラント補綴治療に10名の完全無歯患者を選定した。各患者には下顎骨両側面犬歯部位にそれぞれ1本づつ、2本の(プレスフィット)デンタルインプラントを埋入した。インプラントは負荷せずに骨膜下で4ヶ月間オッセオインテグレーション期間を設けて治癒した。その後患者を5名ずつの2グループに分け、グループIの患者には上顎骨従来式デンチャーとキャストバーを支台にする下顎骨オーバーデンチャーを使用し、グループIIの患者には上顎骨従来式デンチャーと既製バーを支台にする下顎骨オーバーデンチャーを使用した。すべての患者はオーバーデンチャー装着直後と6ヶ月目そして12ヶ月目と18ヶ月目に臨床ならびにレントゲンで評価した。

結果: キャストバーグループでは既製バーグループと比較すると明白な骨吸収が見られた; 既製バーグループでは最小限の周辺骨喪失を示した。

結論: 既製バーオーバーデンチャーはキャストバーインプラント支台オーバーデンチャーよりインプラント末端部で比較的骨吸収が少なかった。キャストバー支台オーバーデンチャーグループは歯肉指数とプラーク指数共に著しい高数値を示した。既製バーインプラント支台オーバーデンチャーは1年後も骨高径減少がほとんど見られず、18ヶ月後はさらに骨高径減少度が僅かになっている。

キーワード: デンタルインプラント、既製バー、キャストバー、下顎骨オーバーデンチャー

CHINESE / 中国語

以植體固定的下頷全口覆蓋式假牙所使用之預鑄和訂製植體桿比較

作者: Mohamed A. Abd El-Dayem, BDS, MSc, DDS, Ahmed S. Assad BDS, MSc, DDS, Mohamed Essam Eldin Sanad, BDS, MSc, DDS, Sayed Abd Al-hady Mahmoud Mogahed B. Ch., M.D.Sc, DDS

摘要:

目的: 針對以植體固定的下頷全口覆蓋式假牙所使用之預鑄和訂製植體桿進行比較。

資料與方法: 選擇10名全口缺牙患者進行牙科植體替換。每位患者接受兩顆(壓貼)牙科植體,其中包括下頷犬齒區域每邊一顆。植體採用埋入式(未載入)以利4個月的癒合骨整合。患者分成兩組,每組各5人。第一組患者接受上頷傳統假牙與下頷覆蓋式假牙(以鑄造桿固定)。第二組接受上頷傳統假牙與下頷覆蓋式假牙(以預鑄桿固定)。在安裝假牙後當時與經過6、12和18個月之後,為所有患者進行臨床和X光評估。

結果: 鑄造桿組的骨吸收較明顯,高於預鑄桿組,而使用預鑄桿組治療的該組則有最低程度的邊際骨流失。

結果: 和預鑄桿植體固定的覆蓋式假牙比較,預鑄桿覆蓋式假牙的植體末端骨吸收較少,牙齦指數與牙菌斑指數也明顯高於使用預鑄桿植體固定的覆蓋式假牙治療的該組。一年之後,預鑄桿植體固定的覆蓋式假牙顯示低程度的骨質高度明顯降低。

關鍵字: 牙科植體、預鑄桿、鑄造桿、下頷覆蓋式假牙。

KOREAN / 한국어

임플란트-지지 하악 총의치에 사용된 사전 제작 바와 맞춤제작 바의 비교

저자: 모하멧 A.아브델 데이엠 (Mohamed A. Abd El-Dayem), BDS, MDS, DDS, 아메드 S.아산 (Ahmed S. Assad) BDS, MDS, DDS, 모하멧 에삼 엘딘 사나드 (Mohamed Essam Eldin Sanad), BDS, MDS, DDS, 사이예드 알하디 마흐못 모가헛 (Sayed Abd Al-hady Mahmoud Mogahed) BCh, MDS, DDS

요약:

목적: 본 연구의 목적은 임플란트-지지 하악 총의치에 사용된 사전제작 바와 맞춤 제작바를 비교하는데 있다.

재료 및 방법: 10명의 완전 무치악 환자가 치과용 임플란트 시술 대상으로 선택되었다. 각 환자는 2개의 임플란트 (가압-장착)를 하악의 양쪽 송곳니 부위에 시술 받았다. 임플란트는 골유착 치유기간 4개월 동안 식립하지 않은 상태로 놓아두었다. 환자들을 각 5명씩 두 개 군으로 나누어 제 1군 환자들을 위해서는 기존의 전통적 상악의치와 주조 바로 지지되는 하악 총의치를 제작하였다. 제 2군 환자들은 전통적 상악의치와 사전제작 바로 지지되는 하악 총의치 시술을 받았다. 모든 환자들은 의치 제거 후 즉시, 그리고 이후 6개월과 12개월, 18개월에 임상검사 및 방사선 검사를 받았다.

결과: 주조 바 군에서, 사전제작 바 군과 사전제작 바로 치치한 최소 변연골 소실 군보다 훨씬 명백한 골 재흡수가 있었다.

결론: 사전제작 바 총의치의 경우가 주조 바 임플란트-지지 총의치의 경우보다 임플란트와 먼 부위에서 골 재흡수가 더욱 적었다. 잇몸지수와 플라크지수 모두 주조바 지지 총의치 처리군에서 통계적으로 유의하게 높았다. 사전제작 바 임플란트-지지 총의치의 경우 18개월 후 현저히 높은 수준의 골 높이 감소율을 보였으며, 1년 후 시점에서 골높이 감소는 그보다는 낮은 정도였다.

키워드: 치과 임플란트, 사전제작 바, 주조 바, 하악 총의치.