



METAL REINFORCEMENT FOR IMPLANT-SUPPORTED MANDIBULAR OVERDENTURES

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The implant-supported overdenture is a commonly used, cost effective, and predictable treatment for the edentulous mandible that is proven to increase patient satisfaction.¹⁻⁷ However, denture base fracture is a common complication encountered with implant-supported overdentures. A review by Goodacre et al⁸ showed that fracture of acrylic resin overdentures occurred in 7% of the prostheses, with a range from 3% to 24%. Moreover, Gonda et al⁹ investigated the fracture prevalence of implant-supported mandibular overdentures and reported a fracture rate of 21.4% for the 1-implant-supported overdenture and 9.3% for the 2-implant-supported overdenture designs. An important conclusion of this study was that denture base fractures occurred most often in association with the position of the implant abutments.

Techniques to reinforce the denture base and prevent or minimize overdenture fracture have been reported.^{3,5,7,10,11} The technique presented describes not only the reinforcement of the denture base with a metal framework but also the inclusion of the attachment metal housing in the framework design to prevent fractures that could occur at the sites close to the implant abutments.

PROCEDURE

1. Use a recently reported clinical technique¹² to make an open tray impression of the edentulous arch with 2 implants.

2. Pour the definitive casts in Type III stone (Alston; Assign Building Products Industry and Trading Co, Ltd, Ankara, Turkey) and fabricate record bases and wax rims to make the registration in centric occlusion. Mount the casts in a semi-adjustable articulator (Stratos 100; Ivoclar Vivadent, Schaan, Liechtenstein).

3. Select ball attachments (NucleOSS T4 4833, O-ring abutment; Şanlılar Medical Devices, Izmir, Turkey) of appropriate gingival height and screw them onto the implant analogs (T4 4020 analog; Nucleoss) in the definitive cast (Fig. 1A).

4. Place the metal housings with silicone rings (NucleOSS T0 5200 O-ring metal housing and silicone ring; Şanlılar Medical Devices) onto the ball attachments (T4 4833, O-ring abutment; NucleOSS) (Fig. 1B).

5. Place relief wax (Milling Wax Chip Green; Yeti-Dental Intl GmbH, Engen, Germany) and firmly adapt it to the definitive cast.

6. Remove the relief wax in selected areas to provide tissue stops for the metal framework, bilaterally in

the posterior region and between the implants in the anterior region.

7. Fill in the space between the metal housing silicone ring assembly and the implant analog with modeling wax (Tenatex Red Wax; Kemdent, Purton, UK) (Fig. 2A). In addition, place modeling wax above the assembly (Fig. 2B) to allow sufficient vertical space in the metal framework for the ball attachment.

8. Apply separating medium (Isocera; Bego Dental, Bremen, Germany) on the modeled wax with a brush.

9. Finish the wax pattern of the framework as shown in Figure 3A. Sprue, invest, and cast the metal framework.

10. Adjust, airborne-particle abrade, and finish the metal framework by using conventional laboratory procedures.¹³

11. Place the metal framework on the metal housing silicone ring assembly attached to the ball attachments and ensure passive fit (Fig. 3B).

12. Bond the framework to the metal housing silicone ring assembly with a resin bonding agent (DTK-Kleber; Bredent GmbH & Co KG, Senden, Germany). Remove the excess resin material (Fig. 4).

13. Airborne-particle abrade the surfaces where opaque will be applied. Mix opaque powder with its liquid activator (Pink-OP; K&K Coskan Dental,

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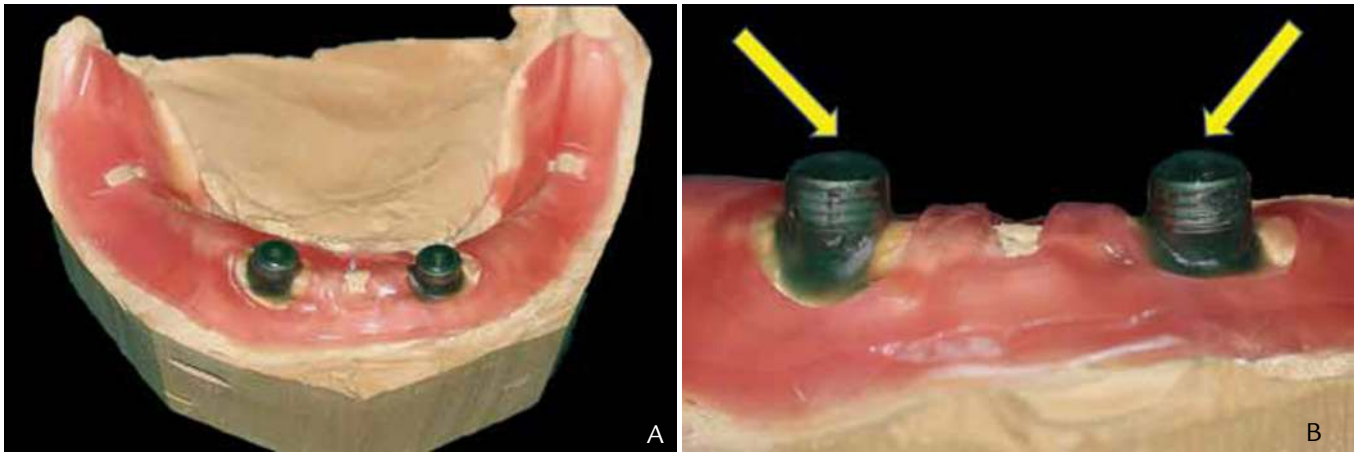
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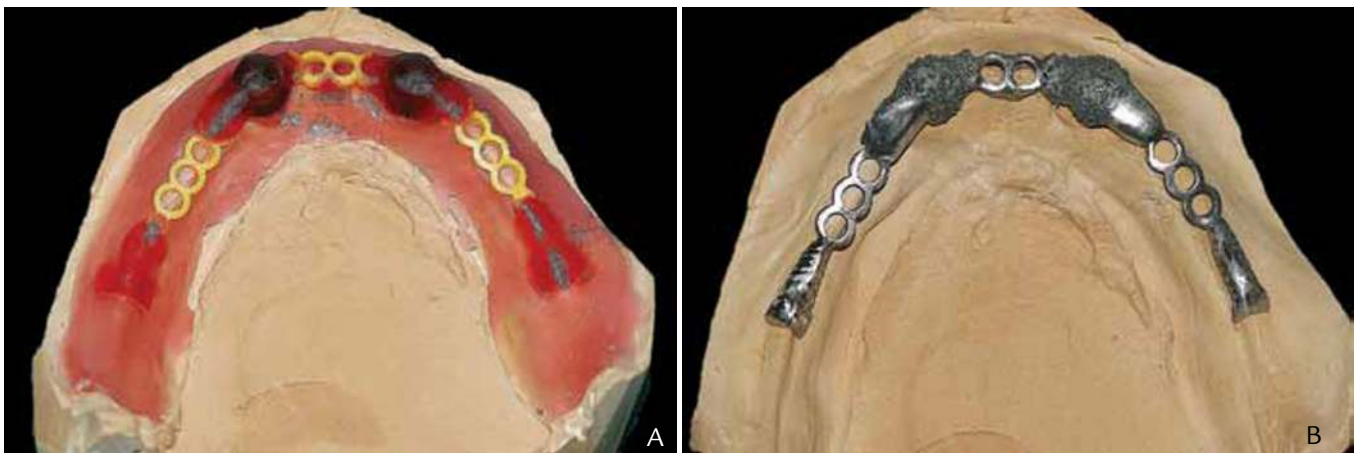
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1 A, Ball attachments placed on implant analogs in definitive cast. B, Metal O-ring housings placed on ball attachments.



2 A, Definitive cast with relief wax. B, Wax added around and on attachment assembly.



3 A, Metal framework wax pattern. B, Framework cast in Cr-Co alloy.



4 Attachment assemblies luted to metal framework.

Bursa, Turkey), and apply the mixture using a brush. Let the mixture set under 6 atm pressure, 120°C for 10 minutes. Process the overdenture with conventional laboratory procedures.

REFERENCES

1. Burns DR. Mandibular implant overdenture treatment: consensus and controversy. *J Prosthodont* 2000;9:37-46.
2. Mericske-Stern R. Treatment outcomes with implant-supported overdentures: clinical considerations. *J Prosthet Dent* 1998;79:66-73.
3. MacEntee MI, Walton JN, Glick N. A clinical trial of patient satisfaction and prosthodontic needs with ball and bar attachments for implant-retained complete overdentures: three-year results. *J Prosthet Dent* 2005;93:28-37.
4. Burns DR, Unger JW, Coffey JP, Waldrop TC, Elswick RK Jr. Randomized, prospective, clinical evaluation of prosthodontic modalities for mandibular implant overdenture treatment. *J Prosthet Dent* 2011;106:12-22.
5. Rached RN, de Souza EM, Dyer SR, Ferracane JL. Dynamic and static strength of an implant-supported overdenture model reinforced with metal and nonmetal strengtheners. *J Prosthet Dent* 2011;106:297-304.
6. Ahuja S, Cagna DR. Classification and management of restorative space in edentulous implant overdenture patients. *J Prosthet Dent* 2011;105:332-7.
7. Orenstein IH, Weinstein BF, Gelman AS, Fiks S, McCartney JW. A technique for converting an existing denture into a cast metal-reinforced implant-retained overdenture. *J Prosthet Dent* 2010;104:397-400.

8. Goodacre CJ, Bernal G, Rungcharassaeng K, Kan JY. Clinical complications with implants and implant prostheses. *J Prosthet Dent* 2003 ;90:121-32.
9. Gonda T, Maeda Y, Walton JN, MacEntee MI. Fracture incidence in mandibular overdentures retained by one or two implants. *J Prosthet Dent* 2010;103:178-81.
10. Rodrigues AH. Metal reinforcement for implant-supported mandibular overdentures. *J Prosthet Dent* 2000;83:511-3.
11. Piermatti J, Winkler S. Metal bases for implant overdentures. *Gen Dent* 2010;58:400-3.
12. Ozelik TB, Yilmaz B. A functional open-tray impression technique for implant-retained overdenture prostheses. *J Oral Implantol* 2012;38:617-9.
13. Phoenix RD, Cagna DR, DeFreest CF. Stewart's clinical removable partial prosthodontics. 3rd ed. Chicago: Quintessence; 2002. p. 309-36, 397-430.

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NOTEWORTHY ABSTRACTS OF THE CURRENT LITERATURE

Zirconia posterior fixed partial dentures: 5-year clinical results of a prospective clinical trial

Schmitt J, Goellner M, Lohbauer U, Wichmann M, Reich S.
Int J Prosthodont 2012;25:585-9.

Abstract: This study aimed to evaluate three- and four-unit posterior fixed partial dentures (FPDs) with zirconia frameworks after 5 years of function. Of the initial 30 subjects, 25 patients with 25 FPDs were examined after a mean follow-up period of 62.1 months. Five patients were not available for recall visits. Two FPDs failed before the 60-month evaluation because of framework fracture or delamination of the veneering ceramic after endodontic treatment. The 5-year survival rate was 92%. Based on these results, it can be suggested that zirconia frameworks have sufficient mechanical requirements for use in the stress-bearing posterior region. Major fracture of the ceramic veneer could be related to inadequate framework design or bruxism.

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