



METAL-REINFORCED SINGLE IMPLANT MANDIBULAR OVERDENTURE RETAINED BY AN ATTACHMENT: A CLINICAL REPORT

Edgar Grageda, DDS, MS^a and Bastian Rieck, DT^b

National Autonomous University of Mexico UNAM; Medica Sur Hospital, Mexico City, Mexico

Results of studies have shown that a single implant mandibular overdenture significantly increases the satisfaction and quality of life of patients with edentulism. The single implant-retained overdenture has the additional advantage of being less expensive and invasive than a 2-implant supported overdenture but has a high incidence of fracture of the acrylic resin base at the point of the implant. The treatment, design, and fabrication of a metal-reinforced single-implant mandibular overdenture with the Locator attachment as a retention device is described. (J Prosthet Dent 2014;111:16-19)

Edentulism correlates highly with low-income, poor health, and reduced education.¹⁻⁴ For more than a century, complete dentures were the standard of care for the patient with edentulism. Implant-retained or implant-supported prostheses have been shown to be more efficient than a complete denture, based on measures of quality of life, satisfaction, the ability to masticate, the ability to speak, and the nutritional state of the patient.⁵⁻⁹ The use of either 2 or 4 implants for mandibular denture anchorage, either free standing or connected by a bar, is the treatment about which most is known.¹⁰⁻¹⁹ Recently, the use of a symphyseal single implant for mandibular overdenture anchorage has been used as a treatment alternative and has been shown to be equally effective and less expensive than the 2-implant mandibular overdenture.²⁰⁻²⁴ The standard ball attachment and the Locator attachment (Zest Anchors) are the 2 retentive devices that have been studied with the 1-implant mandibular overdenture, and both have positive outcomes.²⁵ A disadvantage of the 1-implant mandibular overdenture is the incidence of fracture, which is reported to be high for overdentures retained by either 1 or 2 implants.²⁶ If a fracture occurs, then it



1 Frontal view of existing denture and remaining mandibular teeth.



2 Panoramic radiograph.

tends to be in areas where the acrylic resin is the thinnest, that is, adjacent to the implant. This disadvantage

can be addressed by adding a metal-reinforcing framework inside the acrylic resin base.

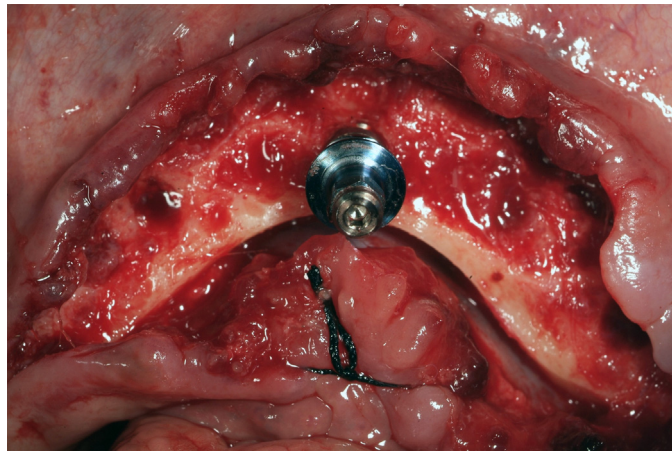
^aAssociate Professor, Department of Prosthodontics, National Autonomous University of Mexico UNAM and Medica Sur Hospital; and Private practice, Mexico City, Mexico.

^bOwner, Dental Technik Laboratory.

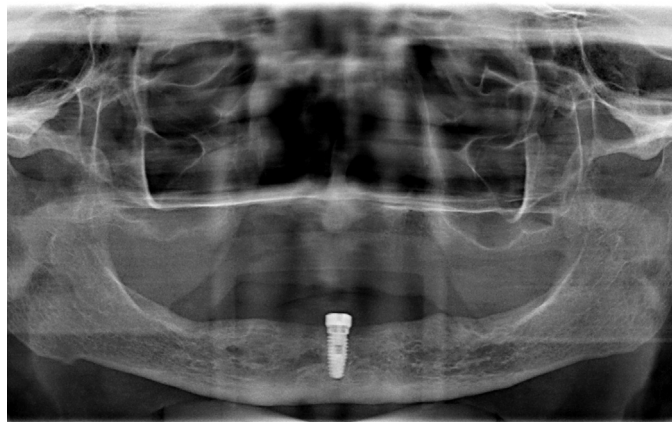
CLINICAL REPORT

A 76-year-old woman presented to the Medica Sur Hospital, EG dental clinic with a poorly fitting maxillary denture and mobility of the remaining mandibular teeth (Fig. 1). Her medical history was not relevant to the proposed dental treatment. A clinical examination revealed a maxilla with ischemic tissue on the palatal site and erythematous tissue on the border of the ridge due to continuous wearing of the dental prosthesis. The mandible presented adequate posterior alveolar ridges with attached mucosa. Severe periodontitis of the remaining mandibular teeth was noted, and the radiographic examination revealed thin, finely trabeculated bone that separated the oral cavity from the nasal cavity, with extensively pneumatized sinuses. No evidence of intrinsic pathology was noted, with the exception of the severe periodontitis of the remaining mandibular teeth (Fig. 2). Among the treatment alternatives that were explained to the patient were conventional complete dentures, implant overdentures, and implant-fixed complete dentures with varying numbers of implants. Based on the patient's expectation, cost consideration, and diagnostic information, the treatment chosen was multiple extractions of the mandibular teeth with simultaneous implant placement and fabrication of a metal-reinforced single-implant mandibular overdenture retained by a Locator attachment.

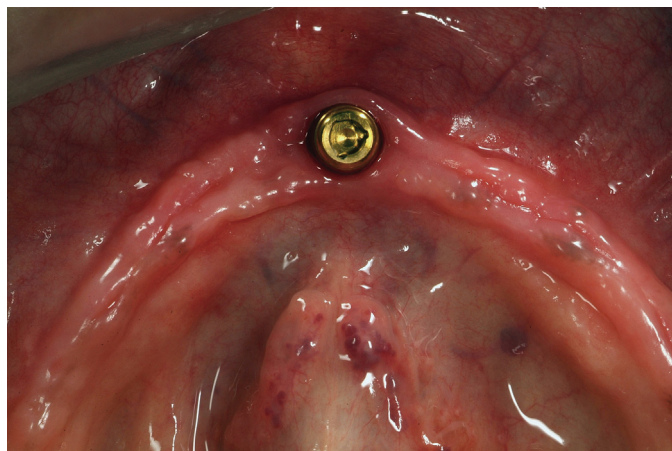
At the surgical appointment, the patient was asked to complete a 30-second preoperative oral chlorhexidine 0.12% rinse (Perioxidin; Ladec). Bilateral mandibular block local anesthesia was administered (4 mL Articaine with epinephrine 1/100 000 Medicaine Septodont), and the remaining mandibular teeth were atraumatically removed. After the extractions, a crestal gingival incision was made, which extended 10 mm distally onto the remaining alveolar process, and a full-thickness mucoperiosteal flap was reflected, which exposed uneven mandible bone excess. The mandibular midline was exposed,



3 Symphyseal implant tightened to 35 Ncm.



4 Panoramic radiograph 6 weeks after surgery, showing mandibular implant in place.



5 Locator attachment tightened to 35 Ncm.

and the alveolar ridge was leveled by using a round bur to create a flat bone base with sufficient restorative space. One root form implant (NT Osseotite 4×13 mm; Biomet 3i) was inserted into the mandibular symphysis and oriented perpendicular to the occlusal plane (Fig. 3). The implant was placed with

an insertion torque of 35 Ncm. A healing abutment was connected, and the mucosa was sutured with 3-0 continuous silk suture (Ethicon; Johnson & Johnson). Postoperative care instructions and medications were prescribed (amoxicillin and clavulanic acid 500 mg per 12 hours for 7 days and

ketarolac 30 mg per 12 hours for 3 days). The surgical site was evaluated, and the sutures were removed after 2 weeks of healing.

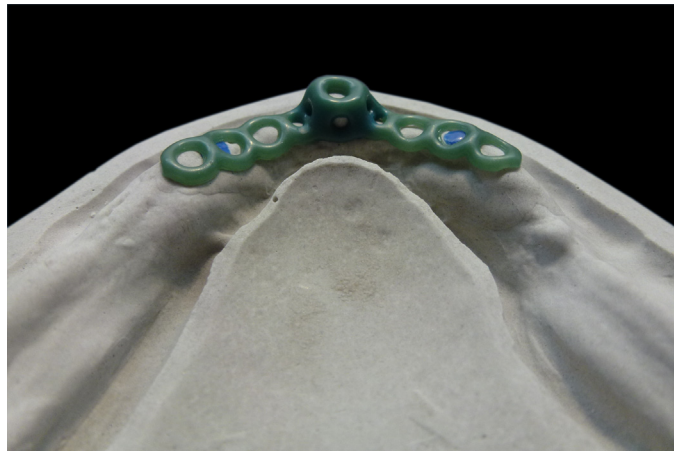
The implant was allowed to heal for approximately 6 weeks, at which time a radiograph was made (Fig. 4). The Locator abutment was then connected to the patient implant at 35 Ncm (Fig. 5) and preliminary impressions were made with irreversible hydrocolloid (xantAlgin; Heraeus Kulzer). Custom impression trays were fabricated (Palatray XL; Heraeus Kulzer).

At the definitive impression appointment, the custom impression trays were border molded with modeling plastic impression compound (Impression compound type I; Kerr Corp). The impression was made with polysulfide impression material (Permlastic Regular; Kerr Corp). The Locator impression cap was used as a direct impression coping, and the implant Locator analog was placed in the definitive impression. The impression was immediately boxed and poured in Type III dental stone (Micro Stone; Whip Mix Corp) Resin record bases and wax occlusal rims were fabricated to average dimensions. An arbitrary facebow and vertical and centric relation interocclusal records were made. The definitive casts were articulated on a semiadjustable articulator (8500 series; Whip Mix Corp). The tooth arrangement incorporated both an anterior-posterior and mediolateral compensating curve to achieve bilateral balance occlusion.

The trial dentures were clinically assessed, and the accuracy of the articulated casts and condylar inclination settings were verified. The patient accepted the esthetics. The position of the mandibular teeth was recorded by making a facial polyvinyl siloxane matrix (Speedex Putty; Coltène/Whaledent). The mandibular trial denture was removed from the master cast, and the metal housing portion of the Locator abutment was connected. The design of the metal reinforced framework was drawn on the definitive cast. A wax block out was performed on the alveolar ridge and around the Locator

attachment area for the production of a refractory cast. Preformed plastic patterns for partial removable dental prostheses were placed onto the investment cast to create the desired contours for a custom-made metal reinforcing

framework (Fig. 6). The wax pattern was sprued, invested, and cast with a base alloy with traditional methods (Vitalium Alloy Co60 Cr31 Mo6; Dentsply). The metal framework was finished and placed onto the definitive cast. A facial



6 Wax pattern of metal-reinforced framework.



7 Overdenture base with metal-reinforced framework.



8 Definitive prosthesis in place.

silicone matrix was used to facilitate accurate repositioning of the mandibular denture teeth.

After refining the denture contours, the wax pattern was invested, packed, and processed in heat polymerized poly (methyl methacrylate) (Meliodent Heat Cure; Heraeus Kulzer) denture base resin with conventional techniques. The processed dentures were returned to the articulator for occlusal equilibration. The dentures were removed from the casts, finished, and polished. The black plastic nylon processing insert of the locator attachment was removed and the pink plastic nylon insert was inserted into the matrix housing with the appropriate tool (Fig. 7). After a clinical remount and occlusal equilibration (Fig. 8), clinical fit assessment and adjustment were accomplished with pressure-indicating paste (Mizzy Inc). Immediate posttreatment therapy included 24-hour, 1-week, and 3-week evaluations, each involving the evaluation of occlusion, oral hygiene, and patient satisfaction and comfort. No clinical complication was seen, and the patient has been followed-up every 6 months for 2 years.

SUMMARY

The single implant mandibular overdenture can be an economical, functional, and esthetic treatment option. The use of a metal-reinforced framework inside the acrylic resin base provides better rigidity to prevent denture fracture; furthermore, the use of a Locator attachment seems to be a suitable attachment system.

REFERENCES

- Felton D, Cooper L, Duquon I, Minsley G, Guckes A, Huang S, et al. Evidence-based guidelines for the care and maintenance of complete dentures: a publication of the American College of Prosthodontists. *J Prosthodont* 2011;20(suppl 1):S1-12.
- Islas-Granillo H, Borges-Yañez SA, Lucas-Rincón SE, Medina-Solís CE, Casanova-Rosado AJ, Márquez-Corona ML, et al. Edentulism risk indicators among Mexican elders 60-year-old and older. *Arch Gerontol Geriatr* 2011;53:258-62.
- Al-Dwairi ZN. Complete edentulism and socioeconomic factors in Jordanian population. *Int J Prosthodont* 2010;23:541-3.
- Mendes DC, De Oliveira Poswar F, De Oliveira MV, Haikal DS, Da Silveira MF, De Barros Lima Martins AM, et al. Analysis of socio-demographic and systemic health factors and the normative conditions of oral health care in a population of the Brazilian elderly. *Gerodontology* 2012;29:206-14.
- Awad MA, Lund JP, Shapiro SH, Locker D, Klemetti E, Chehade A, et al. Oral health status and treatment satisfaction with mandibular implant overdentures and conventional dentures: a randomized clinical trial in a senior population. *Int J Prosthodont* 2003;16:390-6.
- Rashid F, Awad MA, Thomason JM, Piovano A, Spielberg GP, Scilingo E, et al. The effectiveness of 2-implant overdentures: a pragmatic international multicentre study. *J Oral Rehabil* 2011;38:176-84.
- van der Bilt A, Burgers M, van Kampen FM, Cune MS. Mandibular implant-supported overdentures and oral function. *Clin Oral Implants Res* 2010;21:1209-13.
- Morais JA, Heydecke G, Pawliuk J, Lund JP, Feine JS. The effects of mandibular two-implant overdentures on nutrition in elderly edentulous individuals. *J Dent Res* 2003;82:53-8.
- Feine JS, Carlsson GE, Awad MA, Chehade A, Duncan WJ, Gizani S, et al. The McGill consensus statement on overdentures. Mandibular two-implant overdentures as first choice standard of care for edentulous patients. *Int J Oral Maxillofac Implants* 2002;17:601-21.
- Adell R, Lekholm U, Rockler B, Branemark P-I. A 15-year study of osseointegrated implants in the treatment of the edentulous jaw. *Int J Oral Surg* 1981;10:387-416.
- Burns BR, Unger JW, Elswick RK Jr, Giglio JA. Prospective clinical evaluation of mandibular implant overdenture. Part II Patient satisfaction and preference. *J Prosthet Dent* 1995;73:364-9.
- Meijer HJA, Geertman ME, Raghoobar GM, Kwakman JM. Implant-retained mandibular overdentures: 6 year results of a multicenter clinical trial on three different implant systems. *J Oral Maxillofac Surg* 2001;59:1260-8.
- Burns DR, Unger JW, Coffley 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.
- Visser A, Raghoobar GM, Meijer HJA, Batenburg RHK, Vissink A. Mandibular overdentures supported by two or four endosseous implants: a 5 year prospective study. *Clin Oral Implants Res* 2005;16:19-25.
- Wismeijer D, Van Waas MA, Vermeeren JI, Mulder J, Kalk W. Patient satisfaction with implant-supported mandibular overdentures. A comparison of three treatment strategies with ITI-dental implants. *Int J Oral Maxillofac Surg* 1997;26:263-7.
- Batenburg RH, Raghoobar GM, Van Oort RP, Heijdenrijk K, Boering G. Mandibular overdentures supported by two or four endosteal implants. A prospective, comparative study. *Int J Oral Maxillofac Surg* 1998;27:435-9.
- Stoker G, van Waas R, Wismeijer D. Long-term outcomes of three types of implant-supported mandibular overdentures in smokers. *Clin Oral Implants Res* 2012;23:925-9.
- Geckili O, Mumcu E, Bilhan H. The effect of maximum bite force, implant number, and attachment type on marginal bone loss around implants supporting mandibular overdentures: a retrospective study. *Clin Implant Dent Relat Res* 2012;14(suppl):e91-7.
- Naert I, Quirynen M, Theuniers G, Van Steenberghe D. Prosthetic aspects of osseointegrated fixtures supporting overdentures. A 4-year report. *J Prosthet Dent* 1991;65:671-80.
- Cordioli G, Majzoub Z, Castagna S. Mandibular overdenture anchored to single implants: a five-year prospective study. *J Prosthet Dent* 1997;78:159-65.
- Krennmaier G, Ulm C. The symphyseal single-tooth implant for anchorage of a mandibular complete denture in geriatric patients: a clinical report. *Int J Oral Maxillofac Implants* 2001;16:98-104.
- Liddel G, Henry P. The immediately loaded single implant-retained mandibular overdenture: a 36-month prospective study. *Int J Prosthodont* 2010;23:13-21.
- Kronstrom M, Davis B, Loney R, Gerrow J, Hollender L. A prospective randomized study on the immediate loading of mandibular overdentures supported by one or two implants: a 12-month follow-up report. *Int J Oral Maxillofac Implants* 2010;25:181-8.
- Walton JN, Glick N, MacEntee MI. A randomized clinical trial comparing patient satisfaction and prosthetic outcome with mandibular overdentures retained by one or two implants. *Int J Prosthodont* 2009;22:331-9.
- Alsabeeha HM, Payne AG, De Silva RK, Thomson WM. Mandibular single-implant overdenture: preliminary results of a randomized-control trial on early loading with different implant diameters and attachment systems. *Clin Oral Implants Res* 2011;22:330-7.
- 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.

Corresponding author:

Dr Edgar Grageda
Medica Sur Hospital
Puente de Piedra 150
Torre I Int 905-913, Mexico City
MEXICO
E-mail: edgargrageda@hotmail.com

Copyright © 2014 by the Editorial Council for
The Journal of Prosthetic Dentistry.