Retrofitting an Existing Implant Overdenture to a New and Redesigned Intraoral Framework: A Clinical Report

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The esthetics and function of a tissue borne, implant retained overdenture are two of the most important factors that define a patient's acceptance of the prosthesis. In this clinical report, an existing implant overdenture, which was esthetically acceptable to the patient but which had no incorporated retentive components in the substructure framework, was retrofitted to a newly designed and fabricated implant framework. The added retentive components on the new framework increased the patient's overall masticatory function, reduced the frequency of dental visits, and allowed the patient to retain the original overdenture.

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INDEX WORDS: dental technology, abutments, attachments, impressions, reline, implant retained overdenture, overdenture

TISSUE BORNE, implant retained overdentures have become a common treatment modality for the edentulous mandible.[1] Multiple and varied retentive mechanisms are routinely utilized for increased retentiveness and stability of the implant prosthesis.[2] Hader clips and ERA attachments are often used in conjunction with a bar connecting multiple endosseous implants placed in the anterior mandible. This design has been reported to provide increased retention of the prosthesis[3-5] as well as to improve the patient's masticatory function and overall satisfaction.[6,7] Proper maintenance and regular recalls are recommended to help ensure the long-term success of the prosthesis.[4,8]

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This clinical report describes the treatment of a patient who presented with mandibular anterior implants connected with an unsatisfactory existing implant framework. There were no original retentive components incorporated into the framework for retaining the full arch removable implant prosthesis. Both chairside and laboratory-processed soft liners had been placed repeatedly over the years as the only means of retention for the prosthesis. The existing removable prosthesis was retrofitted to a new and redesigned intraoral framework after a laboratory hard reline procedure was accomplished. This was to ensure proper support and correct adaptation to the denture-bearing tissues. Retentive components were also added to the new framework to increase retention. This satisfied the patient's desires for a more functional implant prosthesis. An added benefit was that the patient went without the overdenture prosthesis for only an afternoon while the prosthesis was relined.

Clinical Report

The patient presented with a maxillary complete denture and a mandibular overdenture overlying a bar connecting 3 endosseous 3.75-mm diameter, 13-mm length Branemark implants (Nobel Biocare, TiUnite, MKIII, Yorba Linda, CA). The

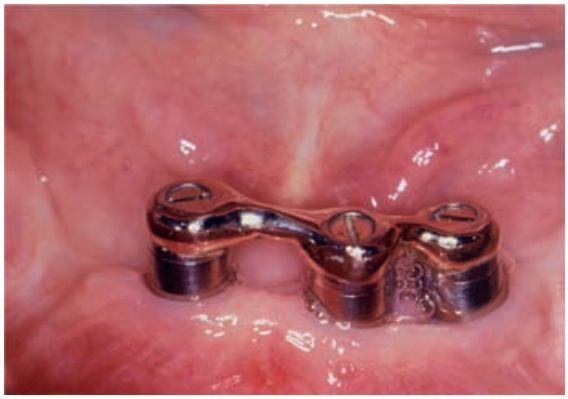

Figure 1. Pre-exsiting framework with no incorporated retentive components.

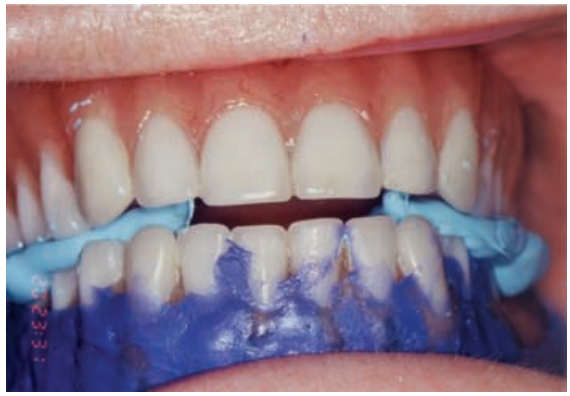

Figure 2. Fixture level and tissue impression in place with centric relation record.

existing framework had no retentive components (Fig 1). A chairside soft liner covered the intaglio surface of the denture only in the area of the framework in an attempt to provide retention. While the patient was very happy with the esthetics of the mandibular overdenture and the posterior teeth showed negligible wear, there was obvious dissatisfaction with the poor retention and very frequent repairs and replacement of the soft liner. The patient rejected any proposal to place additional implants in the mandible and repeatedly expressed the desire to be without the mandibular prosthesis for the least amount of time possible. A new framework design incorporating one Hader clip and two posterior ERA attachments was recommended in order to achieve the desired retentiveness while allowing the existing prosthesis to be tissue borne.[1-3] The patient was informed about the limitations of the design,[4] which still allowed for prosthesis movement in function, the necessity of regular recalls and the maintenance required for the retentive components.[1,8]

Procedure

First Appointment

1. The patient's existing mandibular implant overdenture was border molded with modeling plastic (Kerr Green Stick Compound, Glendora, CA), the framework undercuts were blocked out with Oro-Seal (Ultradent, South Jordan, UT) and a light-bodied, polyvinylsiloxane impression (President-Plus, Coltene/Whaledent, Mahwah, NJ) was made in the intaglio surface of the denture as has been previously described in the literature.[9] This impression, utilizing an open-mouth technique, simultaneously captured the denture bearing areas and served as an implant fixture level impression. The existing framework, which was verified as having a passive fit, functioned as an implant transfer impression coping and then as a laboratory verification jig or index. The adaptation of the existing framework had been previously verified clinically and radiographically.
2. Prior to removing the impression from the mouth, a centric relation record was made with polyvinylsiloxane registration material (Blu-Mousse, Parkell, Farmingdale, NY) (see Fig 2). A facebow registration was also obtained to mount a cast of the patient's maxillary denture.
3. Upon removing the impression from the mouth, the existing framework was removed and secured with gold retaining screws to implant abutment analogs or replicas (Fig 3).
4. The framework and attached analogs were placed back in the impression and stabilized with sticky wax (Kerr, Glendora, CA) (Fig 4). The impression was poured with an improved dental stone with low setting expansion (Resin Rock, WhipMix, Louisville, KY).
5. The casts of the maxillary denture and the mandibular overdenture (not yet separated from the poured master cast) were mounted on a semiadjustable articulator utilizing the facebow and interocclusal bite records. Upon setting of the mounting stone, the incisal pin was stabilized at the existing vertical dimension of

Figure 3. Pre-existing framework attached to abutment analogs.

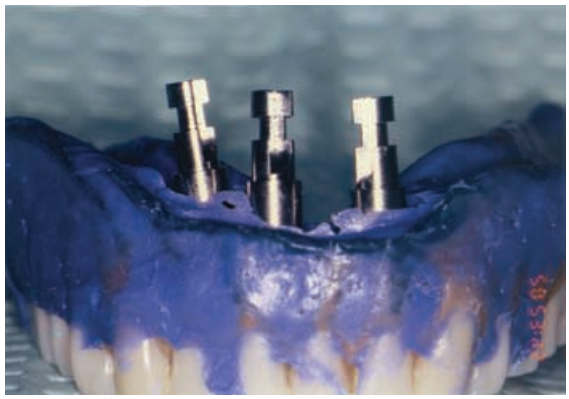

Figure 4. Framework and analogs stabilized in impression.

occlusion and then the mandibular overdenture was separated from the mounted cast.

6. The impression material inside the mandibular overdenture was removed in the anterior area, in the regions of the existing framework bar, and sent to the lab for the processed hard reline in the areas of tissue support (similar to that for a distal extension removable partial denture) along with this mounted master cast.
7. A silicone putty index was also fabricated on this master cast to indicate the position of the existing framework. This served as a guide for the laboratory in fabricating the new framework to fit within the same relative confines of the patient's previous overdenture (Fig 5). The new framework contours were waxed and developed at the commercial laboratory just prior to the processed hard reline procedure that destroyed this master cast.

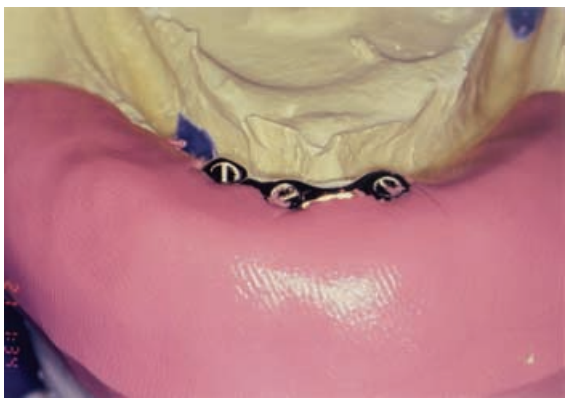

Figure 5. Silicone putty index to indicate position of previous framework to the laboratory technician.

8. The patient's existing framework was screwed and hand torqued back into the mouth.
9. The articulator with the mounted casts, the incisal pin locked at the correct vertical dimension of occlusion, the silicone index, and the stone master cast with the abutment analogs in the mandibular arch were sent to the laboratory.

Second Appointment

The following day, the commercially fabricated laboratory hard reline in the overdenture was adjusted and delivered and a temporary chairside soft tissue conditioner (Lynal, Dentsply-Caulk, Milford, DE) was utilized in the anterior area to provide retention.

Third Appointment

1. Four days after the initial visit, the newly fabricated framework with a design incorporating 1 nylon Hader clip with housing and 2 distal ERA attachments with housings (APM Sterngold, Attelboro, MA), was evaluated intraorally.
2. Upon verification of an acceptable passive fit of the new framework, the resilient retentive components were added to the framework (Fig 6), and the existing overdenture was adjusted to create adequate space for the retentive components to be picked up in the prosthesis.
3. Block out putty (Oro-Seal) was again utilized around the framework,[9] venting holes were made in the overdenture for expressing excess acrylic, and denture repair acrylic (Dentsply Repair Material, Dentsply, York, PA) was

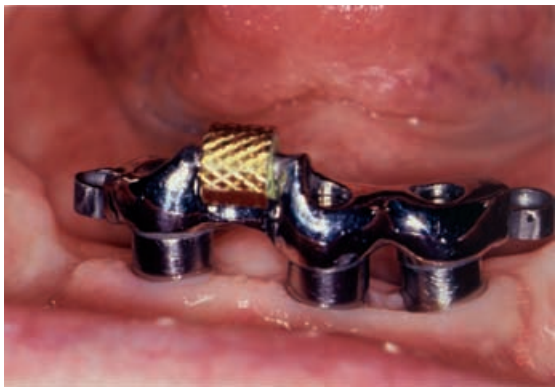

Figure 6. Clinical evaluation of the newly fabricated framework with incorporated retentive components.

utilized to clinically pick up the Hader clip and the 2 ERA attachments (Fig 7).

4. Upon removal of the denture, additional denture repair acrylic resin was used to fill in irregularities and voids in the intaglio surface of the denture around the attachments. Excess acrylic was removed and a clinical remount was performed to verify and adjust the occlusion. The denture was pumiced, polished, and delivered to the patient with postoperative home care instructions and a recommended schedule for re-evaluation and maintenance.
5. Postoperative appointments occurred at 24 hours, 1 week, and 1 month after the delivery appointment.

Discussion

This procedure was utilized to replace the patient's existing and inadequate implant framework with a new one, enhanced with retentive components. This procedure was chosen to accommodate the patient's desire to keep the original removable prosthesis as much as possible throughout the course of treatment, as opposed to previously described techniques where the patient is without the original prosthesis for a more extended period.[10] The pre-existing denture was evaluated clinically to determine if the space provided was adequate in order to incorporate the retentive components without significantly weakening the denture, creating excessive thickness lingual to the anterior teeth, or altering the patient's vertical dimension of occlusion.[11] The adaptation of the presenting overdenture to the oral tissues was also evaluated and improved with the laboratory hard reline. An important step in this procedure was the communication with the dental laboratory technician since he was not provided with the prosthesis itself. For this reason, the following steps were followed:

1. The incisal pin was secured with acrylic resin on the articulator in order to prevent alteration of the existing vertical dimension of occlusion.
2. A silicone index was made to indicate the position extent of the previous framework, so the newly fabricated framework would fit closely within the confines of the initial framework with minimal alteration of the existing overdenture.

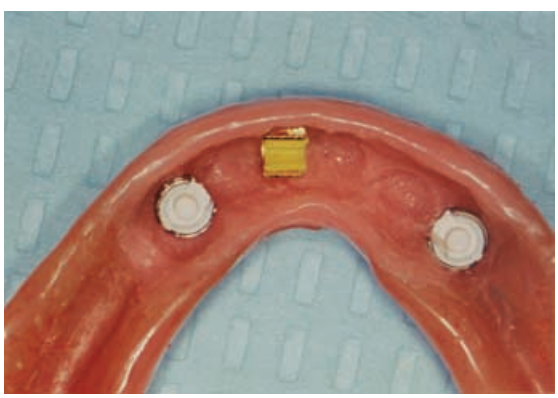

Figure 7. Retentive attachments, with their housings, picked up in the existing overdenture.

Conclusion

This clinical procedure can be applied in selected cases where the clinician decides to add or replace substructure implant framework components without replacing the existing removable prosthesis. At the same time, the patient is only briefly without the original prosthesis throughout the course of treatment, thereby greatly increasing patient satisfaction. Advantages of this technique include:

1. Providing the patient with a more retentive and stable prosthesis thereby improving masticatory function
2. Allowing the patient to keep the existing overdenture thereby avoiding the time and cost of fabricating a completely new prosthesis
3. Decreasing greatly any patient inconvenience or embarrassment, because the existing

overdenture is not taken away from the patient, except for a short time for the laboratory reline.

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