Full and Partial Removable Implant Prosthetics in the General Practice

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Educational objectives:

Upon completion of this course, participants should be able to achieve the following:

- Understand why attachment-retained overdentures are becoming the most popular type of removable implant prosthesis fabricated today.
- Learn the three-step protocol for successful implant overdenture master impressions.
- Learn how to use a new, thermoplastic impression tray as a custom tray.
- Learn how to use a new tracing device, called the Jaw Relation Recorder, for obtaining an accurate centric relation record.
- Learn how to perform an intra-oral pickup of Locator attachments into the processed denture base.
- Learn how to accomplish the border molding part of the master impression.
- Understand the purpose of the Aesthetic Control Base in establishing incisal edge position of the anterior denture teeth.
- Learn how to determine the proper height Locator abutment to use for each implant site.
The attachment retained implant overdenture has become the “go to” prosthesis for many of us in restorative practice. It’s easy to see why this transformation has happened. Like many other experienced restorative dentists, the sole removable implant prosthesis I used to fabricate was a bar-retained overdenture. However, about five years ago I could no longer ignore the positive results being noted by other clinicians and dental labs with attachment-retained overdentures. There are two primary reasons for this shift in preference: 1. Eliminating the bar results in lower case costs; and 2. Reduced technical difficulty for the clinician as a result of not having to make a bar casting fit passively.

Both of the above features are laudable advantages, but can we consider the attachment-retained overdenture to be as “good” as the bar-retained format? That determination might yet be open to debate but my personal experience, and that of many others, is very favorable for the attachment retained. One of the more telling trends is found by consulting high-volume dental implant labs. My discussions with these labs reveal that the percentage of full-arch removable implant cases they fabricate is much greater than fixed implant cases. Furthermore, the preponderance of removable implants cases are done with the attachment-retained format.

The following case illustrates a common treatment plan in our private practice as a solution for the fully edentulous arch. In addition, this case includes a growing trend to use implants, sparingly at times, for the partially edentulous case.

Our patient was a 71-year-old male with a failing dentition. All remaining teeth in the maxilla were deemed hopeless due to extensive caries and periodontal disease induced bone loss (Figure 1). We reviewed all options for treatment with the patient who ultimately chose to have an immediate maxillary denture placed at the time of extractions followed by an attachment-retained implant overdenture. All other options were reviewed including a fixed implant prosthesis and a bar retained overdenture. The patient’s choice was based on the economy, simplicity and relative ease of cleansibility of the attachment overdenture. In the mandibular arch, #s 19, 21 and 30 required extraction due to unrestorable caries. The patient agreed to have one implant placed on the edentulous right posterior area to aid in retention of a cast frame removable partial denture.

Following maxillary extractions and placement of the immediate denture, the remaining maxillary arch was bone grafted by the oral surgeon. Three Nobel Biocare Replace (Nobel Biocare, Yorba Linda, California) 4.3mm diameter implants were placed in approximately the #’s 4, 6, and 11 sites. One 5.0mm diameter Nobel Biocare Replace implant was placed in the #14 site (Figure 2). The patient’s immediate denture was relined with Visco-Gel (Dentsply, Milford, Delaware) material to prevent micro-movement or damage to the newly placed implants and graft. Protection of the graft and/or implants is critical to reducing the possibility of damage from hard surface acrylic denture base material.

After removal of the hopeless mandibular teeth a 4.3mm diameter Nobel Biocare Replace implant was placed by the surgeon in the #28 site. The patient agreed to have additional implants placed in the lower arch if needed for better retention of the mandibular removable partial denture (RPD) in the future – most likely in the #21 extraction site.

The final restorative phase began after a four-month implant integration period. The maxillary overdenture impression was made with the Massad three-step method. This impression technique includes:

1. Tray stops.
2. Border molding.
3. Wash and impression coping impression.

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Closed tray impression copings were threaded into all maxillary implants (Figure 3). A panoramic radiograph confirmed complete seating of the copings prior to initiating the master impression. The Strong-Massad Denplant (Global Dental Impression Trays, Inc., Tulsa, Oklahoma) impression tray was correctly sized prior to the first step. This impression tray is heat moldable, meaning that it can be bent upon heating with a Blazer micro torch and adapted to the ridge anatomy. The goal is to provide about 1-2mm of space between the impression tray interior and arch form for adequate impression material thickness. Heating and shaping the tray to the patient’s ridge contours is followed by cooling the tray in room temperature water. The tray material has no memory and will not rebound to its original shape but it retains its rigidity. Thus the DenPlant impression tray becomes accurately adapted without the usual time and expense involved in making a traditional custom tray. Due to the crystal clarity of the DenPlant tray, it could be seen that the impression copings did not touch the interior of the tray (Figure 4).

The tray stops were made using Aqua Sil Ultra Heavy impression material (Fast Set, Dentsply, Milford, Delaware). Four areas received the impression material and the tray was inserted into the mouth about 2mm short of the vestibule limits. Creation of these tray stops eliminates the possibility of overseating the tray in subsequent steps (Figure 5). Next border molding was also done using Aqua Sil Ultra Heavy impression material (Figure 6). After insertion into the mouth, I manually border molded the anterior frenum and cheeks. Then the patient was instructed to perform a “pooch and smile” movement that further refined the buccal vestibule areas. Opening widely produced an imprint of the hamular frenum area and occluding the patient’s nostrils while having him cough forcefully created a post-dam imprint.

The final impression step was made by injecting Aqua Sil Light Viscosity around the four impression copings, repeated border molding also with Aqua Sil Light viscosity, and placing Monophase (medium viscosity) in the trough of the tray where the impression copings were to be located (Figure 7). This medium viscosity material provides rigidity to the impression when pouring the master cast. Using fast set impression material allows us to complete the master impression in about 10 minutes. An important tip during these procedures is to have the patient or an assistant hold the cheeks out of the way with metal retractors. This allows for an unimpeded placement of the impression tray into the mouth without dragging impression material against the lips.

The four upper impression copings were removed from the implants, joined to implant analogs, and replaced into the master impression. The impression was ready to send to the dental lab for pouring the maxillary master cast. An identical impression technique was followed for the mandibular master impression, i.e. DenPlant tray sizing, tray stops, border molding and wash impression. The single lower right implant received a closed tray impression coping also for this impression. Both impressions complete with impression copings and analogs inserted were sent to the dental lab to pour the master casts. The patient was then dismissed with his interim soft lined denture replaced.

The dental technician fabricated two maxillary baseplates. The first of these, called the Aesthetic Control Base (ECB) had a wax rim attached and was used to complete a facebow transfer procedure. With the ECB placed in the mouth the incisal edge position was determined by contouring the wax rim about 1-2mm beyond the resting upper lip line. The midline and high smile lip line were also marked into the wax rim of the ECB. The ECB was then attached to a SAM 3 artic-
The Jaw Relation Recorder (GDIT, Tulsa, Oklahoma) was used to establish centric relation. This is a tracing device consisting of a maxillary striking plate attached to an upper baseplate and a ball bearing pin attached to the lower baseplate (Figure 8).

With the pin closed against the striking plate intra-orally, the patient moved his lower jaw forward and back and side to side. This action scribed an arrow on the striking plate, whose point represented centric relation (Figure 9). The upper and lower baseplates were then locked together at this centric relation position using Regisil Rigid bite registration material (Dentsply). The mandibular cast was mounted to the maxillary cast using this bite registration. The use of the Jaw Relation Recorder has proven to be a highly accurate and simplified method for registering centric relation.

The dental lab technician set denture teeth in wax for both arches and returned these setups to our office for the try-in appointment. A cast metal framework was fabricated and inserted into the baseplates for the try-in. Locator abutments (Zest Anchors, Carlsbad, California) were also selected for the proper height and their respective attachments were luted into the intaglia of the baseplates. Measuring from the gingival crest to the implant platform provides the correct abutment height with a 1.5mm supragingival retentive area to receive the Locator attachment.

At the try-in appointment the Locator abutments were threaded into all implant sites and both setups were inserted in the mouth. Evaluation of the patient's occlusion, phonetics, and aesthetics were made by the patient and the author. Pronouncing words with the “f,” “v,” “s,” “th” and “ch” sounds were spoken by the patient with satisfaction. Some of the maxillary baseplate palatal coverage was eliminated and found to be highly pleasing to the patient versus the full palatal coverage of his immediate full denture. The mandibular removable partial denture try-in also verified sufficient retention with the single right side Locator abutment and attachment.

Photos of the setups in wax were made in various poses and from different angles. These photos were then shown to the patient on the computer monitor in the operatory for his approval. We find it helpful to view the try-in from both frontal and lateral angles and with multiple levels of lip retraction, i.e. lips at rest, slight smile elevation, and full smile. Most patients prefer some degree of asymmetry with the anterior maxillary setup, which can be provided by slight rotation of the lateral incisors and/or cuspids (Figure 10).

The setups were processed in acrylic and returned to our office for delivery. The four maxillary Locator abutments were seated into the implants and torqued to 20 NCM with the Nobel Biocare torque wrench (Figure 11). As instructed, the lab processed only the two anterior attachments into the completed maxillary overdenture leaving room for me to pickup the two posterior attachments at delivery (Figure 12). In my experience the accuracy of seating all four attachments after processing has been somewhat inconsistent. Therefore, I have chosen to have two sites lab processed and to pickup the other two intra-orally in most cases.

Locator metal housings with black (less than 1 lb. retention) attachments were placed on the two posterior maxillary abutments for the intra-oral pickup procedure. A white gasket was then snugged around the housing below its threaded exterior in order to keep excess resin material from becoming locked into an undercut. The material of choice for this pickup procedure is ERA Pickup resin and bonding...
agent. (Sterngold, Attleboro, Massachusetts). ERA Pickup material was placed into the reamed out receptacle area of the denture interior. A small amount was also syringed onto the metal housing in the mouth. The overdenture was snapped onto the two anterior abutments and the patient instructed to closed fully, but lightly, into occlusion. The dual cure resin was initiated with a hand held curing light placed on the buccal and lingual aspects of the denture acrylic. The overdenture was then removed from the mouth and the pickup of the two posterior housings/attachments was confirmed (Figure 13). Excess flash of the resin was easily removed with a scaler since the ERA Pickup material sticks only to denture acrylic where the bonding agent is painted.

The single lower Locator abutment, processed at the dental lab, was seated and the mandibular removable partial denture delivered without difficulty (Figures 14 & 15). The patient’s occlusion and phonetics were approved prior to completion of the appointment (Figure 16). Post-delivery appointments required minimal sore spot adjustments. The maxillary overdenture was retained with the anterior two blue (1 lb) and the two posterior black (less than 1 lb.) retention attachments. Once the patient had acclimated to the overdenture, the two posterior attachments were changed to blue (1 lb.) retention levels.

This case exemplifies a trend we have seen in many dental practices in which the edentulous maxillary arch is successfully treated with only four implants using individual attachments. It is important to stress that longevity of these types of implant prostheses requires further evidence of success. However many clinicians and labs are reporting excellent results with cases in function for over three-to-five years. Our patient reports being able to enjoy a range of foods comparable to any dentate patient. The added convenience of a palateless design adds yet another dimension of satisfaction to dining with a heightened sense of taste and texture which is denied to the conventional denture patient. Furthermore, I find it personally amazing that his single lower implant provides a measure of retention for the mandibular removable partial denture beyond that seen with conventional clasping. Particularly in this era of economic distress, the ability to provide this level of service to our patients with a minimum number of implants is more attractive than ever (Figure 17). The use of the materials mentioned here including new impression trays and methods, jaw relation recording device, and user-friendly material to pick up the implant attachments intra-orally allow the dentist to complete these cases with fewer appointments and greater accuracy.

Dr. Samuel Strong has lectured and published widely on implant prosthetics and aesthetic dentistry for over 15 years. He has a general practice focusing on these areas in Little Rock, Arkansas. Dr. Strong is a Diplomate of the International Congress of Oral Implantologists and member of the American Academy of Cosmetic Dentistry and American Academy of Fixed Prosthetics, among others. He also is host of the internet radio show “Dentistry for the Baby Boomers” and co-developer of the Massad Edentulous Impression Tray System. Dr. Strong’s unique practical style of lecture has received acclaim from numerous dental audiences throughout the U.S. and abroad.

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1. What are two primary reasons for the popularity of attachment retained overdentures versus fixed implant prostheses?
   a. Reduced case costs and reduced technical difficulty.
   b. Reduced case costs and fewer allergic patient reactions.
   c. Higher long term success rates with fixed implant prostheses.

2. The use of a soft liner in this article’s case was advocated in order to:
   a. Produce a thinner denture base.
   b. Prevent micro movement of the denture that could damage the newly placed graft and/or implants.
   c. Reduce the chance of denture base fracture.

3. The Jaw Relation Recorder has proven to be a highly accurate and simplified aid to procuring centric relation.
   a. True
   b. False

4. Being able to seat all four Locator attachments after denture processing has proven to be somewhat inconsistent for the author.
   a. True
   b. False

5. What type impression copings were placed into the implants for the master impressions?
   a. Open tray
   b. Closed tray
   c. Combination of open and closed tray

6. The case illustrated in this article reviews a trend for placement of how many implants associated with an attachment retained overdenture?
   a. Two
   b. Three
   c. Four
   d. Five

7. How much space is recommended between the impression copings and the tray interior?
   a. 0.5mm
   b. 1-2mm
   c. 3mm
   d. 3-4mm

8. What senses are improved by the implant retained overdenture compared to the conventional denture?
   a. Smell and cognition.
   b. Taste and texture.
   c. Taste and smell.
   d. Taste and vision.

9. When picking up a Locator housing and attachment intra-orally, what type of attachment is used?
   a. White
   b. Black
   c. Blue
   d. Red

10. What is the recommended position of the Aesthetic Control Base relative to the upper lip?
    a. Even with the upper lip at rest.
    b. 1mm shorter than the upper lip at rest.
    c. Even with the upper lip during smiling.
    d. 1-2mm longer than the upper lip at rest.

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