Efficient Placement of Implant Overdenture Attachments

INTRODUCTION
Attachment-retained implant overdentures are functionally superior to conventional dentures and are effective and cost-saving alternatives to fixed implant dental prostheses. In the mandible, the 2-implant overdenture is the least costly implant option,1 it offers a significant increase in retention and stability over a complete denture,2 and demonstrates a considerable improvement in quality of life.3 For these reasons, the mandibular 2-implant overdenture has been described as a standard of care for edentulous mandibles.4-6 Furthermore, solitary attachments have been shown to be as effective as bars for overdenture retention; there is no difference in implant prognosis,7 bars increase the cost of overdentures,8 they require more space,9 they do not improve retention or stability,10 and hygiene is more difficult with bars.11 The cost of 4 implants and a bar approaches that of a fixed dental prosthesis with no significant improvement in bone preservation or patient comfort compared with a mandibular overdenture with 2 implants.12

Short-term data also indicate high success rates for the 4-implant maxillary overdenture with solitary attachments. Cava llaro and Tarnow,13 on an admittedly small sample of 5 patients over a period of 48 months, documented 100% success with maxillary overdentures on 4 implants. Excel lentete et al14 demonstrated high success rates even after immediate loading protocols. These data indicate that solitary attachments for both mandibular and maxillary overdentures provide an acceptable implant prognosis and predictable retention while simplifying implant treatment protocols and reducing costs, making implant dentistry available to a larger segment of the population. Use of solitary implant attachments is therefore likely to become an established and regularly used restorative protocol.

Dentists now require materials and systems that facilitate the use and placement of the vast assortment of available implant attachments. The following patient presentation demonstrates chairside placement of attachments in an edentulous maxilla with 5 implants. The illustrated technique is also applicable to mandibular overdentures.

CASE REPORT
Diagnosis and Treatment Planning
A 63-year-old male patient presented to the office of the prosthodontist with a failing maxillary fixed dental prosthesis and discomfort in the area of the left second molar (Figure 1). Clinical and panoramic radiographic examination revealed that the mandibular teeth and prostheses were intact. Three implants with 3 splinted crowns replaced the premolars and first molar in the maxillary right posterior quadrant. Five endodontically treated teeth retained a fixed dental prosthesis from the maxillary right canine to the left second molar (Figure 2). The second molar abutment was deeply carious and the retainer was loose. To relieve the patient’s discomfort, the prosthesis had been sectioned distal to the canine abutment by the prosthodontist (Figure 3) and the molar extracted by the treating periodontist (Figure 4).

Definitive treatment options considered and discussed were: (1) retention of the 4 remaining maxillary teeth and a removable partial denture adjacent to the existing implant prosthesis; (2) extraction of the remaining teeth, additional implant placement with placement of a ceramo-metal fixed dental prosthesis; and (3) extraction of the remaining teeth and a bar retained removable overdenture or; (4) an implant overdenture retained by solitary attachments.

Primarily due to financial restraints, the patient, prosthodontist, and periodontist agreed upon 2 additional implants in
the maxillary left quadrant and an implant overdenture retained by 5 individual implant attachments. Due to a severe gag reflex, an open-palate prosthesis was planned.

**Initial Surgical and Prosthodontic Treatment**
Two dental implants were placed by the periodontist, with minimal divergence in relation to the existing implants, distal to the sectioned fixed dental prosthesis in the areas of the left first premolar and first molar (Figure 5). The patient continued to wear the existing fixed dental prosthesis during the integration period of 3 months. The prostheses were then removed from the teeth and existing implants, the remaining 4 endodontically treated teeth were extracted, healing abutments were placed on the 3 previously placed implants and an interim denture was seated over the 5 implants during healing of the extraction sites (Figure 6).

**Definitive Prosthodontic Therapy**
After a 3-month integration period, definitive prosthodontic therapy began with depth measurements from the implant platforms to the most coronal aspect of the surrounding gingival levels. Locator Implant Abutment (Zest Anchors) selection was predicated on these measurements. Selection of the shortest Locator Attachments (Zest Anchors) while maintaining the retention ring supragingival to the highest point of the gingival crest is advisable for several reasons: less hollow grinding of denture teeth is required, the denture base is not unduly weakened, and shorter attachments facilitate chairside seating of attachment housings.

Locator Abutments were seated on the implants and tightened to specified torque values (Figure 7). Locator Processing Spacers (Zest Anchors) were placed over the Locator Abutments to provide relief in the denture for chairside attachment of the Locator titanium caps (Zest Anchors) and males (Figure 8), and then the final impression was made. The cast was poured and the palatal extent of the open-palate prosthesis was demarcated (Figure 9). Denture teeth (SR Phonares [Ivoclar Vivadent]) were selected and arranged for a wax try-in (Figure 10), and the approved waxing was then processed with gingival characterization (Figure 11). The palate was reinforced with a metal subframe, and 5 recesses for chairside seating of the Locator Caps were provided by the incorporation of the processing spacers (Figure 12). Prior to attachment placement, complete basal seating of the prosthesis was ascertained with pressure indicating paste (Figure 13) and the occlusion was refined (Figure 14). Locator block-out spacer rings (Zest Anchors) were placed on the abutments followed by titanium caps with processing males (Figure 15).

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Chairside Attachment

A novel gingival-colored composite resin luting system (Quick Up [VOCO America], ideal for the chairside placement of implant attachments, was used to complete the implant overdenture. The kit (Figure 16) also includes Fit Test C&B, a silicone for checking interferences and for blocking out undercuts; Quick Up Adhesive to enhance retention between the denture base and Quick Up resin; and Quick Up LC, a light-cured flowable composite resin for filling voids in the cured material.

Another important application for Quick Up is inexpensively retrofitting existing dentures and rejuvenation of implant overdentures that require replacement of attachments. The method described below can be used when relining an overdenture or replacing misaligned or worn attachments.

First, Quick Up Test C&B silicone was injected into the overdenture recesses (Figure 17), the overdenture was seated over the attachment caps and the Quick Up Test C&B was allowed to set before the overdenture was removed (Figure 18). Potential interferences that were detected between the denture base and attachments were checked and eliminated. Next, a No. 8 round bur was used to place undercuts in the recesses (Figure 19) to provide mechanical retention between the denture base material and the Quick Up composite resin. Additionally, the same bur was used to place vent holes from the attachment recesses through the palatal surface of the overdenture to allow escape of excess resin (Figure 20).

Quick Up Adhesive was painted into the overdenture recesses to enhance retention between the denture base and the composite resin (Figure 21). Petroleum jelly was applied to basal surfaces of the denture to prevent unwanted adherence of excess resin (Figure 22). Using the small enclosed cartridge tip, Quick Up Test C&B was injected around potential undercut areas of the attachments that could impede removal of the prosthesis after the resin cured (Figure 23).

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ure 23). Quick Up luting resin was then injected about two thirds of the height of each recess and the overdenture was seated. (Figure 24). One method of seating the overdenture is to instruct the patient to gently close, and the author has found this approach to result in varied amounts of closing force for each individual patient, and some older patients have compromised motor control or slight tremors that might affect the accuracy of the registration. The author, thus, prefers to gently hold the prosthesis in place by hand (Figure 25) and

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has found this technique to result in more predictable control of the fit and retention of the attachments. After a total of 3 minutes, the overdenture with the incorporated caps was removed (Figure 26). Slight voids around the caps or in the access openings were filled with Quick Up LC, a matching light-cured flowable composite resin (Figure 27). Excess resin around the attachments was removed and refined with a No. 8 round bur. Quick Up resin that extruded through the palatal openings was smoothed and polished. This gingival colored composite resin blends nearly seamlessly with most denture resins. Appropriate Locator males that provided adequate retention, yet easy removal, were seated into the overdenture (Figure 28). In just a few days following seating, the patient was able to overcome his exaggerated gag reflex with the aid of the open palatal prosthesis (Figure 29). The implant retained overdenture met the patient’s aesthetic objective of age appropriate denture teeth (Figure 30) that blended with his existing mandibular crowns and teeth, and his functional and comfort goals of improved occlusion and mastication. (Figure 31).

CONCLUSION

Attachment retained implant overdentures have become a routine alternative to traditional removable dentures and a lower cost alternative to more complex fixed dental implant prostheses. As demonstrated, new materials can assist in efficient chairside seating of a myriad of implant attachments (such as studs, o-rings, clips, and others). An obvious advantage to placing attachments, as described in the case report above, is cost savings by decreasing laboratory fees and reducing chair time, but more importantly, it may be a more accurate method of attachment placement by giving the clinician complete control of attachment placement and elimination of inaccuracies caused by laboratory transfers.

Innovative dental materials and techniques which simplify the technical processes involved in restorative implant dental treatment present clinicians another incentive to offer these valuable services to a greater number of patients who would benefit from implant dentistry.

Acknowledgement

Dr. Priest would like to thank the team of dental technicians at Georgia Dental Lab for their consistent excellence and assistance with the work presented here.

References


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