A variety of techniques have been reported in the literature for the incorporation of attachments in implant-retained partial and complete overdentures with unsplinted or individual abutments. Three important elements that are necessary in describing any technique for incorporation of attachments are the type of final impression method (tissue-level impression, abutment-level impression, or implant-level impression), stage of overdenture fabrication (record base stage, denture-processing stage, or denture insertion stage) and nature of technique (direct or indirect). This article reviews 7 different techniques for the incorporation of attachments in implant-retained complete and partial overdentures. Discussion of indications, contraindications, advantages, and disadvantages of each technique is provided to aid the clinician in making an appropriate choice. (J Prosthodont Dent 2012;107:288-299)
and occlusion are generally needed at the denture insertion stage. During fabrication of implant-retained overdentures, this procedure is advantageous because attachments can be incorporated during the fabrication of the processed base itself. This can provide accurate engagement of the attachments over the abutments because of the reduced distortion attributable to the reduced volume of acrylic resin used for fabrication. A processed denture base may be preferred over an interim record base in situations with unfavorable maxillomandibular relationships or complicated anatomy such as maxillofacial defects. The disadvantage of the processed denture base includes the need for an additional laboratory step, resulting in increased treatment cost and time.

The 3 important elements necessary in describing any technique for incorporation of attachments are: 1) type of final impression method; 2) stage of overdenture fabrication; and 3) nature of technique. The choice of the final impression method is critical because it determines the subsequent clinical and laboratory steps and therefore dictates the method of attachment incorporation into the prosthesis. Depending upon the clinical situation, the final impression technique can be accomplished through: a) conventional tissue-level impression independent of the implants; b) abutment-level impression; or c) implant-level impression. The stage of overdenture fabrication is necessary for description of a technique because inclusion of attachments can be performed at: a) record base stage; b) denture processing stage; or c) denture insertion stage. Finally, the nature of technique is important for description because inclusion of attachments can be performed by: a) direct technique or b) indirect technique. Various factors affecting choice of technique for incorporating attachments for implant-retained overdentures are described in Table I. The purpose of this article is to review various techniques for incorporating attachments in implant-retained overdentures with unsplinted abutments, and discuss their indications, contraindications, advantages, and disadvantages.

### TECHNIQUES FOR INCORPORATING ATTACHMENTS

Each technique listed below is described by the type of final impression method, stage of overdenture fabrication when attachments are incorporated, and inherent nature of the technique (Table II).

<table>
<thead>
<tr>
<th>Table I. Factors affecting choice of technique for incorporating attachments for implant-retained partial and complete overdentures</th>
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<tbody>
<tr>
<td>1. Choice of prosthetic design (splinted versus unsplinted abutments)</td>
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<td>2. Chronology of implant placement with respect to prosthesis</td>
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<tr>
<td>3. Number and position of implants</td>
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<td>4. Angulations of implants</td>
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<td>5. Prosthetic space availability</td>
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<tr>
<td>6. Choice of attachment system</td>
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<tr>
<td>7. Need for processed denture bases</td>
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<td>8. Complexity of maxillomandibular relationships</td>
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<td>9. Changes in tissues after implant surgery</td>
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<td>10. Operator preference</td>
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<td>11. Availability of inventory for prosthetic components</td>
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<td>12. Cost</td>
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1. After the preliminary impressions, perform border molding and final impression procedures independent of the implants and fabricate a definitive cast.

2. Adapt a 2-sheet thickness of base-plate wax on the definitive cast and fabricate the processed denture base according to conventional techniques.12

3. Confirm intimate adaptation of the processed denture base with the underlying tissues and any remaining teeth intraorally (for partial overdentures) by using a pressure indicating paste (Mizzy Inc, Cherry Hill, NJ).

4. Drill relief holes in the processed base in the recorded areas corresponding to the positions of the healing abutments of the implants (Fig. 1A).

5. Place the desired abutments and torque them according to implant manufacturer’s instructions and then place the corresponding attachments on the abutments (Fig. 1B). For 2-stage implant surgeries, the exposure of the implant, placement of healing abutment, and tissue healing precede the final impression procedure.

6. Ensure the relief holes are large enough to establish a passive path of insertion and removal of the processed denture base over the attachments.

7. After appropriate moisture control and blockout procedures, inject autopolymerizing acrylic resin or light-activated acrylic resin into the relief holes. After polymerization, confirm stability and adequate encasement of the attachment housing in the acrylic resin (Fig. 1C). Similarly, for clinical situations with cast metal partial removable dental prostheses, use autopolymerizing acrylic resin to complete the record base on the metal framework and drill relief holes to incorporate the attachments. Ensure that retentive loops are used around the implants to allow space for the acrylic resin.

8. Insert the definitive attachment into the metal housing and confirm adequate engagement of the abutments intraorally.
**TABLE II.** Summary of indications, advantages, and disadvantages of 7 different techniques for incorporating attachments in implant-retained partial and complete overdentures

<table>
<thead>
<tr>
<th>Technique</th>
<th>Description</th>
<th>Indications</th>
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<tbody>
<tr>
<td>Tissue-level impression, record base stage, direct technique</td>
<td>Make tissue-level final impression independent of implants, fabricate processed denture base and directly incorporate attachments through relief holes</td>
<td>1. Presence of relatively parallel implants. 2. Situations with unfavorable maxillomandibular relationships or complicated anatomy such as maxillofacial defects. 3. Patient has normal range of mouth opening.</td>
</tr>
<tr>
<td>Tissue-level impression, denture insertion stage, direct technique</td>
<td>Make tissue-level final impression independent of implants, fabricate definitive denture and directly incorporate attachments through relief holes in denture.</td>
<td>1. When implants are planned on being placed after fabrication of denture, provided that no alveoloplasty will be performed. 2. When clinician desires to directly incorporate attachments after definitive denture has been fabricated. 3. Presence of relatively parallel implants. 4. Patient has normal range of mouth opening.</td>
</tr>
<tr>
<td>Tissue-level impression, denture insertion stage, indirect technique</td>
<td>Make tissue-level final impression independent of implants, fabricate definitive denture and indirectly incorporate attachments through laboratory reline of denture.</td>
<td>1. When clinician desires to incorporate attachments after definitive denture has been fabricated. 2. When implants are planned on being placed after fabrication of denture. 3. When alveoloplasty will be performed for prosthesis space purposes or when significant change in tissue morphology occurs after implant surgery.</td>
</tr>
<tr>
<td>Abutment-level impression, record base stage, indirect technique</td>
<td>Make abutment-level final impression and fabricate processed denture base incorporating attachments indirectly.</td>
<td>1. When clinician desires superior retention and stability of denture base for maxillomandibular relationship records. 2. Situations with unfavorable maxillomandibular relationships or complicated anatomy such as maxillofacial defects. 3. Additional support for interim prosthesis is needed during treatment period.</td>
</tr>
<tr>
<td>Abutment-level impression, denture processing stage, indirect technique</td>
<td>Make abutment-level final impression and incorporate attachments indirectly during final denture processing on definitive cast.</td>
<td>1. When there are fewer implants that are relatively parallel. 2. Additional support for interim prosthesis is needed during treatment period.</td>
</tr>
<tr>
<td>Implant-level impression, record base stage, indirect technique</td>
<td>Make implant-level final impression, choose attachment system and fabricate processed denture base incorporating attachments indirectly.</td>
<td>1. When implants do not appear to have acceptable angulations or if clinician is not sure of implant parallelism. 2. When prosthetic space needs to be determined or re-assessed before selection of attachment system. 3. When clinician does not have inventory of abutments of various heights. 4. Situations with numerous implants.</td>
</tr>
<tr>
<td>Implant-level impression, denture processing stage, indirect technique</td>
<td>Make implant-level final impression, choose attachment system and incorporate attachments during final denture processing indirectly.</td>
<td>1. When implants do not appear to have acceptable angulations or if clinician is not sure of implant parallelism. 2. When prosthetic space needs to be determined or re-assessed before selection of attachment system. 3. When clinician does not have an inventory of abutments of various heights. 4. Situations with 2 or fewer implants ideally. If not, metal base is needed to decrease amount of acrylic resin used for final denture processing and hence lesser distortion.</td>
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</table>
### TABLE II. Summary of indications, advantages, and disadvantages of 7 different techniques for incorporating attachments in implant-retained partial and complete overdentures

<table>
<thead>
<tr>
<th>Technique Description</th>
<th>Indications</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct technique</td>
<td>1. When clinician desires to incorporate attachments after definitive denture has been fabricated.</td>
<td>1. No stains or porosity on polished surface of definitive denture.</td>
<td>1. Potential for misfit of attachments due to polymerization distortion during denture processing.</td>
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<td>2. Situations with unfavorable maxillomandibular relationships or complicated anatomy such as maxillofacial defects.</td>
<td>2. Provides opportunity to try various abutments and attachment systems in laboratory.</td>
<td>2. Potential for misfit of attachments due to polymerization distortion during denture processing.</td>
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<td>3. Presence of relatively parallel implants.</td>
<td>3. Stocking an inventory of abutments of various heights is not necessary.</td>
<td>3. Difficult to use in situations with numerous implants or non-parallel implants.</td>
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<td></td>
<td>4. Cannot be used when denture should be made prior to implant surgery.</td>
<td>4. Final fit and accuracy of denture can be confirmed early on.</td>
<td>4. Cannot be used when denture should be made prior to implant surgery.</td>
</tr>
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<td></td>
<td>5. Difficult to use in situations with non-parallel implants.</td>
<td>5. Advantageous in situations with unfavorable maxillomandibular relationships or complicated anatomy such as maxillofacial defects.</td>
<td>5. Laboratory errors may result in additional steps.</td>
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<td>6. Need for less acrylic resin during definitive denture processing, so lesser distortion.</td>
<td>6. Better stability of record bases for maxillomandibular relationship records and wax trial dentures.</td>
<td>6. Cannot be used when denture should be made prior to implant surgery.</td>
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<tr>
<td></td>
<td>7. Less adjustments of fit and occlusion at insertion.</td>
<td>7. Need for less acrylic resin during definitive denture processing, so lesser distortion.</td>
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| Indirect technique                          | 1. When clinician does not have inventory of abutments of various heights. | 1. Accuracy of attachment seating can be confirmed instantly.             | 1. Additional laboratory procedure.                                                                 |
|                                             | 2. Situations with unfavorable maxillomandibular relationships or complicated anatomy such as maxillofacial defects. | 2. Single step procedure.                                                 | 2. Increased laboratory expenses.                                                                    |
|                                             | 3. Presence of relatively parallel implants.                                | 3. Allows occlusion-directed seating of definitive prosthesis over implant components. | 3. Laboratory errors can result in additional procedures and increased time.                        |
|                                             | 4. Cannot be used when denture should be made prior to implant surgery.     | 4. Less expensive than indirect technique.                                 | 4. Need for stocking inventory of abutments of various heights.                                      |
|                                             | 5. Difficult to use in situations with non-parallel implants.               | 5. Dentures can be made before implant placement.                          |                                                                                                     |

*Note: The above table is a summary of indications, advantages, and disadvantages of 7 different techniques for incorporating attachments in implant-retained partial and complete overdentures.*
9. Lubricate the intaglio surface of the processed base with petroleum jelly, place corresponding analogs into the attachments, and then develop a remount cast before proceeding with subsequent steps of denture fabrication.

Tissue-level impression, denture insertion stage, direct technique

1. Perform routine border molding and final impression procedures independent of the implants and fabricate a definitive cast.

2. Fabricate the definitive denture according to conventional prosthodontic principles. Verify the retention, stability, and occlusion of the definitive denture.

3. Place the desired abutments and torque them according to implant manufacturer’s instructions and then place the corresponding attachments on the abutments.

4. Transfer the positions of the attachments to the intaglio surface of the denture with an ink stick (Dr. Thompson’s Sanitary Color Transfer Applicators; Great Plains Dental Products Inc, Kingman, Kan).

5. Drill relief holes in these positions and establish a passive path of insertion and removal of the denture over the attachments (Fig. 2A).

6. After appropriate moisture control and block-out procedures, inject auto-polymerizing acrylic resin or light-activated acrylic resin into the relief holes while stabilizing the denture (Fig. 2B). Ask the patient to gently close into centric occlusion.

7. After polymerization, confirm stability and adequate encasement of the attachment housing in the acrylic resin.

8. Insert the definitive attachment into the metal housing and confirm adequate engagement of the abutments intraorally.

9. Adjust the polished surfaces of the denture for patient comfort. Instead of a relief hole, note that a relief area may be created inside the denture to create space for new acrylic resin to encase the attachment.

Note that this procedure has the advantage of maintaining the integrity of the polished surfaces but has the disadvantage of not allowing visual confirmation of accurate placement of the attachment over the abutment as well as errors in occlusion.

1. A, Relief holes drilled into processed denture base fabricated for implant-supported mandibular resection prosthesis (partial overdenture). Holes were drilled based on positions of healing abutments recorded by tissue level impression. B, Locator abutments were selected for treatment and were torqued according to implant manufacturer’s recommendations. C, Intaglio surface of processed denture base showing encasement of attachments in auto-polymerizing resin that was injected into relief holes. Additional acrylic resin was added around deficient areas, and black processing caps were replaced by definitive patrices before proceeding with maxillomandibular relationships.

2. A, Relief holes drilled into definitive denture shows passive seating over abutments and attachments. Also note use of block-out spacer material (white) to prevent acrylic resin from being locked in undercut areas. B, Autopolymerizing resin injected into relief holes to connect attachments to definitive denture. Manual stabilization of denture preceded patient’s closure into centric occlusion during polymerization of acrylic resin.

3. Intaglio surface of definitive denture showing relief areas drilled in sites corresponding to implant abutments and attachments. Polyether impression tray adhesive was applied on denture before relining. B, Denture relined with light-body polyether impression material incorporating Locator attachments with black processing caps. C, Intaglio surface of definitive denture after being relined with heat-polymerized acrylic resin incorporating Locator attachments. Black processing caps were replaced by definitive patrices at denture insertion.
9. Lubricate the intaglio surface of the processed base with petroleum jelly, place corresponding analogs into the attachments, and then develop a re-mount cast before proceeding with subsequent steps of denture fabrication.

Tissue-level impression, denture insertion stage, direct technique

1. Perform routine border molding and final impression procedures independent of the implants and fabricate a definitive cast.

2. Fabricate the definitive denture according to conventional prosthodontic principles. Verify the retention, stability, and occlusion of the definitive denture.

3. Place the desired abutments and torque them according to implant manufacturer’s instructions and then place the corresponding attachments on the abutments.

4. Transfer the positions of the attachments to the intaglio surface of the denture with an ink stick (Dr. Thompsen’s Sanitary Color Transfer Applicators; Great Plains Dental Products Inc, Kingman, Kan).

5. Drill relief holes in these positions and establish a passive path of insertion and removal of the denture over the attachments (Fig. 2A).

6. After appropriate moisture control and block-out procedures, inject autopolymerizing acrylic resin or light-activated acrylic resin into the relief holes while stabilizing the denture (Fig. 2B). Ask the patient to gently close into centric occlusion.

7. After polymerization, confirm stability and adequate encasement of the attachment housing in the acrylic resin.

8. Insert the definitive attachment into the metal housing and confirm adequate engagement of the abutments intraorally.

9. Adjust the polished surfaces of the denture for patient comfort. Instead of a relief hole, note that a relief area may be created inside the denture to create space for new acrylic resin to encase the attachment. Note that this procedure has the advantage of maintaining the integrity of the polished surfaces but has the disadvantage of not allowing visual confirmation of accurate placement of the attachment over the abutment as well as errors in occlusion.

2 A, Relief holes drilled into definitive denture shows passive seating over abutments and attachments. Also note use of block-out spacer material (white) to prevent acrylic resin from being locked in undercut areas. B, Autopolymerizing resin injected into relief holes to connect attachments to definitive denture. Manual stabilization of denture preceded patient’s closure into centric occlusion during polymerization of acrylic resin.

3 A, Intaglio surface of definitive denture showing relief areas drilled in sites corresponding to implant abutments and attachments. Polyether impression tray adhesive was applied on denture before relining. B, Denture relined with light-body polyether impression material incorporating Locator attachments with black processing caps. C, Intaglio surface of definitive denture after being relined with heat-polymerized acrylic resin incorporating Locator attachments. Black processing caps were replaced by definitive patrices at denture insertion.

Tissue-level impression, denture insertion stage, indirect technique

1. Make a conventional final impression of the tissues independent of the implants, and fabricate the definitive denture according to standard prosthodontic principles. Verify the retention, stability, and occlusion of the denture.

2. Place the desired abutments and torque them according to implant manufacturer’s instructions and then place the corresponding attachments on the abutments.
3. Transfer the positions of the attachments to the processed base with an ink stick (Dr. Thompson’s Sanitary Color Transfer Applicators; Great Plains Dental Products Inc).

4. Drill relief areas in these positions to allow sufficient encasement of the attachments by the impression material and apply impression tray adhesive on the intaglio surface of the denture (Fig. 3A).

5. Load the denture with light body impression material and place the denture over the tissues and implant attachments and ask the patient to gently close into centric occlusion.

6. After the material has polymerized, carefully remove the denture from the mouth and confirm stability and adequate encasement of the attachment in the impression material (Fig. 3B).

7. Insert abutment analogs into the attachments and pour a definitive cast. Perform denture flasking procedures and at wax elimination stage, separate the 2 halves of the flask and peel out the impression material from the denture. Replace the attachments on the analogs on the drag (lower) compartment of the flask.

8. Mix heat-polymerized acrylic resin and process the denture reline according to conventional laboratory procedures.

9. At denture insertion, place the definitive attachment into the metal housing and confirm adequate engagement of the abutments. Evaluate the occlusion and intimate contact of the denture with the underlying tissue (Fig. 3C). If an attachment fails to seat accurately on the corresponding abutment, remove the acrylic resin around the attachment and carefully separate it from the prosthesis. Replace the attachment on the abutment and attach it to the denture using a direct technique.

Abutment-level impression, record base stage, indirect technique

1. After selection of the attachment system, torque the abutments according to the implant manufacturer’s recommendations.

2. Perform border-molding procedures and place impression copings on the abutments (if indicated by the selected attachment system).

3. Make a final impression of the tissues and implant abutments (Fig. 4A).

4. Place corresponding analogs into the impression copings and fabricate a definitive cast (Fig. 4B).

4 A, Maxillary abutment-level final impression with light-body vinyl polysiloxane material showing impression encasement of impression copings placed on Locator abutments. B, Definitive cast with Locator analogs prepared for fabrication of processed denture base. This patient had maxillofacial surgical defect on left side. C, Intaglio surface of processed denture base showing incorporation of attachments. Black processing caps were replaced by definitive patrices before proceeding with maxillomandibular relationships.
5. Place the corresponding laboratory attachments (matrices or patricia) on the analogs and eliminate undercuts beneath the attachments to prevent excessive acrylic resin from polymerizing in this region.19

6. Adapt a 2-sheet thickness of baseplate wax on the definitive cast and fabricate the processed denture base according to standardized techniques.12

7. After polymerization, confirm stability and adequate encasement of the attachment housing (Fig 4C).

8. Insert the definitive attachment into the metal housing and confirm engagement of the abutments intraorally.

9. Lubricate the intaglio surface of the processed base with petroleum jelly, place corresponding analogs into the attachments, and then develop a remount cast before proceeding with subsequent steps of denture fabrication. If an attachment fails to seat accurately on the corresponding abutment, remove the acrylic resin around the attachment and carefully separate it from the processed base. Replace the attachment on the abutment and attach it to the denture using a direct technique.

**Implant-level impression, record base stage, indirect technique**

1. On a preliminary cast, fabricate a custom tray for an implant-level impression procedure.

2. Perform border-molding procedures by using the custom tray.

3. Remove the healing abutments from the implants and insert appropriate impression copings and make an implant-level final impression.

4. Place corresponding implant analogs and tissue moulage and fabricate a definitive cast (Fig. 6A).

5. Select the appropriate attachment system and hand tighten the abutments into the analogs on the cast.

6. Place the corresponding laboratory attachments (matrices or patricia) on the analogs and eliminate undercuts.

7. Adapt a 2-sheet thickness of baseplate wax on the definitive cast and fabricate the processed denture base according to conventional techniques.12

**Implant-level impression, denture-processing stage, indirect technique**

1. On a preliminary cast, fabricate a custom tray for an implant-level impression procedure.

2. Perform border-molding procedures with the custom tray.

3. Remove the healing abutments from the implants, insert appropriate impression copings, and make an implant-level final impression.

4. Place corresponding implant analogs, tissue moulage, and fabricate a definitive cast and select the appropriate attachment system.

5. In situations with 1 or 2 implants, perform the subsequent steps of maxillomandibular relationship records and trial denture insertion and proceed with denture processing. In situations with more than 2 implants, fabricate a metal base on the definitive cast with retentive loops around the implants before proceeding with the subsequent steps and denture processing (Fig. 7A). Note that the metal base adds strength and also minimizes the amount of polymerization distortion.
A, Mandibular abutment-level final impression with light-body polysulfide impression material showing impression of ball abutments and tissues. B, Definitive cast with ball abutment analogs prepared for fabrication of definitive denture. Note that median implant in patient was not used for retentive purposes, but only used as indirect retainer. C, Intaglio surface of definitive denture showing incorporating of attachments (Preci-Clix; Preat Corporation). Definitive matrices (yellow) have been placed into housings.

A, Definitive cast fabricated from implant-level impression to analyze prosthetic space and to choose appropriate attachment system before fabricating processed denture base. B, Intaglio surface of processed denture base showing incorporation of Locator attachments. Definitive patrices (pink) have been placed into metal housings before proceeding with maxillomandibular relationships. C, Locator abutments were torqued on 4 implants, before evaluating processed denture base with corresponding attachments.

6. At the wax elimination stage of denture processing, hand tighten the abutments into the analogs on the definitive cast (Fig. 7B).

7. Place the corresponding laboratory attachments (matrices or patrices) on the analogs and eliminate undercuts.

8. Mix heat-polymerized acrylic resin and process the denture according to conventional laboratory procedures.12

9. After polymerization, confirm stability and adequate encasement of the attachment housing.

10. Insert the selected abutments intraorally and torque them according to the implant manufacturer’s instructions.

11. Insert the definitive attachment into the metal housing and confirm engagement of the abutments, occlusion, and intimate contact of the denture with the underlying tissue (Fig. 7C). If an attachment fails to accurately seat on the corresponding abutment, remove the acrylic resin around the attachment and carefully separate it from the prosthesis. Replace the attachment on the abutment and attach it to the denture using a direct technique.

DISCUSSION

Each of the 7 techniques reviewed in this article for incorporating attachments to the overdenture have unique indications, advantages and disadvantages. While the type of impression material, attachment acrylic resin and attachment system is the clinician’s preference, understanding the rationale of each of these techniques can help making the appropriate choice for a given clinical situation. The direct technique can be performed at the record base stage or at the denture insertion stage. Both techniques are indicated when the implants are relatively parallel and the patient has an adequate mouth opening. They are not indicated when implants have severe misalignments, prosthetic space issues or when the patient is unable to open their mouth adequately.
A, Definitive cast fabricated from implant-level impression to analyze implant angulations. Metal base was fabricated to reduce amount of acrylic resin needed for definitive denture processing and minimized distortion. B, At wax-elimination stage, final abutments (spherical/ball abutments) were hand-tightened on definitive cast and corresponding attachments were placed on them before denture processing. C, Intaglio surface of definitive denture showing incorporating of attachments (Preci-Clix) Definitive matrices (white) placed into housings.

9. After polymerization, confirm stability and adequate encasement of the attachment housing.

10. Insert the selected abutments intraorally and torque them according to the implant manufacturer’s instructions.

11. Insert the definitive attachment into the metal housing and confirm engagement of the abutments, occlusion, and intimate contact of the denture with the underlying tissue (Fig. 7C). If an attachment fails to accurately seat on the corresponding abutment, remove the acrylic resin around the attachment and carefully separate it from the prosthesis. Replace the attachment on the abutment and attach it to the denture using a direct technique.

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This may be compounded if there are errors in the laboratory procedures, requiring additional chairside corrective procedures. It can be argued that the expenses resulting from additional laboratory procedures may be less than the expenses incurred due to increased chair time by the clinician, when using a direct technique. The authors identified no studies in the literature that compare these experiences. However, a recent study on long-term prosthetic maintenance has shown that the direct technique has fewer maintenance issues than the indirect technique.8

SUMMARY

This article described indications, contraindications, advantages, and disadvantages of 7 techniques for incorporating attachments for implant-retained overdentures. The choice of attachment incorporation technique and the choice of a final impression technique for the overdenture are interrelated. This is because the selection of a final impression method determines the subsequent clinical and laboratory steps and therefore dictates the method of attachment incorporation into the prosthesis. The 3 different final impression methods used for overdentures include tissue-level impression, abutment-level impression, and implant-level impression. Depending upon the clinical situation, incorporating overdenture attachments can either be performed at the record base stage, denture processing stage, or denture insertion stage. Finally, inclusion of attachments can be performed by a direct technique or indirect technique. Each of the 7 techniques reviewed in this article has advantages and disadvantages, and a successful clinical outcome is dependent upon sufficient attention to detail.
Longitudinal clinical evaluation of undercut areas and rest seats of abutment teeth in removable partial denture treatment


Purpose: Adequate preparation of abutment for removable partial denture (RPD) rest seats appropriate masticatory force transmission, retention, and stability of supporting structures. It follows that careful preparation will be important for the longevity of the rehabilitation. The present study aimed to clinically evaluate rest seats and undercut areas of abutment teeth in RPD wearers after 2 years of use.

Materials and methods: A total of 193 occlusal, incisal, and cingulum rest seats were evaluated in terms of shape, rest adaptation, wear, caries, fractures, and surface type (enamel, composite resin, or amalgam). Two hundred and fourteen undercut areas were evaluated in terms of surface type (enamel or restoration) and integrity. This study was approved by the Research Ethics Committee of the Federal University of Rio Grande do Norte, resolution 196/1996, protocol number 11/05.

Results: Intact preparations accounted for 92.2% of the total. Application of the Pearson test ($P=0.289$) found no statistically significant differences among the materials on which the rest seats were prepared. For the undercut areas, 20.7% of those obtained on restorative material were nonintact. In addition, Fisher’s exact test showed a statistically significant difference ($P=0.001$) in surface type; enamel surfaces were shown to be 14 times more stable than restored surfaces.

Conclusions: The results of this study suggest that rest seats are stable, regardless of the material on which they are prepared. Retentive areas were shown to be more stable when they were located in enamel.

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