

# IMPLANT PROSTHODONTICS: FROM SINGLE TOOTH TO COMPLEX CASES

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**O**verall interest in dental implants has grown significantly for many years. Most general dentists and prosthodontists are accomplishing this important part of dentistry. However, difficulty is encountered in accomplishing some of the laboratory procedures, and some dental laboratories have ceased to construct implant prosthodontics. Are there simple, predictable methods to accomplish typical, commonly needed implant prosthodontic procedures? Can some of the uncertainty about longevity of the prostheses be reduced? Are some of the techniques too complicated? Should fees for these procedures be as high as they are currently? These are a few of the questions that are asked by dentists, technicians, and patients. A few articles written by the author that support or further explain the concepts in this article are referenced.<sup>1-5</sup> This article addresses these and other questions, and presents several simple, practical, successful, and economical implant prosthodontic techniques practiced routinely by the author for many years.

## **SINGLE TOOTH, OR MULTIPLE CONTIGUOUS, SINGLE TOOTH REPLACEMENTS**

These implant prostheses are among the most simple types, but many dentists avoid using them in practice. There are several implant abutment interfaces, most of which adapt well to single tooth replacements. The two most used interfaces are the external

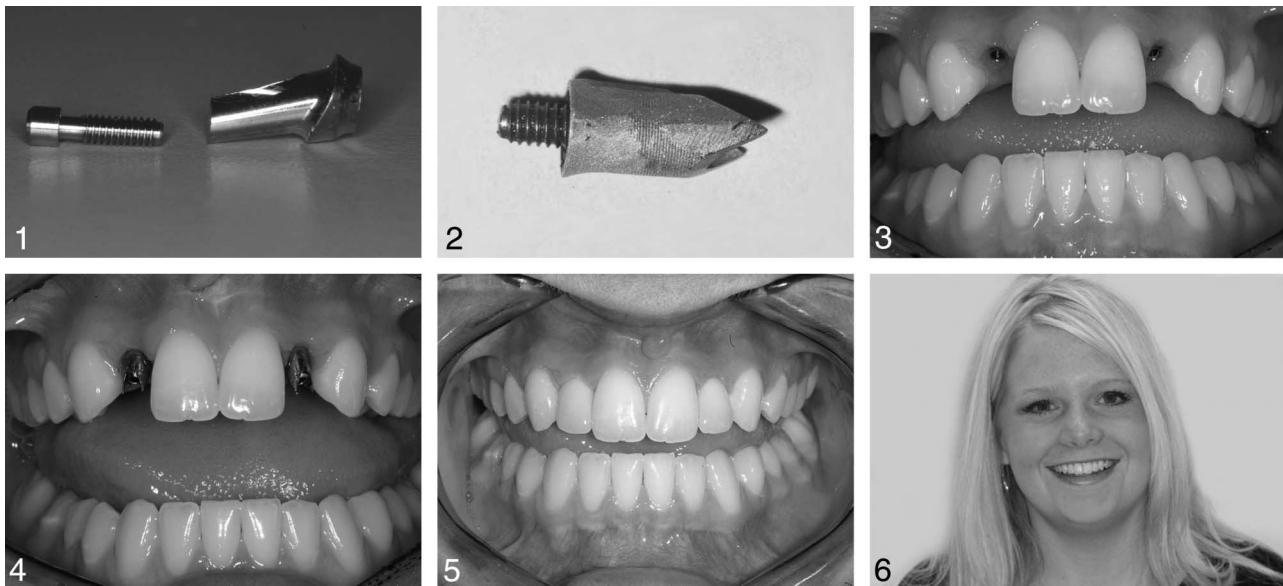
hexagonal or various types of internal antirotational features. Most implant companies provide numerous premanufactured abutments for single tooth replacements (Figure 1). Although some of these prefabricated abutments work well, the author prefers to make custom abutments, using UCLA-type cast laboratory abutments. The author does not prefer to make screw access in the occlusal surfaces of the crown; instead his preference is to cement the crown over the custom-made abutment (Figure 2). Reasons for this preference are the significant clinical time savings offered by this technique, the ability to obtain optimum aesthetic results by correcting almost any peculiar implant angulation, and the ability to choose either final or provisional cementation options.

Some clinicians prefer to use screw-retained prostheses. Since there has been no research to compare the acceptability of screw-retained or cemented prostheses over long periods of time, it appears that the decision as to which type of prosthesis to be used is one of clinician preference. There are quite obviously some advantages to screw-retained prostheses.

The following is the single-unit implant prosthesis technique (Figures 3 through 6). At the first restorative appointment:

1. Appropriate shade-taking procedures are accomplished, and the previously placed wide-diameter healing cap or custom acrylic resin

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FIGURES 1–6. FIGURE 1. Typical manufacturer's prefabricated abutment. FIGURE 2. Custom-made cast abutment. FIGURE 3. Implants placed by author in areas 7 and 10. FIGURE 4. Custom-made abutments placed on implants. FIGURE 5. Crowns cemented over abutments. FIGURE 6. Satisfied, beautiful patient.

- provisional restoration is removed from the implant.
2. An appropriate transfer coping is placed on the implant and evaluated for adequate fit. If the implant is in proper alignment with the natural teeth, a closed impression tray is used. If the implant is 15° or more from the alignment of the natural teeth, an open impression tray is used so the transfer coping can be unscrewed and removed with the impression.
  3. An impression is made in addition to reaction silicone in a Dentsply light-curing triad tray using heavy body material around the transfer coping and medium body for the remainder of the full arch impression.
  4. The healing cap or resin provisional is replaced, and the patient is dismissed. This entire appointment requires only a few minutes.

At the second restorative appointment:

1. The healing cap is removed, and the custom abutment is placed on the implant and evaluated for fit and anatomical acceptability.

2. The crown is placed over the abutment and evaluated.
3. Changes are made in the crown if necessary.
4. The abutment is seated onto the implant using either sealer only (Omnibond from Attachments International, San Mateo, Calif) or thin film thickness resin cement (Panavia F from Kuraray). The screw is torqued to a level considered appropriate, usually 30 Ncm.
5. The crown is seated over the abutment with *one* of the following procedures: (1) cotton is placed in the open coronal end of the abutment, and provisional cement such as Tempbond (Kerr, Orange, Calif) or Improv (Nobel Biocare, Yorba Linda, Calif) is used for cementation; (2) final cementation is accomplished with a thin film thickness resin cement, such as Panavia F.

When the prosthesis is cemented with a final resin cement, it is desirable to use a piece of floss, placing it deeply subgingival and moving it facial-lingually to remove any excess cement that has exuded from the marginal area. Radiography of the prosthesis af-

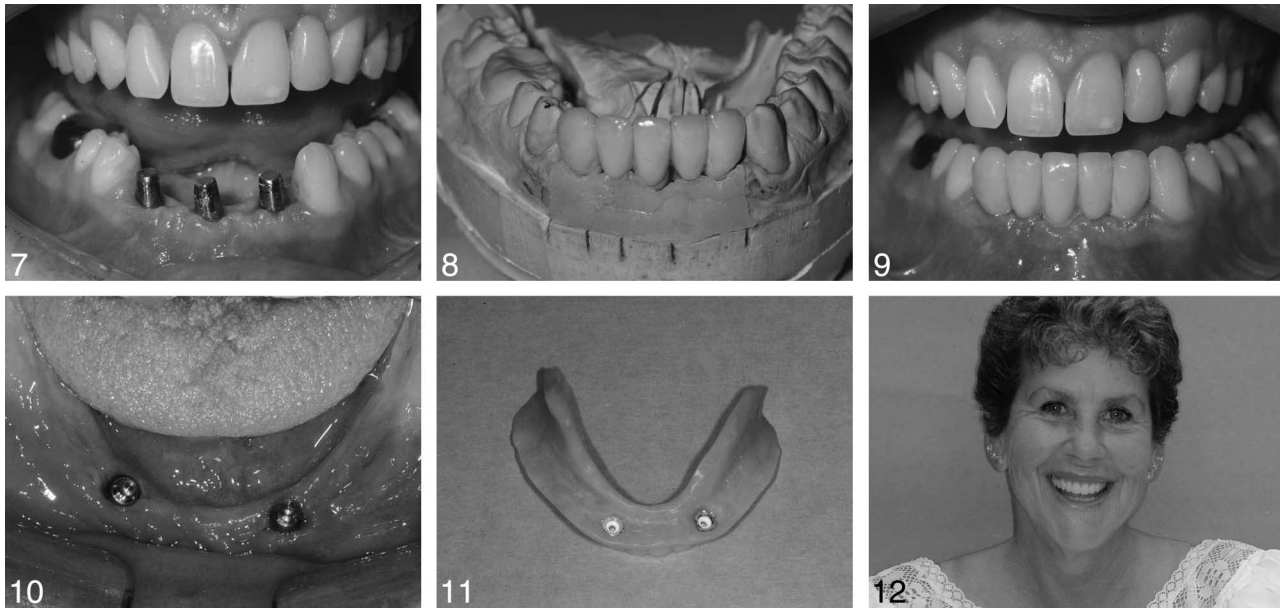
ter the cementation is necessary to see if any of the cement has been retained. The entire cementation procedure for a crown that does not require significant color or contour modification lasts a few minutes.

In the event that there appears to be little or no potential for removal of the prosthesis, the author prefers to use final cementation. However, if the bone is at all questionable, the periodontal condition may require further treatment, or the prosthesis or implant are suspect in any other manner, then provisional cementation is desirable.

Single tooth implant prostheses accomplished in the manner described are simple both clinically and in the laboratory. The author has had nearly 100% success with the described technique over a period of up to 10 years.

#### SEVERAL-UNIT IMPLANT-SUPPORTED FIXED PROSTHESES

Depending on the situation, either the custom abutment technique described above or manufacturer abutments cemented or screwed to the implants are used. A typical fixed prosthodontic clinical procedure can be used (Figures 7 through 9).



FIGURES 7–12. FIGURE 7. Implants with manufacturer prefabricated abutments ready for conventional fixed prosthodontic impressions. FIGURE 8. Implant prosthesis in laboratory. FIGURE 9. Cemented implant prosthesis. FIGURE 10. Implants placed in areas 22 and 27 with small spherical abutments. FIGURE 11. Completed dentures. FIGURE 12. Satisfied patient with good denture stability.

Although some dentists prefer the standard fixed prosthodontic technique, the author has found that using the conventional fixed prosthodontic technique requires more clinical time and effort than the custom abutment technique. The reasons for the greater time involvement are the necessity to modify the abutments, use cords, make a typical impression, and contend with the blood and uncertainties of a standard fixed prosthodontic procedure. Fixed prostheses can be constructed simply and easily using either laboratory-formed abutments or manufacturer abutments.

**IMPLANT AND SOFT  
TISSUE-SUPPORTED REMOVABLE  
COMPLETE DENTURES**

The author's first clinical recommendation to patients with an edentulous mandible is for the placement of 2 implants with small spheres on them and O-ring attachments in the denture. Even patients with minimal income can afford this significant upgrade from complete conventional dentures if you can influence them to spend the additional money for the 2 necessary

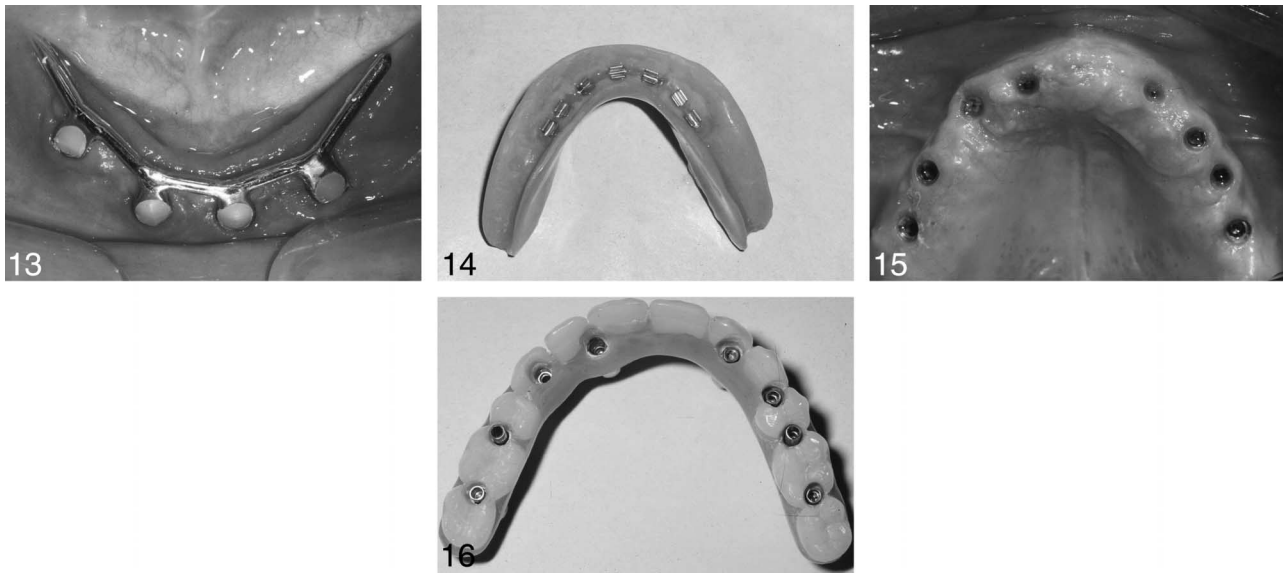
implants. The technique follows (Figures 10 through 12):

1. Implants are placed in the mandibular canine areas. The type of implant is the choice of the clinician. The implants are allowed to integrate into bone for up to 4 months. Although early loading of implants has acceptability in good bone, the author still prefers to let the implants settle for a few months before they are loaded.
2. Small spheres are placed on the implants. My preference is the O-ring attachment (Attachments International). These small spheres can be obtained for almost all popular implants.
3. The diagnostic cast is blocked out where the implants are located. A typical custom tray similar to those used for complete dentures is made from Dentsply triad tray material.
4. A complete denture impression is made in polyether (Permadyne, 3M ESPE, St Paul, Minn). Heavy body material is used as a preliminary final impression, and regular body is used for a subsequent final wash

impression. Before the final impression, a small amount of heavy-bodied material is placed around the implants to provide stability for analog placement.

5. The impression is poured in the standard manner in conventional dental stone or moderate-strength density stone.
6. Denture construction is accomplished in the normal manner, except that small copings that hold the rubber retentive washers are processed into the appropriate locations in the denture.
7. When seating the denture, about 1 mm of resin is removed from the denture base internally within the most coronal portion of the well that houses the sphere. This space allows up and down flexibility in the denture and reduces stress on the implants.
8. Occlusion is adjusted. Fit to soft tissue is corrected if necessary. The rubber O-rings are placed in their holders, and the denture is ready to be delivered to the patient.

Over the course of 15 years, the au-



FIGURES 13–16. FIGURE 13. Patient with 4 implants and bar constructed to support denture. FIGURE 14. Denture with gold alloy clips processed into it. FIGURE 15. Implants placed in maxillary arch. FIGURE 16. Hybrid fixed-detachable prosthesis constructed for the patient.

thor has delivered hundreds of these dentures to patients, many of whom have been near-dental cripples. The acceptance has been excellent, and the longevity of the prostheses has been far more than anticipated. Standard low-wear denture teeth wear out in about 8 to 10 years, and the inexpensive O-rings wear out in about 6 to 18 months. These implant-supported prostheses have been highly acceptable, life-changing procedures in the author's practice.

#### IMPLANT-SUPPORTED REMOVABLE COMPLETE DENTURES

The author's favorite type of implant-supported prosthesis for edentulous jaws is the "bar and clip"-supported removable prosthesis (Figures 13 and 14). The following is the technique for bar and clip-supported removable complete dentures:

1. A minimum of 2, or an optimum of 3 or 4, implants are placed in the jaw in appropriate locations and allowed to integrate into bone for 4 to 6 months.
2. The implants are exposed, and the soft tissue is allowed to heal.
3. Transfer copings are placed on the implants.

4. An impression is made in addition reaction silicone in a custom Dentsply triad tray (Dentsply, York, Pa). A closed or open tray is used depending on the parallelism of the implants.
5. A bar is made of noble (high palladium) or high noble (type 4 gold alloy).
6. The bar is fitted to the implants and an impression of the bar and the surrounding soft tissue is made in addition reaction silicone.
7. The denture is set up and tried prior to its fabrication. The denture is constructed, incorporating small metal clips (Attachments International, San Mateo, Calif), which engage the bar and offer retention and support during chewing.

These types of dentures are the author's favorite treatment for edentulous jaws because they are simple to construct, less expensive than fixed-detachable hybrid dentures, easily repairable, and allow an optimum aesthetic result.

#### FIXED-DETACHABLE COMPLETE HYBRID PROSTHESES

These types of prostheses are similar to the original Branemark prostheses,

although the concept has been modified and upgraded many times since the original design. For some patients, these prostheses are excellent. However, the aesthetic result is often compromised to allow accessibility for optimum oral hygiene. Advantages are that they feel similar to natural teeth and that the patient may chew almost anything without difficulty (Figures 15 and 16).

The following is the technique for the hybrid prosthesis:

1. Place at least 5 or 6 implants per arch, although some prefer to place 8 or more to allow for potential implant failure. It has been my experience that 6 well-placed implants are sufficient for most complete arch prostheses.
2. Allow the implants to integrate.
3. Place appropriate transfer copings and make an impression in addition reaction silicone in a custom Dentsply triad tray.
4. Make a metal understructure in noble (high palladium) or type 4 fixed prosthodontic gold alloy.
5. Try on the framework and evaluate the fit to the implants.
6. Accomplish a centric jaw relationship.

7. Try on the artificial teeth on occlusion rims.
8. Seat the denture.
9. Make adjustments over the course of several weeks.

This type of implant prosthesis is the most stable; however, it is also the most expensive.

#### SUMMARY

Types of commonly used implant prostheses have been described and il-

lustrated, including single tooth replacements, multiple tooth replacement fixed prostheses, implant and soft tissue-supported removable complete dentures, implant-supported removable complete dentures, and fixed-detachable complete dentures.

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