



Obtaining Impressions for the Clinically Successful Implant-Supported Restoration

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ABSTRACT

The emergence and acceptance of implant dentistry have given clinicians a wide variety of new treatment alternatives for fixed and removable rehabilitation. Although initially for full arch reconstruction, implant dentistry has expanded into every aspect of tooth replacement. Implants are utilized to replace a missing single tooth, multiple teeth with fixed restorations, replacements for posterior distal extension partial dentures, and of course, the full denture. All of these new treatment options involve ideology in treatment planning, diagnostic acumen, surgical, and prosthetic reconstructive techniques which have evolved throughout the past decade. Proper impression techniques remain as one of the foundations for proper prosthetic reconstruction.

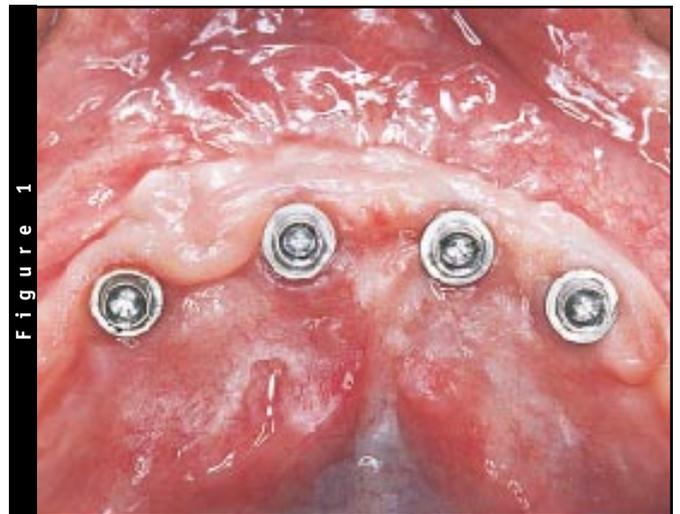
ABOUT THE AUTHOR



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Whether the partially or fully edentulous condition is to be restored, it is important to understand all of the prosthetic steps necessary to complete the treatment. While there are differences between natural teeth and implant fixtures, conventional prosthodontic techniques and concepts are the foundation for proper implant-supported reconstruction. For the implant patient, however, clinicians are often at an *advantage* over natural tooth preparations, partial denture, or full denture reconstruction. This is due to the fact that implant dentistry has had an increasing number of component parts, each designed for improved fit and function of the final restoration. The implant fixture is only the first component necessary to restore a patient's dentition. Each implant will either receive a standard *machined* abutment, or a *custom cast abutment* to fabricate the restoration. These machined parts are designed to be highly accurate, changing the clinician's burden from capturing an accurate margin on a natural tooth preparation, to precisely "indexing" these machined parts with an effective impression technique. Proper impression techniques for implant dentistry should be no different than techniques used in conventional dentistry and, therefore, remain as one of the foundations for proper prosthetic reconstruction.

One of the most common implant-supported restorations is the mandibular bar overdenture. At the direction of the restorative dentist, 2 - 6 implants are placed in the anterior mandible in a favorable position to support a removable denture. After osseointegration has been verified, the transmucosal healing collars or the definitive



One of the most common implant-supported restorations involves four fixtures placed in the anterior mandible.

M A S T E R S O F I M P R E S S I O N I N I M P L A N T S U P P O R T E D R E S T O R A T I O N



Figure 2
Transfer impression posts for the closed-tray technique, secured to the trans mucosal abutment.



Figure 5
The material should surround the soft tissue area and include the gingival sulcus in order to capture an accurate representation of the soft tissue.



Figure 3
A closed-type custom tray is fabricated utilizing Triad® Custom Tray material, ensuring that there is adequate relief.



Figure 4
The light body Aquasil™ LV impression material is carefully syringed around each transfer post and abutment.

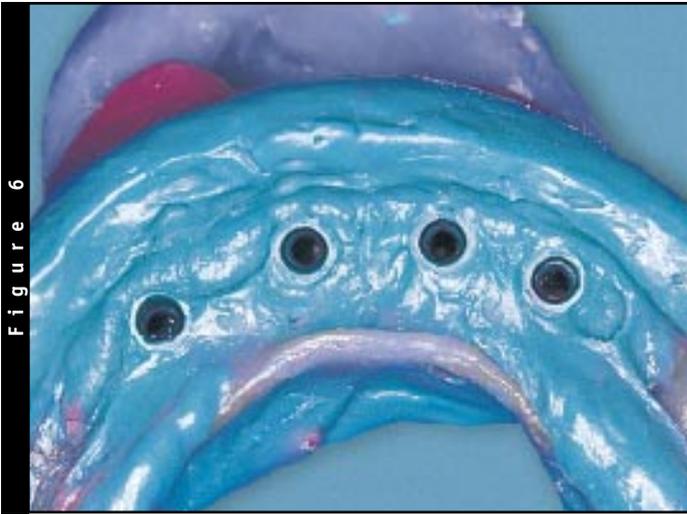
abutments can be placed (Figure 1). It is important to allow for adequate healing of the surrounding attached keratinized tissue, which may take 4 - 6 weeks following exposure of the implants prior to the next reconstructive step.

IMPRESSION PHASE

Closed-Tray Technique

Two different types of impression posts are commonly available to transfer the relationship of the implants from the patient's mouth to a master cast. These posts differ in design based upon the impression tray technique utilized, i.e. *open or closed*. In the closed-tray technique, impression posts (straight or conical) are secured onto the implant abutments and remain attached to the implant fixtures throughout the procedure (Figure 2). A working cast should be created prior to the transfer impression, with a preliminary alginate impression of the mandibular arch using wax spacers. From this working cast, a custom tray is fabricated utilizing Triad® Custom Tray material (DENTSPLY Trubyte, York, PA), ensuring that there is adequate relief to surround the height of the transfer impression posts (Figure 3). This visible light-cured material, and the entire Triad product line, is quick and easy to use for both dentist and auxiliaries, and is recommended for any practice devoted to implant dentistry.

Using a syringe, light-body, low-viscosity impression material (Aquasil™ LV, DENTSPLY Caulk, Milford, DE) is delivered to the mouth. Each transfer post should be adequately surrounded by the impression material, including the sulcus (Figures 4 and 5). The objective is to capture an accurate representation of the soft tissue, as well as the position of the post, to maximize the information relayed to the dental laboratory technician. While this can be achieved with a single-phase impression material, the soft tissue replication is enhanced with a dual-phase material (Aquasil™ Monophase/Aquasil™ LV, DENTSPLY Caulk, Milford, DE). When working with multiple implant abutments, it is absolutely necessary to achieve a passive or tension-free relationship between the superstructure and the underlying fixtures.



Upon inspection, sharp, accurate margins of the occlusal surface and shoulder of the transmucosal abutment should be replicated in the impression.



Each individual transfer post is attached to the appropriate analog and placed back into the impression, usually with an audible "click" verifying a positive seat.



Therefore, the impression technique should be precise, utilizing a material which has a high resistance to permanent deformation, thereby ensuring master cast accuracy. The custom tray is filled with Aquasil Monophase and delivered to the patient.

After setting, the impression is removed from the patient's mouth, leaving the transfer posts attached to the implants. Upon inspection, sharp, accurate margins of the occlusal surface and shoulder of the transmucosal abutment should be replicated in the impression (Figure 6). Each transfer post is carefully removed from the patient. It is advisable to remove one post at a time and attach each to the specific transfer analog. The analog/post combination is then placed back into the impression in the same site that it occupied in the mouth, generally with an audible click verifying a positive seat (Figure 7). If a soft tissue model is required, the appropriate material is injected around each transfer post/analog combination. The impression is then boxed and poured in stone. The resulting master cast should be an accurate representation of both soft tissue anatomy and fixture location (Figure 8).

Open-Tray Technique

The open-tray technique requires a Triad tray which has been fabricated to accommodate the larger two-piece transfer post design. The transfer post for an open-tray technique consists of a square shaped post and a fixation screw allowing precise connection to the implant (Figure 9). The tray should have an open window to allow for the internal screw to be removed, as the body of the transfer post will remain within the impression (Figure 10). The specific design of the tray may vary due to personal preference, but it should be rigid and allow for an adequate flow of impression material around each transfer post (Figure 11). The Aquasil LV is delivered via syringe to surround each transfer post, as previously described (Figure 12). The custom tray is then filled with the impression material (Aquasil Monophase) and delivered over the square transfer posts and lower arch. The transfer post bodies will then be incorporated into the impression. The open tray cannot be removed from the



The master cast should accurately reflect the soft tissue anatomy, as well as the precise position of each implant abutment and fixture location.



For the open-tray technique, a two-piece implant transfer system is utilized, consisting of square shaped posts and long fixation screws.



The Triad custom tray is designed with an open window, allowing room for the large two-piece transfer posts.



The transfer posts will become embedded within the impression. Each post should appear clean and shiny, ready for analog connection.



The custom tray should be rigid and provide for sufficient volume of impression material to flow around each transfer post.



The Aquasil LV impression material is syringed around each two-piece transfer post.

mouth without first utilizing the appropriate tool to carefully remove each transfer post fixation screw. Upon visual inspection, each post margin should be clear and free from excess impression material (Figure 13). If any impression material appears to be covering the machined aspect of the transfer post, then the post was not fully secured to the implant fixture. Impression material which has been entrapped will result in a discrepancy in the master cast which is not acceptable. The final bar restoration should fit passively over each implant fixture, and be designed to proper resistance and retention form to support the desired tooth position (Figure 14). The final mandibular overdenture and opposing maxillary full denture are implant- and soft-tissue-supported, and conform to conventional prosthodontic techniques utilizing BioForm IPN teeth (DENTSPLY Trubyte, York, PA) (Figure 15).

Custom Cast or Prepared Stock Abutments

The use of implants for partially edentulous areas has increased dramatically in the past 15 years. There are several different methods which will enable the clinician to develop a proper fixed, ceramometal implant-supported restoration. As an example, the single tooth replacement can be fabricated with a screw-retained, single-component crown, or a separate screw-retained post with a cementable ceramometal crown as the definitive restoration. For screw-retained restorations, using machined abutments, the prosthetic procedures are similar to those previously described for the bar overdenture type abutments.

When the clinician elects to utilize a custom cast post or a prepared stock abutment followed by a cementable crown, there are two basic restorative protocols. The first would require an impression at the level of the implant fixture. The custom cast post would then be cast, or a laboratory prepared stock abutment utilized, delivered to the patient for try-in, and returned to the laboratory for direct fabrication of the final restoration. This method provides for the most accurate assessment of crown-to-abutment fit, since all of the components



The completed bar designed to support a mandibular overdenture prosthesis.



The final mandibular overdenture and opposing maxillary full denture are implant- and soft-tissue-supported.



Once the soft tissue has stabilized, the implant abutment is ready for the impression phase and fabrication of the final prosthesis. Note the adjacent prepared natural premolar tooth.



If sound prosthodontic protocol is followed, the implant-supported restoration can be fabricated to achieve proper aesthetics and function in a similar manner to the adjacent natural tooth.

will be examined out of the mouth. The impression phase for this technique has been previously described.

The second protocol is most similar to conventional crown and bridge restorative procedures and offers several management and technical advantages. Once the post is cast or laboratory prepared, it is delivered to the patient, and will remain with the patient to support a provisional restoration. The provisional restoration should be utilized to evaluate the desired emergence profile of the final prosthesis, while serving to place the fixture in function. The custom post should be similar in shape to a natural tooth preparation, leaving adequate space to accommodate the metal substructure and appropriate layering of porcelain (Figure 16).

Following the appropriate duration of time, the soft tissue contours will stabilize, and the final aesthetic result accepted via the provisional restoration. The final impression can be taken following the standard crown and bridge technique (Figure 16). There is some controversy regarding the utilization of retraction cords around implant-supported restorations. There have been reports of a perimucosal seal in which the connective tissue fibers insert into the titanium abutments. If there is a sufficient zone of healthy keratinized tissue which has been in function and stable during the provisional phase of treatment (no loss of vertical height), then the retraction cord can be employed conservatively. Care should be taken to minimize trauma to this area and, therefore, the cord should be as thin as possible and placed with little apical pressure. For this type of impression, a high tear strength, dual phase material which exhibits resistance to deformation is desirable.

The new impression materials (Aquasil Monophase and Aquasil LV) offer excellent hydrophilicity which results in improved tooth wetting properties. This wetting factor is important during the working time necessary to carefully syringe natural or implant abutments. When dealing with multiple abutments, it is advisable to use an impression material which exhibits high tear strength so that the impression can be easily removed from the oral cavity without tearing, deformation, or distortion. For the custom cast post, or a stock abutment which has been prepared, accurate detail is essential in the impression phase to ensure the proper fit of the final restoration. An impression material which exhibits high tear strength and low contact angle offers the most effective detail reproduction. If the clinician follows sound prosthodontic protocol, treating the implant-supported abutment with the same attention to detail as a natural tooth preparation, then the ceramometal restoration can be fabricated to achieve enhanced aesthetic and functional results (Figure 17).

CONCLUSION

Implant dentistry has empowered clinicians with new techniques to restore edentulous areas. There is an ever-expanding knowledge base regarding improved surgical and prosthetic protocols for implant reconstruction. The overall success is the ultimate replacement of the missing tooth, and this can best be achieved through established prosthodontic principles. Whether or not the partially or fully edentulous condition is to be restored, it is important to understand all of the prosthetic steps necessary for treatment success. Proper impressions for implant dentistry are predicated upon conventional restorative techniques and, therefore, remain as one of the foundations for proper prosthetic reconstruction.



CE QUESTIONS



M A S T E R S O F I M P R E S S I O N I S M

The 10 multiple-choice questions for this exercise are based on the article "Obtaining Impressions for the Clinically Successful Implant-Supported Restoration" by Scott D. Ganz, DMD.

This article discusses techniques for obtaining accurate impressions for implant-supported restorations utilizing a new generation of dual-phase hydrophilic impression materials. Upon reading the article and completing this exercise, the reader should have an updated knowledge of:

- Open- and closed-tray impression techniques for implants.
- Impression protocols for custom cast post or a prepared stock abutment followed by a cementable crown restorations.

- In mandibular bar overdenture implant-supported restorations, adequate healing of the surrounding attached keratinized tissue (following exposure of the implants) requires:**
 - 4 - 6 days.
 - 1 - 2 weeks.
 - 4 - 6 weeks.
 - None of the above.
- In the open-tray impression technique, the custom tray is filled with Aquasil and delivered over the round transfer posts and upper arch.**
 - True.
 - False.
- In the closed-tray impression technique:**
 - A custom tray is fabricated from a working cast.
 - The tray should have an open window to allow for internal screw removal.
 - Impression posts are removed from the implant abutments midway through the procedure.
 - A Triad tray which has been fabricated to accommodate a much larger two-piece transfer post design is required.
- When utilizing retraction cords to obtain final impressions for implant-supported restorations:**
 - Connective tissue fibers may be inserted into the titanium abutments due to a per mucosal seal.
 - The cord should be as thin as possible and placed with little apical pressure.
 - There should be no loss of vertical height evident.
 - All of the above.
- The objective(s) of syringing a light-body, low-viscosity impression material around transfer posts and the sulcus is (are):**
 - To capture an accurate representation of the soft tissue.
 - To capture an accurate representation of the position of the post.
 - To maximize the information relayed to the dental laboratory technician.
 - All of the above.
- According to the author, when working with multiple implant abutments, it is absolutely necessary to:**
 - Utilize a one-phase impression material.
 - Achieve a passive or tension-free relationship between the superstructure and the underlying fixtures.
 - Remove the transfer posts from the implants following setting of the impression material.
 - None of the above.
- For screw-retained crowns, utilizing machined abutments, the prosthetic procedures are similar to those described for the bar overdenture type abutments.**
 - True.
 - False.
- According to the author, the two different types of posts commonly available to transfer the relationship of the implants from the patient's mouth to a master cast are:**
 - Open and closed.
 - Single phase and dual phase.
 - Straight and conical.
 - Coated or screw-retained.
- When the clinician elects to utilize a custom cast post or a prepared stock abutment followed by a cementable crown, the following should be used to evaluate the desired emergence profile of the final restoration:**
 - The height of the gingival margin.
 - The transfer post/analog.
 - The soft tissue anatomy and fixture location.
 - The provisional restoration.
- In the open-tray technique, the final bar restoration should:**
 - Fit passively over each implant fixture.
 - Be designed to proper resistance and retention form to support the desired tooth position.
 - a and b.
 - None of the above.

