A Comprehensive Review of Basic Implant Impression Techniques

Dr. Kalamalla A Saran Babu*, Dr. Ponnapalli Haripriya2, Dr. Dineshkumar Perisetty3, Dr. Mahammad Rasool4, Dr. P Lakshmaiah2 and Dr. Yendhuluri Pavankumar6

1Assistant Professor, Department of Prosthodontics, Narayana Dental College and Hospital, Nellore, India
2Assistant Professor, Department of Oral Pathology, Narayana Dental College and Hospital, Nellore, India
3Assistant Professor, Department of Conservative and Endodontics, Narayana Dental College, Nellore, India
4Assistant Professor, Department of Prosthodontics, CKS Theja Dental College and Hospital, Tirupati, India
5Assistant Professor, Department of Prosthodontics, Narayana Dental College, Nellore, India
6Assistant Professor, Department of Conservative and Endodontics, Narayana Dental College and Hospital, Nellore, India

*Corresponding Author: Dr. Kalamalla A Saran Babu, Assistant Professor, Department of Prosthodontics, Narayana Dental College and Hospital, Nellore, India.

Received: February 28, 2020; Published: March 14, 2020

Abstract

Impression making in implant prosthodontics has a pioneer role in the better outcome, success and durability of the prosthesis in the day to day clinical perspectives of implant dentistry. The objective of an impression making in implant dentistry is to accurately relate the implant analogue or implant abutment analogue to the other related structures in the dental arch. This is influenced by type of an impression technique used. With appropriate technique selection and manipulation, accurate impressions can be obtained by the contemporary restorative dentist for fabrication of implant-supported restorations. Proper impression technique remains as one of the foundations for proper prosthetic reconstruction. This article critically outlines the different types of impression techniques used in implant dentistry.

Keywords: Dental Implants; Impression Techniques; Closed Tray Technique; Open Tray Technique

Introduction

Expansion of implant prosthesis to conventional treatment modalities has revolutionized the field of modern dentistry and was considered as a hallmark in the emerging trends of clinical practices in day to day life [1,2]. The long term durability and success of these implant prosthesis depends on the passive and precise fit of implant supra structure to an implant abutment [3]. The exact transfer of implant or abutment position to a definitive cast is a determining factor for a successful passively fitting implant restoration and is important for preventing prosthetic complications. In turn exact transfer depends on the “impression technique” used. So, clinician should emphasize on the accuracy of impression and impression techniques being practiced in the implant dentistry [4,5]. This article mainly focuses on the basics of “Implant impression techniques” being practiced in day to day life.

Before discussing in detail about the basic impression techniques in fabrication of implant prosthesis, one should be familiar with the basic implant components involved in making the impressions. Accordingly, pre-prosthetic assessment also should be done.

Citation: Dr. Kalamalla A Saran Babu., et al. “A Comprehensive Review of Basic Implant Impression Techniques”. EC Dental Science SI.02 (2020): 01-11.
Impression tray: Similar to crown and bridge prosthodontics, impression trays can either be stock trays or custom made trays. Custom trays are preferred as they are generally more rigid and permit the impression material to be used in its optimal thickness. In implant prosthodontics, trays can further be classified as open (Figure 1) or closed (Figure 2). An open tray permits direct access to the implant fixture head with the tray seated intra-orally.

![Figure 1: Open custom tray.](image1)

![Figure 2: Closed custom tray.](image2)

Impression materials: The impressions of the implant should be made using rubber based impression materials as dimensional accuracy is required in the impression and to achieve predictable results in the fit and for precision in the implant prosthesis. The impression material used should be easy to mix, accurate, rapidly setting and dimensionally stable following removal from the mouth. Most commonly used materials include, Alginate, Agar, Polysulphide, Polyether, Condensation Silicone, Addition Silicone. Considering all the advantages Polyether and Polyvinylsiloxane (addition silicone) are preferred to make implant impressions.

Screwdrivers: An implant screwdriver is a critical piece of equipment used to screw and unscrew various components onto the fixture head. Depending on the implant system, screw drivers heads can be slotted, hexagonal, star shaped, etc (Figure 3). Screwdrivers are often designed to fit into a manual or motor driven torque device, which can be used to tighten components to a predetermined torque (Figure 4).

Citation: Dr. Kalamalla A Saran Babu., et al. “A Comprehensive Review of Basic Implant Impression Techniques”. EC Dental Science SI.02 (2020): 01-11.
Healing abutment/caps: The fixture head is usually at the level of the alveolar bone crest; therefore, in order to provide access to the fixture head, a removable transmucosal component known as a healing abutment/cap (Figure 5) is screwed onto the fixture head by the surgeon, either at the time of implant placement or as a second surgical procedure. Healing abutments/caps vary in height, width and profile. An appropriate healing abutment is selected to mould the peri-implant tissues during healing and prevent tissue overgrowth.
Impression coping: The impression coping is the component that fits onto the implant fixture head or an implant abutment while making an impression. Broadly speaking, there are two types of impression copings: one that is used with a closed tray and retained in the mouth after the impression is removed (Figure 6) and the second, used with an open custom tray, in which the impression is removed with the coping in situ within the impression (Figure 7). Certain clinical situations, e.g. unfavourably positioned implants, the need to support adjacent soft tissues, poor access, etc. dictate the need for a custom impression coping [6].

**Figure 6: Closed tray impression coping.**

**Figure 7: Open tray impression coping.**

Abutment: The portion of the implant that supports retains a prosthesis or implant supra structure. These are available in a variety of materials (e.g. titanium, zirconia, etc).

Prefabricated stock abutments: Prefabricated stock abutments are off-the-shelf components produced in a variety of collar heights, widths and angulations (Figure 8). For implant retained over dentures, prefabricated abutments with a variety of attachment mechanisms (Figure 9) are available in a series of different heights and widths, with its own specifically designed impression coping (Figure 10).
Figure 8: Definitive standard abutments.

Figure 9: Abutments for implant retained over denture.

Figure 10: Impression copings on abutments.

Citation: Dr. Kalamalla A Saran Babu., et al. “A Comprehensive Review of Basic Implant Impression Techniques”. EC Dental Science SI.02 (2020): 01-11.
Custom abutments: Custom abutments, individualised for each restoration, can be used where prefabricated abutments are inadequate. They are often made using CAD/CAM techniques and are available in a variety of metals and ceramics (Figure 11). Custom abutments are generally more expensive than prefabricated abutments. However, they can be designed so that the abutment-crown junction is hidden to ensure superior aesthetics.

Figure 11: Titanium CAD/CAM custom abutments. Crown margin is hidden subgingivally.

Pre-prosthetic assessment

Before commencing the steps to fabricate the definitive prosthesis, the prosthetic dentist should conduct a pre-prosthetic assessment of the case [7].

This includes:

1. One should verify whether Implant placed has been Osseo-integrated both by clinical means and radiographic means.
2. Clinically for the assessment of osseointegration and dental implant stability, one should perform palpation, percussion, reverse torque testing and radio-frequency analysis etc.
3. Radiographic evaluation at this time is appropriate to confirm healthy peri-implant bone. Successful completion of this assessment enables progression to the prosthetic phase of treatment.
4. If the prognosis of implant placed is questionable, one should communicate with the surgical dentist about the need for further assessment.
5. Evaluating the location and angulations of the integrated dental implants in relation to the remaining dentition and the opposing arch, and their suitability to support the desired prosthesis should be done accordingly.

Implant impression procedures

There are many ways to make implant impressions and a particular method is chosen based on the requirements of the particular implant case.

Citation: Dr. Kalamalla A Saran Babu., et al. “A Comprehensive Review of Basic Implant Impression Techniques”. EC Dental Science SI.02 (2020): 01-11.
**Direct/prepared abutment impression technique**

In the prepared abutment technique, the final abutment is fixed on top of the implant in the patient’s mouth and prepared with a normal crown and bridge technique, using a diamond or carbide bur. Once the abutment is finally prepared, an impression is made using polyether or addition silicone material, poured with a high-strength stone material. The prosthesis is fabricated and cemented in the mouth by following crown and bridge technique steps [8].

**Indications**

a) Single-body/one-piece implant.

b) Implant placement in non-aesthetic posterior region.

c) Cement-retained prosthesis where high precision is not a concern.

**Indirect/pick-up impression technique:**

This is the most regularly followed common impression technique in the fabrication of implant prosthesis, as it precisely and accurately transfers the implant position and orientation from the patient’s mouth to the working cast. The impression should be recorded using a rigid impression material expressed around the impression components as well as in the tray. This impression can be made using either an open tray or closed tray technique [8].

**Closed tray technique**

An impression material with soft to medium consistency (less rigid) should be used in the closed tray technique, for ease of removal from the mouth without any tearing of the impression around the impression posts. The gingival former is removed from the implant in the patient’s mouth and a closed tray impression transfer abutment is inserted onto the implant using a connection screw. The accurate and complete seating of the impression abutment on the implant should be checked with a radiograph. An impression of this impression abutment using polyether or addition silicon material is made. After successfully recording the impression, the impression abutment is removed from the implant and assembled with an appropriate implant analogue. The impression abutment-analogue assembly is reinserted at the corresponding location in the impression, making sure that the impression transfer abutment is inserted with the same orientation as in the mouth. The impression is sent to the dental laboratory to fabricate the working model. It is recommended to pour a soft tissue replicating material around the implant analogue because it facilitates the removal of the impression abutment after the stone die is poured and provides ease of working to the laboratory technician, to the level of implant abutment connection [8].

**Open tray technique**

The open tray technique transfers the implant position and orientation more precisely and accurately than the closed technique and thus should be followed when a higher level of accuracy is required. It is required to be followed when castable implant components, which need a high level of precision to accurately seat the final cast prosthesis onto the implants in the mouth, are used. This technique should also be followed in cases of multiple implants inserted at different angulations, as the closed tray technique may tear the impression in such cases on removal from the mouth. The open tray technique is also helpful if the implants are seated very deep in the soft tissue, as this causes the emergence of a very short part of the closed tray impression abutment out of the thick soft tissue, which hardly gets engaged firmly in the impression [8].

**Indications:**

- Multiple number of implants which are not parallel to each other.

---

**Citation:** Dr. Kalamalla A Saran Babu., et al. “A Comprehensive Review of Basic Implant Impression Techniques”. EC Dental Science SI.02 (2020): 01-11.
Full arch implant supported fixed prosthesis.

Abutment level impressions of multiple to full arch implant case.

Joint screw-retained prosthesis over multiple implants.

Deep seated implants.

Similarly, during the fabrication of implant supported prosthesis, usually impressions are made at two levels:

a) Implant level impressions.

b) Abutment level impressions.

**Implant level impressions**: Two techniques are commonly employed to make an impression of the fixture head: the closed tray and open tray techniques [2,5,9].

**Steps for implant level closed tray technique (Figure 12a-12f)**

The healing abutment/cap is removed with a screwdriver and the implant fixture head is exposed:

1. A closed-tray impression coping, appropriate to the type and size of implant, is selected and fitted onto the exposed fixture head. If the clinician is unsure about the complete seating of the coping onto the fixture head, a confirmatory radiograph should be taken.

2. An appropriate stock tray or a closed custom tray is tried in. It is important to ensure that the tray covers the entire arch, provides adequate vertical space for the impression coping and optimum space for the impression material.

3. Generally, a combination of light bodied and heavy bodied silicone material is used in a manner similar to conventional crown and bridge impressions. Care must be taken not to use too much light bodied material as it tends to be less rigid and may affect the repositioning of the impression coping.

4. Once set, the impression is removed, leaving the impression coping in the mouth.

5. The impression coping is then removed and manually repositioned into the impression. It is important that the coping relocates positively and it is critical to ensure that the geometric details of the impression coping is recorded accurately in the impression.

6. The healing abutment is replaced (Figure 12a-12f).
Steps for implant level open tray impression technique (Figure 13a-13d)

At the preliminary appointment:

1. A conventional alginate impression is made and study models are cast.
2. A rigid custom tray is manufactured with a window cut through over the implant.

At a subsequent appointment:

1. The healing abutments are removed.
2. Appropriate impression copings are selected and fitted. In some cases, these copings may be splinted together intra orally to provide greater rigidity and possibly greater accuracy.
3. The open tray is tried in - the impression copings should emerge level with the window. This permits easy removal of the impression copings, while ensuring that the copings are supported by sufficient impression material.
4. The window is sealed with wax.
5. An impression is taken in the open tray with a silicone impression material. The tips of the impression copings should be felt through the wax covering the window.
6. Once the impression has set, the impression copings are unscrewed through the window on the tray and the impression is removed from the mouth along with all the impression copings in place.
7. The healing abutments are replaced (Figure 13a-13d).

Steps for implant level closed tray technique

Figure 13: Open tray impression technique: impression copings in place (a), open custom tray with window sealed with wax (b), impression in place with the tips of the impression copings projecting through the wax window (c), the completed impression with the impression copings in situ (d).

Citation: Dr. Kalamalla A Saran Babu., et al. “A Comprehensive Review of Basic Implant Impression Techniques”. EC Dental Science SI.02 (2020): 01-11.
In most implant cases, implant level impressions are made where the impression abutments are inserted to the implant, and after recording open or closed tray pick-up impression, these impression abutments are removed from the implant and assembled with the implant analogue.

If three or fewer implants, there was no difference between an open tray and closed tray approach. However, if there were four or more implants, impressions appeared more accurate with an open tray technique [10].

**Abutment level impressions [2,8]**

The abutment level impression technique is practiced in cases of screw-retained multiple unit to full arch joint implant prosthesis. In this technique, the gingival formers/healing abutments are removed from the implants and replaced with the appropriate abutments which are called ‘abutment for screw’. At one side this abutment for screw is screwed to the implant in the mouth and on top of it another abutment or the prosthesis is fixed using the connection screw. Thus, after these abutments for screw are inserted on top of implants, the impression posts are screwed over these abutments and an abutment level impression with closed or open technique is made. After successfully recording the impression, the impression posts are assembled with the ‘abutment analogue’ and the impression is poured in the usual fashion. The restoration is then fabricated over the abutment analogues on the working model and fixed over the abutments for screw in the patient’s mouth.

Within general dental practice, there is often a need to replace an implant crown, which is aesthetically unsatisfactory, while the underlying abutment is satisfactory. In these situations, a routine crown and bridge approach may be employed, i.e. the gingivae may be retracted using displacement cord or alternative methods and a conventional impression in a rigid tray may be made. Care must be taken not to damage the fragile epithelial attachment to the abutment. The crown/bridgework can then be made and cemented onto the abutments. Alternately, the implant crown can be over contoured along the gingival margin by adding a small amount of composite resin, following which the crown is reseated for 5 - 10 minutes. This will displace the gingival tissue and permit an accurate impression of the abutment to be made. This technique has the advantage of not disrupting the epithelial attachment around the abutment.

**Summary and Conclusion**

Accurate impressions and meticulous attention in recording complete details provide a foundation for long term durability and success of the prosthesis in implant prosthodontics. Comprehensive understanding of the wide range of basic prosthetic components, implant impression materials, implants impression techniques will provide paramount skills in performing clinical procedures in implant dentistry. Impression techniques in particular either open or closed tray techniques have their respective merits and drawbacks and the choice of technique employed can be down to clinician preference. There by, this article acts as a beginners guide in understanding the basic protocol and procedures in making implant impressions.

**Bibliography**


**Citation:** Dr. Kalamalla A Saran Babu., et al. “A Comprehensive Review of Basic Implant Impression Techniques”. EC Dental Science SI.02 (2020): 01-11.


© All rights reserved by Dr. Kalamalla A Saran Babu., et al.