

Impression Techniques in Implant

Dr. Amitha G.L¹, Dr. Pranav V Mody²

¹Dept. of Prosthodontics, K. V. G Dental College and Hospitals, Kurunjibhag, Sullia, Karnataka, India

²Dept. of Prosthodontics, K. V. G Dental College and Hospitals, Kurunjibhag, Sullia, Karnataka, India

Review Article

*Corresponding author

Dr. Amitha G.L

Article History

Received: 07.05.2018

Accepted: 15.05.2018

Published: 30.05.2018

DOI:

10.21276/sjds.2018.5.5.14



Abstract: The object of making an impression in implant dentistry is to accurately relate an analogue of the implant or implant abutment to the other structures in the dental arch. This review focuses on the components, impression materials and the various impression techniques that can be used in implant restorations with note on recent advances in implant impressions.

Keyword: dental arch, Dental implants, prosthesis

INTRODUCTION

Dental implants have become a quite successful method for the restoration of completely and partially edentulous patients [1]. Thus making the global statement “Any edentulous space is a potential implant site” pertinent [2]. Implants in dentistry require a multidisciplinary team of expertise that lead to an aesthetically pleasing and biologically acceptable final restoration [3]. The success of the dental implants is influenced by various factors. The success of implants depends on its osseointegration and the passive fit of the prosthesis [4].

Implant impression is one of the most important steps in achieving passive fit by accurately relating an analogue of the implant or implant abutment to the other structures in the dental arch. Further the accuracy of impression is affected by the selection of impression tray, impression technique and type of impression material, number and angulation of implants[5,6].

A variety of impression techniques for the fabrication of implant supported prosthesis have evolved in the past decade. Selection of a specific technique depends on the evaluation of a particular patient and the clinical situation present.

The impression technique which is selected for the particular implant supported prosthesis must record the soft tissue supporting areas and the accurate positioning of the implant components. The resilience difference between the implant and the mucosa should also be considered while making the impressions for implant supported prosthesis. Hence it is essential to obtain an accurate impression in implant supported prosthesis due to the nature of the fit of the impression hardware. Inaccuracies introduced during impression technique can cause misfit of the prosthesis which may lead to uneven force distribution and possible prosthesis complications such as abutment screw loosening and occlusal inaccuracies.

Though a variety of impression techniques has evolved for the fabrication of implant retained prosthesis each one has got its own limitations and it cannot be used in all situations. Thus the selection of a

particular impression technique, which greatly influences the outcome of the treatment, still remains as a tough task. This article highlights the various techniques of impression making, their merits and demerits in the fabrication of implant supported prosthesis and also the selection of an appropriate technique for the corresponding clinical situation present.

Impression techniques

The impression techniques for implants are broadly classified on the basis of

- Type of tray used
- Type of technique used
- Material used
- Number of procedures

Open tray impression technique [7]

The open tray impression technique is one of the commonest impression methods used in the fabrication of implant supported prosthesis.

An open-tray technique for impressing implants that is inexpensive, clean, and easy to perform with materials commonly found in a restorative dental

practice. The soft boxing wax is easy to apply to the impression tray and easily peels off. It confines the Blu-Mousse (Parkell, Inc, Edgewood, NY) used around the implant copings and allows the guide pins to protrude through the tray. Blu-Mousse is preferred around the impression copings because of its rigidity[6]. The Blu-Mousse is placed in the impression tray last because it polymerizes in 2 minutes, whereas most vinyl polysiloxane impression materials polymerize in approximately 5 to 6 minutes.

Other open-tray impression protocols recommend wiping off the excess impression material that extrudes through the hole in the tray with a gloved finger or injecting impression plaster through the hole(s) in the tray to fill the remaining void[7,8]. This may be messy to accomplish. Additionally, the powder on same gloves may inhibit the polymerization of vinyl polysiloxane (VPS) impression materials[9]. Wax placed over the hole in the tray prevents contact of the impression material with gloves.

Closed tray technique [8]

In this technique the impression copings remain in the mouth on the removal of the set impressions. After the removal of the impression, the impression copings are transferred to the impressions and then the cast is poured.

Indications

It is mainly indicated in case of restricted mouth opening.

Conventional impression techniques for implant supported prosthesis [8]

The conventional method of impression making consists of two phases

- Primary impression
- Secondary impression

PRIMARY IMPRESSION

The purpose of making the primary impression is

- For the fabrication of study casts
- Visualizing implant body angulations
- Choosing the final prosthetic abutment
- Fabricating a custom tray

MODIFIED IMPRESSION TECHNIQUES

Trayless impression technique [9]

A technique incorporating accuracy, simplicity, and speed is desirable when making complex impressions. This trayless impression procedure, a technique not identified in other articles within the dental literature. Using this method, which was originally intended to facilitate impression making in the surgical field, the author has made complete arch impressions at the time of surgery for the fabrication of immediately loaded, single-piece, screw-retained provisional restorations supported by external hex

implants. This technique is efficient and has also been used for making definitive impressions. This trayless technique facilitates making impressions in edentulous patients with restricted access. Direct splinting has been shown to be the most accurate method for multiple abutment impressions. The prostheses fabricated using this impression technique are clinically and radiographically accurate, using accepted in vivo evaluation procedures,

INDICATIONS

- In the fabrication of complete arch implant supported prosthesis.
- In patients who have restricted mouth opening.

Functional impression technique [10]

An overdenture impression must record the soft tissue supporting areas simultaneously with accurate positioning of the implant components. An implant retained overdenture has characteristics resembling those of a complete denture, with a combination of tissue support and implant retention. Thus, resilience difference between implant and mucosa should be considered for the impression of implant-tissue-retained overdentures. The functional impression technique records the mucosa in a functional state and simultaneously records the implant components in relation to the alveolar tissues. The primary advantage of this technique is to provide the accurate relation of the implant components and the supporting tissues. After insertion of the prosthesis, chair time decreases for post-insertion adjustments. However, the procedure is technique sensitive in recording the border relation with different impression materials, and it is more time consuming compared with the single-stage impression.

The functional impression technique records the mucosa in a functional state and it simultaneously records the implant components in relation to the alveolar tissues. In this technique ZnO impression paste and elastomeric impression material is used.

INDICATION

Mainly used in the fabrication of implant retained overdenture.

Two-step impression technique [11]

Passive fit of components is considered to be critical to the long-term success of implant treatment plans. Poor fit has been associated with biologic complications and component failure. Each laboratory and clinical stage may contribute to positional discrepancies in fit. Therefore, it is essential to minimize the variation at every step in the restorative process. The process of impression making for a mandibular overdenture situation may be susceptible to several factors that can contribute to distortion in the final master cast. These include flexure of the mandible, distortions in the impression material, and problems with the impression procedure. The overdenture

impression must record the soft tissue supporting areas simultaneously with accurate positioning of the implant components. This procedure that uses two steps. The first is conventional border moulding and impression in an individualized tray that fits over the implant abutments. The second step involves attachment of the implant impression copings to the tray and picking up the copings from the mouth.

Dual impression technique [12]

In some aspects, such as force direction and distribution, implant-retained overdentures are similar to bilateral distal extension removable partial dentures (RPDs) (Kennedy Class I). Occlusal forces on RPDs must be distributed uniformly to the supporting teeth and residual ridges. Some authors believe that the difference in the displaceability between teeth and residual ridges cannot be captured by a single impression procedure. Dual impression techniques were introduced to produce a "corrected cast" whereby the teeth will be registered in their anatomic position and the residual ridge will be recorded in their functional form.²⁻⁴ This can be used in implant retained overdentures as well. Two categories of dual impression techniques have been described in the literature. These are: (a) physiologic techniques and (b) selective pressure techniques. The physiologic impression techniques record the ridge portion in its functional form by placing an occlusal load on the impression tray during the impression procedure. Three physiologic impression techniques are: (a) McLean-Hindels method (i.e., recording the tissues of the residual ridge in the functional form using a custom tray and then making a dual impression using a stock tray), (b) functional reline impression technique (i.e., adapting a wax or metal spacer over the ridge on the cast before processing the denture base, replacing with light-bodied polysulfide rubber base during a reline impression that will be substituted with denture base material), and (c) fluid wax method (i.e., registering the residual ridge by painting the fluid wax on the tissue side of the impression tray). The selective pressure impression technique equalizes support between abutment teeth and soft tissue and directs the forces to the portions of the ridge that are most capable of tolerating the forces. This is accomplished by relieving the tray in some areas, while allowing the impression tray to contact the ridge in other areas. Greater soft tissue displacement will occur in areas where relief is not provided. Although the technique is described in conjunction with the Straumann Dental implant system, it can be applied when other implant systems are used as well.

Indications

Mainly in the fabrication of implant retained overdentures.

Snap on impression technique [13]

Use of a custom tray with elastomeric impression material or a stock tray with a putty-wash

method is recommended for making an impression of dental implants. For impressions of the transfer impression assembly, including the impression coping and positioning cylinder, a stock tray with putty impression material must be used to register an unmodified solid abutment. When abutments are prepared to provide adequate space for the restoration, relief of the putty impression material must be accomplished to provide sufficient space for the wash material. Inadequate space may result in displacement of the impression assembly and a distorted impression. The following technique can be used to provide space during the making of a putty impression for modified abutments.

INDICATIONS

- Mainly in case of inadequate abutment space.
- In modified abutments.

Screw retained impression technique [14]

Making an accurate impression at the implant level, fabricating a simulated implant-level soft tissue cast, and mounting the cast in an articulator are common procedures that allow the dentist to evaluate and diagnose implant placement, abutment selection, and prosthodontic options. When implants are placed in limited space or have unfavourable positions or adverse angulations, a precise implant-level impression can be time consuming. Contact interferences between impression copings or adjacent teeth may complicate impression techniques and necessitate an increased number of radiographs to verify the fit of the impression copings to the implants. This technique describes the use of titanium or plastic implant index copings as impression copings for an implant-level impression. Implant index copings were invented to index the hexagon position of the implant and relate the implant position to the adjacent teeth at Stage I surgery. Indexing the implant at stage I surgery enables the appropriate abutment and provisional fixed prosthesis to be inserted immediately at stage II surgery. This technique saves time. Instead of waiting for soft tissue maturation 2 to 4 weeks after stage II surgery and provisional prosthesis placement even later, the patient receives a fixed provisional prosthesis on the day of stage II surgery. Index copings come in 2 varieties: a 2-piece screw retained titanium index coping and a 1-piece plastic frictional fit/snap-on index coping. The connection between the implant and index coping can be achieved by means of screw retention (titanium) or the frictional fit/snap-on (plastic) design. This connection relates the hex position to the implant analog. When used, the index copings can be connected to each other and the adjacent teeth with autopolymerizing acrylic resin.

INDICATIONS

It is indicated in case of Improper implant position and angulation

Impression technique for implant in close proximity [15]

Correct implant placement is essential to establish proper esthetics, occlusion, and preservation of peri-implant tissue health. However, this is not always possible because of anatomic limitations, such as sinus proximity or roots of adjacent teeth, which can be restricting. As a result, implants may be placed either very closely, or with an angulation toward each other. These situations are challenging for the restorative dentist, as certain technical difficulties must be overcome, including making an impression of the implants. The impression copings provided by the manufacturers for the direct transfer method, which, according to some authors, is more accurate, are usually long and bulky in the upper region. The lack of space or the angulation between the implants may preclude the correct fastening of the impression copings to the Osseo integrated implants, resulting in an incorrect registration of the positions of the implants. Precise impression procedures of implant positions are essential for the fabrication of accurately fitted implant-supported prostheses. This is generally a routine procedure. However, implants placed in close proximity or with adverse angulations can make impression making a difficult task. McCartney presented a method in which gold cylinders are substituted for the impression copings, whereas Chaimattayompol described an impression technique in which screw-retained titanium or frictional fit plastic implant index copings are used for implant position registration when unfavourable implant positions are present. This Procedure presents a method to overcome the difficulties associated with the impression procedures of implants placed in close proximity or with adverse angulations, making the placement of the impression copings challenging.

INDICATIONS

Implants placed in close proximity.

Plaster and silicone combined impression technique [16]

To reduce the risk of prosthetic complications when restoring implants, passive fit of the framework is recommended. With increasing misfit of the framework, the external preload is magnified when prosthetic screws are torqued to specifications and static stresses raise the risk of prosthetic complications. Wee *et al.* described various methods of improving the framework fit. Among these, the use of a dimensionally accurate impression material was reported to be the most critical factor, particularly when it is not possible to achieve fit of the framework by a sectioning and soldering procedure. The use of plaster as an index material for implant impression has been described for partially edentulous patients. For such techniques, an initial impression is necessary to make a custom tray. This technique uses a stock impression tray that allows for a 1-appointment impression procedure. Although this procedure can be used for completely or partially

edentulous patients, the situation presented is for a completely edentulous mandible.

MODIFIED IMPRESSION TECHNIQUE [17]

Making a pick-up impression with a windowed tray is a routine technique for impressing dental implants. It may be difficult for the guide pins to protrude from the opening of the wax lid, however, because the impression material in the tray can obscure the guide pins during the procedure. It has been our experience that if the tray is repositioned several times, the impression may be distorted and/or contains bubbles. If the opening of the wax lid is too wide, or if the wax lid is out of place, the impression pressure may decrease, and the impression material may not extend over the soft tissue around the implants, especially in the maxilla. Incomplete soft tissue impression around implants hinders the fabrication of a superstructure with a proper emergence profile. A modified implant impression technique is presented as a solution to these problems.

Impression techniques for arches requiring both implant and natural tooth restorations [18]

There are clinical situations in which an impression of implants and prepared teeth are made simultaneously. Both dimensional fidelity and fine detail reproduction are important when impressions are made of tooth preparations. However, when impressions are made of implants or implant abutments, only dimensional fidelity is important. Fine detail reproduction is not required when impression copings are used, because analogs are available to reproduce implant or abutment surfaces on the casts. To record the fine detail of tooth preparations, it is advantageous to use a light-bodied elastomeric impression material that has the consistency and flow to record the margins and fine detail of the prepared teeth. A light-bodied material is usually injected around tooth preparations with an impression syringe. When implant impression copings are in place to capture the position of implants, they may limit access to margins of the prepared teeth, which can result in an unacceptable impression. Adequate access may be significantly compromised when implant impression copings removed with the impressions are used. This type of implant impression coping is preferred by many clinicians, because it has demonstrated dimensional accuracy in reproducing a master cast. This technique is based on an impression technique described by Cannistraci and in which individual impression trays are made for tooth preparations. Using this technique, impressions of the tooth preparations are made independently from the impressions of the implants. Impression copings for implants are attached after tooth preparations are impressed. An over impression relates the implants and tooth preparations.

INDICATIONS

In case of arches requiring both implant and natural teeth restoration

Single step implant impression procedure [19]

After the second-stage exposure of dental implants, it is essential to study their position to design the final prosthesis. Abutment selection depends on the depth of the soft tissue sulcus and adequate emergence profile from either pre-angled, wide base-shouldered, or custom-cast abutments. Mounted diagnostic casts are helpful for this purpose and can serve as a convenient means to design the superstructure and communicate with the laboratory. A simplified one-step procedure for making the impression is described for implant reconstructions.

SUMMARY

The wide clinical applicability and ever increasing pace of the implantology research field has resulted in the evolution of various implant impression techniques. The options available for the dentist have improved in terms of the availability of various impression materials. Because of this, the selection of an appropriate impression technique that suits the patient's condition and the dentist operation skill has become more challenging. Hence it is essential to have knowledge on the various techniques in order to fabricate successful implant supported prosthesis.

Though various techniques are available for making impression for implant supported prosthesis research has proven that the open tray impression technique has given the highest success rate. Since a good impression forms the foundation for the fabrication of a successful prosthesis it is wise to choose the impression technique according to the clinical situation present.

Hence good impression techniques will indeed result in better treatment and better patient care.

REFERENCE

1. Kallus T, Bessing C. Loose gold screws frequently occur in full-arch fixed prostheses supported by osseointegrated implants after 5 years. *International Journal of Oral & Maxillofacial Implants*. 1994 Mar 1;9(2).
2. Fagan MJ. *Implant prosthodontics: surgical and prosthetic techniques for dental implants*. Year Book Medical Pub; 1990.
3. Garg S, Dable RA, Gopi A, Shukla S, Saxena S. *Impression techniques in dental implantology*.
4. Devi SG, Fathima AA, Sanitha M, Iyappan S, Curtis WR, Ramya M. Expression and characterization of alkaline protease from the metagenomic library of tannery activated sludge. *Journal of bioscience and bioengineering*. 2016 Dec 1;122(6):694-700.
5. Al Quran FA, Rashdan BA, Abu Zomar AA, Weiner S. Passive fit and accuracy of three dental

- implant impression techniques. *Quintessence International*. 2012 Feb 1;43(2).
6. Assuncao WG, Gennari Filho H, Zaniquelli O. Evaluation of transfer impressions for osseointegrated implants at various angulations. *Implant dentistry*. 2004 Dec 1;13(4):358-66.
7. Windhorn RJ, Gunnell TR. A simple open-tray implant impression technique. *The Journal of prosthetic dentistry*. 2006 Sep 1;96(3):220-1.
8. Misch CE. *Dental Implant Prosthetics-E-Book*. Elsevier Health Sciences; 2014 Jul 21.
9. Richard W. Toth A trayless Impression technique for implant supported restorations: *J Prosthet Dent*. 2005, 94;202-203,
10. Uludağ B, Şahin V. A functional impression technique for an implant-supported overdenture: a clinical report. *Journal of Oral Implantology*. 2006 Feb;32(1):41-3.
11. Gregory-Head B, LaBarre E. Two-step pick-up impression procedure for implant-retained overdentures. *The Journal of prosthetic dentistry*. 1999 Nov 1;82(5):615-6.
12. Jannesar S, Siadat H, Alikhasi M. A dual impression technique for implant overdentures. *Journal of Prosthodontics*. 2007 Jul 1;16(4):327-9.
13. Monzavi A, Siadat H. Use of wax spacers for putty-wash impression of implant snap-on impression copings. *Journal of Prosthetic Dentistry*. 2005 May 1;93(5):494.
14. Ivanhoe JR, Adrian ED, Krantz WA, Edge MJ. An impression technique for osseointegrated implants. *The Journal of prosthetic dentistry*. 1991 Sep 1;66(3):410-1.
15. Michalakakis KX, Kalpidis CD, Kang K, Hirayama H. A simple impression technique for dental implants placed in close proximity or adverse angulations. *Journal of Prosthetic Dentistry*. 2005 Sep 1;94(3):293-5.
16. Eid N. An implant impression technique using a plaster splinting index combined with a silicone impression. *Journal of Prosthetic Dentistry*. 2004 Dec 1;92(6):575-7.
17. Assif D, Marshak B, Nissan J. A modified impression technique for implant-supported restoration. *Journal of Prosthetic Dentistry*. 1994 Jun 1;71(6):589-91.
18. Chee WW, Alexander ML. Impression technique for arches requiring both implant and natural tooth restorations. *Journal of Prosthodontics*. 1998 Mar 1;7(1):45-8.
19. Kakar A. Simplified one-step procedure for making impressions and jaw relation records of implant-supported reconstruction. *The Journal of prosthetic dentistry*. 1995 Sep 1;74(3):314-5.