



ECLECTIC TECHNIQUES FOR IMPLANT IMPRESSION- A SYSTEMATIC REVIEW

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ABSTRACT

Background: Various implant impression techniques has evolved for the fabrication of implant retained prosthesis, such as the splint, pick-up, transfer techniques etc. and each technique has got its own limitations and selection of a specific technique depends on the evaluation of a particular patient and clinical situation present. **Purpose:** The purposes of this review were to: (1) highlight the various techniques of implant impression making, (2) merits and demerits in the fabrication of implant supported prosthesis, 3) selection of an appropriate technique for the corresponding clinical situation present.

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

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INTRODUCTION

The introduction of dental implants by Branemark, the treatment modalities in dentistry have evolved into leaps and bounds.¹ The implant treatment has overcome the various limitations of the conventional prosthetic treatment procedure. It has provided the perfect solution for the functional problems and psychological needs of the patient. With this evolution the osseointegrated implants have been proven successful in the treatment of edentulous and partially edentulous conditions. The success of the dental implants is influenced by various factors. One of the key factors affecting the outcome of the treatment is the impression procedure involved in the fabrication of the implant prosthesis.

An impression is defined as the negative replica of teeth and oral tissue. A good impression forms the basis for a successful prosthetic treatment. The oral environment presents a challenging task for the dentist, which has to be replicated for the fabrication of the prosthesis. In order to achieve a proper impression one should have knowledge of the oral anatomy, various impression techniques, material science of the impression material being used. Furthermore the skill and appropriate selection of the material and techniques place a significant role. The basic principle behind making an impression is to provide support, retention and stability for the prosthesis. An impression also will act as a foundation for the improved appearance of the prosthesis.

Varieties of implant impression techniques for the fabrication of implant retained prosthesis, such as the splint, pick-up, transfer techniques etc. have evolved in the past decade. Selection of a specific technique depends on the evaluation of a particular patient and clinical situation present.² In the fabrication of implants, the primary objective of impression making is to record and transfer the relationship between the non – yielding, osseointegrated fixture abutments and reproduce the relationship in the master cast. The purposes of this review were to: (1) highlight the various techniques of implant impression making, (2) merits and demerits in the fabrication of implant supported prosthesis, 3) selection of an appropriate technique for the corresponding clinical situation present.

History

Before the middle of the 18th century, no method was available for producing an impression. Blocks of ivory or bone were used as impression materials as well as for prosthesis. Then, during the 18th century it became possible to produce reasonably accurate models of mouth by the use of wax.

In 1840, Charles de loude of London made one of earliest references to impression trays when he wrote, “for impressions ,I use wax in tin cups or shapes, the whole size of the upper and lower jaws, or right or left, half jaws and fronts”. About this same time (1847), desirabode referred to an impression tray in the following manner, “we place the wax in a box, a kind of semi elliptical gutter of tin or silver, upon the anterior part of which is a shaft which forms a handle.

Mark, Terry and Jack in 1990 did a study for evaluating the impression techniques for osseointegrated implants. They develop a experimental model to test the accuracy of 3

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impression techniques and the components used to make the transfer records using stock trays. Jose, Steven and Peter in 1993 did an evaluation of 3 impression techniques for osseointegrated oral implants. The purpose of the study was to evaluate the passive fit of the framework to the sample casts made by the 3 techniques.³

In 1994, David, Barry and Joseph describe a modified auto polymerizing resin custom tray to allow splinting of the impression copings directly to the tray.⁴

In 1995, AshishKakar describes a simplified one step procedure for making impressions of implant supported reconstruction. In this technique the patients existing denture is duplicated in clear acrylic resin. Then using this denture as a tray, impression is made with an elastomeric impression material.⁵

In 1997, Souheli and Tanya described a technique for a multiple implant cast fabrication in single visit. They used an open tray and acrylic resin to splint the transfer copings. In this process they sectioned and rejoined the resin between the transfer copings and then poured the impression by first joining the analogues with impression plaster, sectioned it, rejoined it again to stabilize the analogues and finally using dental stone to pour the impression.⁶

In 1997, GamalBurawi, Frank and Declan studied on the dimensional accuracy of splinted and un splinted technique pour the bone lock implant system. They construct a stone model incorporating 5 implants. They used this model and compared the dimensional accuracy of a splinted and un splinted impression technique.⁷

In 1999, Belinda and Eugene described two step impression technique for implant retained over dentures.⁸ In 2000 Herbst, Nel and Becker did a comparative study on 4 impression techniques in the terms of their dimensional accuracy to reproduce implant positions on the working cast. They used to 4 different impression techniques. They are tapered impression copings not splinted, squared impression copings not splinted, squared impression copings splinted with autopolymerising acrylic resin, squared impression copings with a lateral extension on one side not splinted.⁹

In 2002, Yasuyuki and Masafumi described a modified implant impression technique. In this impression coping are seated in the implant and secured with guide pins. Then an opening is made on buccal side of the tray near to the implants. Holes are prepared to allow the guide pins to protrude without contacting the tray during impression making. Then the area around the remaining teeth is recorded with light body material.¹⁰

In 2003, Jason, Richard and Leslie did a study on open tray implant impression. In this they compared a accuracy of impression made from polycarbonate stock trays and rigid custom made trays.¹¹

In 2003 Paolo, Zeina and Giampiero did a study on accuracy of 3 techniques used to pour multiple implant abutment impressions. Impressions was made with polyether impression materials using 3 different techniques they are non-modified square impression copings, squared impression copings joined together with autopolimerising acrylic resin, square impression copings that had air born particle-abraded and adhesive coated.¹²

In 2004, Nickolas described an implant impression technique using a plaster index compared with silicone impression material. The flexibility of the elastomeric impression material is used to captured the undercut intra oral topography and splinting effect of the plaster to improve the accuracy of the fit of the prosthetic components.¹³

In 2005, Richard described a tray less impression technique for complete arch implant supported immediately loaded definitive restorations.¹⁴

In 2006, Chee and Jivraj, describes a technique for implant, in this technique they used transfer type impression copings with out custom tray were used.¹⁵

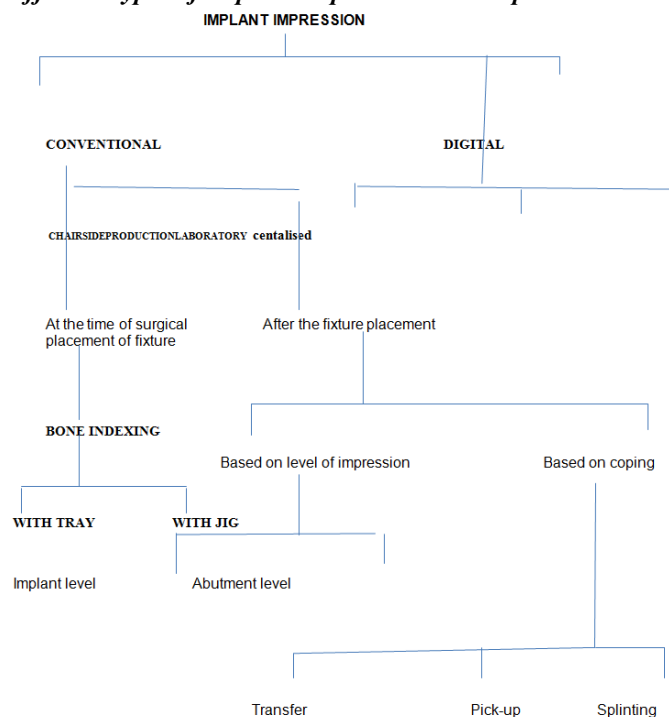
In 2006, Richard and Thomas described a simple open tray impression technique for implants. This technique makes use of a soft boxing wax which is easy to apply and remove.¹⁶

In 2006, BulentUludag and Voikan described a functional impression technique for implant retained over denture. It is a two-step technique.¹⁷

In 2007, Uludag, Ozturk and Gozde described an alternate functional impression technique for implant retained over dentures.in this technique impression is made with a combined use of zinc oxide eugenol paste and low viscosity impression paste.

In 2010, Soong- Ryong Jung and Jill D. Bashutski, describe a method to simplify a direct implant impression using an extended guide pin.

Defferent Types of Implant Impression Techniques



Implant impression are classified as¹⁸

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

1. Type of tray used
2. Type of technique used
3. Type of material used
4. Number of procedure

Based on the tray used

Open tray technique
Closed tray technique

Based on the technique used

- Conventional impression technique
- Modified impression technique
- Functional impression technique
- Tray less impression technique
- Two step impression technique
- Transfer type impression technique
- Impression using splinted and non splinted copings
- Impression using tapered impression copings
- Impression using squared type impression copings
- Pin retained transfer impressions
- Snap on impression
- Impression technique for angulated implants

Based on the type of materials used

- Polyether impression
- Additional silicone impression
- Condensation silicone impression
- ZnOE + elastomeric impression materials

Based on the number of procedures

- Single step
- Double step

Open tray impression technique:¹⁶

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

Armentarium

- Stocktray
- Tray adhesive
- Boxing wax
- Medium bodied and light bodied polyvinyl siloxane impression materials

Procedure

- A custom acrylic resin tray is fabricated and openings were created in the area where the implants are located.
- The healing abutments are removed and implant impression copings are placed.
- Then evaluate the impression tray intraorally. ensure that it is well adapted and that all the impression copings protrude through the openings in the tray without contacting the acrylic resin tray.
- Remove the tray from the mouth and adapt a section of boxing wax in the tray and seal the wax in the tray and seal the wax to the tray using a hot instrument.
- Then the tray adhesive is painted on the inside of the tray except where the wax is located and allowed to dry.
- Then the light bodied vinyl polysiloxane impression material is injected around the impression coping near the gingival tissues and into the interproximal areas between teeth. then the tray is filled with either medium or heavy bodied vps impression material in all areas except where the wax is located.

- The loaded tray is placed intraorally and pushed on the wax until all impression coping guide pins have been located and protrude through the wax a few millimeters.
- Allow the impression to completely polymerise.
- Any wax or impression material on the guide pins are then removed to gain access for connection of screw driver .
- All the guide pins from implants are then disengaged and impression is removed from the patients mouth.
- Then the impression is disinfected.

Closed tray technique:¹⁹

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 incase of restricted mouth opening.

Advantages

The major advantage here is there is no need of custom tray.

Disadvantage

Of this technique are poor accuracy and poor fit of the prosthesis.

Conventional impression techniques for implant supported prosthesis:¹⁹

The conventional method of impression making consists of 2 phases:

Primary impression

The purpose of making the primary impression is

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

Procedure

- The first step in the making of primary impression is to remove the healing cap.
- Then place the tapered hydrocollod impressipn coping into the implant body and the appropriate size stock tray is selected .
- An alginate impression then made.
- The indirect copings from the fixture are unscrewed and implant analogues are attached.
- Indirect impression transfer with analog is placed carefully into the corresponding hole in the impression.
- Then the cast is poured with dental stone .
- Recover the cast and removed the impression copings.
- Trim and complete diagnostic cast.

Secondary impression

- Then the custom tray is fabricated using the primary cast and then the final impression is made.

- To make a fully bone anchored prosthesis, a stable and accurate impression material is used for final impression.
- Remove healing caps, clean caps, clean the abutments, and rinse the tissues.
- Connect the square impression copings with guide pins.
- Conform the fit with radiographs.
- Try in the tray to verify fit intra orally.
- Inject impression material around each impression coping and surrounding tissues.
- Fill the impression tray with remaining impression material.
- Seat the tray intraorally and wipe excess impression material to expose the guide pins.
- Unscrew the guide pins and remove the impression and the final cast is poured.

Modified impression techniques

Trayless impression technique:¹⁴

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 tray less facilitate making impressions in edentulous patients with restricted access.

Indications

In the fabrication of complete arch implant supported prosthesis.

In patients who have restricted mouth opening.

Procedure

In this technique implant level transfer impression copings are placed prior to suturing.

The upper half of the impression copings left exposed.

Then fast polymerizing vinyl polysiloxane impression material is placed with generous extension over the tissues in the surgical field.

Following this using a disposable syringe or with the tip provided, place light polymerised acrylic resin in manageable overlapping increments around the upper half of the impression copings to engage their mechanical retentive features, locking the copings into the resin. Keep the acrylic resin off the tissues and on the impression material.

The impression material will act as an insulator from the warmth generated during polymerization. Use air and water spray coolant as soon as the resin stops flowing.

Then the impression is removed and the cast is poured with type IV dental stone. Care should be taken while pouring the cast since there is no adhesive between the impression material and acrylic resin.

Advantages

The advantages of this technique are accuracy and precise prosthesis can be fabricated and time consumed is very less.

Disadvantages

The primary disadvantage of this technique is its technique sensitive.

Functional impression technique:²⁰

An over denture 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 techniques 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 postinsertion 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 zinc phosphate impression paste and elastomeric impression material is used.

Indication

Mainly used in the fabrication of implant retained overdenture.

Procedure

After second stage surgery, healing caps are placed on the tapered abutments in the edentulous ridge. Then preliminary impressions of the maxilla and mandible are made with irreversible hydrocolloid to serve as a guide for the fabrication of custom acrylic resin impression trays.

Custom tray is prepared, leaving an opening in the areas of the implants.

A positive notch is formed on the midpalatal region for ease in supporting the tray intraorally with finger pressure.

The healing caps are removed and indirect abutment transfer components are screwed onto the tapered abutments then border moulding is done with modeling plastic impression compound and the impression of the alveolar mucosa is made with zinc phosphate impression paste.

Upon completion of the impression procedure, remove excess impression paste from around the implant sites are removed and the tray is seated carefully intraorally once again. Then the light bodied elastomeric impression material is injected around the implants through the open area in the tray. A definitive impression is made by inserting a stock tray over the acrylic resin tray using heavy body impression material. Then the abutment transfer components are unscrewed and attached to

the implant analogs. This assembly is then transferred to the impression and cast is poured.

Advantage

The advantages of this technique are it provides the accurate relation of the implant components in relation to the alveolar tissue and less post operative adjustments is required.

Disadvantages

The disadvantages of this techniques are highly techniques sensitive and it is time consuming.

Two step impression technique⁸

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 components failure.

Each laboratory and clinical stage may contribute to positional discrepancies in fit.

There it is essential to minimize the variation at even 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 procedure.

The over denture 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.

Procedure

In some aspects, such as force direction and distribution, implant retained overdenture are similar to bilateral distal extension removable partial dentures. 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 where by the teeth will be registered in their anatomic position and the residual ridge will be recorded in their functional form. This can be used in implant retained overdenture as well. Two categories

1. after healing from second stage surgery an irreversible hydrocolloid preliminary impression of the arch is made with healing abutment in place. An acrylic resin tray is then fabricated on the resultant cast and the tray handle is placed between the abutments to accommodate access to the implants.
2. at the final impression appointment, an impression is made by means of conventional means. The impression is removed and pick up type impression copings are placed on the implants.

3. then the holes are drilled in the impression tray through the area of abutment wide enough to permit the impression to be seated in the mouth without touching the impression copings.
4. when the impression seats fully and passively an autopolymerising acrylic resin or light curing resin is injected around the copings.
5. after polymerization of the resin the copings screws and the impression are removed. The copings are held rigidly by the tray. The analogs are placed in the copings and the master cast is fabricated by conventional means.

Advantages

The major advantages of this technique are it provides excellent fit of the prosthesis and accurate relation between the bar and soft tissues surface of the overdenture can be obtained.

Disadvantages

The disadvantages of this technique are time consuming and technique sensitive.

Dual impression technique:²¹

Different 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

1. 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).
2. 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 polysulfid rubber base during a reline impression that will be substituted with denture base during a reline impression that will be substituted with denture material) and c) fluid wax method (i.e, registering the residual ridge by painting the fluid wax on the tissues side of the impression tray). The selective pressure impression techniques 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.

Procedure

- Remove the healing caps place diagnostic abutments into the implant fixtures, and make a preliminary

impression with irreversible hydrocolloid impression material.

- Pour the diagnostic cast with type III dental stone.
- Relieve the residual ridge by adding a thin layer of melted baseplate wax except on the primary stress bearing areas(i.e buccal shelves).
- Adapt one or two layers of base plate wax on the abutments to maintain the space for the elastomeric impression material.
- Make a custom impression tray using autopolymerizing or light polymerizing acrylic resin material. Use a carbide bur to make holes on the anterior portion of the tray for injection of the elastomeric impression material.
- Try in the tray and border mold the tray distal to the abutment using a low fusing modeling plastic impression compound.
- Make the impression of the residual ridge using zinc oxide eugenol paste.
- Remove any excess material that is extended into the abutment region.
- Inject the elastomeric impression material through the holes to make the impression of the abutments while applying finger pressure to the distal portion of the tray.
- This will record the soft tissue of the residual ridge under pressure and the abutments in their anatomic position.

Advantages

This technique uses two impression materials that register the residual ridge under the load and record the implant abutments in their anatomic position.

Snap on impression techniques:²²

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.

Procedure

- The impression coping is placed over the solid abutment after abutment preparation.
- Then hard baseplate wax is softened over a flame and wax is added around and over the impression copings.
- Then an impression with putty type impression material is made.

- The impression is then removed from the mouth after polymerization of the impression material.
- The wax and impression coping from the putty is removed.
- The wax from the impression coping is removed and the impression coping is repositioned intra orally.
- Finally the impression is relined with the light bodied impression material.

Advantages

The advantages of this technique are highly accurate impression can be made and precise fit of prosthesis can be obtained.

Disadvantages

The disadvantage of this technique is its technique sensitivity.

Screw retained impression technique:²³

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 2-4 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 one piece plastic frictional fit/snap on index coping. The connection between the implant and index coping can be achieved by means of screw retention or the frictional fit/snap on design. This connection related the hex position to the implant analogue. 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.

Procedure

1. Initially the healing abutments are removed and implant position, angulation or space limitations are identified with the use of either long guide pins or conventional impression copings. Determine whether the long guide.
2. Pins or conventional impression copings present compromising contact interferences and whether these interferences are minor or major. If the interferences are

minor proceed to step 2. If the interferences are major then proceed to step 3.

3. If the interferences are minor remove the guide pins or impression copings and attached a screw retained titanium implant index coping to the implant. use dental floss to locate the minor interferences between the coronal or lateral borders of the screw retained titanium implant index copings and the adjacent copings or teeth. Eliminate the interferences by removing the copings and grinding them with high speed diamond bur.
4. If the interferences are major excessive modification of titanium index copings may damage the head of the titanium screw.
5. In such a case replace the titanium coping with a plastic implant index coping. Remove and grind the interferences on the plastic index copings with a high speed diamond bur.
6. After all interferences have been eliminated reseat the index copings. Floss should pass through easily with no snap sound.
7. Ensure that the height of the plaster index coping does not interference with seating of the tray. If interferences occur, use a high speed diamond bur to eliminate the coronal portion of the plastic index coping. Use light activated acrylic resin or autopolymerising acrylic resin to connect the index copings to each other to increase rigidity and accuracy prior to impression making.
8. Make an impression with an elastomeric impression material. Use an open top tray for screw retained titanium index copings or a closed tray for plastic index copings.
9. Place the implant analogues and pour a soft tissue implant level gypsum cast. Use this cast to select the definitive implant abutments and to adjust the selected abutment level impression copings if necessary.
10. Place the definitive implant abutments in the mouth connect the previously adjusted abutment level impression copings and make a final impression.

Advantages

The advantage of this technique are those copings are smaller and easy to use. It requires less chair time. It is less expensive.

Impression technique for implant in close proximity:²⁴

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, implant 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 osseointegrated implants, resulting in an incorrect registration of the position of the implants. Precise impression procedures of implant positions are essential for the fabrication of the accurately fitted implant supported prosthesis. This is generally a routine procedure. However, implants placed in

closed 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, where as Chaimattayompol describe 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.

Indication

Implants placed in close proximity.

Procedure

1. Place a retained impression coping on one of the implants to be impressed and secured with the accompanying screw.
2. Using a carborandum disk cut a retained impression coping to a pointed which it does not interfere with proper seating on the second implant. Prepare undercuts on both surfaces of the copings. Alternatively, use a hex retentive element after it is cut to the proper height.
3. Secure the modified impression coping on the second implant with a short fastening screw, since the long fastening screw that accompanies the retained transfer impression coping may interfere with the screw of the adjacent coping.
4. If more than two unfavourably positioned implants are present, follow the same procedure for remaining implants. make a periapical radiograph to verify complete seating of the impression copings.
5. Connect the impression copings with the low shrinkage autopolymerizing polymethyl methacrylate raising engaging the undercuts on the surface of the shortened impression copings. After polymerisation of the acrylic resin, remove the fastening screws from the modified impression copings.
6. Cover the access openings of the modified impression copings with autopolymerizing pmma resin to prevent intrusion of the impression material, and proceed with the standard impression procedures. A custom tray made from PMMA resin with an access window directly above the region of the implants can be used for the direct transfer method. Make the impression with a medium body polyether impression material. Alternatively, use impression materials of various viscosities, but with similar accuracy and dimensional stability to those of polyether.
7. Unscrew the fastening screws from the unmodified retained impression copings and remove the impression. Disinfect the definitive impression.
8. Place the implant replicas on the unmodified impression copings and screw then into place with the accompanying screws. Hold an implant replica firmly on the modified impression coping while connecting the two adjacent replicas with autopolymerising acrylic resin. Repeat this procedure if there is more than one modified impression coping.
9. If implants are very close to each other, blockout the coronal portions of the interproximal areas of the

adjacent implants with wax to prevent tearing of the gingival mask material. Do not block this area with wax if implants are in adverse angulations to each other but there is some space between them. Place a gingival mask material around the implant replicas and pour the impression with a type IV stone. Complete the definitive restorations in the conventional manner.

Advantages

The advantages of this technique are yet does not require any additional component and it is highly accurate.

Disadvantages

The major disadvantage is its technique sensitivity.

Plaster and silicone combined impression technique:¹³

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. Weet et al described various methods of improving the framework fit. Among these, the use of a dimensionally accurate impression materials 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 procedures. 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.

Procedure

1. A vinyl polysiloxane impression is made using a stock plastic impression tray. Then the prosthetic abutment are covered with healing caps.
2. Then the impression is evaluated and the silicon around the implant area and the top of the impression tray is removed.
3. The impression copings are then screwed in position with a guide pin that exists above the tray when the tray is placed intraorally. Ensure that sufficient space is present around the copings and access to the guide pins exists prior to proceeding to the next step.
4. Hold the tray with the polymerised impression in position during the plaster splinting index procedure. Inject impression plaster around the impression copings with the plastic disposable syringe.
5. After the plaster has set, unscrew the guide pins. The tray is then removed with the plaster index and the copings.
6. Evaluate the plaster index for fractures or shifting.
7. screw the implant analogues in place. Apply a thin coat of separator on the plaster. Pour the impression with the type IV plaster to obtain the definitive cast. For partially edentulous situations, preserve the silicone material in the interdental spaces before the second stage and fill small voids with wax.

Advantages

The advantages of this technique are the flexibility of the elastomeric impression material captures the undercut of intra oral topography accurately.

The splinting effect of the impression plaster helps to improve the accuracy and fit of the prosthetic components.

Modified impression technique:⁴

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 absorb 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 contain 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, specially in the maxilla. Incomplete soft tissue impression around implants hinders the fabrication of the super structure with the proper emergence profile. A modified implant impression technique is presented as a solution to these problems.

Procedure

1. Seat the impression copings on the implants, and secure them with guide pins.
2. Prepare an opening on the buccal side of the tray near the implants. Prepare holes in the tray to allow the head of the guide pins to protrude without contacting the tray during impression making.
3. Use light bodied impression material to record the area around the remaining teeth.
4. Replace the tray in the mouth, and to ensure that the guide pins are visible through the holes on the top of the tray.
5. Place injection type impression material through the side opening until the material flows from the holes at the top of the tray and the lingual edge of the tray.
6. After the impression material has set, remove the impression containing the copings.

Impression techniques for arches requiring both implant and natural tooth restorations:²⁵

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 margins and fine detail important. Fine detail reproduction is not required when impression copings are used, because analogues 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 consistencies and flow to record the margins and final 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 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.

Technique

1. A preliminary impression of the prepared teeth is made with irreversible hydrocolloid, and a cast is constructed.
2. Five layers of rubber separator are painted over prepared teeth to aid in separation of trays from the cast. To allow for a thickness of approximately one mm of impression material, the trays are relieved internally.
3. Individual trays with external retentive undercuts for pickup by the over impression are made for tooth preparations. An over impression tray with openings to access the implant impression copings is made over these individual copings.
4. The provisional restorations are removed and the preparations cleaned.
5. The individual impression trays are painted with adhesive internally and externally at least 7 minutes before making the impression.
6. Usually tissue retraction is needed only if margins are more than one mm subgingival.
7. Heavy bodied polyvinyl siloxane impression material is placed into the individual trays and trays are seated over the preparations.
8. Each tray is removed after the impression material has fully set and examined for completeness; this stage can be repeated if incomplete areas are found.
9. The individual impression and trays are perforated at the coronal aspect with a #6 round bur and the preparations redried. Light bodied polyvinyl siloxane impression material is placed in the existing impression and the impression and individual tray is resealed on the preparation slowly.
10. Excess material escapes through the perforations and along the margins of the impression. The individual impression trays are left in place for the remainder of the procedure.
11. Next, the implant impression copings are attached and over impression is made using a medium bodied polyvinylsiloxane impression material.
12. The impression copings are released and the impression is removed.

Advantages

The advantages of the technique are it allows in master cast with both tooth preparations and implants analogues to be used to fabricate the restorations. It facilitates adequate access to tooth preparations without interference of impression copings. It allows the individual impressions of the teeth to be examined individually before the full arch impression is made. It reduces stress for the operator and patient, because impressions of the prepared teeth are made independently of the implant. It

minimises trauma to the gingival tissue in some situations, because tissue retraction is not necessary when tooth preparation does not extend more than one mm subgingivally.

Disadvantages

1. The disadvantages of this technique are it requires individual impression trays for the prepared teeth.
2. Limits access in placing the implant impression copings if the individual impression trays are in closed proximity.
3. Increase bulk of the over impression tray because it must accommodate both the individual impression trays and implant impression copings.

Single step implant impression procedure:⁵

After the second stage exposure of the dental implant, 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 superior structure and communicate with the laboratory.

A simplified one step procedure for making the impression is described for implant reconstructions.

Procedure

1. The patient's existing denture is duplicated by clear acrylic resin by use of a denture duplicating flask.
2. After the acrylic resin has set completely, the denture is removed from the mold and the excess flash is trimmed from the denture borders.
3. Finish and polish the denture.
4. Try the duplicated denture in the patient's mouth and make any necessary adjustments.
5. Remove the healing caps from the implants and place the impression posts on the implants. Make radiographs to confirm the seating of the impression posts.
6. Cut through the denture base so that it can be completely seated in the mouth without contacting the impression posts.
7. Add triad VLC tray material or utility wax to the denture to close the portion that was removed. Do not pack the material around the posts because it should touch only the exposed ends of the impression posts.
8. Use the duplicate denture as a tray to make an impression of the arch with an elastomeric impression material.
9. After the impression material sets make a jaw relation record with a rigid elastomeric registration material.
10. After removing the impression from the mouth screw implant analogues onto the impression posts and pour a soft tissue model.

Implant Indexing¹⁸

Implant Indexing is a method in which impression is made at the time of surgical placement. This allows for the preparation of an abutment and provisional crown placement for one stage procedure or the provisional crown is inserted instead of healing abutment at the time of exposure in two stage implant procedure. It is of two types: tray technique and jig technique.

Tray technique

The pick- up coping is recommended to minimize the amount of force loaded onto the newly placed implant using a traditional tray.

Jig technique

Prior to surgery a jig is fabricated to avoid using the impression material while the surgical flap is opened. An acrylic splint including 3-4 adjacent teeth should be fabricated on a diagnostic cast. Space is created in the jig for the future impression coping. After surgical placement of implant fixture, place the pick- up coping. A cold sterilized jig is positioned in the mouth. Relate the coping to the jig using liquid acrylic or Triad gel. Make sure that the coping screw rotates freely and the undercut is not blocked. The acrylic or gel can be cured now. Release the coping screw and free the splint with the abutment in it. Release space in the stone cast to accommodate the implant analog. Position the jig and attached analog. Pour the stone and remove the jig once the stone is set. The implant is indexed onto the model.

Recent advance in impression tray

The Mira tray developed by Hager is the recent advance to overcome the difficulties in an open tray technique. The tray comes with unique design and available in three sizes. The transparent foil in the occlusal surface helps in identifying the head of the pins intra orally. The loaded impression tray is inserted and pressed apically; the pins pierce the film and capture the impression more easily. Once the material is set, the pins are rotated counter clock wise to remove the tray intra orally. This tray can be used in all situations whether the arch is partially or completely edentulous.

Gingival retraction

The aim of gingival retraction is to allow the impression material to create space for the impression material in order to provide sufficient thickness of impression material to withstand the tearing force while retrieving the impression. Bennani discussed various gingival retraction methods in teeth and implant and concluded that there is no existing device or method to retract gingiva that can be used for direct impression of the implant abutment.

The support provided by the peri- implant fiber is not the same as the periodontal structure; therefore it may not be able to prevent the collapse of retracted tissues as compared to periodontal tissues. Hence it is difficult to make accurate impression in implant dentistry.

To overcome this, a Canadian company, Stomatotech, came up with a simple idea to retract the gingival tissue using a disposable plastic collar. The main purpose of the G-Cuff™ system is to support the soft tissue that surrounds the dental implant abutments allowing the impression means (conventional or digital) to access to the surface of the abutment. It is inserted on the apical end of the abutment before the abutment is engaged to the implant. Following the abutment's engagement to the implant, the plastic collar is found between the apical part of the abutment and the gingival soft tissue. Shortly after the removal of the impression from the mouth, the plastic collar is pulled out and removed permanently. The plastic collar creates a perfect gingival retraction with a valve factor preventing the liquids from contaminating the area of the finish line of the abutment.

Benefits of G-Cuff™

1. Simple, more reliable, economical
2. Compatible with most of the existing dental implant brands
3. Impression can be made with either "open tray" or "close tray"
4. Due to the significant shortening of the lab procedure the risk of impression distortion is dramatically
5. Lowered.
6. Eliminates the need of the materials such as: Impression Copings, Implant Analogs, Temporary Abutments and Custom Impression Trays.

CONCLUSION

Every day various impression materials and impression techniques are being tried in implant dentistry. Dental implant treatment modality is one of the most promising and challenging option for replacing a missing tooth or teeth. So, Clinicians has to be very careful and knowledgeable about various impression techniques and its utilization for the benefit of patient so as to achieve a predictable prognosis.

References

1. Branemark. Osseointegration and its experimental background: *J Prosthet Dent* 50; 399 - 410; 1983.
2. Reddy S, Prasad K, Vakil H, Jain A, Chowdhary R. Accuracy of impressions with different impression materials in angulated implants. *Nig J Clin Pract* 2013; 16:279-84.
3. Mark R. Spector, Terry and Jack An evaluation of impression techniques for osseointegrated implants; *J Prosthet Dent* 63; 444-447, 1990.
4. Richard W. Toth, A trayless impression techniques for implant supported restorations: *J Prosthet Dent* 94; 202-203, 2005.
5. AshishKakar Simplified one step procedure for making impression and jaw relation records of implant support reconstruction; *J Prosthet Dent* 74; 314-315, 1995.
6. SouheilHussaini and Tanya Wong One clinical visit for a multiple implant master cast fabrication; *J Prosthet Dent* 78; 550-553, 1997.
7. GamalBurawi, Frank Houston, DeclanByrne, NoelClaffey A comparison of the dimensional accuracy of the splinted and unsplinted impression techniques for the bone -lock implant system; *J Prosthet Dent* 77; 68-75,1997.
8. Belinda and Eugene Two Step pick up impression procedure for implant retained over denture; *J Prosthet Dent* 82; 615-616, 1999.
9. D.HerbstNel and Becker Evaluation of impression accuracy for osseointegrated implant supported supported super structures; *J Prosthet Dent*; 355-361, 2000.
10. YasuyukiMatsuhita and Masafumi and MasafumiKihara A modified implant impression techniques; *J Prosthet Dent* 87;343-344,2002.
11. Ying - Chin Peng, Song - BorKuo, Yu - Fu Shen, and Hsiang- His Hong use of impression cap to retract peri implant mucosa before cementation of iti abutment ; *J Prosthet Dent* 89;422-43,2003.

12. Vigalo P, Majzoub Z, Cordioli G. Evaluation of the accuracy of three techniques used for multiple implant abutment impressions. *J Prosthet Dent* 2003;89:186-92.
13. Nicolas Eid An implant impression technique using a plater splinting index combined with a silicone impression; *J Prosthet Dent* 92;575-577,2004.
14. Richard W.Toth, A trayless Impression technique for implant supported restorations: *J Prosthet Dent* 94; 202-203,2005.
15. Chee and Jivraj Impression techniques for implant dentistry: *British Dental Journal* 201;429-432,2006.
16. Richard J. Windhorn and Thomas R. Gunnel A simple open tray implant impression technique; *J Prosthet Dent* 96;220-221,2006.
17. Bulent Uludag and Gozdecelik An alternative impression technique for implant retained overdenture; *J Prosthet Dent* 96;377-378,2006.
18. Impressions in implant dentistry – a review article
19. Carl E. Misch Dental Implant Prothetics.
20. Bulent Uludag and Volkan Sahin. A functional impression technique for an implant supported overdenture; *J Oral Implant.* 23;41-43,2006.
21. Sina Jannesar, DDS Hakimeh Siadat, and Marzieh Alikhasi, A Dual Impression Technique for Implant over dentures *J Prosthodont* 16; 327-329,2007.
22. Abbas Monzavi, and Hakimeh Siadat, use of wax spacers for putty wash impression of implant snap-on impression copings; *J Prosthet Dent* 93;494,2005.
23. John R. Ivanhoe An impression technique for osseointegrated oral implants *J Prosthet Dent* 66; 410-411, 1991.
24. Konstantinos X. Michalakis, Christos D.R Kalpidi and Kihokang, A simple impression technique for implants placed in close proximity or adverse angulations; *J Prosthet Dent* 94; 293-295,2005.
25. Winston W.L. Chee, and Marc L. Alexander Impression technique for arches requiring both implant and natural tooth restorations; *J Prosthodont* 7;45-48, 1998.

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