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ORIGINAL RESEARCH

Impressions in dental implants

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Abstract
Implant advancement is considered a landmark in the upliftment of dentistry. They are the treatment of choice for each and every dentist. Even though it is an excellent mode of treatment, yet is highly technique sensitive. Impression-making in dental implants is essential as it records the in-depth intaglio surface to make the prosthesis not only long-lasting but also user-friendly. Elastomeric impression material is the material of choice for the recording of a dental implant. In this article, we shall be discussing various techniques for making a conventional dental implant impression.
Keywords: Landmark, intaglio surface, elastomeric material.

Introduction

The twentieth century is considered a boon in the advancement of science. The dental implant is one of those inventions and is considered a milestone in the rehabilitation of both partial as well as complete edentulous patients. The success, function, and aesthetics of an implant restoration are dependent on proper treatment planning and thorough knowledge of components and instrumentation. Some of the commonly used components are drivers, healing abutments, lab analogues, screws, and impression copings. Impression is defined as a negative likeness or copy in reverse of the surface of an object; an imprint of the teeth and adjacent structures (GPT-9).[1] The recording of impressions in implant treatment requires great precision as the implants are essentially rigid and incapable of orthodontic movement. Thus, inaccuracies will result in a poorly fitting prosthesis and high stresses, both in the superstructures and in the bone around the implant. The crucial aspect is not to replicate the minute surface detail but to record the spatial intraoral orientation of the implant. A passive and precise match of implant supra-structure to implant abutment determines its future success and sturdiness therefore reducing prosthetic complications[2]. Although a range of techniques for making impressions of implant-retained prosthesis has evolved, each one has

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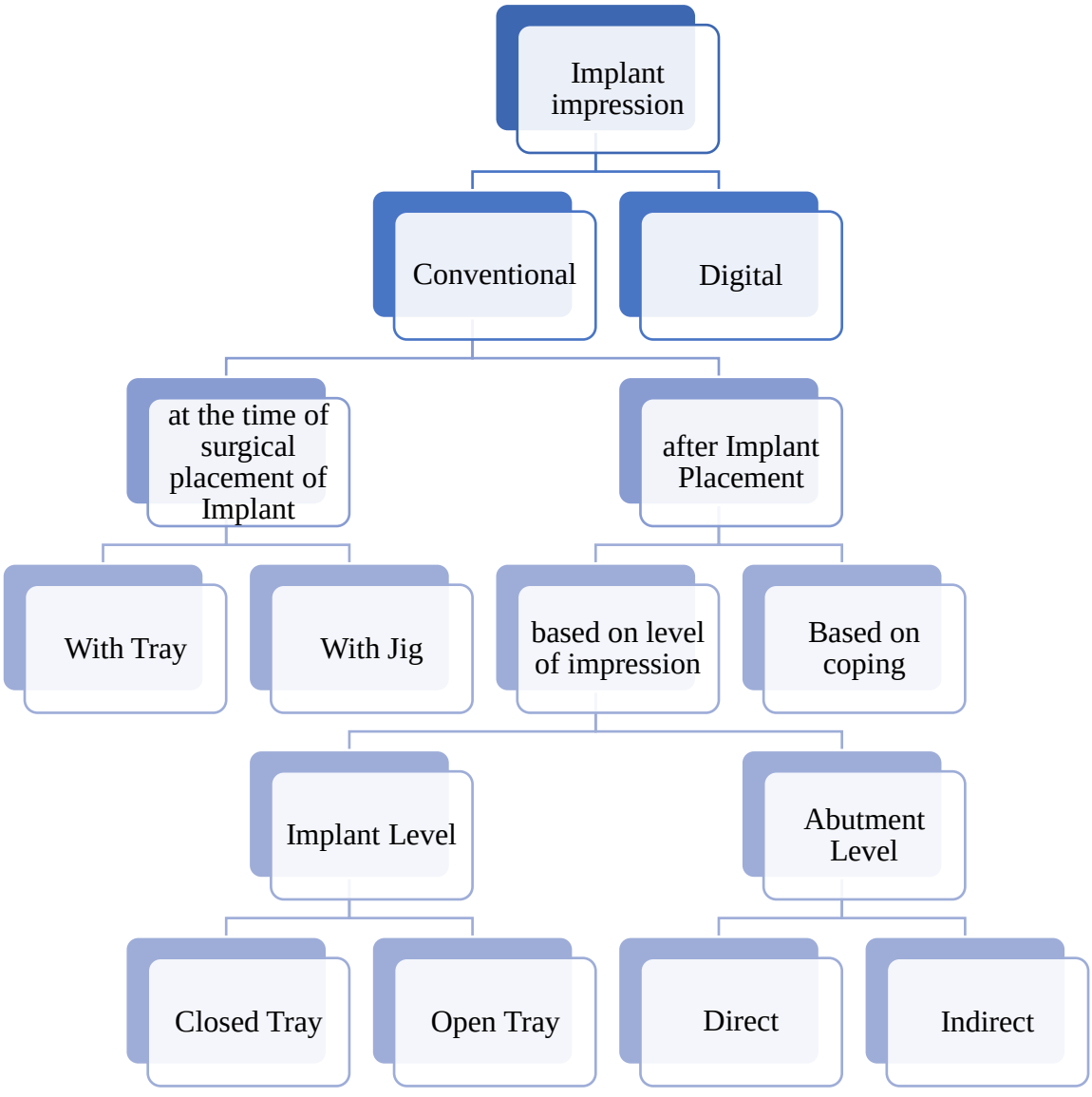
got its impediments. Thus, the selection of a specific impression technique, which enormously affects the outcome of the treatment, still remains a tedious task. There are certain factors that affect the implant impression. These include impression material, implant depth, number of implants, and impression technique used. A variety of impression materials are currently available for implant impressions, which include polyvinylsiloxane, condensation silicone, polyether, polysulphide elastomeric impression materials, hydrocolloids, and impression plasters. Two widely used materials are Polyvinylsiloxane and Polyether because they showed greater dimensional stability, hardness, and elastic recovery[3].

Classification



Impression at the time of surgical placement of Implant

This procedure of making an impression at the time of implant placement is known as implant indexing. It fulfills two function- firstly allow the preparation of an abutment and secondly, the preparation of a provisional crown for the stage one procedure. It has been further classified into two types- The tray technique and the Jig technique.

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Tray technique

In order to minimize the amount of force onto the newly placed implant**.** It involves the use of open tray copings using a traditional tray.

Jig technique

i) Before implant placement, a jig is fabricated in order to avoid using impression material.
ii) Jig is fabricated with auto-polymerizing resin and should include 3-4 adjacent teeth.
iii) Spacer is created within the jig for future impression coping.
iv) After implant placement, open tray copings are screwed and the jig is positioned in the mouth.
v) Jig is positioned in the mouth, relate the coping to the jig using liquid acrylic or Triad gel.
vi) After the acrylic is cured. Release the coping screw.
vii) Provide some space in the stone cast to accommodate the implant analog.
viii) Position the jig and attached analog.
ix) Pour the stone and remove the jig once the stone is set.

Open tray impression/ Pick up/ Direct impression

It is indicated in:

- making impressions of multi-unitrestorations.
- angled implants[4]
- Full fixed arch mandibular impressions
- Deep implants

Technique

i) In stage II, a healing abutment is placed for 7-10 days. After that impression for full mouth implants or angled implants with open trays are made using square-shaped copings. (Figure-1a)
ii) A custom tray is fabricated and holes or windows are made to expose coronal ends of an impression coping screws. (Figure-1b)
iii) Copings are screwed on the implants. (Figure-1c)
iv) Check the proper seating of the tray as it should not have any interferences.
v) Before making an impression, splitting an impression coping is essential.
vi) Impression material is syringed around the impression coping and filled trays are placed in the mouth.
vii) Make sure all the impression coping is exposed through the impression material. (Figure-1d)
viii) Wait for the material to polymerize and inspect for the impression. (Figure-1e).
ix) The implant analogs in the impression are connected to the copings to fabricate the definitive cast.

Figure 1 – Indicating Steps for making an open tray impression. (Courtesy: Dr Suvansh Gupta, Senior lecturer, Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab, India)

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(a) (b)

(c) (d)

(e)

Two types of trays simplify the process of making open-tray implant impressions. These are the Mira tray and the Kohler tray.

Mira tray

The occlusal surface is covered by a transparent plastic rim. Tray adhesive was not applied to the plastic rim surface as this may obscure visualization of the transfer copings while inserting the tray to the proper depth. PVS impression material was used to make an impression with the Mira tray.[5]

Kohler tray

Kohler tray was placed and positioned with respect to the implant analog and was marked and the corresponding section from the impression tray was removed with the driver that was supplied with the tray and the impression was made. Kohler implant tray with removable segments is rigid reusable and can be sterilized. The Kohler tray was filled with soft putty (PVS) and a light body (PVS) was injected around transfer copings and on the ridge and an impression was made. Seat the tray on the model. After the setting of the impression material, transfer copingswere unscrewed and the impression was removed with transfer copings in one snap.[6]

Splitting of Implant

An impression made by splitting dental implants is considered more accurate.

The basic principle in splinting the impression copings is to connect all the impression copings together using a rigid material to prevent the individual copings to move during the impression-making procedure. It prevents rotational movement of the copings hence, decrease the amount of distortion and improving impression accuracy and implant stability.[7]

Splitting of the copings can be done using various materials such as flowable composites, pattern resin, impression plaster, thermoforming material, and acrylic resin using dental floss

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as a scaffold. Recently, titanium bars were used to weld the abutments or impression analogs intraorally, making it a new procedure for splinting of implants.

Papaspyridakos P et al. conducted a study in 2011 in which they use the direct impression technique with and without splinting for each arch in 13 edentulous arches, and it was seen that results obtained in impressions using the splinting technique were significantly better than non-splitting impressions.[8] Another study by Jalalian in 2017 conducted a comparative analysis of splinted and non-splint in open tray impression techniques on open-tray impression techniques on 15 and 25º angled implants. At first steel models in 8 cm diameter and 3 cm height were made with 4 holes to stabilize 4 implants. Two central implants were placed with a 12 cm interspace from each other and an interspace of 17 mm from angled implants. Central implants were perpendicular whereas the other implants had a divergence of 15 and 25º. The implants and T-eries were fabricated using acrylate and polymeric acrylate. It was concluded that a significant difference was detected in the dimensional accuracy of the resultant casts made from Splinted and non-Splinted impression techniques[9].

Closed tray impression

It is indicated in patients with limited inter-arch space, in single implant, a patient having severe gag reflex,[10] when there is difficulty in the posterior region in the mouth, and patients with restricted mouth opening (Liou Ad in 1993)[11].

Advantages of Closed Tray

- Easier
- Suitable for short inter arch distance.
- Visual screwing of the analog to the coping is more accurate

Disadvantages of Closed Tray[12]

- Inaccuracies with deformation of impression material may be encountered with nonparallel implants.
- Not Suitable for deeply placed implants.

Technique

i) It can be made with both stock or custom trays.
ii) It uses a tapered impression post that is screwed onto the implant for impressions.
iii) The impression copings remain fixed to the implant on the removal of the set impressions.
iv) After tray selection, coping is screwed.
v) Impression material is syringed around the impression coping and filled trays are placed in the mouth.
vi) Wait for the material to polymerize and inspect for the impression.
vii) After the removal of the tray from the mouth, the impression copings are separated from the implant and combined with the implant analogue.[13]
viii) This then goes into the impression body during what is called a transfer process. The combined coping-analog assembly is inserted in the final impression.
ix) Disinfect it and pour it with type IV Gypsum Product.

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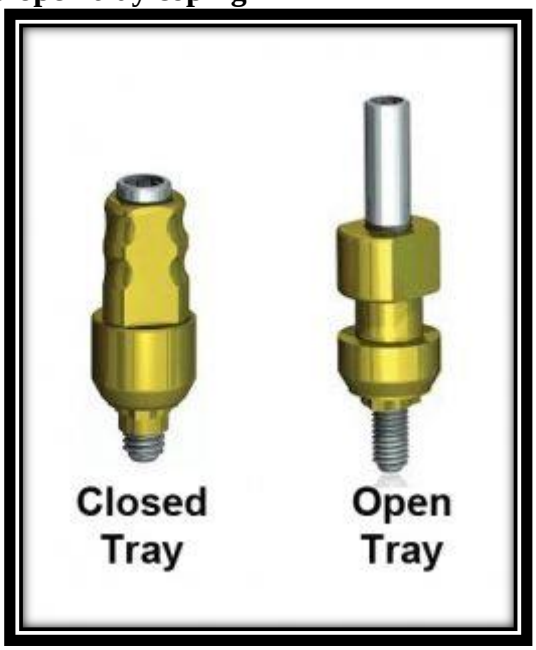
Figure2: Closed tray and open tray coping



Snap fit technique/Press fit plastic impression coping (Figure-3)

This technique uses press-fit impression coping which is connected to the implant by pressing instead of screwing and the plastic impression copings are picked up in the impression.[14] This technique is not considered as a pickup impression because it does not require an open tray, but instead uses a closed tray.

Advantages

- easier to manipulate
- time-saving
- more comfortable for both the clinician and patient.
- The press-fit coping design allows the removal of the coping with the impression and has the merits of both the open and closed-tray implant impression techniques. Thus, the press-fit impression coping helps to overcome the movement of impression copings inside the impression material. An implant impression technique in which the press-fit impression coping was used to achieve accurate working casts.

Figure3: Press fit plastic impression coping

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Digital Impression

CAD/CAM technology made it possible to fabricate implant-supported restorations through a digital workflow. Digital impressions transfer the intra-oral situation to a virtual model and represent the first step of the digital workflow. The accuracy of this procedure may determine the success of the treatment. Digital impressions can accelerate the data-capturing process and eliminate most of the drawbacks usually found with conventional impressions, thereby decreasing patient discomfort while improving the predictability of prosthesis design and manufacturing procedures.[16]

The intraoral scanning devices utilize an ultra-modern optical surface scanning technology that works equally to a camera, however rather than merely capturing lights and colors, the sensors live lightweight reflection times from numerous surfaces through processes to capture the article three-dimensionally. This info is then captured by the three-D software package that utilizes specific alignment algorithms to permit registration. All of those techniques utilize a mixture of that numerous imaging capturing methodologies to gather the surface information of the teeth-associated tissue layer or mucosa so the data may be registered and "stitched" along through an alignment method so as to make the virtual three-dimensional model.

Advantages of Digital Implant Impressions

1. Reduced distortion of impression materials.
2. Elimination of any unpleasant taste or gagging sensation due to the dental impression materials.
3. The impressions can be viewed three dimensions before processing.
4. Assessment of emergent profile in anterior cases specifically.
5. Reduced chair time.
6. Prevent cross-infection.

Disadvantages

1. Multiple implants can cause difficulty in identifying the correct positions of the abutments.
2. Inability to scan the surrounding soft tissue when implants are close to each other.

Conclusion

The greater number of teeth missing in a patient, the more challenging the task to rehabilitate becomes. The fit of an implant prosthesis depends on having an accurate definitive cast, which relies on the accuracy of the implant impression. Hence, adequate knowledge is essential as it is very technique sensitive.

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