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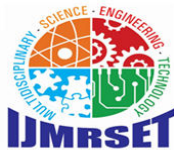
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International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

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Various Impression Techniques used for Different Implant Supported Overdenture Procedures - A Narrative Review

Dr K.Udayabhanu¹, Dr B.Lakshmanarao², Dr K.Sudheer³, Dr A.Supriya⁴, Dr A.Devisuvarchala⁵,
D K.Jayalakshmi⁶

Post Graduate Student, Department of Prosthodontics, Lenora Institute of Dental Sciences, Rajahmundry, A.P., India¹

Professor & HOD, Department of Prosthodontics, Lenora Institute of Dental Sciences, Rajahmundry, A.P., India²

Professor, Department of Prosthodontics, Lenora Institute of Dental Sciences, Rajahmundry, A.P., India³

Post Graduate Student, Department of Prosthodontics, Lenora Institute of Dental Sciences, Rajahmundry, A.P., India⁴

Post Graduate Student, Department of Prosthodontics, Lenora Institute of Dental Sciences, Rajahmundry, A.P., India⁵

Post Graduate Student, Department of Prosthodontics, Lenora Institute of Dental Sciences, Rajahmundry, A.P., India⁶

ABSTRACT: For implant-supported overdentures, impression techniques are essential to guaranteeing the prosthesis's appropriate fit, lifespan, and functionality. Different imprint techniques were proposed by different authors in implant prosthodontics depending on the attachment system. The doctor should use the right imprint substance and technique based on the particular clinical scenario. The purpose of this narrative review was to go over different impression methods for various implant supported over denture scenarios.

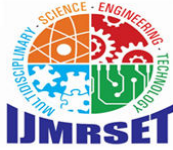
I. INTRODUCTION

Making impressions with an open tray and a window is a popular practice. Because the impression material in the tray may cover the guide pins during the technique, it can be challenging for them to emerge from the aperture of the wax lid. Repositioning the tray multiple times has been shown to cause distortion and/or bubbles in the impression. The pressure on the impression tray may decrease and the impression material may not cover the soft tissue around the implants, particularly in the maxilla, if the opening of the wax lid is excessively large or if the wax lid is misaligned. A poorly modelled soft tissue surrounding implants makes it more difficult to fabricate a superstructure with an appropriate emergence profile. To address these issues, a modified implant impression procedure is offered. [1,2]

Different modifications can be listed as follows:

1. Tray-Less Impression Technique:

When creating complicated impressions, a technique that combines simplicity, accuracy, and speed is preferred. This method, known as the tray-less impression procedure, has not been mentioned in any other dental literature papers. The author has taken full arch impressions at the time of surgery using this technique, which was first developed to make impression-taking in the surgical field easier. These impressions will be used to fabricate immediately loaded, single-piece, screw-retained provisional restorations that are supported by external hex implants. It only takes six minutes to accomplish this effective approach, which has been utilised to leave a lasting impact. Making impressions on edentulous patients with limited access is made easier with this tray-less method. It has been demonstrated that the most accurate technique for numerous abutment impressions is direct splinting. By employing recognised in vivo assessment techniques, the prostheses made with this impression process are radiographically and clinically correct.[3]



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2. Impression Technique for Implants Placed in Close Proximity or Adverse Angulations:

Impression method is used to create impressions in instances where it is difficult to make an impression of implants positioned closely together. A modified impression coping with a short fastening screw is one type of coping, and an unmodified impression coping is the other. Undercuts on the upper part of the impression coping that is shortened. For the implant impressions, polyether and vinyl polysiloxane were suggested materials. The literature appears to be inconsistent when it comes to accepting a better method.[4]

3. Digital Impressions:

Direct intraoral scanning of the implant can be used to manufacture a milled model with a removable implant analogue in addition to producing a three-dimensional (3D) virtual model for the restoration's design and milling. [5]

One of two methods can be used to make a digital impression: either directly through intraoral scanning or indirectly through master cast scanning. Direct mouth scanning allows for the electronic transmission of digital data to a milling machine, which creates a digital model without the need for intermediate stages that are required in traditional impression production.

Two methods are demonstrated by digitalisation: Direct and Indirect techniques.

Direct technique: This method entails taking an impression inside the patient's mouth using an intraoral scanner, which makes it simple to create a 3D image. Then, instead of saving the cast as in traditional methods, it can be saved as a stereolithographic file.

Indirect technique: Once the cast has been produced from the impression generated using the open-tray or closed-tray technique, the impression is made using the indirect technique. The cast that is produced after the casts are poured into die stone is scanned with an extraoral scanner, and the resulting stereolithographic file can then be stored and transmitted for additional prosthetic fabrication.

4. Functional Impression Technique:

Accurate implant component location must be recorded in tandem with the recording of the soft tissue supporting regions in an overdenture impression. With both tissue support and implant retention, an implant retained overdenture possesses features that are similar to those of a complete denture. Therefore, when making an impression of implant-tissue-retained overdentures, the resilience differential between the implant and mucosa should be taken into account. The functional impression technique concurrently records the implant components in relation to the alveolar tissues and captures the mucosa in a functional state. This technique's main benefit is that it provides a correct relationship between the supporting tissues and implant components. Chair time for post-insertion adjustments diminishes following prosthesis insertion. However, compared to a single-stage impression, the process takes longer and is more technique-sensitive when recording the border connection with various impression materials [7].

The functional impression technique concurrently records the implant components in relation to the alveolar tissues and captures the mucosa in a functional state. ZnO-E impression paste and elastomeric impression material are employed in this approach. mostly employed in the production of overdentures held in place by implants.[8]

5. Two-Step Impression Technique:

For implant treatment regimens to be successful over the long term, components' passive fit is thought to be essential. Biologic problems and component failure have been linked to poor fit. Positional variations in fit may arise from any stage of the laboratory or clinical examination. Minimising variance is therefore crucial at every stage of the restorative procedure. A number of variables may affect the impression-making process in cases of mandibular overdenture, which could lead to distortion in the finished master cast. These include mandibular flexion, material deformities in the imprint, and issues with the imprinting process. Accurate placement of the implant components and recording of the soft tissue supporting areas must occur simultaneously in the overdenture impression. There are two steps in this process. The first method involves creating an impression and moulding the border using a custom tray that fits over the implant abutments. Attaching the implant impression copings to the tray and removing the copings from the mouth constitute the second step.[9]



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6. The dual impression Technique:

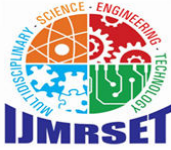
Implant-retained overdentures and bilateral distal extension removable partial dentures (RPDs) are comparable in many characteristics, such as force distribution and direction (Kennedy Class I). On RPDs, occlusal forces need to be evenly distributed throughout the remaining ridges and supporting teeth. According to some writers, a single impression method is unable to capture the difference in displaceability between teeth and residual ridges. Dual impression procedures were developed to provide a "corrected cast," in which the residual ridge is recorded in its functional form and the teeth are registered in their anatomic position.²⁻⁴ This technique can also be applied to implant-retained overdentures. The literature has outlined two sorts of dual impression approaches. These are selective pressure techniques (b) and physiologic procedures (a). During the impression procedure, an occlusal load is placed on the impression tray in order to record the ridge part in its functional form using physiologic impression procedures. There are three different ways to take a physiologic impression: (a) the McLean-Hindels method, which involves recording the residual ridge's tissues in a functional form using a custom tray and then using a stock tray to take a dual impression; (b) the functional reline impression technique, which involves replacing the wax or metal spacer over the ridge on the cast with a light-bodied polysulphide rubber base during a reline impression that will be replaced with denture base material; and (c) the fluid wax method, which involves registering the residual ridge by painting fluid wax on the tissue side of the impression tray. By applying equal pressure to the soft tissue and abutment teeth, the selective pressure impression technique distributes the forces to the areas of the ridge that can withstand the stresses the best. In order to achieve this, the impression tray is allowed to make contact with the ridge in certain places while being released in others. Where relief is not given, there will be more soft tissue displacement. The method can be utilised with different implant systems even though it is explained in relation to the Straumann Dental implant system. mostly used in the creation of overdentures that are implant-retained.

7. The snap on impression Technique:

When taking an impression of dental implants, it is advised to use a stock tray with a putty-wash technique or a custom tray with elastomeric impression material. A stock tray containing putty impression material must be used to record an unmodified solid abutment for impressions of the transfer impression assembly, which includes the impression coping and positioning cylinder. Relief of the putty imprint material is required in order to create enough room for the wash material once the abutments have been prepared to accommodate the restoration. Insufficient room could cause the impression assembly to shift and cause a distorted impression. To create room while creating a putty impression for changed abutments, utilise the following method. Indications for redesigned abutments and those with insufficient abutment space^[11]

8. Screw-retained impression Technique:

The dentist can assess and diagnose implant location, abutment choice, and prosthodontic alternatives through standard techniques such as creating an accurate imprint at the implant level, creating a soft tissue cast that simulates the implant level, and placing the cast in an articulator. Obtaining an accurate implant-level impression might take a long time in situations when implants are positioned in awkward spaces, have unfavourable angulations, or both. In order to confirm that the imprint copings fit the implants, contact interferences between the copings and neighbouring teeth may make the impression process more difficult and require more radiographs. This method explains how to use implant index copings made of plastic or titanium as impression copings for an implant-level impression. During Stage I surgery, implant index copings were developed to index the implant's hexagonal position and correlate it with neighbouring teeth. By indexing the implant during stage I surgery, the proper abutment and temporary fixed prosthesis can be placed right away during stage II surgery. This method conserves time. On the day of stage II surgery, the patient obtains a fixed provisional prosthesis rather of waiting for soft tissue maturation, which occurs two to four weeks following surgery, and provisional prosthesis implantation, which occurs even later. There are two types of index copings: a one-piece plastic frictional fit/snap-on index coping and a two-piece titanium index coping with a screw retained. There are two ways to link the implant to the index coping: friction fit/snap-on (plastic) or screw retention (titanium). This link connects the implant analogue to the hex position. When employed, auto polymerising acrylic resin can be used to attach the index copings to the neighbouring teeth and each other. This approach is useful in cases of improper implant positioning and angulation impression technique for implants that are close together.^[12]



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9.Plaster and silicone combined impression technique:

Passive fit of the framework is advised while repairing implants in order to lower the risk of prosthetic problems. When prosthetic screws are torqued to specifications, the external preload increases with increasing framework mismatch, and static stresses increase the likelihood of prosthetic problems. Wee et al. provided several techniques for enhancing the framework fit. The use of a dimensionally precise imprint material was found to be the most important of these, especially in cases when sectioning and soldering cannot be used to ensure framework fit. For patients who are only slightly dentiable, plaster has been described as an index material for implant impressions. To create a bespoke tray using such techniques, an initial impression is required. This method provides for a one-appointment impression procedure by using a stock impression tray. The case illustrated is for a totally edentulous mandible, although this treatment can be performed for patients who are partially or entirely edentulous.[13]

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

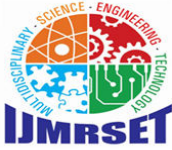
In certain clinical settings, prepped teeth and implant impressions are taken at the same time. Impression of dental preparations requires both precise detail replication and dimensional integrity. However, only dimensional integrity matters when taking an impression of an implant or its abutment. When impression copings are utilised, fine detail replication is not necessary because implant or abutment surfaces on the casts can be replicated using analogues. It is beneficial to utilise a light-bodied elastomeric imprint medium that has the consistency and flow necessary to record the margins and small details of the prepared teeth in order to capture the minute details of tooth preparations. Using an imprint syringe, a light-bodied substance is often injected around tooth preparations. Implant impression copings, which are used to record the location of implants, may restrict access to the prepared tooth margins, thus leading to an unsatisfactory impression. When implant impression copings that were removed along with the impressions are used, adequate access may be seriously jeopardised. Many clinicians prefer this kind of implant impression coping because it has shown to be dimensionally accurate when replicating a master cast. This method is based on an impression technique that Cannistraci described, in which tooth preparations are prepared using individual impression trays. This method allows for the independent creation of impressions for the dental preparations and the implants. After impression preparations are made, impression copings are affixed to implants. An over imprint connects the dental preparations and implants.[14]

11.Single step implant impression procedure :

In order to create the final prosthesis, it is important to examine the position of the dental implants following their second-stage exposure. The choice of abutment is determined by the depth of the soft tissue sulcus and the suitability of the emerging profile from either custom-cast or pre-angled, wide base-shouldered abutments. For this reason, mounted diagnostic casts can be a useful tool for designing the superstructure and facilitating communication with the laboratory. For implant reconstructions, a streamlined one-step impression-making process is outlined.[15]

12.Two-step (spacer used with the putty impression first and then the wash stage) impression technique:

The method most frequently employed to create imprints for traditional fixed dental prosthesis. For implant-fixed restorations, impressions are often obtained in a single step. Although Gregory Head and LaBarre describe a two-step pick-up impression procedure for implant-retained overdentures,[16] the impression analogues for multiple implants are typically splinted for stability to resist deformation caused by pressure developed during the impression making procedure.[17] In contrast, the two-step putty-wash impression technique achieves more accuracy and less deformation because the pressure developed on the impression analogues is negligible. Using auto-polymerizing or light-polymerizing acrylic resin material, create a custom impression tray at the prosthetic phase appointment for implant-fixed restorations, leaving space for impression copings. Remove the gingival healing abutments and insert impression analogs—preferably open-tray impression analogs—on the implants intraorally. Place the impression analogues in the custom tray and make sure there is at least 4 mm of space surrounding them. Subsequently, create and apply a 2 mm thick vacuum-formed polyethylene sheet spacer on any leftover prepared teeth in the arch (if any) in the customary way. Additionally, adapt a double thickness modelling around the imprint copings. Use putty or another elastomeric impression medium to create the impression. Once the impression has set, take it out of the mouth by unscrewing all of the impression analogues in the customary way. An alternative method for adding stiffness is to utilise polyether impression material. Take off the spacer (if any), modelling wax, and imprint analogues from the putty impression. Apply the light body impression material to the prepared teeth and impression analogues, paying particular attention to the gingival edges. Reinstall the putty impression intraorally and apply the light body impression material to the spacer



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and wax areas as well. If the gap between the impression analogues and tray is not entirely filled, then inject light body impression material there. Once it has set, unscrew the impression analogues, take the impression out, and check it for flaws.[18]

II. CONCLUSION

Research has shown that, despite the availability of other methods, the open tray impression technique yields the highest success rate when creating impressions for implant-supported prostheses. It is wise to select the imprint technique in accordance with the current clinical scenario, since a successful prosthesis is built on a solid foundation. Therefore, using good impression techniques will lead to better patient care and treatment.

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