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Impression Technique in Implantology: A Review

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ABSTRACT

The Success of Implant lies not only in Implant placement but also in accurate delivery of the Prosthesis. A Good Impression forms the basis for a successful Prosthetic treatment. The Oral environment presents a challenging task for the Dentist, Inaccuracies Introduced during Impression technique can cause misfit of the Prosthesis which may leads to uneven force distribution and possible Prosthesis complication such as Abutment Screw Loosening and Occlusal Inaccuracies. In order to achieve a proper impression one should have a knowledge, skill and appropriate selection of the impression material and technique. This Article Compare the Close tray and Open Tray Impression techniques.

Key words: Abutments, Impression copings, implant

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INTRODUCTION

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. 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 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 Two basic restorative implant techniques are used to make a master impression, and each uses a different design transfer coping, based on the transfer technique performed.

Classification

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

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

Based on Level of Impression

- Prepared abutment level
- Implant level
- Abutment level

Based on the Tray Used

- Open Tray Technique
- Closed Tray Technique

Based on the Technique Used

- Conventional Impression Technique.
- Modified Impression Techniques

Based on the Type of Materials Used

- Polyether Impression
- Addition Silicone Impression
- Condensation Silicone Impression

Based on the Number of Procedures

- Single Step
- Double Step

Implant Level Impression

An intra-oral impression is made transferring the emergence of the implant. The implant's location and angle are recorded, with or without the orientation of the internal hex.

Abutment Level Impression

An intra-oral impression is made of Abutments for Screw that have been placed onto the implants. Abutments for Screw location and angle are recorded for screw-retained prosthesis.

Prepared Abutment Level Impression

An intra-oral impression is made of prepared abutment(s), similar to a standard crown & bridge impression.

Closed Tray Technique

In the Closed Tray Transfer technique, after impression set impression is removed from the mouth but the transfer coping remain in the mouth.. The copings are then removed from the mouth and connected with the appropriate Implant Analog. The coping with analog is then indexed (transferred) into its corresponding position in the impression. A working model is poured in Type 4 die stone, providing a replica of the implant's location in the patient's mouth [1].

Indications

- limited inter arch distance
- Parallelism of implant is equal
- In case of primary impression.

Advantages

- Custom trays and local anaesthesia are not required.
- used in case of limited mouth opening
- posterior region where access is less
- Patients with gag reflex.(Insufficient time)

Disadvantages

- Coping dislodgement may occur.

- lack of predictability
- Error may occur during impression coping transfer.
- Transfer of soft tissue anatomy is not very accurate.
- modification in abutment size & shape is not possible
- Undercuts leads to difficult in remove the impression

Open Tray Technique

Once the impression has set the surgeon will unscrew the cylinder from the fixture using the end of the screw that protrudes through the impression. Once the screw has been removed the impression will be removed from the patients mouth and the pickup coping remains retained within the impression material. The Implant Analog is connected to the imbedded copings and a working model is poured in Type 4 die stone, providing a replica of the implant in the patient's mouth [2].

INDICATIONS

- During the lack of implant parallelism
- In case greater than 25° divergent of implant
- Height of implant level impression coping below the occlusal plane.
- For making master or secondary impression

Advantage

- Allows direct access to the screws
- Inaccuracies are eliminated due to impression coping transfer along the impression
- The impression is easily retrievable in case of non-parallel implants
- Minimum distortion of impression material

Disadvantage

- Need for a custom tray
- Not able to use in case of restricted mouth opening patients
- Need for technique skill

Splinting Technique

The splint technique for an implant impression was introduced along with the development of a metal-acrylic resin implant fixed complete denture for an edentulous jaw. The underlying principle was to connect all the impression copings together using a rigid material .To prevent individual coping movement during the impression making procedure [2, 3].

Material Used

- Acrylic Resin
- Impression Plaster
- Light Curing composite resin

Acrylic resin is the material used quite often for splinting, thus, minimizing the shrinkage of the acrylic resin is the most important factor to ensure an accurate impression using the splint technique. Some authors sectioned the splint material connection, leaving a thin space between, then rejoining with a minimal amount of the same material to minimize the shrinkage or they connected all of the impression copings with splint material, and then waited for complete polymerization of the material [4-7].

The splinting technique using light cured acrylic resin was significantly less accurate than by using autopolymerizing resin or by impression plaster. This may be caused by the incomplete polymerization of the light cured acrylic resin; another reason may be that the shrinkage during polymerization of the light cured acrylic resin creates stresses at the impression coping / acrylic resin interface. There is also significant importance to the intensity and direction of the light source that might have a negative influence on the adaptation of the light cured acrylic resin to the coping. Impression plaster sets rapidly, is quite accurate and rigid, and does not bend or distort, it is also easy to manipulate, less expensive. The exothermic reaction is negligible [8].

Splint Technique (Vs) Nonsplint Technique

Among the impression making methods presented in the literature, the splinted technique has gained popularity and has proven to be the most accurate (9,10). Even though there was no consistent result for higher accuracy with any one technique as opposed to the other, splint or nonsplint, more number of studies has reported increased accurate implant impressions with the splint technique than with the nonsplint technique. Some authors suggested possible problems with the splint technique, such as distortion of the splint materials [11] and fracture of the connection between the splint material and the impression copings [12]. Kim et al. [13] investigated the accuracy of the implant impression over multiple laboratory procedures and found that the nonsplint technique was more accurate during the impression-making procedure, while the splint technique was more accurate during the cast fabrication procedure. It was interesting that more studies advocating the splint technique were found within recent literature. Five out of 7 studies recommending the splint technique were published after 2003, as opposed to 2 older studies which appeared before 1996. Modifications in splinting techniques and its manipulation may result in minimizing the distortion.

Open Tray Technique (Vs) Close Tray Technique

Fourteen studies have compared the accuracy of pick-up and transfer impression techniques, twelve studies reported that the accuracy did not differ and 2 studies showed more accurate impressions with the transfer technique. However, the results of 1 of the 2 studies were questionable because the experimental design was not clinically relevant and

favored the transfer [14] technique and it was the only study that advocated the transfer technique when 3 or fewer implants were placed [15]. Daoudi et al. [16] compared the closed tray technique at the implant level with the open tray technique at the abutment level for single tooth implants and found the open tray technique to be superior and more predictable. The closed tray technique had discrepancies in axial rotation and inclination of the analogs. Several authors have reported the superiority of the open tray technique. Carr [17] compared the open and closed tray techniques with a 5 implant mandibular cast where the interabutment divergence angles were all less than 15 degrees. The open tray technique was found to be superior as it provided the most accurate working cast. Carr [17] indicated that the inaccuracy of the closed tray technique may arise from nonparallel implants and the apparent deformation of a stiff impression material such as polyether. In a subsequent paper evaluating a 2 implant situation, 1 parallel to the long axis of the teeth and the other with a 15 degree lingual inclination, Carr [17] reported that both techniques provided comparable results.

Daoudi et al. [16] investigated repositioning of the copings after making the transfer impression by 3 different groups of people: senior dentists, postgraduate dental students, and dental technicians. The copings never returned to the original position and this was believed to be the primary source of error in the transfer impression technique. This error could be multiplied when the impression is made in situations of multiple implant placements.

It was found that for situations in which there were 4 or more implants, more studies showed more accurate impressions with the pick-up technique than the transfer technique. Some implant manufacturers have developed a snap-fit (press fit) plastic impression coping. This technique is not a pick-up impression because it does not require an open tray, but instead uses a closed tray. It is not a transfer impression, either, because the plastic impression copings are picked up in the impression. The press-fit impression coping is easier to manipulate, time saving, and more comfortable for both the clinician and patient because the coping is connected to the implant by pressing instead of screwing. The press-fit coping design allows removal of the coping with the impression and has the advantage of both the open- and closed-tray implant impression techniques. Thus, the press-fit impression coping helps to overcome movement of impression copings inside the impression material. The snap-fit technique may be a reliable impression making technique [18] but regarding accuracy of this technique none of the study is available for investigation.

CONCLUSION

A review of studies of accuracy of implant impression techniques revealed that more studies reported greater accuracy of implant impressions with the splint technique than with the nonsplint technique. For situations in which there were 3 or fewer implants, most studies showed no difference between the pick-up and transfer techniques, whereas for situations in which there were 4 or more implants, more studies showed more accurate impressions with the pick-up technique (open tray) than the transfer technique (closed tray). And explain about the advantage and disadvantage of each technique.

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