

Impressions In Implantology: Its Varied Clinical Implications

Abstract

Simulating the working conditions in the mouth to a laboratory setting for implant dentistry is technique sensitive but critical to the success of implant therapy. Many articles have been published on the advantages and disadvantages of various impression techniques, impression materials, impression trays etc. The aim of this article is to describe the clinical efficacy of impression techniques and its clinical implications in implant therapy for transferring information to the laboratory.

Key Words

Transfer Impression, Pick up Impression, Splint Technique, Review

Introduction

A dental impression is a negative imprint of an oral structure used to produce a positive replica of the structure for use as a permanent record or in the production of a dental restoration or prosthesis^[1]. The objective of an impression making in implant dentistry is to accurately relate the implant analogue or implantabutment analogue to the other related structures in the dental arch. This is influenced by use of an impressiontransfer coping which is attached to the implant or implant abutment. With appropriate technique selection and manipulation, accurate impressions can be obtained by the contemporary restorative dentist for fabrication of implant-supported restorations. Inaccurate impression may result in various complications. Mechanically it may result in screw loosening, screw fracture, implant fracture, and occlusal inaccuracy^{[2],[3]}. Biologically it may result in marginal discrepancy resulting in various soft and hard tissue reactions^{[4],[5]}. The development of impression techniques to accurately record implant position has become more complicated and challenging. Several impression techniques have been suggested to obtain a master cast that will ensure passive fit prosthesis on implants.

The aim of this article is to describe various impression techniques and its clinical implications.

Transfer Versus Pick Up Impression

Technique

The impression coping takes two general forms, one type is retained in the mouth when the set impression is removed – this type of impression coping is known as the transfer type impression coping. The other type is incorporated in the impression and is removed from the mouth together with the set impression and is known as a pick up type impression coping.

Characteristics of the transfer type impression coping are that they remain in the mouth on removal of the set impression, the analogue is attached to the impression coping after removal from the mouth and this assembly is replaced in the indentation left on the set impression. No custom tray is required for this type of impression.

Characteristics of the pick-up type impression coping are that they are removed from the mouth together with the set impression. They require access to the retaining screw to allow release of the screw prior to removal of the impression coping — impression assembly, the analogues are attached to the impression copings while they are embedded in the impression tray. Daoudi et al^[6] 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

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the superiority of the open tray technique. Carr^[7] compared the open and closed tray techniques with a 5 implant mandibular cast where the inter-abutment divergence angle was less than 15°. The open tray technique was found to be superior as it provided the most accurate working cast. Carr^[7] indicated that the inaccuracy of the closed tray technique might arise from nonparallel implants and the apparent deformation of a stiff impression material such as polyether

Some implant manufacturers have developed a snap-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^[8].

Clinical Implications

When impressions are required for multi-implant restorations the precision of the impression is even more critical. Multiple implants bring along with them the problem of non-parallelism and the use of the indirect technique has shown to cause errors in the fitting of the framework. In such situations, pick up impression technique is a preferred technique. This technique allows direct access to the screws that hold the transfer copings correctly positioned against each implant. The principal advantage of this technique is that the transfer coping remains in the impression and the inaccuracies of transferring are avoided. When multiple implants are present and there is a non-parallel configuration, this technique is ideal as firstly, the impression is easily retrievable and secondly, there is minimum distortion of impression material.

For single impression restoration, impression can be taken by transfer impression technique. Other clinical situations which indicate the use of the closed tray technique are when the patient has limited interarch space, tendency to gag, or if it is too difficult to access an implant in the posterior region of the mouth. The advantage of this technique is that it is relatively simpler and does not require custom tray.

The disadvantage is the lack of predictability with the possibility of coping dislodgement during impression making. Additionally abutments have to be fitted onto the copings and errors may be introduced at this stage. Further soft tissue anatomy transfer is not very accurate and the size and shape of the abutment cannot be modified. Sometimes it is very difficult to remove the impressions from the mouth of the patient.

Many studies showed more accurate impressions with the pick-up technique than the transfer technique when there are

4 or more implants.

Splint Technique Versus Nonsplint Technique

The underlying principle of splint technique to connect all the impression copings together using a rigid material to prevent individual coping movement during the impression making procedure. Splint technique has gained popularity with the development of a metal-acrylic resin implant fixed complete denture for an edentulous jaw. The splinted impression technique has been shown to be a primary factor in increasing the fitting precision of the restorative complex.

There are many controversies exist since Branemark et al. emphasized the importance of splinting impression copings together before registration of impression. Hsu et al.^[9], Philips et al.^[10] and Herbst et al.^[11] found no significant differences between the values obtained with acrylic-splinted versus unsplinted groups in impression techniques. Interregui et al.^[12] and Burawi et al.^[13] showed better result with un-splinted group using polyether or additional silicone impression material alone and presumed the main reason of distortion with resin splinted group possibly occurred by the residual polymerization shrinkage. However, Assif et al.^[14] and Naconecy et al.^[15] showed that splinting technique was significantly more accurate than unsplinted techniques.

Different materials can be used for splinting the implants. Impressions using copings can be splinted with either autopolymerizing acrylic resin, plaster or with a dual-cured acrylic resin. According to Assif et al.^[14], impression techniques using autopolymerizing acrylic resin or impression plaster as splinting materials were significantly more accurate than those using dual-cured acrylic resin as a splinting material & impression plaster would seem to be the material of choice for completely edentulous patients.

There is clinical evidence that the splinted impression technique generates more accurate implant impressions and master casts than the nonsplinted technique for complete-arch, one-piece fixed prostheses^[16]. Some authors suggested possible problems with the splint technique, such as distortion of the

splint materials^[17] and fracture of the connection between the splint material and the impression copings^[13]. Kim et al.^[18] 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 cast fabrication procedure.

Conclusion

Various techniques had been introduced to get accurate impression. Different techniques are indicated in different situations. However, a review of studies of accuracy of implant impression techniques revealed that more studies reported greater accuracy of implant impressions by transfer impression technique as compared to pick up impression technique. There is no significant difference between pick up and transfer impression technique when impression of 3 or fewer implants has to be taken however for 4 or more implants pick up technique is the technique of choice. A review of studies has also reported, greater accuracy of implant impression with splint technique than with non-splint technique.

References

1. The glossary of prosthodontic terms J Prosthet Dent. 2005;94:30.
2. Barguete RL, Johns RB, King T, Patterson EA. Tightening characteristics for screw joints in osseointegrated dental implants. J Prosthet Dent 1994;71:592-9
3. Sahin S, Cehreli MC. The significance of passive framework fit in implant Prosthodontics: Current status. Implant Dent 2001;10:85-92.
4. Lindhe J, Berglundh T, Ericson I, Liljenberg B, Marinello C. Experimental breakdown of peri-implant and periodontal tissues. A study in the beagle dog. Clin Oral Implants Res 1992;3:9-16.
5. Augthun M, Conrads G. Microbial findings of deep per-implant bone defects. Int J Oral Maxillofac Implants 1997;12:106-12.
6. Daoudi MF, Setchell DJ, Searson LJ. An evaluation of three Implant Level Impression Techniques for Single Tooth Implant. Eur J Prosthodont Rest Dent 2004; 12:9-14.
7. Carr AB. A Comparison of Impression Techniques For A Five-

- Implant Mandibular Model. *Int J Oral Maxillofac Implants* 1991;6:448-455.
8. Nissan J, Ghelfan O. The press fit implant impression coping technique. *J Prosthet Dent*. 2009; 101:413-4.
 9. Hsu CC, Millstein PL, Stein RS. A comparative analysis of the accuracy of implant transfer techniques. *J Prosthet Dent*. 1993;69:588–593.
 10. Phillips KM, Nicholls JI, Ma T, Rubenstein J. The accuracy of three implant impression techniques: A three-dimensional analysis. *Int J Oral Maxillofac Implants*. 1994;9:533–540.
 11. Herbst D, Nel JC, Driessen CH, Becker PJ. Evaluation of impression accuracy for osseointegrated implant supported superstructures. *J Prosthet Dent*. 2000;83:555–561.
 12. Inturregui JA, Aquilino SA, Ryther JS, Lund PS. Evaluation of three impression techniques for osseointegrated oral implants. *J Prosthet Dent*. 1993;69:503–509.
 13. Burawi G, Houston F, Byrne D, Claffey N. A comparison of the dimensional accuracy of the splinted and unsplinted impression techniques for the Bone-Lock implant system. *J Prosthet Dent*. 1997;77:68–75
 14. Assif D, Marshak B, Schmidt A. Accuracy of implant impression techniques. *Int J Oral Maxillofac Implants*. 1996;11:216–222.
 15. Naconecy MM, Teixeira ER, Shinkai RS, Frasca LC, Cervieri A. Evaluation of the accuracy of 3 transfer techniques for implant-supported prostheses with multiple abutments. *Int J Oral Maxillofac Implants*. 2004;19:192–198.
 16. Effect of splinted and nonsplinted impression techniques on the accuracy of fit of fixed implant prostheses in edentulous patients: a comparative study. *Int J Oral Maxillofac Implants*. 2011; 26(6):1267-72
 17. Spector MR, Donovan TE, Nicholls JI. Evaluation of impression techniques for osseointegrated implants. *J Prosthet Dent*. 1990; 63:444-7.
 18. Kim S, Nicholls JI, Han CH, Lee KW. Displacement of implant components from impression to definitive cast. *Int J Oral Maxillofac Implants*. 2006;21:747-55.

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