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A review on dental implant impressions

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Abstract

Dental implants are fixtures that serve as replacements for the root of a missing natural tooth. Dental implant therapy has been widely used for the restoration of partially and fully edentulous patients. Implantology currently consists of a reliable oral treatment that follows scientific and clinical evidence. Despite the proven success of rehabilitations with implants throughout a long period of time, many difficulties still persist without solution. The objective of the impression procedure in implantology is to obtain the most accurate copy of the implant analogues and the surrounding oral tissues, avoiding instabilities in the prosthetic device. Precise fit between dental implants and the superstructure is important for the long term success of implants and implant-supported prostheses.

Keywords: Dental implants, abutment, impression copings

1. Introduction

The use of dental implants to replace the natural tooth has become a common practice in the contemporary restorative and surgical dentistry [1] In modern dentistry dental implant play most vital role in the replacement of missing teeth. Implants provide excellent support for fixed as well as removable prosthesis, which increases function, compared with conventional complete and partial denture prosthesis and restores esthetics of the patients [2] Prosthodontic rehabilitation with osseointegrated implant turned out to be the therapeutic solution of choice for treating partially or completely edentulous arches [3] Implant success is the most desirable aspect which greatly influences the clinical practice and motivates patient to prefer implant supported prosthesis [4]. Impression making for the implant is one of the important factor to obtain a good prosthesis. A good implant impression records three dimensional position of implant in oral cavity. An accurate impression is mandatory for the success of implant-supported dental prosthesis as an accurate recording of spatial implant position is required to obtain a proper support to definitive restoration with passive fit [5].

Basic impression techniques for implant are

1. Implant level impression technique.
2. Abutment level impression technique.

Hence different techniques of impression making have influence on the precision of the implant impression.

Impression Techniques in Implants.

1. Implant Level Impression

The implant level impression is a universal technique allowing for fabrication of any type of restoration. This impression gives greater flexibility for the selection and modification of an abutment. It is recommended when implant is not ideally placed. There are 2 types of impression techniques

- A. Pick up / open tray impression
- B. Transfer Type / closed tray technique

A. Pick up impression / open tray

Open tray technique is better than closed tray technique, especially in case of larger number of implants and in edentulous patients. the open-tray impression technique exhibited higher accuracy in comparison to closed-tray technique with TC and TC-Cap [6, 7].

The open tray technique reduces the effect of implant angulation, deforming the impression material upon recovery from mouth, and removes the concern of replacing the copings into the impression [8]. open-tray metal splinted impression coping was significantly superior and was quite more precise [9].

The technique can be further subdivided into splinted and non-splinted techniques. The splinting procedure is recommended in case of multiple implants to decrease the

amount of distortion and to improve impression accuracy and implant stability. Splinting of the transfer copings prevents rotational movement of impression copings in the impression material during analog fastening, which provides better results than not splinting.

Accuracy of a splinted impression technique depends upon its resistance to deformation under the forces of impression material; hence the use of rigid splint material is essential for accurate master cast [10].

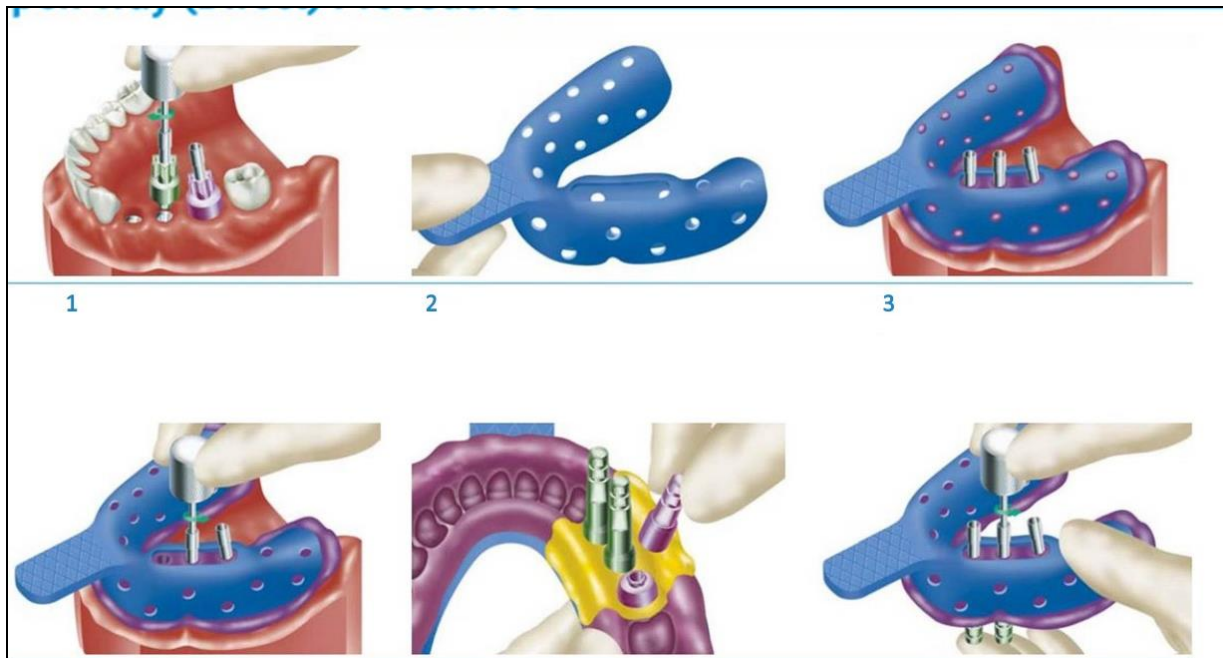


Fig 1: Open tray impression technique

B. Transfer Type / Close Tray Technique.

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. It is mainly indicated in case of restricted mouth opening, [11] limited access areas (posterior) and severe gagging patients, the closed tray impression technique is better choice [12] Regarding the transfer impression techniques used, T4(square copings splinted with prefabricated acrylic resin bar) showed the best results, followed by T3. This result is in accordance with the one obtained by Dumbrigue *et al*, [13] in which it was observed

that the use of prefabricated acrylic resin bars for splinting square copings can decrease the polymerization shrinkage of the acrylic resin and increase system stability. The most favorable implant position for the impression transfer was the one perpendicular to the horizontal surface. Those results corroborate the findings of Assuncao *et al*, [14] who studied transfer impressions for osseointegrated implants at various angulations and concluded that the most favorable implant position for an accurate transfer impression is when it is perpendicular to the surface (90°), while the worst results occur with more inclined implants (65°).

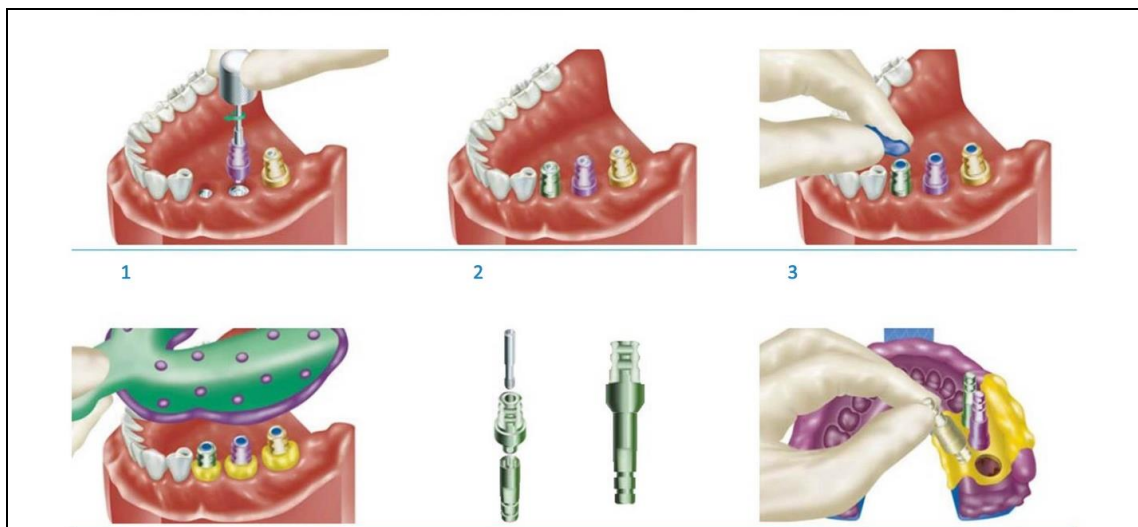


Fig 2: Close tray impression technique

1. Abutment Level Impression

If there is a requirement to replace old implant supported crown, abutment level impression is indicated just like crown and bridge cases [12] abutment-level impression with open tray technique is more accurate [4] Employing conventional crown and bridge impression techniques for accurate implant-abutment level impressions may be required when further modifications need to be applied to prefabricated or customized implant abutments. It has been reported that the accuracy of the implant-abutment level impression is higher when the pick-up technique is used as opposed to conventional crown and bridge impression technique [15] The fixture-level method was not superior to the abutment-level technique in terms of angular accuracy and most of the linear errors. The abutment-level method showed a better linear accuracy in the case of highly diverged posterior implants. Increasing the angle of implants' divergence from 40° to 60° might not usually lead to a significant increase in the errors, especially when using abutment-level impressions [16].

Implant splinting technique is to stabilize the impression copings during the subsequent clinical and laboratory impression transfer procedures and to minimize 3-D spatial relationship changes. The shim splinting technique introduced in the present technique report offers an alternative to previously reported approaches such as the block/ splinting approach. Moreover, the shim splinting technique has several advantages such as a simpler laboratory fabrication process, less patient chair time, and the need for fewer implant components [17].

The most commonly used transfer techniques for implant-supported prostheses with multiple abutments are indirect, direct, and direct splinted [18]. Some authors have noted that the impression made by the direct transfer technique for implants with splinting is more accurate than that of other techniques [19]. Chemically activated acrylic resin is frequently used to fabricate intraoral splinting to join

impression copings during the open-tray implant impression technique. However, some splinting methods can be used, each with advantages and disadvantages. The technique that uses dental floss as a framework for chemically activated acrylic resin is used thoroughly and demands longer clinical time for application [20, 21] Other splinting forms are prefabricated bars [22] and metal sticks, [23] which use a smaller amount of acrylic resin.

However, digital dentistry has introduced new methods in which conventional impression techniques are substituted with intra-oral scanners.

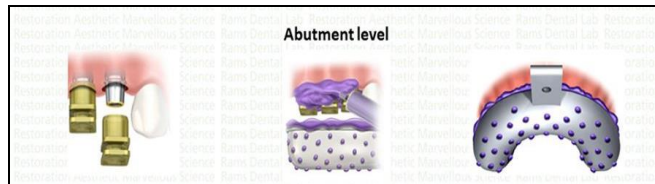


Fig 3: Abutment Level Impression Technique

3. Digital Impressions

Digital scanning and dedicated software for superimposition of the resultant STL datasets represent an efficient technique to measure and compare the trueness (accuracy) at the microscopic level. Trueness is defined as the proximity of the absolute values of the 3D deviations of each test dataset in relation to the control dataset [24] the scanning and recording of structured data, CAD software applications can then create a geo-metric virtual 3D model, and CAM techniques then employ several printing and milling machines to produce replica precise copy of the virtual model in a physical form. On the basis of this study, the authors advocate the use of an intraoral scanner in dental implant full-arch rehabilitations and digitally create an accurate dental impression, which greatly increase efficacy [25]

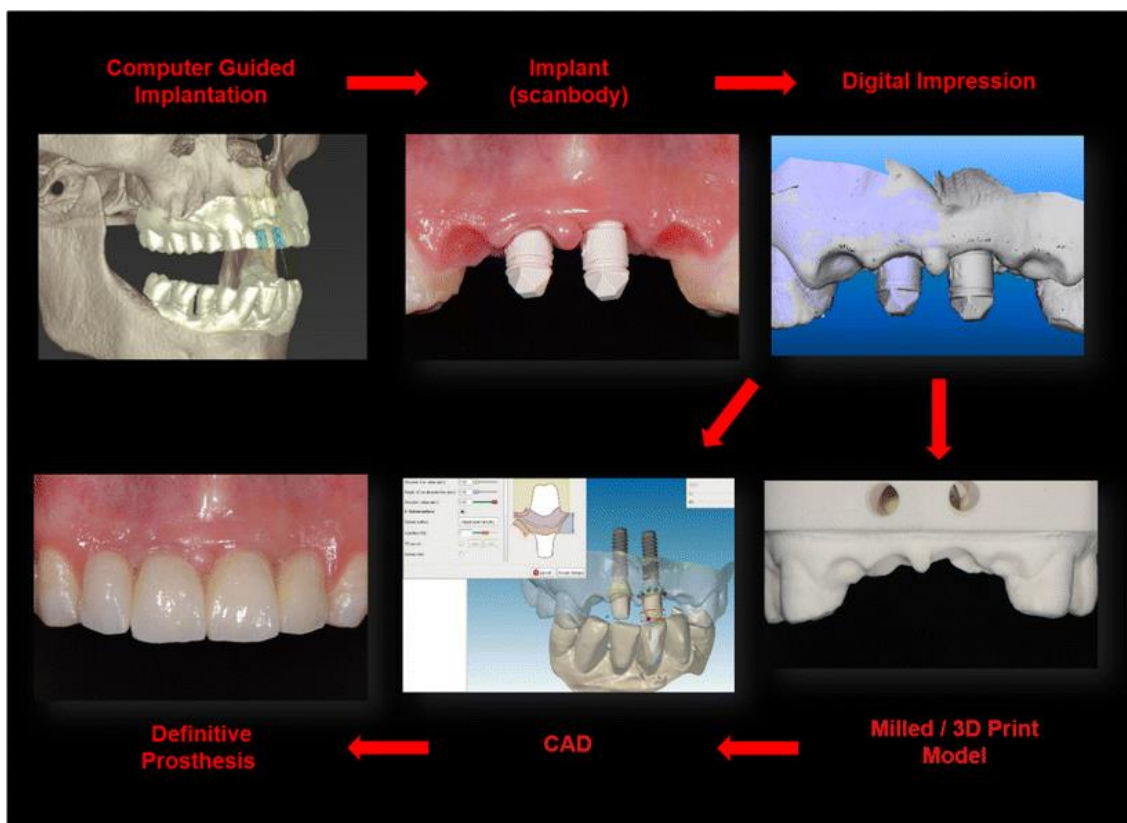


Fig 4: Digital impressions

Conclusion

A good impression is the main requisite of implant supported prosthesis. Without accurate impression, the prosthesis will be failed. Benefits of Impression in implant dentistry is to record; Position, Depth, Axis/Angulation, Rotation-Hex position, Soft Tissue Contour (Emergence Profile). Hence, Impression technique is the key for the success in the field of implant dentistry.

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