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RESEARCH ARTICLE

IMPRESSION TECHNIQUES FOR IMPLANT DENTISTRY (PART 2) : OPEN TRAY TECHNIQUES

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Abstract

A highly accurate impression is one of success requirements in implant dentistry. A passively fitting prothesis is achieved when the 3-dimensional position of the implants is precisely transferred to the cast. Various impression techniques are described in the literature. Each one presents indications, qualities and limits. Many studies compared the main techniques which are closed and open-tray impressions along with their specificities. In this second part, the open-tray technique is described and discussed then compared with the closed-tray one.

Introduction:-

Successful implant prosthodontic treatments depend on optimum passively fitting prothesis. In fact, it is a precondition for the maintenance of osseointegration, which relays upon the fact that the interface between the bone and the implant permits limited movements of 10um, unlike natural teeth. The minimum prothesis-to-implant misfit produces stress on implant, and generates mechanical complications; such as fracture or loosening of occlusal and/or abutment screws with functional loading, and fracture of prosthetic framework or veneering material.

Therefore, reproducing and transferring a 3-dimensional intraoral position of implants or abutments to working casts, the most meticulously, is the first step in achieving an accurate passive fit between the implant and the suprastructure. (1-6)

As we presented the closed-tray technique in a previous paper, the aim of this work, is to describe, step by step, the open-tray technique, along with a comparison of both techniques.

Implant impression technique

The objective of any implant impression procedure is to capture accurately the position of the implant or the implant abutment, as well as its relation to the other structures in the dental arch, in order to obtain a passively fitting implant prosthesis. (4,7)

Open tray technique

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. A custom tray with access to the impression coping screws is required. (4)

This technique can be used for : (8)
Single tooth restoration

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Multi-unit restorations
Implant over dentures for either cement retained or screw retained prothesis

The steps of this technique are described through a clinical case :
At first, an open tray is required and the access to the implants site through it is verified (fig 1 & fig 3). The impression copings are screwed on the implants (fig 2). Impression material, which is VPS is syringed around the copings, and filled tray inserted into the mouth. The coronal ends of the copings should be visible and their guide pins reachable through the hole in the tray (fig 4). Impression copings are unscrewed and they are removed from the mouth together with the set impression (fig7). Finally, implants analogues are connected to implant copings.

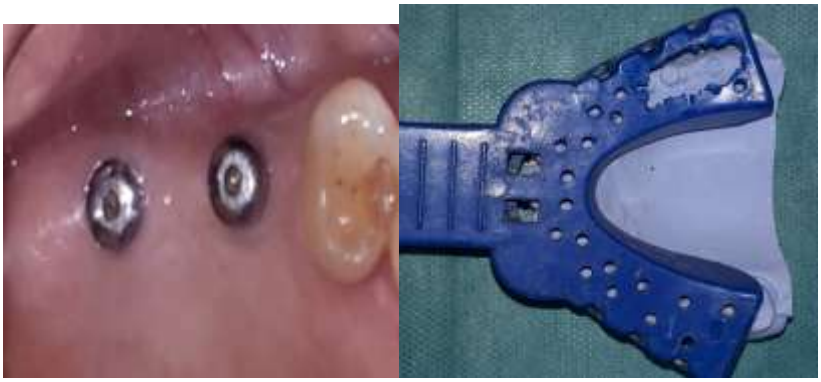

Figure 1:- Open tray is tried to check the access to implants.

Figure 2:- The impression coping are screwed on the implants.

Figure 3:- Verification of the space between the copings and the tray.

Figure 4:- One step VPS impression is taken keeping the coronal ends of the copings reachable.

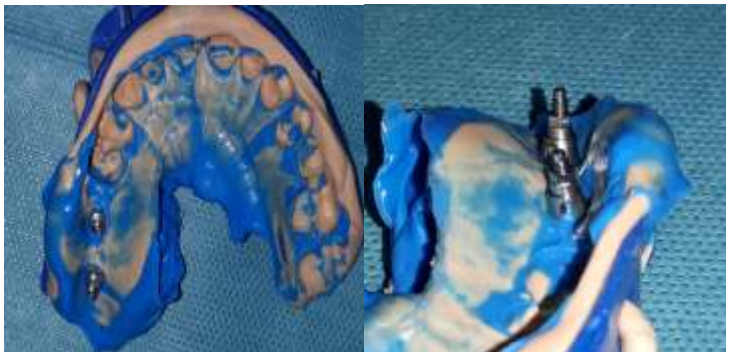

Figure 5:- Remove of the impression together with the copings unscrewed previously.

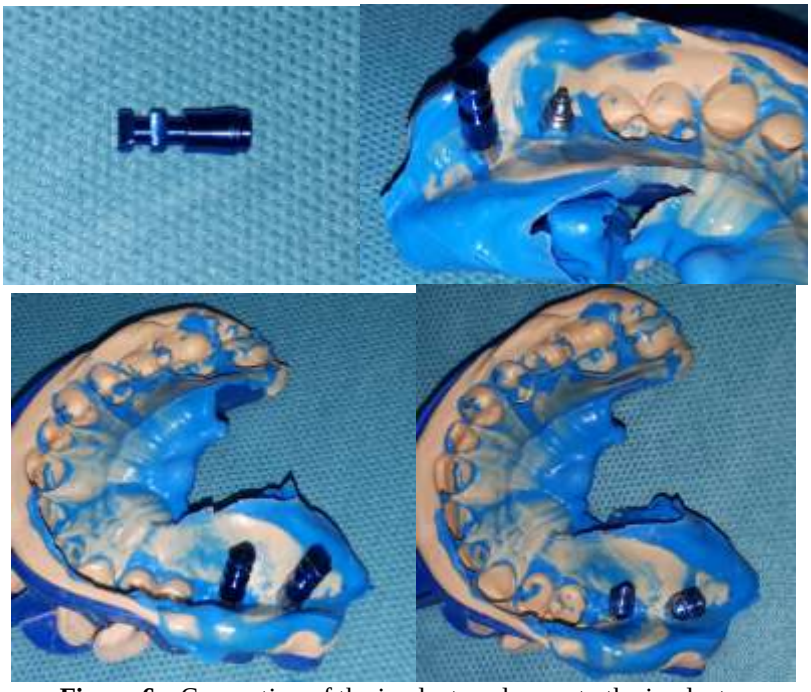

Figure 6:- Connection of the implant analogues to the implants.

Discussion:-

One of the most important factors for the success of implant prosthesis is the accuracy of the impression procedure. Many comparative studies were conducted in order to find the most accurate impression procedure to obtain the original position of the implants or abutments, and to allow the passivity of the framework casting to its supporting abutments without interference between the prosthesis–implant connections. (2)

Within the open tray technique, the accuracy of impression is affected, mainly, by the choice of the coping, the use of splint or non-splint technique.

The studies comparing the impression accuracy between closed and open tray techniques, have been conducted as well.

Despite the existence of surveys investigating impression techniques accuracy, no consensus has been achieved among them, and the different works present heterogeneous results. (9)

Splint Vs Non-splint

In order to improve impression accuracy, many techniques have been reported in the literature. From the studies examining implant impression accuracy, splinting has been an important subject of investigation. In fact, the splinted technique is one of the most important methods mentioned in the literature, gaining popularity over the years and proven to be the most accurate – even though contrary opinions (10)still remain. (11,12)

The method intends to prevent individual coping movement using an acrylic resin which encompasses the connection of all the copings. Distortion of the splint material or the fracture of the connection between the splint material and the impression copings are the identified problems related to this technique. (6, 11, 12)

Kim et al (13)investigated the accuracy of the implant impression over multiple laboratory procedures and found that the non-splint technique was more accurate during the impression making procedure, while the splint technique was more accurate during the cast fabrication procedure.

Independent of the splint material used, all authors acknowledge the splinted technique as the most accurate over the non-splinted technique.

Copings

Impression accuracy may be influenced by the design and the angulation of the copings according to many studies.

Lee et al(14) found that adding a 4-mm piece of the impression coping as an extension on the original impression coping compensated for the inaccuracy of subgingival placement of the implant. These modifications may lead manufacturers to develop new impression coping designs to enhance the accuracy of the impression. (12)

The influence of different impression materials and lengths of impression coping connections on nonparallel implants was studied and the authors reported a direct relation between impression inaccuracies and the forces required for the impression removal. On the other hand, the study showed that the addition silicon produced more accurate casts for non- parallel implants.(6)

Other factors also play an important role in impression accuracy, such as the number of implants, the proximity of the adjacent tooth (causing minimal space for impression materials), and implant height. To this extent, more studies are required to characterize these and other factors that could increase inaccuracies.(12)

Direct Vs Indirect

There are mainly 2 different implant impression techniques:

The transfer technique using tapered copings and a closed tray to make an impression (as described in part 1 of this article)

The pick-up impression using square copings and an open tray (a tray with an opening), allowing the coronal ends of the impression coping screw to be exposed (6,12)

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 technique and it was the only study that advocated the transfer technique when 3 or fewer implants were placed. (6,11,12)

Daoudi et alinvestigated (15) 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. (6,11)

Carr (16) 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. 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 (16) reported that both techniques provided comparable results. (11)

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 snap-fit technique may be a reliable impression- making technique. (6)

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