Implant impression techniques comparative review: Transfer impression versus direct abutment level

By Zvi Fudim, DDS

The inaccuracy in dental implant impression is a vast and unsolved problem. It is so serious that the high rate of osteointegration of the majority of implants is absolutely meaningless. Knowing that traditional transfer impression techniques seldom deliver a passive fit of a framework means that most bridges will end up with a failure (Fig. 1).

Different studies show that transfer technique is almost four times worse than the official requirement. Therefore, besides the mechanical issue, it is also a patient's right to know that impression transfer method is extremely inaccurate, and requires at least a warning and a legal consent. Patients are often misled by widely accepted sources that state:

"Success rates of dental implants vary, depending on where in the jaw the implants are placed but, in general, dental implants have a success rate of up to 98 percent. With proper care (see below), implants can last a lifetime" (*WebMd.com*).

Numerous in-vitro studies have examined implant restoration accuracy. There is no doubt about the fact that the transfer impression is to blame for the misfit of the framework, but what exactly causes the distortion has not yet been pointed out.

What is wrong in the transfer impression?

The first problem is that the transfer, which is mechanically caught in the impression material (such as PVS), does not become an integral part of the impression. In fact, it can be easily moved. However, due to the friction between the surfaces of the transfer and the impression material, it does not return back to its original position (Figs. 2a, 2b, 2c). That displacement cannot be avoided when the technician engages analogs into the impression. In other words, forces in form of torque or pressure dislocate and mobilize irreversibly the imbedded implant parts.

Fastening in the screw into the analog should be done avoiding any contact with the tray; however, that cannot be always guaranteed. The shift of the transfer can take place even due to the gravity forces of the impression tray, especially in the molar areas. A tray that weighs 100 grams generates in the molar area a torque of 5.8 Ncm by only its own weight; that's enough to rotate the transfer. The polyether impression materials are characterized by a serious amount of expansion, making the transfers lose and mobile in the impression (Figs. 3a, 3b, 3c). The implant manufacturers should indicate that polyether impression materials are not suitable for the techniques using impression transfers.

Splinting transfers with acrylic resins may lead to displacement of the transfers due to the shrinkage of the acrylic materials. Even a splinted complex of impression transfers does not become an integral part of the impression. The second problem is due to the uneven amount of the stone around the analog. The expansion of the dental stone during its setting causes a serious inclination of the abutment from its original position. The third problem is also related to the dental stone expansion. Unlike the stone, the analog does not have any expansion. The analog becomes lose and mobile. Gripping firmly a one-piece analog with a hemostat, one can see with a naked eye how it rotates in the model around its own axis (Fig. 4a, 4b).

Fig. 1: Following a misfit, an implant transversal breakage is observed. Photos/ Provided by Zvi Fudim, DDS

Almost always, sectioning of an implant stone model is very difficult to perform because of the presence of the hard steel analogs in the body of the model. Additionally, a small amount of the dental stone around the analogs often leads to breakage of the die and requires either a redo of the dental model or working on an unsectioned model. These difficult working conditions prevent precise fabrication of the restoration.

Implant manufacturers have invested a lot of resources in the implant improvement but very little in the improvement of the impression accuracy. Many dentists become so frustrated by the results of the implant restoration that they stop restoring implants and refer the clients to prosthodontists.

Finally, more and more dentists today have come to the conclusion that a simple direct impression of the abutment is much better than the traditional transfer impression. The accuracy of the PVS material is very high; it has high volumetric stability and a good resistance for tearing. Additionally the PVS by its slight rate of shrinkage can partially compensate the expansion of the dental stone and with aid of a rigid impression tray provides fabrication of accurate restoration. The main concern with the direct impression is the abutment's sub gingival area registration. In 2008 JADA Dr. Vincent Bennani published a review called Gingival retraction techniques for implants versus teeth. Bennani covered most gingival retraction means for natural teeth and discussed the possibility of apply them in the impression of the implant restoration. His conclusion was that there is no existing device or method for gingival retraction that practically can be used for direct impression of the implant abutment.

Aluminum Chloride Expasy™ was recently tested for use with the titanium endosseous implants and was found as a harmful material for the polished surfaces of the implant and implant parts. Bicon Implants™ uses oversized healing abutments or custom oversized temporary abutments to expand the surrounding tissue. This method has little predictability because the rebound of the tissue varies from patient to patient.

Recently, a Canadian company, Stomatotech, came up with a simple idea to retract the gingival tissue using a disposable plastic collar that is inserted on the apical end of the abutment before the abutment is engaged to the implant (Fig. 5).

Fig. 2a: An open tray transfer impression with engaged analog.

Fig. 2b: Shows alignment of the analog with the rest of the impression.

Fig. 2c: Following torque there is misalignment of the analog.

Fig. 3a: Astratech polyether close tray impression.

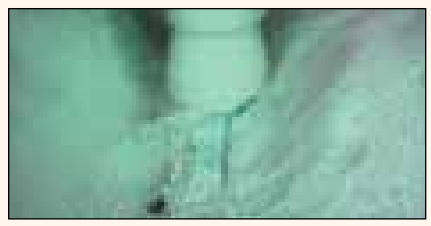

Fig. 3b: Following torque there is misalignment of the line on the analog.

Fig. 3c: Polyether close tray impression presents a gap between the transfer and the rest of the impression.

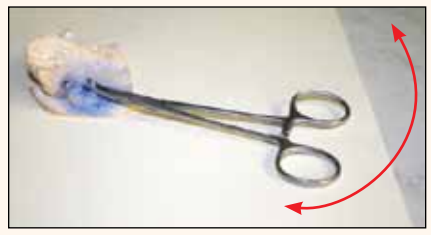

Fig. 4a: An MIS one-piece analog. Stone model was glued on a cardboard. The head of the analog was fastened tightly by a hemostat. Significant mobility of the analog is always observed.

Fig. 4b: A line was traced next to the hemostat's handle. An evident analog movement is clearly observed. (The photo was taken from the same angle.)

Fig. 5: G-Cuff device installed on the abutments.

Fig. 6: Removal of the G-Cuff without unscrewing the abutment.

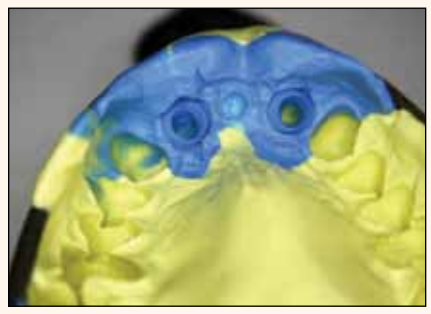

Fig. 7: Final impression Implant Direct Legacy.

Following the abutment's engagement to the implant, the plastic collar is found between the apical part of the abutment and the gingival soft tissue (Fig. 6). Shortly after the removal of the impression from the mouth, the plastic collar is pulled out and removed permanently.

The plastic collar creates a perfect gingival retraction with a valve factor preventing the liquids from contaminating the area of the finish line of the abutment.

It is undeniable that the plastic collar eliminates the need of the impression transfer and the analog. However, the main advantage of that device is the fact that it does not impact the accuracy of the final restoration (Fig. 7).

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