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 that the success rate of up to 98 percent. With properly treated teeth (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 the line of the 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 may lead to displacement of the transfers even due to the gravity forces of the impression tray. Additionally, the analogs often leads to breakage of the die and doubt about either a read 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 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 Bannen published a review called Gingival retraction techniques for implants and referred to the use of the plastic collar (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 material. 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).

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 doubt about either a read of the dental model or working on an unsectioned model. These difficult working conditions prevent precise fabrication of the restoration.

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Dentists create 24/7 online conference, tradeshow, C.E. forum

Dentistry is mired in a perfect storm that challenges the profession from all sides—weak economies in the United States and worldwide, dental trade show attendance declining every year, and dentists reluctant to close their offices or give up personal time (away from their friends and families) in order to take continuing education courses or spend time at trade shows like they did in the past.

On the vendor side, there are more than 150 trade shows in the United States and more than 75 years in education and clinical practice. While some meetings and shows are as strong as ever, many are in the decline. And when attendance drops at meetings, it is more difficult for vendors to realize a good ROI (return on investment). As a profession, we have come to expect vendor visibility (and often high visibility) at most major events. We ask vendors to support lunches and cocktail hours, supply tote bags and more, to the point that it is assumed they will always meet our needs. But are we meeting theirs? The way all of us learn to the point that it is assumed they will always meet our needs. But are we meeting theirs? The way all of us learn.

Enter xpAPce and XPsquared. Formed by two dentists, Drs. Alan A. Winter and Frank Murphy (who combined more than 75 years in education and clinical practice), xpAPce and XPsquared address the challenges facing both the dental profession and the vendors who supply that profession.

How? Let’s take xpAPce. Awkward as it appears, it is not a word to be spoken but an acronym for “eXpert APIproved Continuing Education.” Focus on “eXpert.” We have assembled 15 leading experts to serve as academic advisors who monitor the content and timeliness of our courses given by our world class scholars. Our courses are unique! They are designed to be practical and informative, to remind us of those special steps that make us better clinicians. They are procedural specific. They are self-evaluation tools for precise measurement and feedback about the student’s sample preparations and restorations and how they compare to the institution’s standards. As students progress, they develop digital portfolios that document their accomplishments in tooth preparation, restoration design and occlusal articulation.

From the faculty perspective, xpAPce and XPsquared form a unique tandem that brings 21st century dentistry to dental professionals and vendors around the world. The future is now! You can register (without charge) to join the XPsquared community today.

Visit the C.E. and company websites at: www.xpapce.com and www.xpsquared.com or go straight to the online community at: www-2.virtualevents365.com/xpsquared.

For more information, email info@xpapce.com or info@xpsquared.com or call (212) 355-5335.

Adaptive learning technology trains new dentists

D4D Technologies, manufacturer of the E4D Dentist™ system, has launched E4D Compare™ — an innovative adaptive learning technology tool for dental teaching institutions.

E4D Compare provides evidence-based assessment tools that also document student progress. “The development of E4D Compare and its utilization in teaching institutions provide both students and faculty an innovative method of self-paced learning and a more consistent and objective evaluation of all parameters. This is another example of our commitment at D4D to making dentistry better at every level,” said Dr. Gary Severance of D4D Technologies.

“Is there a crisis in dental education? many students believe that grading is subjective and inconsistent,” said
Excel Studios is a full-service dental laboratory specializing in full-mouth and implant reconstructions.

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(Source: Excel Studios)

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**Adaptation and Impression**

Dr. Walter Renne, course director for CAD/CAM technologies and ceramics at the Medical University of South Carolina, College of Dental Medicine. "The E4D Compare software program enables students to learn by challenging themselves against the ‘master’ templates. E4D Compare has proven to be revolutionary in my classes. The students that have used this program have seen fast results and have been engaged from the beginning. The E4D Compare software provides new possibilities for enhancing the learning experience within the dental curriculum."

E4D Compare is available through Henry Schein Dental and is compatible with E4D Dentist and E4D Labworks systems and PCs meeting certain processing and graphics requirements. For more information, go to www.e4d.com/compare.

**About D4D Technologies**

D4D Technologies is the creator of the E4D Dentist and E4D Labworks systems, which use high-speed laser scanning technology to produce digital 3-D impressions of teeth without the application of contrast agents. Intuitive DentalLogic software enables operators to customize restoration designs and send them wirelessly to the precision mill that uses the latest restorative materials to produce fine esthetic restorations. D4D also offers E4D Compass for restorative-driven implant solutions and E4D Compare adaptive learning technology for teaching institutions.

(Source: D4D Technologies)

The greatest advantage is for optical impression users, because it allows scanning the abutment exactly the same way as a natural tooth. The digital impression is an extremely accurate method for taking impressions, and it is gaining its place in the dental general practice very fast. Still, its use in implant prosthodontics is limited.

A comparative study by J. B. Da Costa published in JOD, shows that there is no difference between direct oral scanning and indirect scanning of a stone model from PVS impression, which confirms the high accuracy of both methods.

**Summary**

The passive fit of the prosthetic framework is extremely important, especially for longevity of an implant. Every implant, even the cheapest one, can last many years in the patient’s mouth if only it is correctly loaded and properly restored. Lack of the passive fit usually leads to serious bone loss and implant failure.

The practitioner has to do everything possible to keep the restoration in the zone of 10 µm of the marginal fit. An implant, unlike a natural tooth, does not have periodontal mechanism that gives the natural tooth a resilience of 50-80 µm.

Splitting as many crowns as possible divides evenly the load between the implants but can compromise the passivity due to the poor accuracy. To achieve 50 µm level of accuracy, every single negative cause should be eliminated from the impression procedure.

The only recipe for implant-supported restoration success is an accurate impression. Currently, the alternative to the transfer impression is the silicon or optical direct impression of the abutment with G-Cuff by Stomatotech or with an optical impression with an aid of scanable bodies.

These two methods deliver a substantial passive fit that assures longevity of the implants and of the whole restoration.

Note: A complete list if references is available from the publisher.

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