

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



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

expansion. The analog becomes loose 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 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 plas-



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.

tic collar that is inserted on the apical end of the abutment before the abutment is engaged to the implant (Fig. 5).

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 gingi-

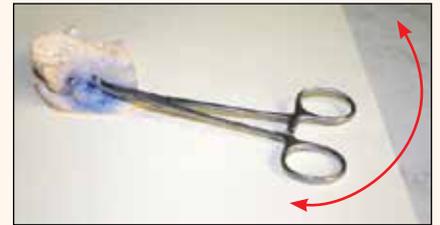


Fig. 4a: An MIS one-piece analog. Stone model was glued on a cardboard. The head of the analog was fastened tightly by a hemostat. Significant mobility of the analog is always observed.



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.

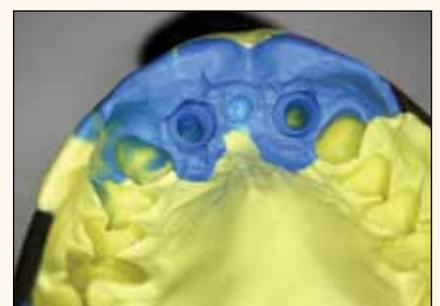
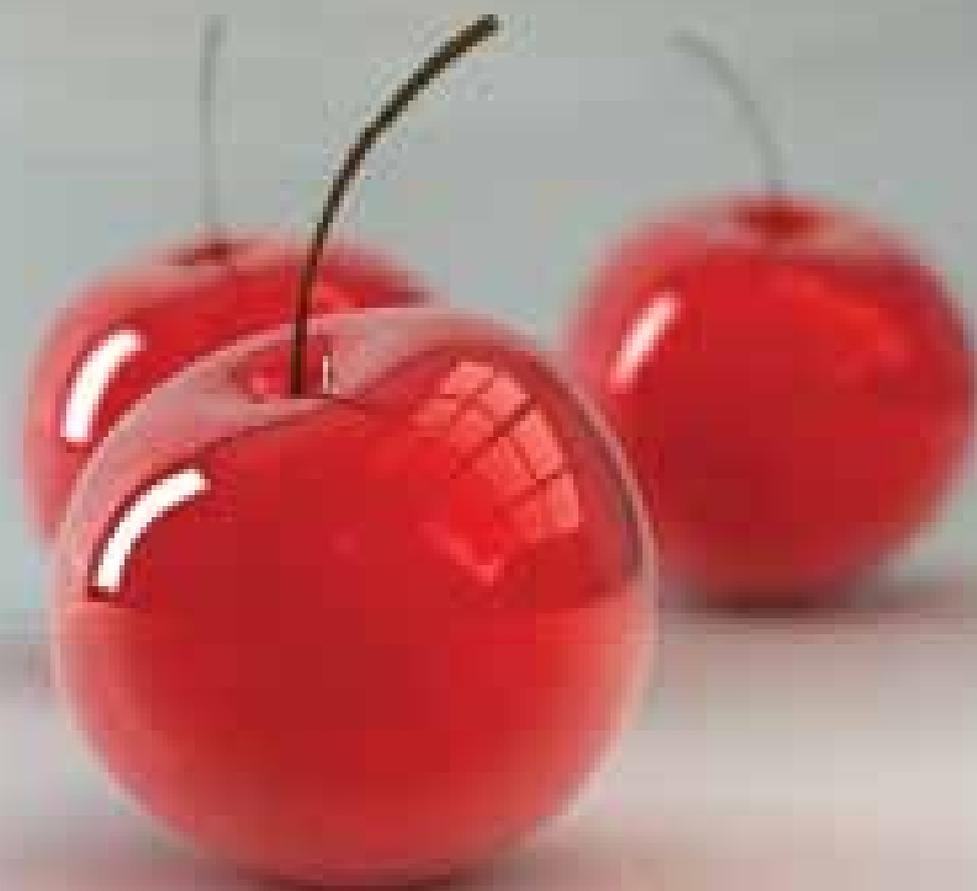


Fig. 7: Final impression Implant Direct Legacy.

val 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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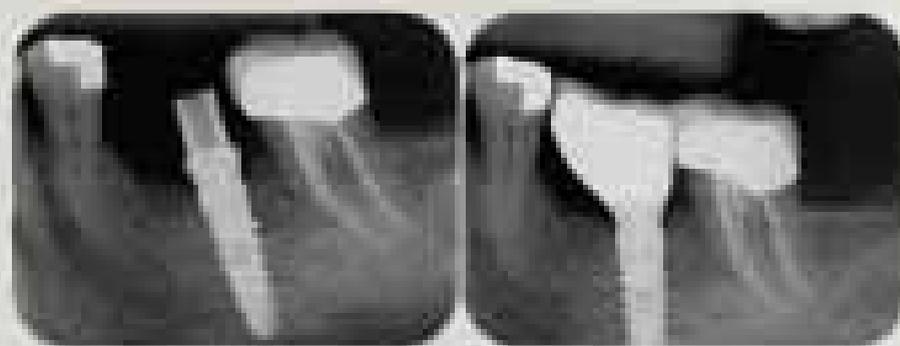


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xpAPce and XPsquared launched

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 alone that tax vendor resources. 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 and do business has changed forever.

Enter xpAPce and XPsquared. Formed by two dentists, Drs. Alan A. Winter and Frank Murphy (who combined have 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 serve that profession.

How? Let's take xpAPce. Awkward as it appears, it is not a word to be spoken but an acronym for "eXPert APproved 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 disassemble techniques and therapies and then put them back together better than before. They are building blocks to larger courses we call "modules." Modules are

complimentary courses linked together that enhance the learning experience, or they may be a longer course by one scholar who provides greater insight into a specific topic or technique. All courses and modules have one thing in common: They provide the tools that utilize current thinking and practices that enhance patient outcomes.

Our thinking: If we have one XP company, why not two? That's how XPsquared was named; it is the name of our online dental community. What is a dental community? XPsquared is much like a giant box store: It houses the day-to-day workings of our profession under one Internet "roof." It is a place where vendors display their products in booths just as they do at brick-and-mortar trade shows. There are plasma screens for videos, PDFs, training films, FAQs, company descriptions, contact information for sales reps, chat rooms at every booth in real time that are linked to the vendors' websites so vendors can take orders, arrange for in-person demonstrations and more. Cost effective, efficient, far-reaching, the XPsquared community members can hold study clubs, host conferences, blog with colleagues in the Networking Café, read the latest journals or discover where the next meeting will be in the Resource Center. Use your personal briefcase to collect contacts, training manuals, white papers and more.

Together, 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.virtual-events365.com/xpsquared.

For more information, email info@xpapce.com or info@xpsquared.com or call (212) 355-5535.

(Sources: xpAPce and XPsquared)

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 students with 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 demonstrate their accomplishments in tooth preparation, restoration design and occlusal articulation.

From the faculty perspective, E4D Compare provides

evidence-based assessment tools that also document student progression. "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.

"There is a crisis in dental education; many students believe that grading is subjective and inconsistent," said

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High-tech laboratory uses latest CAD/CAM

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a representative directly at (800) 981-9008, and let Excel Studios help you reach your ceramic goals.

(Source: Excel Studios)

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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.

Splinting as many crowns as possible divides evenly the load between the implants but can compromise the passivity due to the poor accuracy. To achieve 10 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 scannable bodies.

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

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

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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 DentaLogic™ 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)

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