

The “First Implant”: Protocol for the GP Part 3



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This is part 3 of a 3-part article series. Part 2 of Dr. Tischler's article was published in the October 2011 issue of Dentistry Today and can be found in our archived articles at our Web site, dentistrytoday.com.

The first 2 articles in this 3 part series: “The ‘First Implant’: Protocol for the GP,” covered treatment planning and surgical aspects of a dentist placing his or her first dental implant via “the first implant protocol (FIP).” In the third and final part of this series, laboratory communication, abutment design concepts, impression techniques, and other important aspects of restoring an implant will be described. The process of taking the implant from the provisional to definitive cemented restoration will be discussed in great detail.



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A REVIEW OF PARTS AND SEQUENCING

The dentist’s “first implant” was initially treatment planned using a cone beam computed tomography (CBCT) scan. A single implant was then placed utilizing a CT-derived surgical guide based on the correct prosthetic/restorative position, followed by the provisional restoration cemented onto a temporary titanium implant abutment. After 3 months of healing, allowing for osseointegration, a fixture-level impression is required to transfer the position of the implant from the patient’s mouth to a working cast so that the laboratory can create a permanent cementable crown.

The protocol demonstrated in this series of articles has been based on the straight-walled, internal hex implant (BioHorizons). There are unique restorative advantages to the BioHorizons system, with the most important feature being the “3inOne” abutment that comes with the implant. This abutment has 3 purposes: (1) it serves as an implant fixture mount allowing for easy and accurate implant placement; (2) it serves as an impression transfer coping when an additional ball top screw is placed into the abutment; and (3) it can also serve as a permanent titanium abutment after extraoral modification by clinician or laboratory technician (Figures 1 and 2).

In part 2 of this series covering the surgical aspects of placing a “first implant,” it



Figure 1. 3inOne abutment (BioHorizons) used as a carrier to place an implant in position.

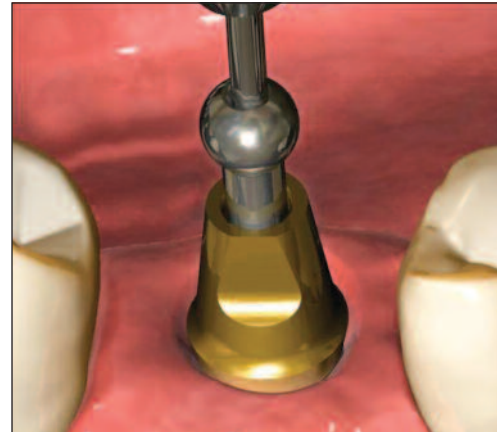


Figure 2. Ball top screw for 3inOne abutment, being used as an impression transfer.



Figure 3. Implant analog attached to 3inOne abutment and ball-top screw.



Figure 4. Extra oral preparation of 3inOne abutment to support a provisional restoration.

was stated that the implant was placed with the flat side of the 3inOne abutment toward the facial aspect of the receptor site. This rotational orientation was recommended to allow for consistency in the positioning of the abutment after modification. In addition, the temporization phase required the use of an abutment; therefore, the 3inOne abutment placed at the time of surgery and provisionalized became a reusable temporary abutment that could be reused in future cases after being cleaned and autoclaved. The sequential steps later in this article will explain this further.

At 3 months, the provisional restoration and temporary titanium abutment will be removed and osseointegration verified. A fixture-level closed-tray impression will be taken with a new unprepared 3inOne abutment and the ball top screw impression coping. This second 3inOne abutment will be

used as an impression coping in conjunction with the ball top screw to fabricate a soft-tissue cast. The abutment will then be used as a permanent abutment after laboratory preparation to gain good marginal adaptation to the surrounding soft tissue. Placing the flat side of the abutment in a predetermined facial position at the time of surgery allows for reuse of the titanium temporary abutment for future cases.

REVIEW OF IMPRESSION TECHNIQUE

In order to take an impression of the implant and transfer the clinical position in the mouth accurately to a dental laboratory, an implant impression transfer coping must be used. There are 2 types of implant impression methods: (1) an “open-tray” technique, where the long impression coping screw secures the coping to the implant,

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protrudes through the tray, and is unscrewed in the mouth after the impression sets; and (2) the second option is the “closed-tray impression” technique, where a traditional type crown and bridge impression is taken of the impression coping after it is secured to the implant with the reusable impression transfer coping.¹ The FIP utilizes the 3inOne abutment (BioHorizons) and a reusable Ball Top Screw (BioHorizons) impression transfer coping. The use of the 3inOne abutment and closed-tray impression technique provides for simplicity and accuracy for the FIP.

When the impression utilizing the implant impression coping has set, the coping is then removed from the implant intraorally and attached to an implant analog or implant “replica” (Figure 3). The color-coded implant analog diameter will correlate to the size of implant used, and will contain the appropriate internal hexagonal connection. The impression coping and implant analog is then placed back into the impression, making sure of proper fit and orientation. An opposing arch alginate impression is required, along with a rigid bite registration (Regisil Rigid [DENTSPLY Caulk]; Blu-Mousse [Parkell]). The implant impression coping, analog, opposing arch study cast, and bite registration will then be sent to the dental laboratory team with appropriate instructions.

After the implant was surgically placed, a transitional restoration was fabricated. The FIP protocol uses a “nonfunctionally” loaded provisional tooth on the implant.² This means that the transitional tooth will be vertically reduced so that it is out of occlusion and nonfunctionally loaded when the patient leaves the office. The transitional restoration will require the use of a secondary abutment. This “extra” abutment will also be a “3inOne” type abutment, which will be prepared extraorally to allow for good marginal adaptation and retention. Therefore, there are actually more than 3 uses for the 3inOne abutment.

When the virtual plan had been established, the exact length and width of the implant was chosen. Allowing for adequate time prior to surgical intervention, it is required that the proper implant body, implant analog, ball-top screw, and second 3inOne abutment be ordered and received by the office. The ball-top screw is univer-



Figure 5. Provisional 3inOne abutment hand tightened to support a provisional restoration.



Figure 8. Body of internal implant (BioHorizons) after removal of 3 in One abutment.

sal to all of the BioHorizons internal hex implant sizes, but the analogs are specific to each implant size and are color-coded. Yellow represents the 3.5 mm diameter platform, green the 4.5 mm platform, and blue the 5.5 mm platform implants. Having these parts on hand allows for better organization, and makes sure the case moves along smoother. The FIP requires that certain of these parts be sent to the dental laboratory at the time of impressioning.

CREATING A PROVISIONAL RESTORATION AT THE TIME OF SURGERY

Once an implant is placed with the FIP, a dentist creates a nonfunctionally loaded provisional restoration for the patient. This is accomplished through extraoral preparation of the 3inOne abutment on a special abutment handle (BioHorizons) (Figure 4). Various titanium carbide burs (Meisinger USA or Brasseler USA) can be used for this procedure.³ The abutment is prepared so that the chamfer on the facial is at or just below the free gingival margin. It is recommended that a small dimple be placed on the flat side of the abutment, so that after preparation, the flat side can still be identified. Once this is done, the abutment is hand tightened on the implant using a .050 hex hand wrench (Figure 5). A light-cured moldable provisional crown (Pro Temp [3M ESPE]) is formed over the abutment and light-cured. Prior to curing the provi-



Figure 6. Provisional (Pro Temp [3M ESPE]) being filled with dual-cured resin after being light-cured.



Figure 9. Ball-top screw on 3inOne abutment in place for a closed-tray impression.

sional crown, the patient bites down into centric relation occlusion. This bite relationship allows for easy adjustment of the provisional to be out of occlusion in all movements. After the provisional crown is light-cured, a dual-cured resin is placed on the occlusal surface of the crown, and the patient bites down on it, allowing it to cure (Figures 6 and 7). After trimming and occlusal adjustment, the provisional crown is cemented with a strong temporary cement (TempBond [Kerr Sybron Dental]). An important aspect of the FIP is to have a nonfunctional provisional restoration during the 3-month healing period.

SEQUENTIAL STEPS TO RESTORING A DOCTOR’S “FIRST IMPLANT”

The first step to restore the provisionally placed implant after 3 months of recommended healing is to remove the provisional restoration and the temporary modified 3inOne abutment using a 0.50 hex hand wrench to unscrew the abutment from the implant body (Figure 8).

The second step is for a ball-top screw (BioHorizons) to be placed on a *second brand new* 3inOne abutment, and an impression is taken with the clinician’s impression material of choice. The authors use light and heavy body vinyl polysiloxane (VPS) impression materials (Aquasil [DENTSPLY Caulk]; Imprint [3M ESPE]) combined. A radiograph needs to be taken to verify full seating of the 3inOne



Figure 7. Bite relationship of provisional restoration out of occlusion. (A nonfunctional immediate provisional.)

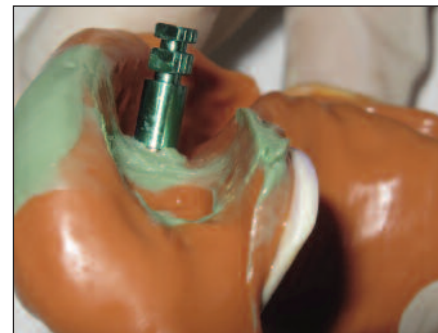


Figure 10. 3inOne abutment with analog placed into impression, ready to be poured in stone by the dental laboratory technician.

impression coping. This radiograph ensures that the rest of the steps are done with the impression coping in its proper position. A closed-tray, full-arch, crown and bridge type impression is done in a very simple manner using a syringe to inject material around the transfer impression coping. The closed-tray technique versus an open-tray technique is preferred in the FIP, due to its simplicity, reduced parts, and accuracy due to the ball-top interface.⁴ If the 3inOne abutment and ball-top screw allow the patient to close without interference, then a full-arch Triple Tray (Premier) can be used. If the 3inOne abutment interferes with the patient’s bite, then a full-arch impression tray is used. A face-bow registration should also be done at this time (Figure 9).

The third step in the FIP is to place the 3inOne impression coping and analog into the impression. Once an impression has been completed, the “second” 3inOne unprepared abutment is removed from the mouth, and a corresponding sized Biohorizons implant analog is attached to it along with the ball-top screw. Once these are connected via the ball-top screw, they are inserted into the impression. The flat side of the abutment and corresponding impression markers on the 3inOne abutment are placed accordingly into the impression. There are other indentations on the 3inOne abutment that allow for a secure orientation into the impres-

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sion. There should be a solid “snap” seating into the impression with a secure type feeling (Figure 10). The impression, bite registration, and counter impression (if it isn't a full-arch dual-arch tray) is sent to the dental laboratory team.

The fourth step in the FIP is to return the temporary restoration with prepared 3inOne abutment placed onto the implant with the dimple towards the facial. The dimple allows easy reorientation of the abutment. As per the FIP, the flat side of the BioHorizons abutment being placed facial, this orientation is effective for all future cases and serves to verify the abutment position in the mouth, and on the working cast. To elaborate on this further, this concept is effective based on the orientation of the internal hex of the implant body. Rotating the flat side of the internal hex initially at the time of implant placement addresses the multiple orientations that are possible when a hexagon shapes the platform, and allows for consistency and accuracy. If this weren't done, the prepped 3inOne abutment couldn't be used in every future case as the margins would be off center. The previously made provisional can now be recemented onto the first implant abutment that was prepared.

The fifth step in the restorative FIP is to add occlusion to the original provisional restoration. The addition of light occlusion allows for progressive loading of the bone.⁵ This progressive loading will now take place during the next 3 weeks while the laboratory is creating the final restoration and preparing the final abutment. The sixth restorative step is to send the final impression with the analog and abutment to the dental laboratory.

The seventh and final step is for the dentist to deliver the implant supported, cement-retained crown. The dentist first removes the provisional restoration on the temporary abutment with gentle rocking of a hemostat. The underlying abutment is next removed by unscrewing the abutment screw with the BioHorizons 0.50 hex wrench. The patient is asked to rinse with a solution of chlorhexidine gluconate (Peridex Chlorhexidine Gluconate 0.12% Oral Rinse [3M ESPE]) at this point to remove any debris in the site.

LABORATORY COMMUNICATION



Figure 11. Soft-tissue laboratory model and the PFM crown.



Figure 12. Laboratory-prepared 3inOne abutment implant body, screwed into place.



Figure 13. View of the permanent PFM crown after cementation.

WITH THE FIRST IMPLANT PROTOCOL

The dental laboratory team is provided with the final impression with the implant analog and impression coping inserted into the impression, along with the bite registration and face-bow registration. The authors prefer to place the analog into the impression so that the clinician can verify the placement. It is important to protect the impression during shipment to the laboratory so that the analog is not dislodged.

The provisional restoration that was on the implant for the past 3 months has formed an emergence profile and mature tissue around the implant. The laboratory will fabricate an accurate soft-tissue model, replicating the sulcus formed intraorally.⁶⁻⁹

This FIP utilizes a cement-retained crown instead of a screw-retained crown.¹⁰ A cement-retained crown allows the 3inOne abutment to

be utilized as the final titanium abutment. Taking an impression with the 3inOne abutment for cement retention also reduces parts that need to be ordered, and helps to contain costs. Furthermore, a cement-retained crown eliminates a screw-access hole that can create porcelain fracture and is often in the position of an occlusal stop or embrasure.

Since the FIP requires abundant bone with healthy keratinized tissue and good interarch clearance, the 3inOne abutment can usually be used as the final abutment. The BioHorizons 3inOne abutment is designed with a chamfer prepared at 3 mm from the implant platform. In the posterior molar region that is out of the aesthetic zone, the dental laboratory can utilize this chamfer, but the authors recommend a definitive preparation to allow enough room for metal and porcelain at the gingival margin or just below.

In the molar region, due to the often large mesiodistal spacing, a PFM crown with sufficient underlying metal supporting the mesiodistal cantilever is also recommended by the authors. The metal support of the porcelain reduces the chance of porcelain fracture.

In a premolar area, a zirconium-based crown can be utilized for aesthetic purposes. There is often limited mesiodistal space in the premolar area. The laboratory should be instructed to lower the chamfer on the abutment to 0.5 mm to one mm below the free gingival margin to improve the aesthetic results and hide the gold abutment color.

The minimal height of an abutment to support a cemented crown is 5 mm. It is important that the dental laboratory allows for adequate retention on the abutment in both height and taper. Retention grooves can be placed into the abutment by the laboratory if increased retention is required.

The laboratory abutment is then removed from the soft-tissue model and inserted into the implant fixture intraorally and hand tightened. The laboratory-produced crown is then tried-in for fit, marginal adaptation, interproximal contacts, and occlusion (Figures 11 and 12). The occlusion is rechecked. It is important to instruct the dental laboratory to create light occlusion on the implant crown. The reason for this is that teeth intrude when a patient bites hard, and implants don't, due to the presence of a periodontal ligament on a tooth. If the implant is hitting at the same level as a tooth, the implant will get

more force than the adjacent teeth, and this could cause bone loss and implant failure due to being overstressed. This has been called implant-protected occlusion by Misch and Bidez.¹¹ When the crown is ready to cement, the abutment is torqued down to 30 Ncm with an implant torque wrench. A light-cured flexible resin material (Fermit N [Ivoclar Vivadent]) is placed in the screw hole.¹² The permanent crown is then cemented with a permanent type cement (TempBond; Durelon [3M ESPE]). The FIP uses a permanent cement to reduce micromovement and possible future prosthetic problems (Figure 13).

CONCLUSION

This is the final article in a series of 3 articles demonstrating the steps to take the clinician from the initial treatment planning phase to placing a single implant, and then restoring the “first implant” following a specific protocol. It is once again emphasized that an appropriate hands-on course is highly recommended prior to commencing these steps for the first time. After understanding the principles in this series of articles and attending an appropriate course, it is the authors' belief that placing a dental implant in adequate bone and soft tissue, based upon proper 3-dimensional diagnosis afforded by the use of a CT scan, and CT derived surgical template, is well within the reach of the general dentist. ♦

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