

Simplifying Fixed Implant Dental Prosthetics



Michael
Tischler, DDS

INTRODUCTION

The longevity of fixed prosthetics on dental implants is well established in the literature.¹ Many dentists shy away from this treatment modality because they feel it is complicated and intimidating. The truth is that restoring dental implants for fixed prosthetics can be easier than crown and bridge on natural teeth. Once the correct impressions are sent to a dental laboratory, the dental technician team will provide everything needed to complete the case. When a single implant is involved, the steps are relatively straightforward and require few appointments. When multiple adjacent implants are involved, the prosthetic steps traditionally become more involved; and the patient visits become longer and more numerous. Through directing the dental

BACKGROUND

The goal of fixed prosthetics supported by dental implants is to provide function and aesthetics similar to natural teeth. In order for this to occur, proper treatment planning must take place that allows for positioning of dental implants in the correct location, angulations, and depth. This becomes even more important when the surgeon is providing multiple adjacent implants to restore multiple missing teeth. The author believes that a computed tomography (CT) scan provides the best information available to correctly plan for successful and safe placement of dental implants.³ Only through a CT scan can a clinician record the amount of available bone in a 3-dimensional (3-D) view prior to implant placement. A CT scan can also be used to guide implant placement based on

healing cap.⁴ This uncovering of the dental implant only needs to occur if the case is being done in a 2-stage approach. Usually, the reasons to bury a dental implant under the gum tissue are related to the stability at the time of placement; and/or if provisionalization during healing will cause stress on the implant. If the bone is dense, and the patient's provisionals are not putting stress on an implant during healing, then a one-stage approach can be utilized. If a one-stage approach is used, then a healing cap can be placed at the time of implant placement. When the dentist is dealing with multiple adjacent implants, it is often difficult to utilize a one-stage approach since a denture is often used for the provisional restoration. This is especially true in the maxillary arch where the bone is softer, providing for less initial stability of the implants.

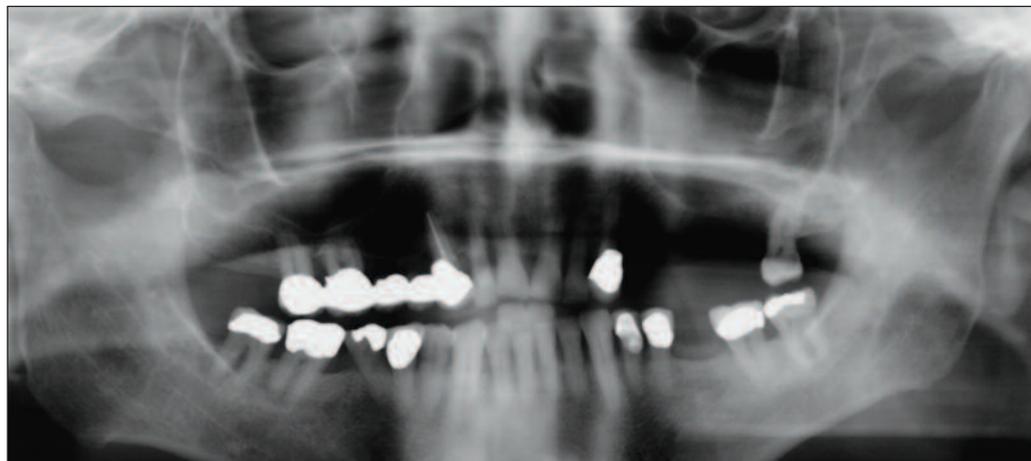


Figure 1. Case 1: Panoramic radiograph showing edentulous on maxillary left side.

laboratory team to deliver a metal framework try-in that is picked up in an impression, the entire case is simplified, the appointment time is reduced, and clinical benefits are gained. This article will outline the framework pickup provisional delivery technique (FPPD) for multiple adjacent implants, discussing the benefits for the patient and doctor. The FPPD technique explained in this article is based on a cement-retained prosthesis. The advantages of cement-retained implant prosthetics are supported in the literature and offer advantages such as reduced parts needed, less stress on the implants, and more leniency for inaccurate cast frameworks than do a screw retained prosthesis.²

the prosthetic end result. This can be done either with a surgical guide stent, or through utilizing the CT for visual reference. The patient presents to the dentist to achieve a successful outcome, and it is up to the surgeon to create positions of the implants that will support this desire. The foundation for ideal prosthetics on dental implants can be realized only through thorough and properly done treatment planning.

PROSTHETIC STEPS FOR FIXED IMPLANT DENTISTRY

After a dental implant or implants are placed correctly into the bone and adequate healing time is allowed for integration, the surgeon uncovers the implant and places a

TRADITIONAL STEPS

Whether a one- or 2-stage approach is used, the starting point for the restorative dentist for the prosthetic steps starts with a patient who presents with a healing cap with mature healthy gum tissue around it. The question is, what are the steps taken once a patient presents with a healing cap? Traditionally, the healing cap is removed and an open- or closed-tray impression is taken to register the position of the implants so a laboratory can create a model. Once this is done, the abutment is created. The abutment can be a stock abutment that is custom shaped, a cast custom abutment, or a CAD/CAM milled abutment.⁵ For a single implant, the final crown and abutment can be delivered at the very next appointment. Through this process, the patient receives their tooth relatively soon, with minimal appointments.

When multiple adjacent dental implants are involved, the prosthetic steps traditionally increase, since the metal framework has to be tried-in. These steps have traditionally meant placing and removing the abutments multiple times during these try-in visits. These traditional steps taken also involve a bisque bake try-in appointment so that the occlusion and aesthetics can be established prior to completion. The clinician has now removed the healing caps and

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placed and removed the abutments 2 times and will deliver the abutments for a third time at the time of permanent cement. During this time period of trying everything in, the patient is wearing a provisional prosthesis that is often difficult to wear. This is especially the case if it is a full denture on a full-arch restorative case. What if the patient could receive fixed provisionals and final abutments at the next appointment after the final impression? The benefits to providing this are numerous, for the patient, restorative dentist, and for communication with the dental laboratory. Everyone benefits.

THE FRAMEWORK PICKUP PROVISIONAL DELIVERY TECHNIQUE

The FPPD technique protocol starts with a patient presenting with multiple adjacent implants with healing caps and mature gum tissue around them.

Step 1

The first step in the FPPD protocol is for the restorative dentist to take an impression to capture the positions of the implants accurately. This can be done with an open or closed tray. A custom tray offers the benefits of a better fit, less impression material, and stability. The healing caps are simply unscrewed, and impression copings are placed into the implants and an impression is taken. Radiographic verification of seating of the impression copings is recommended at this appointment. Various implant companies have impression copings that vary in shape. The end result that is needed is an accurate and stable impression that allows laboratory analogs to be placed into the impression copings that accurately relay the implant position and tissue height. It is imperative that the implant impression copings do not turn in the impression and that they are stable. If there is a discrepancy between the mouth and the model, then there will be a problem with the framework fitting. A bite registration and face-bow registration are sent to the dental laboratory with the impression.

Step 2

The second step in the FPPD protocol is for the dental laboratory team to utilize this impression to create abutments, a metal framework, and provisionals that all fit onto the abutments created. The abutments can be either stock abutments that are shaped in the dental laboratory, or custom cast, or

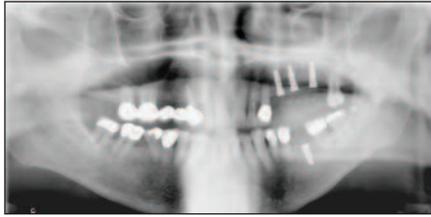


Figure 2. Case 1: Panoramic radiograph showing implant placement on maxillary left side.



Figure 3. Case 1: Healing caps in place after implant uncovering at 3 weeks.



Figure 4. Case 1: Laboratory model with metal framework, prepared abutments, and provisional restoration.



Figure 5. Case 1: Lab-fabricated prepared abutments placed; ready for metal pick-up impression and provisional restorations.

CAD/CAM milled abutments. The clinical condition, tissue height, and parallelism will dictate which type of abutment will be utilized. The laboratory will also create a metal framework that fits accurately on these abutments. The author always splints his abutments because of the biomechanical advantages seen through splinting implants. If the clinician doesn't want the implants splinted, then the copings can be made individual. The author has the laboratory place metal pick-up buttons on the metal framework. This is an advantage for the next step in the FPPD protocol when an intraoral pick-up impression is taken. The dental laboratory at this point also creates laboratory-processed provisionals. The advantages to laboratory produced provisionals are numer-

ous and include increased strength through metal reinforcement and better stain resistance and increased polish over provisionals produced chairside.⁶ The provisional restorations are created with very light occlusion. The purpose for the provisionals at this point is to provide aesthetics and initial feedback from the patient on a previously edentulous area. These provisionals will also allow for the dentist to provide feedback to the lab with regards to aesthetics and shape, once they are in the patient's mouth. This is



Figure 6. Case 1: Provisional restorations placed onto lab-fabricated abutments, after metal pick-up impression.



Figure 7. Case 1: Final restorations in place and cemented.



Figure 8. Case 1: Panoramic radiograph of final restorations on implants on upper left 3 years post-op.

a very important aspect of the FPPD process.

Step 3

The third step in the FPPD protocol is for the restorative dentist to deliver the custom abutments, pick up the metal framework, and deliver the provisionals to the patient. The patient is now receiving a fixed supported prosthesis, although temporary in nature. This delivery of a stable provisional is occurring at the second appointment after uncovering of the implants.

Once the abutments are tried-in, the framework is verified, the abutments are torqued down to the manufacturer's specifications. The advantage here is that this is the first and last

time the abutments have to be placed. With traditional techniques on multiple implant cases, the abutments have to be removed multiple times, making for longer appointments taking up chair time for the doctor and time of the patient. The metal framework is tried-in and verified for fit. If there is a discrepancy in the fit of the metal at this point, the framework can be sectioned and indexed with acrylic and then picked up. Any discrepancy would be due to movement in the impression of the impression copings. In the aesthetic zone, there is an opportunity to verify the margin placement of the metal and abutment. If there is a marginal discrepancy in the aesthetic zone, then the opportunity exists to modify the abutment margin and take an impression of the abutment when the rest of the metal is picked up. It would at this point be similar to taking a crown and bridge impression on teeth. The laboratory would then redo the metal on the area where there was a discrepancy. The metal framework is picked up in an impression whether the metal fits well, the metal has to be sectioned, or if there is a marginal discrepancy. The author uses polyvinylsiloxane (PVS), heavy body and light body. It is recommended that light body be syringed into embrasures and pontic areas so the metal is lifted firmly in the impression. Prior to picking up the metal framework, a bite registration is taken with the metal in place. This gives the laboratory a second verification of the bite and opportunity to assess clearance issues. The last step of this appointment is to try-in and deliver the laboratory processed provisionals. Sometimes the provisionals need to be relined for increased retention. The occlusion is adjusted so that there is light contact. The light occlusal contact is important so the implants are loaded in a timely manner and not overloaded. This progressive loading concept has been supported in the literature.⁷ This is the first time the implants are receiving any real loading. The provisionals are also adjusted for aesthetics and contour. Once approved by the patient, an impression is taken to guide the laboratory for the next appointments of either a bisque bake or final delivery.

CASE EXAMPLES: USING THE FPPD PROTOCOL

Case 1

A 63-year-old male presented with missing teeth in the upper left quadrant; teeth Nos. 12 to 14 (Figure 1). After sinus grafting and 6 months of

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healing, 3 BioHorizons (BioHorizons) implants were placed and allowed to heal for 4 months (Figure 2). After uncovering of the dental implants in a 2-stage protocol, healing caps were placed and the tissue was allowed to heal for 3 weeks (Figure 3). The healing caps were removed and a closed-tray impression was taken with custom trays and analogs were placed in the impression into the impression copings. The dental laboratory (DaVinci Studio) sent back a soft-tissue model, metal framework, prepared abutments, and lab-processed provisionals (Figure 4). The abutments were placed and

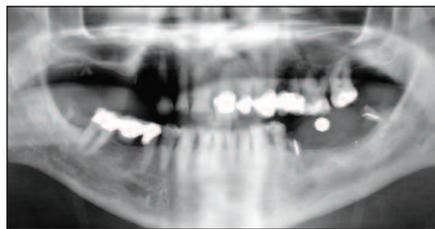


Figure 9. Case 2: Panoramic radiograph of patient as presented.

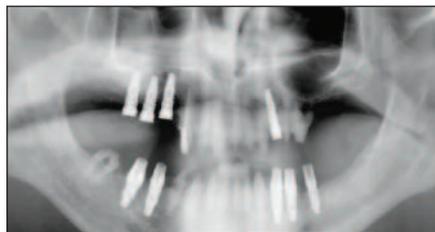


Figure 10. Case 2: Panoramic radiograph showing the positions of implants placed.



Figure 11. Case 2: Healing caps in place; ready for impressions.



Figure 12. Case 2: Impression copings on BioHorizons 3-in-1 Abutments for closed-tray impression.



Figure 13. Case 2: Model showing laboratory-fabricated abutments.

torqued to 30 Ncm (Figure 5). After a pick-up impression (Affinis [Coltène Whaledent]) was done on the metal framework, the provisionals were placed and temporarily cemented (Figure 6). An alginate was taken of the provisionals to guide the laboratory for the shape of the final restorations. The final prosthesis was cemented at the next visit (Figure 7). The case appears stable with no bone loss at 3 years postoperative (Figure 8). This case demonstrates the simplicity of using the FPPD protocol in managing multiple adjacent dental implants.

Case 2

A 68-year-old male presented with a multitude of missing teeth (Figure 9). Extractions, sinus grafting, and implants were placed in the edentulous areas of the posterior maxilla and mandible (Figure 10). After a healing period of 4 months, the implants were uncovered and healing abutments placed (Figure 11). Two weeks later, impression copings were placed and a closed-tray impression was taken on the maxillary and mandibular arches (Figure 12). The dental laboratory returned soft-tissue models, prepared stock and cast custom abutments, a metal framework, and provisionals (Figures 13 and 14). The metal framework was picked up in a PVS impression (Affinis) (Figure 15). The laboratory-processed provisionals were temporarily cemented in the patient's mouth (Figure 16). The final crowns were cemented (Figure 17). The postoperative panoramic radiograph shows splinted dental implants with good bone levels. (Figure 18) This case shows how multiple dental implants can be easily managed utilizing the FPPD protocol.

SUMMARY

Through following the FPPD protocol for multiple adjacent implants, and delivering final abutments, picking up the metal framework, and delivering provisionals, many benefits are gained. The benefits of following the FPPD protocol are as follows:

The restorative dentist is trying-in and delivering the final abutments in one visit as opposed to removing them and placing them multiple times. This requires less chair time and time for the patient. It also reduces the mechanical stress on the abutment screw and implant body due to the elimination of multiple try-in appointments.

When the metal framework is tried-in and verified for fit, the restorative dentist has the opportunity check the retention, check the margins, and make any corrections that



Figure 14. Case 2: Model showing metal framework that will be picked up. (Provisional restoration shown next to it.)



Figure 15. Case 2: Pick-up impression of metal framework.



Figure 16. Case 2: Provisional restoration cemented after metal pick-up impression.



Figure 17. Case 2: Final (cemented) restorations.



Figure 18. Case 2: Panoramic radiograph showing the final restorations in place.

might be needed. The abutments will be staying in the mouth when the framework is picked up. This metal try-in allows for a verification of the bite to be given to the dental lab.

The delivery of provisionals manufactured by the dental laboratory offers many advantages in the FPPD technique. The patient has a form of tooth much earlier in the traditional appointment sequence. The patient can now offer feedback to the doctor and laboratory for fabrication of the permanent prosthesis with regards to shape and color. The laboratory-fabricated provisionals offer progressive loading to the implants through having a reduced occlusion yet allowing food to stimulate the implants.

Overall, the FPPD technique offers shorter appointment times, more rapid delivery of fixed supported teeth, improved doctor-technician communication, and less mechanical wear on the implant parts. ♦

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Dr. Tischler is a general dentist in private practice in Woodstock, NY. He is a Diplomate of the American Board of Oral Implantology, a Diplomate and Fellow of the International Congress of Oral Implantologists, a Fellow of the American Academy of Implant Dentistry, and a Fellow and graduate of the Misch International Institute. He is on the CE Editorial Board for *Dentistry Today* and on the Editorial Advisory Board for the *Journal of Implant and Advanced Clinical Dentistry*. He has published many articles in various dental journals and lectures internationally on the principles of implant dentistry and bone grafting. He is the director of implant education for Davinci Dental Studios and is also on the BioHorizons educational speakers' panel. He offers in-office courses at his teaching facility in Woodstock many times during the year and has a popular instructional DVD available that covers the principles of implant dentistry and bone grafting. He can be reached at (845) 679-3706 or visit tischlerdental.com.

Disclosure: Dr. Tischler lectures on the BioHorizons Implant system and is on their educational speakers panel.

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