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Simplified Fixed Implant Prosthetics

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This article discusses a “simplified fixed implant prosthetics” (SFIP) protocol that offers the entire implant team simplicity and increased predictability for fixed implant prosthetics.¹ The restorative dentist only has to take a crown and bridge impression to provide the final fixed implant prosthesis. The protocol involves the implant surgeon following a 2-step process of making an index impression at surgery, then delivering a laboratory-processed temporary prosthesis on the implant abutment for the restorative dentist. By following this procedure, the restorative dentist receives a provisional restoration that has started control of the hard- and soft-tissue healing. There is also cost reduction and increased simplicity for the restorative dentist. The patient further benefits by having fewer appointments.

The SFIP protocol is demonstrated in this article utilizing the BioHorizons implant system (BioHorizons Implant Systems, Inc). The SFIP protocol is made easier utilizing the BioHorizons system through use of the included abutment as an indirect impression coping. If an implant system used for the SFIP protocol does not have an included abutment, then an impression coping and abutment will need to be ordered.

Conventionally, the restorative dentist has ordered the implant parts and delivered the provisional fixed restoration. With the SFIP protocol, the surgeon makes an impression and procures the necessary parts. This article outlines the theoretical and clinical benefits of the SFIP protocol utilizing the surgeon to initiate the fixed restorative process.

BACKGROUND

Christensen states, “The people ultimately responsible for the long-term restorative follow-up of patients receiving dental implants are general practitioners and prosthodontists.”² With implant dentistry having both a surgical and a prosthetic component, problems can occur if the “team approach” is not organized and does not have good communication.

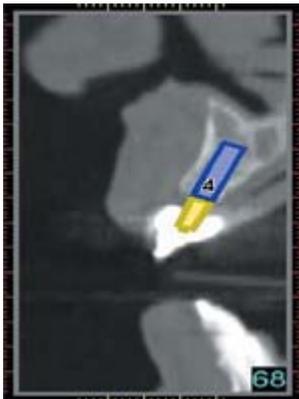


Figure 1. Interactive CT for treatment-planning the correct implant/bone relationship with respect to angulations.

When a surgeon places an implant, the prosthetic loads on the implant will be a significant determining factor in the future health of the implant. With the surgeon and the prosthetic dentist planning the prosthetic end result together, the surgeon can then place the implant in the correct position with respect to offset loads on the implant.³ This presurgical planning can be done with study models, interactive CT scans, or presurgical wax-ups (Figure 1). Presurgical treatment planning will also reveal if a bone graft is needed to obtain the correct implant position. By utilizing the SFIP protocol, the surgeon can further reduce the chances of overloading on the implant by sending the patient back to the restorative dentist with a provisional restoration. With the surgeon placing a provisional restoration, the bone and soft tissue can be formed in a progressive manner with the correct forces. The restorative dentist now receives the preloaded implant in the planned position, but instead of dealing with confusing parts and pieces, only an impression has to be taken.

Three options at the time of surgery

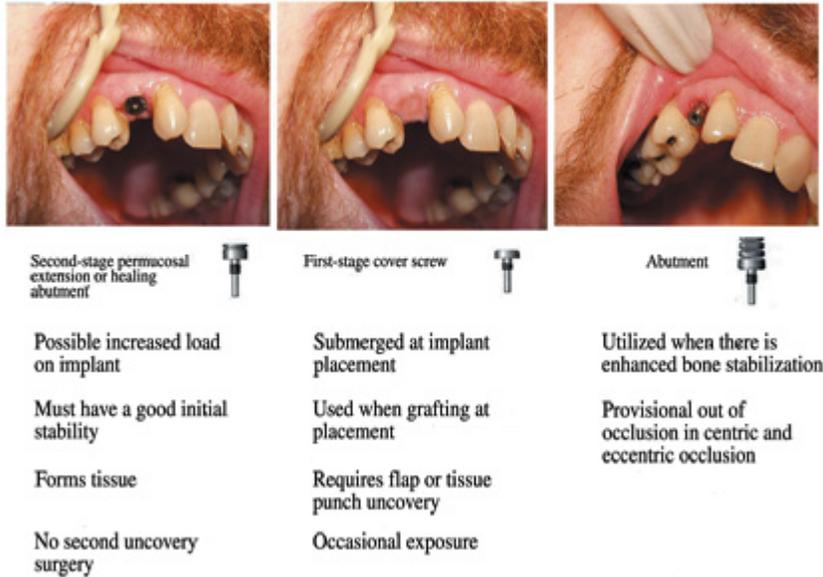


Figure 2. Options available at implant placement.

The surgical dentist benefits by creating the initial loading and increased predictability of the implant, the restorative dentist benefits by not having to order any parts or instruments, and the patient benefits by fewer appointments and more refined care. In order for this sequence of events to occur, certain steps have to be coordinated. The steps outlined for this protocol can be utilized for implants that have been covered at placement (2-stage) or left uncovered at placement (1-stage) (Figure 2). With either method, a laboratory-prepared abutment and provisional restoration are delivered at some point after implant placement.

The concepts of the SFIP protocol are based on cement-retained fixed prosthetics for the restoration of dental implants. There are various advantages of cement-retained implant prosthetics compared with screw-retained implant prosthetics. As described by Misch,⁴ the advantages of cement retention include less porcelain breakage, less screw breakage, better axial loads, more passive castings, better aesthetics, the ability to progressively load the bone, and reduced overhead costs.

THE PROTOCOL Step 1: Index Impression of the Implant Abutment by the Surgeon



Figure 3a. BioHorizons implant abutments.



Figure 3b. BioHorizons laboratory analogs.



Figure 4. Laboratory-prepared abutment, soft-tissue model, and provisional restoration.

Once the dental implant is placed into the correct, previously treatment-planned position, the implant surgeon makes an index impression of the implant body to relate the dental implant position in the dental arch (Figures 3a and 3b). The process is simplified with the BioHorizons implant system, since the implant comes with the final abutment attached and has a flat positioning side. The abutment with one flat side can be positioned into the indirect index impression easily. If this abutment is not used, an impression coping must be used. This basic index impression simply allows the dental laboratory to fabricate the provisional restoration on the laboratory-prepared abutment from a soft-tissue model (Figure 4). Care should be taken to make sure the impression material is not left in the surgical site. The impression can be made at the time of implant placement or at a time after surgery. If the impression is made at a time other than implant placement, a 1-stage approach will eliminate an uncovering procedure. The density of bone, opposing arch forces, and quality of bone are factors that determine if a 1-stage approach can be done. An advantage of making an impression at the time of implant placement is the additional time provided for the laboratory adjustment and fabrication of the implant abutment and provisional restoration while the bone interface is maturing.^{5,6} This not only saves dental chair time but also allows for improved soft-tissue healing at the next prosthetic appointment.^{7,8}

There are 4 considerations when making an impression at 1-stage surgery: (1) density of bone and stability of the implant so mobility of the implant body is not created; (2) parallelism of the implant and how it relates to an impression, which may dislodge an implant body; (3) assurance that impression material is not lodged in the seam of the crest module of bone; and (4) whether a bone graft is done at the time of implant placement, since impression material can be caught in and contaminate the graft materials.



Figure 5. BioHorizons abutment, analog, and screw.



Figure 6. Laboratory-prepared provisional prosthesis.

Once an impression is made of the BioHorizons system implant abutment or another implant system's impression coping, an implant analog is attached, and they are seated together into the impression (Figure 5). The impression with the analog/abutment combination is then sent to the dental laboratory for the abutment to be prepared and a provisional prosthesis fabricated (Figure 6). The dental laboratory prepares a soft-tissue model that represents the gingival tissue around the abutment.⁹ Since this is not the final impression, only an approximate soft-tissue relationship is required.



Figure 7. Long-span, laboratory-prepared provisional with ovate pontics and metal reinforcement.

Preparation of the abutment in the dental laboratory eliminates heat that can occur during intraoral preparation or titanium filings that may be trapped under the flap and discolor the tissue. The laboratory can also survey the abutment for correct angulations. There are also advantages to having a laboratory fabricate the provisional restoration. If the provisional is a long span, a metal-reinforced and/or heat-processed temporary may be made, offering increased strength^{10,11} (Figure 7). A laboratory-processed provisional usually can be made with more ideal aesthetics and improved contours than can be produced in a dental office setting. This opportunity for ideal contours can create an emergence profile, negating the need for custom abutments. The laboratory is instructed to keep the provisional restoration out of occlusion so progressive occlusal loading of the implant may be accomplished. This also reduces chair time for the transitional delivery, since exact occlusal contacts are not required.

Step 2: Delivery of the Implant Abutment and Provisional Prosthesis by the Implant Surgeon



Figure 8. Laboratory-prepared abutments prior to provisionally formed tissue maturation.

Depending on such factors as bone quality, patient healing capabilities, and opposing arch forces, step 2 can occur any time between implant placement and 6 months later. Once the dental laboratory has prepared the implant abutment and fabricated a provisional prosthesis, the surgeon delivers these to the patient at the appropriate time. At this second-step appointment, the implant surgeon also torques the abutment to 33 Ncm (for the BioHorizons abutment). The provisional restoration is cemented on the abutment and checked for lack of occlusion and correct contour. Smooth areas interproximally and at the margins are important for soft-tissue maturation.¹² After allowing the provisional restoration to form tissue maturation for roughly 2 weeks or more, the restorative dentist may take the final impression (Figure 8).

The restorative dentist has now received an implant that has been provisionally restored and out of occlusion, with correct soft-tissue maturation. At this point, the restorative dentist can take a traditional crown and bridge impression. The provisional restoration offered to the restorative dentist can also be used as a guide to aesthetics for the permanent crown. To take advantage of bone remodeling under reduced occlusal forces, the concept of progressive loading is suggested.¹³ The progressive loading is accomplished by controlling diet, occlusion, material hardness, and time. The provisional is first placed out of occlusion, and the forces of the tongue and food mastication start loading the bone with low forces. A few weeks later, the occlusion on the provisional is adjusted to an increased occlusal load. This increase in loading may allow the bone to increase in density, which may decrease crestal bone loss. This can be accomplished at the conclusion of this appointment by the restorative dentist adding acrylic to the occlusion so the implant may receive a slightly greater occlusal load (yet still in acrylic).

CONCLUSION

The complexity of restoration and cost of implant parts often prevents dentists from performing implant dental treatment. The SFIP protocol described offers simplicity and many clinical benefits. By following this protocol, the restorative dentist can create the final fixed implant prosthesis by simply taking a crown and bridge impression. With the implant surgeon following a 2-step process of taking an index impression and delivering an abutment with provisional prosthesis, simplicity and improved healing can be achieved for the restorative dentist.

With implant dentistry being a prosthetically driven discipline, it makes sense for the surgeon to set up and verify the initial prosthetic phase. This article has presented the benefits and rationale of simplifying implant prosthetics through indexing at the time of implant placement. By following these outlined sequences of events, increased predictability of the final prosthetic outcome is achieved.

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