



Full-Arch Zirconia Screw-Retained Bridges

The Advantages of a Guided Surgical Approach

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Full-Arch Zirconia Screw-Retained Bridges: *The Advantages of a Guided Surgical Approach*

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INTRODUCTION

When treatment planning full-arch reconstruction for a zirconia screw-retained implant bridge, implants can be placed either with a surgical guide or nonguided. While both guided and nonguided CBCT approaches can be successful, a guided approach offers certain advantages. These advantages include more precise alveoplasty levels based on the prosthetic plan; more precise implant placement positions, especially with respect to the screw holes; and the availability to prefabricate a milled provisional for same (or next) day delivery. Considering that alveoplasty levels and screw hole positions are crucial for success with full-arch zirconia bridges, a surgically guided approach can offer advantages over a nonguided approach when full-arch screw-retained implant bridges are treatment planned.

This article will outline the principles of utilizing guided surgery for full-arch screw-retained zirconia bridges, while demonstrating a unique reference pin-based guided system as an example of the principles discussed.

GUIDED VERSUS NONGUIDED APPROACHES

When a CBCT scan is utilized to plan a full-arch implant case, the CBCT information can be visually referenced to successfully perform proper alveoplasty, osteotomy preparation, and implant placement *without* the use of a surgical guide (Figure 1). This has been termed the *diagnostic freehand approach* (by Dr. Scott D. Ganz), where the CBCT information is used, but without a guide for implant placement.¹ This requires the ability to correlate the CBCT information with the patient's ridge anatomy, and intuitively provide the surgical plan. One disadvantage of this nonguided CBCT approach is the *subjectivity of surgical decisions*, and the possibility of negative consequences of inadequate alveoplasty or poor implant positions.

For example, inadequate alveoplasty could translate into a zirconia implant bridge that is too thin and, therefore, susceptible to breakage. Or, it could also lead to poor aesthetics in a patient with a high lip-line because of the zirconia gingival interface being exposed when the patient smiles.² Improper implant positions could create a poor anterior-posterior (A-P) spread, or screw holes that are not ideally directed, causing the need for multiunit abutments.³ While multiunit abutments serve many benefits, both straight and angled multiunit abutments are not mandatory for every case. Some clinicians prefer a nonguided approach, as it gives more freedom to

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pre-determined final surgical guides can then accurately guide the clinician for the correct amount of alveoplasty, the correct implant positions based on angulations, and positions relative to the screw holes.⁹ An *online planning meeting* can then outline all surgical steps and parameters for success and deliver an accompanying printed plan. The GuidedSMILE V2R system planning involves considering the alveoplasty pinhole positions and guide fixation pinhole positions. These pin positions must take into account the positions of pre-extracted teeth, and the patient's nerve and vascular anatomy.

Alveoplasty/Implant Placement Principles

Alveoplasty is a key surgical step for success with a full-arch zirconia bridge and most full-arch screw-retained options.¹⁰ At least 12.0 mm of height must be obtained for a full-arch zirconia bridge, measured from the screw hole to the implant platform. The V2R guide system uses the pre-extracted teeth to demarcate CBCT-determined 2.0 mm holes in the bone to then create an alveoplasty level (Figure 3). The bone is then reduced to this level, as determined by the surgical/prosthetic plan (Figure 4). Other guide systems are based on an alveoplasty guide that is created from a virtual CBCT post-extraction ridge anatomy (Figure 5). One problem with a virtual plan is that, if bone is lost during the extraction process, the pre-determined CBCT-planned alveoplasty guide may not fit. This will then impact the subsequent implant placement guide, causing a deviation from the original plan and creating multiple prosthetic problems. With the GuidedSMILE V2R system, once the alveoplasty has been performed to a tooth-referenced pin-based level, the implant surgical guide can then be placed based utilizing the same pin reference positions (Figure 6). This continuity with the same tooth-referenced pin positions creates a certainty for the implant osteotomy and placement positions (Figure 7). This certainty of implant positions is true for either template-assisted or full template guided surgery.

Provisional Delivery

The GuidedSMILE V2R system provides a nanoceramic screw-retained provisional restoration as part of the package



Figure 3. GuidedSMILE V2R (Biomedical USA) tooth-supported guide to place alveoplasty holes (red) and index holes for pins for surgical guide and provisional prosthesis (blue).



Figure 4. Drilling alveoplasty holes through the tissue with the GuidedSMILE V2R tooth-supported guide prior to extraction.

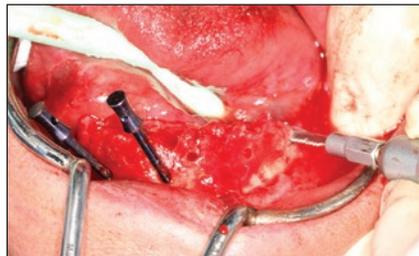


Figure 5. Using bone saw after extraction and reflection, following the 2.0 mm alveoplasty holes placed from the referenced pre-extracted tooth position.



Figure 6. GuidedSMILE V2R surgical guide in place with the reference pins, based upon the pre-extracted tooth positions, supporting it after performing the planned alveoplasty.



Figure 7. Osteotomies being performed through the GuidedSMILE V2R surgical guide. The implants can also be placed through the guide.



Figure 8. The BioHorizons non-engaging titanium interfaces, ready to have the GuidedSMILE V2R pin-referenced provisional attached, then polished.

offered. This screw-retained provisional is now referenced into the same fixation pin locations that the surgical guide used and indexed to titanium interfaces (Figures 8 and 9). Instead of doing a traditional chairside relin of the prosthesis and awkwardly achieving the correct occlusal scheme, the GuidedSMILE V2R provisional is placed into pin references with a preplanned occlusal position (Figures 10 and 11). This is why it is important to have *accurate occlusal records* from the start of a case. A second clear duplicate of the provisional can also be picked up, allowing an accurate prosthetic record for use in the fabrication of the final prosthesis (Figure 12). This allows

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for the entire appointment sequence to be as few as 4 appointments. The patient can have a well referenced, milled nanoceramic provisional delivered at the chair on the same (or next) day using the GuidedSMILE V2R system (Figure 13).

Tissue Closure Considerations

The tissue closure technique for full-arch guided surgery is dependent upon the timing of the delivery of the screw-retained provisional that is planned. If the screw-retained provisional is being delivered the same day of the surgery, then the tissue is sutured around straight or angled multiunit abutments. By suturing around multiunit abutments, it allows time for the provisional to be finished chairside, without collapse of the soft tissue. If healing caps are used to support the tissue without multiunit abutments the same day as surgery, then the tissue has a tendency to collapse when the healing caps are removed for provisional delivery. This makes delivery of the provisional very difficult on many levels. If the screw-retained provisional is being delivered the next day, then the surgeon can suture to either multiunit abutments or to healing caps alone. By the time a provisional is delivered the next day, the tissue has shrunk, and removing healing caps does not collapse the tissue, making delivery easier. One advantage of a guided surgical plan is that, since the implant screw holes are preplanned in a precise direction to the cingulum of anterior teeth and occlusal of posterior teeth, multiunit abutments are not always mandatory for screw hole redirection. This allows a clinician the option of utilizing multiunit abutment or not, especially when the provisional is being delivered the next day. Next-day delivery of a provisional also requires less chair time for the patient and doctor as the dental laboratory team can refine the provisional in a more controlled manner than can be done directly at the chair.

IN SUMMARY

CBCT-guided surgical templates for full-arch zirconia screw-retained implant bridges offer many advantages. Through proper surgical prosthetic planning, the correct amount of alveoplasty can be performed, allowing for both an adequate thickness of the zirconia prosthesis and, in the maxilla, to hide the zirconia gingival junction when smiling. A CBCT surgical guide can also allow for implant positions that have both an ideal position for screw hole access and for angulations of distal



Figure 9. GuidedSMILE V2R pin-referenced provisional with the BioHorizons titanium interfaces in position.



Figure 10. Chairside polished acrylic around housings of the provisional restoration.



Figure 11. Chairside polished anterior view of GuidedSMILE V2R provisional. Pin-referenced positions from pre-extracted teeth create minimal occlusal adjustment needs.



Figure 12. Clear duplicate of provisional restoration that transfers the prosthetic parameters to the lab team. This allows a reduced number of appointments.



Figure 13. Final GuidedSMILE V2R nanoceramic polished provisional restoration.

implants for an improved A-P spread. These advantages of guided surgery for a full-arch zirconia screw-retained bridge are further benefited by a pin-based system that uses pre-extracted teeth for a pin-based reference for both alveoplasty and guided implant placement. These referenced pin positions can also be used to place a pre-fabricated provisional restoration. ♦

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POST EXAMINATION QUESTIONS

1. When a tooth is loaded, stress concentrates in the cervical portion of the tooth, and this becomes more critical in the maxillary anterior as the load is off-axis to the tooth's long axis.
a. True b. False
2. Endodontically treated teeth that have one or both marginal ridges of native tooth structure missing are always adequately restored using directly placed composite resin restorations.
a. True b. False
3. Fiber posts have a modulus of elasticity that more closely approaches that of dentin, making them a desirable choice when a post is indicated.
a. True b. False
4. Stiff metal posts create stresses concentrating at the apical tip of the post, with vertical root fracture being a frequent occurrence.
a. True b. False
5. According to the author and numerous studies, when restoring endodontically treated teeth, a properly designed ferrule is not needed, as long as adhesive dentistry principles are properly followed.
a. True b. False
6. The choice among all-ceramic materials is dependent on function, inherent material properties, and the aesthetic demands/needs of the patient.
a. True b. False
7. CAD/CAM-fabricated all-ceramic restorations do not require any modifications in preparation.
a. True b. False
8. Due to the nature of milling employed in CAD/CAM, it is easier to mill rounded interior aspects to the crown than sharp angles.
a. True b. False

