

CLINICAL ROUNDTABLE

Question:

What parameters decide whether to perform a hard tissue graft when osseous architecture suggests a compromise in positioning?

David A. Garber, DMD; Jack T. Krauser, DMD; Robert A. Levine, DDS

DR. GARBER

After tooth loss, if fixture placement and/or site preservation is not undertaken, osseous resorptive changes are inevitable. At this stage, the decision-making process may involve the following factors:

1. What are the patient's expectations and esthetic awareness?
2. Is the site within the esthetic zone?
3. How much three-dimensional volume of bone is lost and in what dimensions?

Clinically, this is generally viewed as horizontal loss, vertical loss, or combined bone loss. If the loss is predominately labial or horizontal with sufficient bone remaining to develop primary stability in the palatal/lingual remaining bone, and where the interproximal height of bone on the adjacent teeth is within 4.5 mm of the contact point of the visualized final restoration, the fixture can often be stabilized at a more acute angle within this lingual remaining bone. The head of the fixture is then placed considerably deeper, to allow for the angulated restorative abutments to facilitate developing the final restorations in the optimal esthetic and functional plane.

The buccal bone loss can then be esthetically compensated for with a connective tissue graft and/or a particulate xenograft with PRGF (plasm rich growth factors), which will, create the cosmetic illusion of a normal robust ridge with an esthetic implant restoration emerging from within its confines.

In fixed-implant, supported-tooth replacement, where esthetic expectations are high, loss of the interproximal height of bone (IHB) is the most difficult to compensate for, and grafting with orthodontic extrusion of the adjacent teeth and osseous is invariably essential.

4. Is primary stability within the remaining bone possible?

If primary stability in an adequate position within the remaining bone is not possible, grafting is essential. If primary

stability of the implant is possible, but the resultant restorative endeavors will be compromised as a result of the osseous loss, a combination fixed prosthesis is still often viable using ceramo-metal tooth forms combined with gingival replacement using composite and/or porcelain. This is particularly effective if the transition between the "pink restorative gingivae" and the remaining soft tissue can be hidden behind the inferior border of the upper lip.

5. Will the final prosthesis need to be fixed or removable?

In removable cases, the off-axis implant position can still be compensated for with angulated restorative components and hidden by the flanges of the prosthesis. Fixed cases invariably require hard and soft tissue grafting to redevelop the esthetic gingival soft tissue profiles.

DR. KRAUSER

Today, implant positioning encompasses decisions regarding predictable ridge augmentation to attain a more ideal prosthetic result in terms of function as well as esthetics. While the augmentation adds to the time and cost of the procedure and elevates the need in clinician levels of expertise, it is key to include these thoughts today, as it is approaching state-of-the-art in implant therapy.

In my practice, my team initially evaluates the prosthetic needs of the patient. Once the needs are established, we review and examine three-dimensionally using the in-office I-CAT (Imaging Sciences International, Hatfield, PA) cone beam device. This allows our team to interact and establish what, if any, grafting and augmentation is needed to obtain the best outcome for the patient. Our augmentations may be soft tissue only or combinations of hard and soft tissue with a series of steps following the algorithm of the ideal case plan. If soft tissue is to be considered, we consider allograft or autograft sources. Bone augmentation may include bone graft substitutes

or autograft in block or morselized forms. Membrane use is also a consideration in terms of material types and resorption profiles. Titanium mesh or ridge-split methods are also considerations. If we perform ridge split, we use the VarioSurg™ (Brasseler USA, Savannah, GA) units, just as we use them for lateral sinus graft windows. The Piezo method is clean and kind to soft tissues, while allowing for precise bone cuts. Also, we have used motorized site-specific ridge expanders. When the treatment involves more than two teeth, more complex techniques are often employed, including a combination of the above methods.

In summary, the nature, size of the defect, clinical requirements, restorative demands, and esthetics enter into the discussion. Compromise in implant therapy is not warranted today with the availability of so many materials and techniques.

DR. LEVINE

As esthetic oral plastic and reconstructive implant surgeons, our mantra is that we strive to place all implants in a restorative-driven team approach. With the use of an anatomically correct surgical template for all procedures and reformatted computerized tomography (CT) scans when appropriate, we are able to ascertain quickly the correct three-dimensional position for placement.

There are clinical situations where adequate buccal-lingual bone is present with a buccal boney concavity and the placement requires positioning slightly to the lingual side, requiring angulating the implant slightly facially within the confines of the surgical guide template. This can be clinically acceptable and is frequently seen in the maxillary/mandibular posterior areas because of postextraction, bone-resorption patterns. Clinically, a concavity to the facial side is noted, but adequate bone is present in width and height (ideally, we would like to see at least 1 mm of bone both to the buccal and lingual sides to the placed implant; a 4-mm-width implant requires a minimum of 6 mm bone width). To achieve an esthetic and natural restoration in these cases, a soft tissue (CT graft) and/or a membrane-protected osseous graft is needed to plump out the facial aspect (in the concavity area) and to allow for a favorable emergence profile. The decision to perform a hard tissue graft or not depends on the residual bone width. If deficient, we will reconstruct it. If the width is borderline and a dehiscence or fenestration defect is anticipated, and one can achieve good, prosthetically driven, primary implant stability, then osseous grafting with membrane protec-

tion using the principles of guided bone regeneration (GBR) would be an appropriate treatment. This approach enables us to decrease treatment time for the patient. If the implant cannot be placed in a prosthetically favorable position because of a significant ridge deformity then I look at two possibilities: whether I can ridge split, ideally using PiezoSurgery® (PiezoSurgery, Inc, Columbus, Ohio) a 4-mm crestal ridge width that diverges apically for a 4-mm to 5-mm implant width), or if the crestal width is < 4 mm then a GBR procedure alone will be considered, with a healing period of 6 months for particulate bone grafting (ie, Regenaform®, Exactech, Inc, Gainesville, FL). I like to refer to this as "prosthetically guided bone reconstruction," because an anatomically correct surgical template is used to properly anticipate how far out laterally the bone needs to be built after healing. It cannot be stressed enough that proper three-dimensional positioning of the implant is critical to the esthetic, phonetic, and comfort outcome for our patients and this becomes even more essential in the "esthetic zone," based on lip-line esthetics and other "esthetic risk factors," which establish that patient's "esthetic risk profile." Compromising by not using a surgical template, or using a template incorrectly, often results in an unhappy patient with poorly positioned implants.

DISCLOSURE

Dr. Levine has received honoraria from Exactech and PiezoSurgery, and he is a current consultant for PiezoSurgery.

Dr. Krauser has no financial relationships with the companies mentioned in his discussion.

ABOUT THE AUTHORS

Dr. Garber is a clinical professor of periodontics and oral rehabilitation at the Medical College of Georgia, a clinical professor of prosthodontics at Louisiana State University, an adjunct professor of restorative dentistry at the University of Texas Health Science Center at San Antonio, and on the clinical staff of Team Atlanta Esthetic Dentistry in Atlanta, Georgia.

Dr. Krauser is in private practice specializing in periodontics, tissue regeneration, and guided implant surgery in Boca Raton, Florida.

Dr. Levine is a clinical associate professor in post-graduate periodontics, perio-prosthesis, and implantology at the University of Pennsylvania Dental School as well as maintaining a private practice at the Center for Dental Implants and Periodontics in Philadelphia, Pennsylvania.