CLINICAL ROUNDTABLE

Question:

What is the Preferred Diagnostic Method for Evaluating Potential Implant Sites?

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Analysis of the diagnostic casts is extremely helpful in viewing the site and arch form from a variety of views. Routine radiographic analysis with periapical and panoramic views are typical. When available, digital radiographs are preferred as they can be adjusted for contrast as well as marked for measurements. If there is a "team approach," communication between offices is an essential factor as well.

When all of these conventional and routine pre-surgical and pre-prosthetic diagnostic methods are complete, the more "definitive" method of incorporating CT or cone beam CT data into the treatment planning process begins. The data collected from these images are of a tremendous help in the "exacting" planning for the case. We now have key anatomical features in three dimensions coupled with the clinical data allowing for a more ideal treatment plan and sequence of therapy. Vital anatomic structures are identified and can be mapped for idealization of implant size in terms of diameter and length. When there are soft or hard tissue defects, these treatments can be sequenced into a logical plan allowing for the optimal solution for the patient. Fortunately, today there is a significant growth in these diagnostic methods. These can also be imported into 3D implant planning software, which can further idealize hard and soft tissue augmentation needs as well as a template or guided surgery appliance that will facilitate the exact positioning of the implant case. Coupled with various CAD/CAM devices, provisional restorations can be prepared for delivery to the patient at the time of implant installation.

DR. LEVINE

When I interview a potential implant patient, the edentulous area is extensively examined for the following factors to ensure a successful "prosthetically guided" team approach:

Oro-facial bone width through thorough palpation of the buccal and lingual aspects of the ridge. It is recommended to use a radiographic guide-template worn by the patient during scanning to give the critical 3-D information to the surgeon, restorative dentist, and patient so there will not be any surgical or prosthetic surprises for any team members. Otherwise, there will be some guessing as to the actual position of the implant.

Vertical height of bone. The correct apico-coronal placement of an implant may require a combination of both horizontal and vertical augmentation before placement. The radiographic guide-template worn during scanning will help measure the amount of vertical discrepancy. In addition, places where the remaining bone height is too small for proper anchorage of oral implants or when unfavorable crown-to-implant ratios may result if vertical augmentation is not achieved before implant placement need to be properly assessed preoperatively.

The amount and thickness of remaining keratinized tissue. A key to horizontal and vertical bone augmentation procedures is continued primary closure of the soft tissues postoperatively to allow unimpeded healing of the underlying bone graft without early dissolution (resorbable membrane) or infection (non-resorbable membrane) of the overlying membrane because of early opening of the incision line.

Boney undercuts, which can be viewed easily with a CT scan or through palpation of buccal and lingual areas. Buccal undercuts are most noticeable in the maxillae in anterior and bicuspid areas; lingual undercuts are often seen in the posterior mandible and, less frequently, in the anterior mandible. A reformatted CT scan is an important adjunct to initial treatment planning as sinus floor position, sinus health and morphology, mandibular nerve position, and alveolar ridge width and height along with boney undercuts are easily viewed and measured.

DRS. SONICK AND HWANG

Visualization. Measurement with a periodontal probe or calipers determines mesial-distal and buccal-lingual dimensions of the edentulous space. At least 1 mm of bone must remain on the buccal and lingual aspects of the implant. In esthetic regions, 2 mm of buccal bone is suggested. Similarly, a minimum distance of 1.5 mm must exist between an implant and adjacent tooth; this distance expands to 3 mm between two implants.

Keratinized tissue evaluation. The presence of keratinized mucosa surrounding an implant, whether smooth- or rough-surfaced, appears to resist peri-mucositis and facilitate pain-free cleansability. Thicker mucosa also withstands recession, thus a minimum width and thickness of 1 mm is suggested. Rolling a periodontal probe lengthwise along the tissue surface distinguishes between fixed keratinized tissue and movable alveolar mucosa. Bone sounding with a periodontal probe determines thickness.

Hard tissue evaluation. In edentulous areas with visibly little structural loss, periapical radiographs give usable apical-coronal and mesial-distal dimension information. These may be used to estimate the distance between an anticipated implant and the inferior alveolar nerve or maxillary sinus floor as well as the space between tooth roots. In cases that require orthodontic separation to create room for implant placement, a periapical radiograph is imperative, especially if movement occurred via tipping rather than translation. Any extreme root convergence precludes the use of even a narrow-diameter implant.

If the clinician remains unsure of the exact location of the inferior alveolar border, maxillary sinus border or other structures, or if the ridge morphology appears to reflect a significant bony defect, other imaging methods may prove useful. Panoramic radiographs give a general impression of any remaining dentition and pathology, but they distort anatomy too much to be used to steer surgery. A CT scan, on the other hand, produces detailed, accurate information, eliminating guesswork. This 3D image allows for bone dimension measurements, deformity detection (ie, dehiscences, periapical lesions, sinus septae) and, with appropriate software, virtual grafting, virtual implant placement, and surgical guide fabrication.