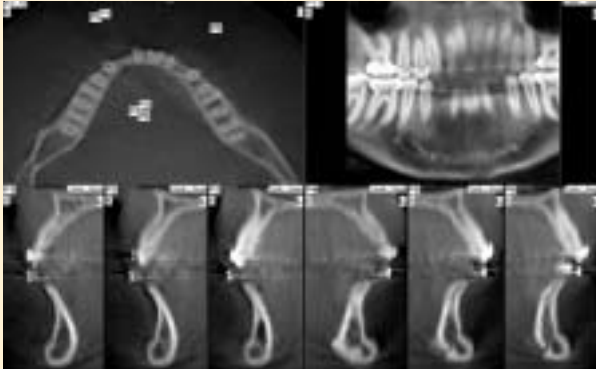


# Radiographic Assessment of Bone Prior to Implant Therapy

by Joan Pluchinsky, CRT with Robert Langlais, DDS, MS



Images courtesy of Ahead Diagnostics, Austin, TX

Post-operative implant success necessitates complete visualization of the area prior to any surgical treatment. Not only is it vital to know the position of the sinuses, nasal fossae, incisive and mandibular canals, but also knowledge of the thickness, shape and contour, and the denseness (including cortical vs. medullary areas) of the bone is necessary. The orientation of the implant must be optimal for best relation to the opposing dentition. Traditional dental radiography cannot provide all this information. Exploratory surgery presents with its own risks and is no longer necessary with the advent of safe and efficient advanced dental radiography.

In *Principles of Dental Imaging*, Drs. Langland, Langlais, and Preece write: "... the minimum standard of care for the radiologic assessment before initiating implant therapy consists of sagittal (lateral) and cross-sectional (coronal) tomograms of each implant site. Periapical, occlusal, cephalometric and sometimes panoramic radiography are commonly used instead of tomograms. Although these images may be used in conjunction with the minimum standard, such images or combination of images do not represent the minimum standard of care for implant imaging because of variations in projection geometry, and in the case of panoramic geometry unequal magnification in the vertical and horizontal directions throughout the panoramic radiograph. CT is probably the most useful imaging modality for pre-surgical implant assessment when multiple implant sites are involved. In addition, most contemporary work stations and software used to process CT image data are rapid, detailed and allow visualization of the proposed sites on a 1:1 ratio that is life sized."

Dr. Langlais expanded on the negative aspects of the use of panoramics for pre-surgical implant assessment: "On panoramic radiographs, parts of the canal and sometimes all of the canal cannot be seen at all. This is common knowledge. Anyone doing implant treatment planning with panoramic radiographs only cannot assess the true position of the canal or it's distance from the crest of the ridge even if the canal can be seen. No one should ever rely on panoramic radiographs for accurate anatomic relationships in implant treatment planning. "

Bone thickness and density are also of major concern. If a patient has lost teeth due to periodontal disease, it is a good possibility that not only have they lost bone height but also width and density. Bone loss can possibly be more severe in the buccal/lingual aspect. The mandible can also vary greatly in shape and contour. Palpitation can reveal a certain amount about that shape but muscle attachments and soft tissue variances make this an unreliable method of assessment. It is imperative that the profile be known in order to place the implant at an angle that will keep it centered in the bone while allowing proper occlusion with the opposing teeth. Additionally, in many instances the resorption pattern of mandibular alveolar bone is such that the mandible may reorient to the lingual in cross-section. This could result in perforation of the cortex lingually when placing an implant.

The patient's general health is also an issue. If a patient has osteoporosis, the density of the bone is greatly affected. Occasionally, one of the first indications of osteoporosis is a feathering appearance of the mandibular cortical bone. The cortical bone surrounding the mandibular canal can be so diffuse that it is extremely difficult if not impossible to see, depending on the extent of the progression of the condition. If this condition is present, the patient may not be an acceptable candidate for implants.

Advanced imaging is now available with made-for dentistry CT. These scanners, unlike their hospital ancestors, are extremely low dose and fast. The Texas Bureau of Radiation Control has tested and determined that the use of the NewTom dental scanner (now available at Ahead Diagnostics in Austin), emits the same amount of radiation as approximately one periapical radiograph. This is far less than even the very safe panoramic imaging, and provides the dentist with a wealth of information to safely and accurately proceed. Also of interest is that images captured by this modality are true size and fabrication of radiographic stints (necessary with conventional tomography) are not required.

Is there a downside to this technology for the dentist? No. The dentist obtains information that will greatly ensure successful implant placement. The patient gains confidence that their dentist is committed to their health and best interest.