

Points

- Implantology has now become a popular branch of dental practice
- Before placing implants, it is necessary to know the quality of bone, as well as the height and width
- Traditional, clinical measurements and intra-oral radiographs, as well as OPGs, are often inadequate for this purpose
- Dental CT, with life-size images, allows accurate measurements to be obtained, so that proper decisions can be taken about whether to place implants or not, and if so, the correct types and sizes.

Dental CT

Over the last decade, implantology has become an important part of dental practice. Placing implants in partially or completely edentulous jaws has evolved from a technique restricted to a few experts, to a modality practiced by many dental surgeons in their clinics.

There are many kinds of implants, of different sizes and shapes that are placed in the jaws. However one overriding issue relates to recognizing whether or not the mandible and/or the maxilla have adequate bone to support these implants.

There are two basic issues

- Quality of bone
- Adequate height and width of bone

The quality of bone is difficult to measure objectively. Measuring the Hounsfield value of bone is not an accurate technique. Most often the assessment of osteoporosis is made subjectively by looking at the density of bone on an x-ray or CT scan or by measuring the bone density at the spine and hip using a DXA machine and extrapolating these results to the mandible. Severe generalized osteoporosis is usually reflected in the mandible as well.

For measuring the height and width of bone, many techniques are available; from clinical measurements to x-rays to CT scans. Both clinical

measurements and x-rays suffer from the inability to get accurate bucco-lingual distances, as well as accurate height, both above the mandibular canal as well as in the posterior maxilla.

Dental CT is performed with the patient supine, with the alveolar edge of the jaw-bone perpendicular to the table-top (Fig. 1). With the new multi-slice scanners, the jaw is scanned in about 1-2 minutes. Thin-slice images (less than 1mm) are reconstructed and then run through a special software program, where panoramic (OPG-like) (Fig. 2) and paraxial (perpendicular to the alveolar edge) images (Fig. 3) are obtained.

The paraxial images allow us to evaluate (Fig. 4) all the four cortices (alveolar, buccal, lingual and inferior). These are then documented life-size on film, thus allowing accurate measurements with a simple ruler, to assess the extent of bone available for an implant (Figs. 5, 6). In the maxilla, if the posterior maxillary height is thin, dental CT can help reassess the area after a sinus lift (Fig. 7).

Many software programs are now available, which incorporate these images into simulations, which allow the implantologists to not only obtain the measurements, but also to place virtual implants. In some cases, jaw models can be created to help in the surgery.



Fig. 1

Fig. 1: Scannogram from a typical study showing the plane of scanning for the mandible with the alveolar edge perpendicular to the table top.

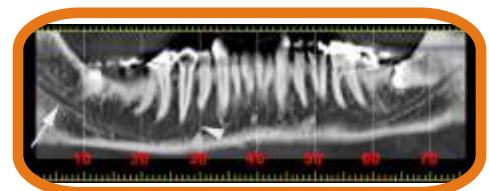


Fig. 2

Fig. 2: Panoramic view. This is an OPG-like view obtained from the raw axial images. Note the mandibular canal (white arrow) and mental foramen (white arrowhead).

The online version is up at <http://www.jankharia.com/innerspaces/current.htm>



Fig. 3A

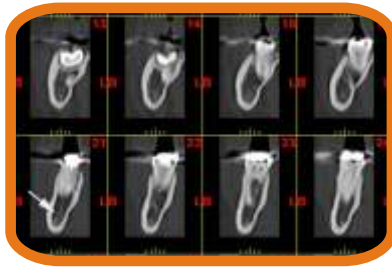


Fig. 3B

Fig. 3 (A, B): Paraxial images. The planes in which the paraxial images are obtained, perpendicular to the bone, are well seen (A). The paraxial images (B) show all four cortices. Note the mandibular canal (white arrow).

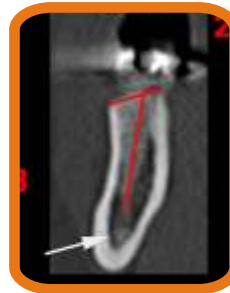


Fig. 4

Fig. 4: Measuring on a paraxial image. The mandibular canal (white arrow) is well seen. The red lines show the way the height and width of the bone are measured. On life-size images, this can be done directly on the film, with a ruler.



Fig. 5A

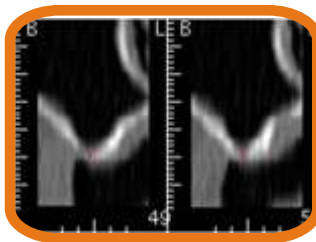


Fig. 5B

Fig. 5 (A, B): Posterior maxilla evaluation. This 66-years old man came for implants. The OPG (A) seemed to show adequate bone in the posterior maxilla. However the dental CT (B) shows a height of just 1mm, which is totally inadequate for placing an implant.



Fig. 6

Fig. 6: Knife-edges. The paraxial images in this patient show a knife-edge, with hardly any bucco-lingual width.



Fig. 7A



Fig. 7B

Fig. 7 (A, B): Sinus lift. This patient underwent a sinus lift procedure with bone graft material placed below the maxillary sinus to augment the alveolar bone. The dental CT shows adequate bone (white arrows) now available, both in the panoramic (A) and paraxial (B) images.



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