

The role of CBCT in implant dentistry: uses, benefits and limitations

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Dental radiography is a vital part of clinical dentistry and CBCT (cone beam computed tomography), a fundamental, ever-evolving diagnostic tool that plays an integral role throughout the patient care pathway – allowing more accurate and informed diagnosis and treatment planning.

Imaging should be selected when clinically justified, based on each individual patient, following referral criteria for best practice.

Undoubtedly, conventional dental x-rays have diagnostic value; however, they are ultimately limited as 2D depictions of 3D structures.

CBCT scanners vary in their capabilities; it is important to understand that achieving a high standard of diagnostic information is dependent on both the patient and the operator. As radiographers, we select the scanner, field of view and voxel parameters based on the clinical indications and individual patient. This optimises the exposure and achieves the greatest level of diagnostic information.

CBCT's undeniable advantage of multiplanar reconstruction has revolutionised implant dentistry; it allows visualisation without the superimposition of structures. This ability to view structures from 'different angles' helps to more accurately evaluate the architecture and dimensions of the bone; the contour and visual density, the cortex and trabeculae pattern within the bone and the surrounding anatomical structures.

Case one, OPG vs. CBCT-50-year-old, considering potential implants predominantly in the lower jaw (Fig. 1a). There are inconsistencies in the bony pattern evident from the OPG, but the extent of these cannot be fully evaluated.

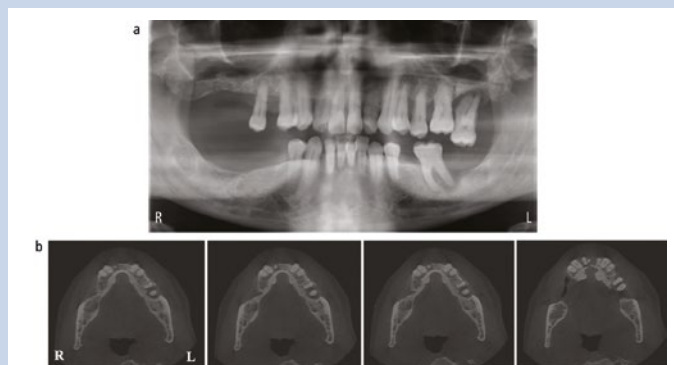


Fig. 1a Case one, OPG vs. CBCT-50-year-old, considering potential implants predominantly in the lower jaw; 1b The CBCT shows significant bone loss especially in the lower right quadrant

The CBCT in Figure 1b shows significant bone loss especially in the lower right quadrant.

It is important when planning for implant placement to fully evaluate the contour of the bone. There are anatomical variations and pathology that can be seen more clearly on CBCT compared to conventional imaging.



Figs 2 a-b Some patients have more pronounced salivary gland depressions: sublingual gland depressions (Fig. 2a) and submandibular gland depressions (Fig. 2b)

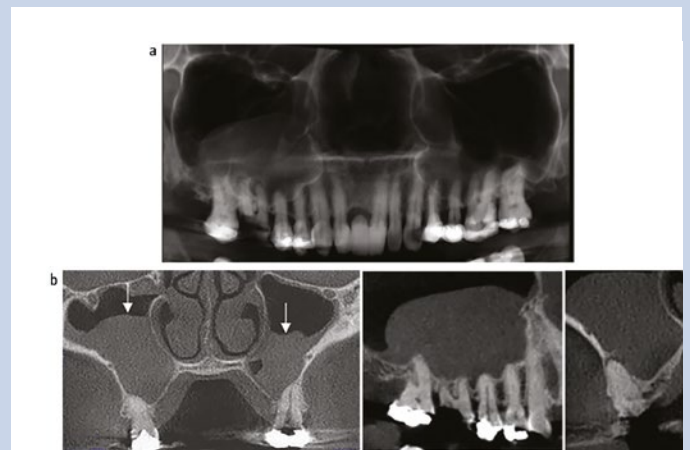


Fig. 4a Case two, CBCT of a 60-year-old, planning for implant placement in the 16; 4b Coronal and sectional views show increase in the thickness and density of the tissues lining the maxillary sinuses, and a possible oroantral communication between the apex of the mesial buccal root of the 16 and maxillary sinus



Fig. 3 A Stafne defect on the lingual surface of the mandible - a normal anatomical variant



Fig. 5 Mental foramen: can vary in number, size, shape and location

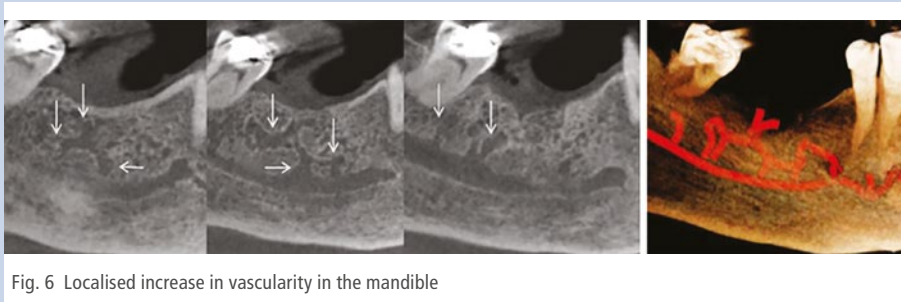


Fig. 6 Localised increase in vascularity in the mandible

Some patients have more pronounced salivary gland depressions: sublingual gland depressions (Fig. 2a) and submandibular gland depressions (Fig. 2b).

Figure 3 shows a Stafne defect on the lingual surface of the mandible – a normal anatomical variant.

CBCT is also beneficial in assessing anatomy outside the dental alveolar region, including the zygoma, paranasal sinuses and airway.

Case two shows a CBCT of a 60-year-old (Fig. 4a), planning for implant placement in the 16. A reconstructed panoramic view shows the 16 to be fractured and the right maxillary sinus to have increased density and a low positioned inferior border.

Coronal and sectional views (Fig. 4b) show an increase in the thickness and density of the tissues lining the maxillary sinuses, and a possible oroantral communication between the apex of the mesial buccal root of the 16 and maxillary sinus.

One of the complications with implant placement can be neurosensory alterations where neurovascular structures have not been accurately identified and protected.

Figure 5 shows a mental foramen which can vary in number, size, shape and location. Figure 6 shows a localised increase in vascularity in the mandible and Figure 7 shows bifurcations of the inferior dental canal.

CBCT is not without its limitations. Existing restorations, treatments and implants can result in a scatter and beam hardening artefact, which can reduce the diagnostic quality of the images. However, adjustments to the scan parameters and patient positioning can minimise this. CBCT is also limited in its ability to accurately represent the internal structure of soft tissues and soft tissue lesions.

Overall, CBCT has revolutionised implant dentistry. Advancements in the technology have pioneered development in scanning equipment and innovations in viewing software allow for more precise treatment planning.

For further information on CT Dent services and cases visit www.ct-dent.co.uk or call 020 7487 5717.

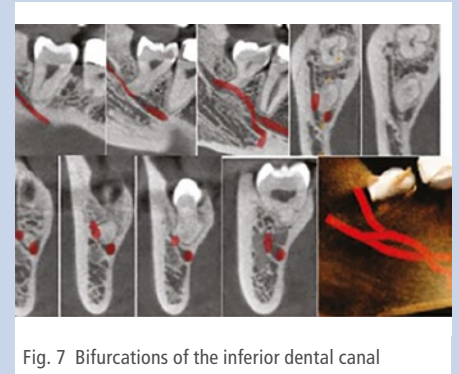


Fig. 7 Bifurcations of the inferior dental canal

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