Role of Cone Beam Computed Tomography in Planning and Placement of Dental Implants

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Diagnostic imaging plays an important role in implant dentistry and the process ensures safe treatments with predictable results. Cone Beam CT Scan is an imaging technique providing 3-D images of teeth, jawbone and vital structures surrounding these which are very important for planning and placement of the dental implants. The procedure having low cost and high ease of use has relatively low level of radiation and has now become popular imaging technique for all types of dental implant treatments. Placing implants by using traditional dental X rays is no longer considered as accepted practice and is very risky. Cone Beam CT Scan (CBCT) has the following five major benefits in dental implant planning and placement [1].

Precise Implant Placement in the Bone
Cone Beam CT facilitates accurate measuring and localizing the available bone to the surgeons. With the help of 3-D software, one can make virtual implant placement by precisely positioning with sufficient bone coverage, in case, the bone is insufficient, and it is improved with different bone grafting techniques. The central idea is the placing of the implant in a position that best supports restoration and keep in in abundant bone [2].

Orientation of Implant With Overlying Restoration Properly
CBCT image is merged with the optical scan of the teeth of the patient for creating a virtual model of complete teeth, bone, and soft tissue. The implant surgeon and restoration dentist, collaboratively design the precise position and perfect bite of the implants in order to support the restoration planned. This avoids misalignment of implants that might be impossible to restore as well as prevents poor functioning and aesthetics [3].

Preventing the Injury to Nerves
With the help of CBCT, the surgeon can map out the path of sensory nerves in jawbone and chooses right implant length. The conventional X rays are distorted and flat and hence provide poor diagnostic images for prediction of nerve positions. Nerve damage caused during implant placement causes complete or partial numbness in lip and chin areas and it could be permanent effect. CBCT is mandatory as imaging technique that helps prevent this serious complication [4].

Prevention of Implant Penetration into the Sinus
CBCT offers an accurate image of the maxillary sinus and the position of sinus relative to the available bone. The surgeon is able to take accurate measurement and choose appropriate implant length and avoid puncturing of the maxillary sinus. Maxillary sinus’s penetration may result in sinusitis or some other inflammatory conditions. The surgeon may also plan for needed bone grafting in case of insufficient bone for supporting the implant. Traditional X-rays are extremely inaccurate for such purposes and fail to offer information needed for safely placing the dental implants in the upper jaw’s back and in maxillary sinus’s proximity [5].
Selection of the Right Size Implant for Optimal Support

Success and longevity of dental implants need maximal stability and integration in the bone. The surgeon allowed by CBCT to measure the available bone and chose the tallest and widest implant suitable for the site. This again is helpful in supporting the forces of high bite and avoids possible failure from overload. Size selection of implant must not be guesswork! Selection of implant is made on the basis of bite scheme, correct measurements, individual patient needs and biological requirements. The benefits of CBCT are clear and it provides more predictable and safer results. Hence it must be an obligatory diagnostic imaging for any implant treatment. It is unwise for the surgeon not to use CBCT for planning and creates pointless risk for the patient.

Reference


