

## SHORT COMMUNICATION

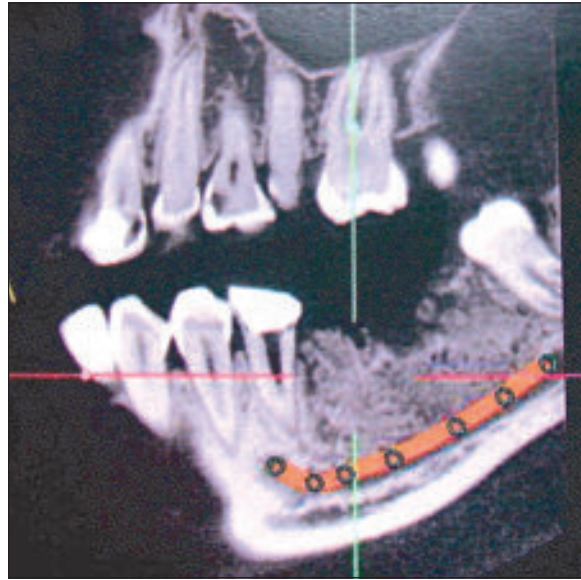
# Use of Cone Beam Computed Tomography in Dental & Maxillofacial Surgery, Bangladesh

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Cone Beam Computed Tomography (CBCT) is an updated imaging technology which is widely used in dental and maxillofacial areas. CBCT scanners are now finding many uses in dentistry, such as in the fields of Oral surgery, Orthodontic planning & implant anchorage, Cephalometric analysis, TMJ analysis, Airway study (sleep apnea), Jaw tumors assessment, Impacted teeth extractions, Periodontal assessment and treatment, Endodontic diagnosis and treatment, Pre-prosthetic alveolar ridge evaluation, Planning and placement of Dental Implant etc.

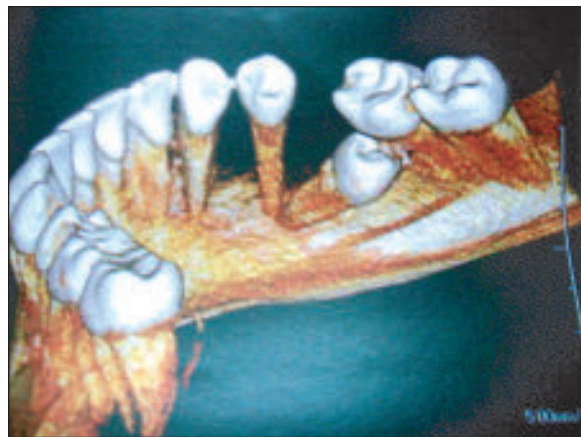
CBCT uses a rotating gantry with a fixed X-ray source and detector. The scanner rotates around the patient's head (from 160 to 360 degrees) obtaining up around 600 distinct images (160 to 1024 depending on the system). A cone shaped source of ionizing radiation penetrates the area of interest to the X-ray detector. The scanning software collects the data and reconstructs it, producing what is termed a *digital volume* composed of three dimensional voxels of anatomical data that can then be manipulated and visualized with specialized



**Fig-1:** Assessment of mandibular bone quality & position of inferior alveolar neurovascular bundle for dental implant placement planning in Oblique CBCT Image.

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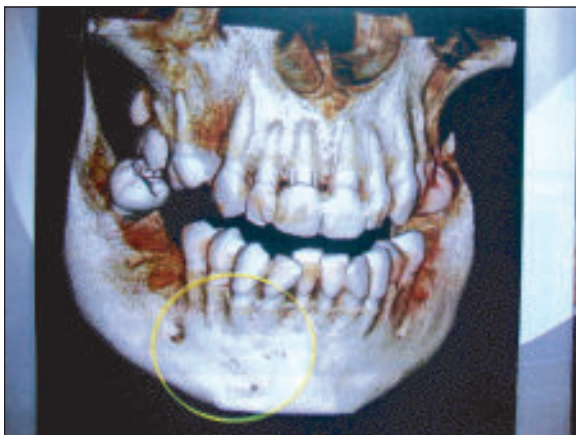
**Fig-2:** Assessment of Periodontal status and malpositioned tooth for orthodontic treatment planning in CBCT Image.



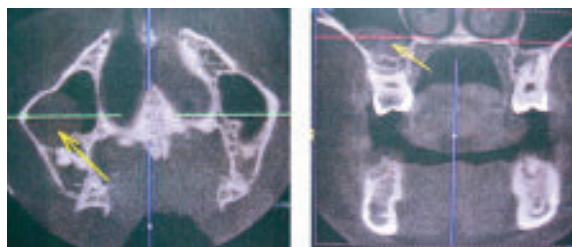
**Fig-3:** Assessment of Complex TMJ and Associated Area in CBCT Image.

software (voxel is the volumetric pixel, i.e. a 3-dimensional pixel where pixel is the smallest component of an image).

CBCT Scanners are preferable than regular CT Scanners in many ways. Medical CT uses a fan-shaped beam and acquires individual image slices with a number of rotations. Each slice requires a separate scan and reconstruction. Cone Beam CT uses a cone-shaped beam and acquires a volume of the complete FOV (Field of View) in only a single rotation (varies from 160-360 degrees depending on the scanning device). One scan acquires enough data for a complete 3D reconstruction.



**Fig-4:** With high quality image resolution CBCT can visualize the position of the mental foramen and the shape of the alveolar bone clearly. It catches lateral vessels branches, no matter how small they are.



**Fig-5:** CBCT Axial and coronal views for assessment of maxillary sinus abnormality.

It is capable of providing sub-millimeter resolution, with shorter and faster scanning times. Scan on a CBCT takes between 10-40 sec, while on a regular CT scanner it takes a few minutes. Radiation dosages are reportedly up to 15 times lower than those of conventional helical CT scans. The image acquisition is somehow similar to conventional CT but also has differences that result its superiority in maxillofacial field. Metal and motion artifacts in CBCT are much less than conventional CT scan.

Though Cone beam technology was first introduced in the European market in 1998 and into the US market in 2001 had been being practiced randomly last few years. In Bangladesh, the practice of using this technology began with the installation of PreXion3D CBCT machine first ever in Department of Dental Radiology, Dhaka Dental College and Hospital, Dhaka in January 2011.

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