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 software.

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

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

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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.

References: