Official Publication of Orofacial Chronicle , India
www.jhnps.weebly.com

Journal of
Head & Neck
physicians and surgeons
ISSN 2347 8128

SHORT COMMUNICATION

CBCT IN HEAD & NECK

Suresh Ludhwani MDS, PGCOI[1], Dipesh Ludhwani (MBBS)

1-Oral & Maxillofacial Radiologist 2- Intern, Pramukh swami medical college, India

***Cite this Article:* Suresh Ludhwani : CBCT in head and neck : Journal of Head & Neck physicians and surgeons Vol 2, Issue 2, 2014 : Pg**

Cone-beam computed tomography (CBCT) presents as a separate evolutionary arm to CT imaging. CBCT prototypes based on C-arms were demonstrated as early as 1983.[1] Compared to fan-shaped CT beams, CBCT images are captured by a cone-shaped beam (hence the name) (figure 1). The beam is emitted in short pulses with a single 180-degree rotation, so there is decrease in radiation exposure up to 10 times less than traditional CT scans. Unlike time-consuming hospital machines, the in-office cone beam is captured in as few as 8.9 seconds, and reconstructed in less than 20 seconds. The final result is a three-dimensional image that can be sliced and rotated for diagnostics and treatment planning & making an ease for doctors.[2] The series of images acquired by the flat plane detector during rotation is processed by the computer to obtain a cylindrical numeric volume, which is used to reconstruct three series of parallel slices in three orthogonal planes (figure 2). Within the numeric cylinder, each volume unit (voxel) is cubic in shape, and the volume is said to be isotropic. Several recent studies have compared the accuracy of CBCT versus multi-slice CT (MSCT) for linear measurements with caliper determined measurements on cadavers. Both systems were accurate to the sub-millimeter level which gives it an edge over CT.[3]

CBCT application in head and neck region is divided in 1) Sinus imaging 2) Temporal imaging 3) Jaw imaging 4) Cervical Vertebra Imaging 5) Air way Analysis.

All Sinuses are best visualized in coronal section of cbct. Diagnosis from sinusitis, polyp, tumor and fracture. Dimension of tumor can be measured with the help of measurement tool and can be correlated with axial and saggital images simultaneously. Air-mucosa-bone contrast is excellent, allowing very interesting study of air cavity anatomy and ventilation. Comparing it with CT images- Effusion, mucosal thickening and ostial obstruction are perfectly visible in CBCT.[4]

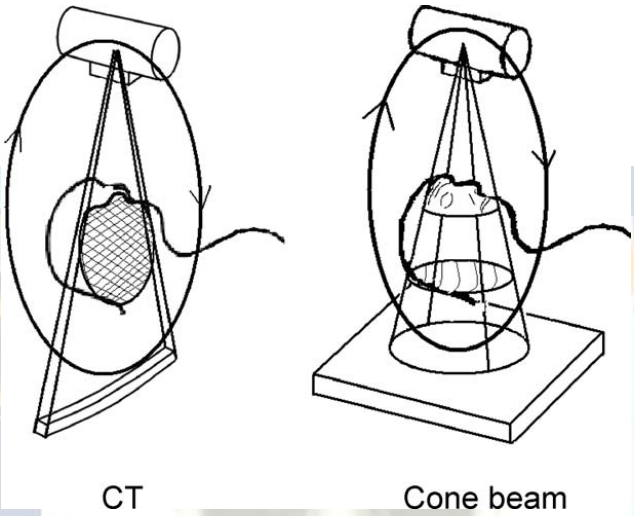

Figure 1- beam shape of CT and CBCT

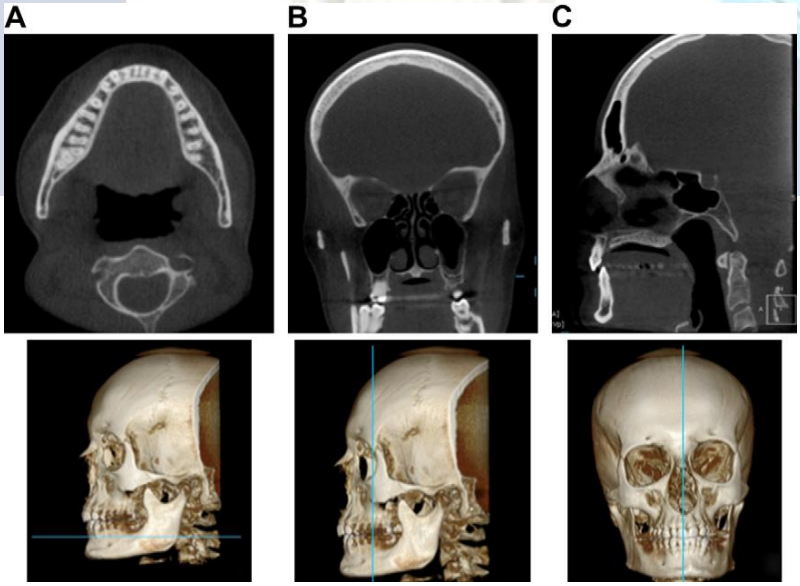

Figure 2- A) Axial section B) Coronal section C) Saggital section.

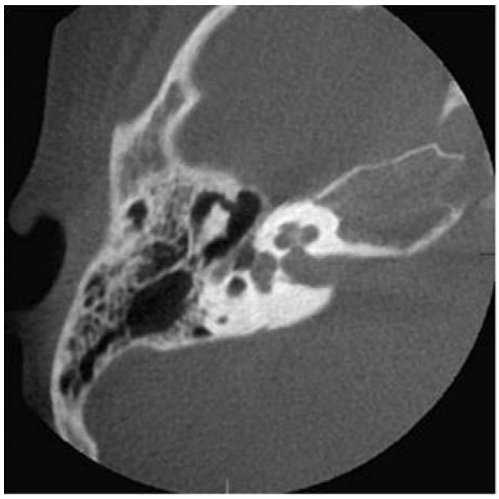

Figure 3- Temporal bone imaging

Pars petrosa study in a well-pneumatized middle ear is as least as good as with high-resolution CT with 500—350 slices. The 125—80 reconstructed slice thickness on CBCT provides much better images of the ossicular chain, notably as concerns the stapes (figure 3). CBCT inner ear imaging is sufficient to diagnose most malformations and dysplasia, traumatic lesions and thin osseous labyrinthine wall erosion or dehiscence. [4] Cochlear implant site assessments in house is possible with CBCT because of its cost and size of the machine an ENT specialist can plan for this machine. Most common tumor, cholesteatoma can also be easily detected on CBCT.CBCT is still considered the Dental CT, Dental imaging comprises two complex bony structures: the mandible, maxilla, alveolar bone and teeth structure. Their curved or arch like configuration makes radiographic imaging difficult. Furthermore, the superimposition of dense teeth and roots may obscure underlying tissues, and streak artifacts from dental restorations often degrade computed tomographic (CT) images but because of low KVP image can be obtained with high scale of contrast so differentiation of two similar density structures is possible. An Imaging are used to evaluate patients with dental implants; in addition, they are being used to assess tumors, cysts, inflammatory disease, oroantral fistulas, silicone implants, fractures, and surgical procedures.[5]

By CBCT, CVM stage can be analyzed in 2 dimensional images but along with that bone deensity can also be analyzed in 3 dimensional images. CBCT with its low radiation dose is suitable for demonstration of cervical spondylosis and also ventral and post lateral cervical

spondylosis. Also plays an important role for spine specialist in rheumatic disease, compression of nerve, intervertebral disc space assessment and hair line fracture diagnosis.[6]

3D imaging is a very efficient method to inspect and identify diffuse narrowing (narrowing disturbed over a large distance) or focal narrowing (encroachments) of the airway. CBCT helps to analyze any anatomical obstruction from tip of the nose to pharynx.[7]

CBCT due to limited sensor size it cannot cover large field of view but in head and neck region it can cover large area and diagnosis can be carried out. Also the advantage of cbct over ct is low cost and low radiation exposure. In future, still further studies are required to analysis further hard tissue structures in head and neck region and its related disorder.

REFERENCES:

1. Christos Angelopoulos, Cone Beam Tomographic Imaging Anatomy of the Maxillofacial Region, Dent Clin N Am 52 (2008) 731–752.
2. Terry L. Myers, Cone beam: past, present, and future, www/.dentaleconomics.com, January 2010.
3. Donald A. Tyndall, Emerging applications of cone beam tomography for aiding clinical diagnosis, Australasian Dental Practice September/October 2009, 110-113.
4. C. Hodez et al, Cone-beam imaging: Applications in ENT, European Annals of Otorhinolaryngology, Head and Neck diseases (2011) 128, 65—78.
5. James J, Dental CT Imaging: A Look at the Jaw, Radiology 2001; 219:334–345.
6. Dr Jorma Järnstedt, Use of CBCT in the diagnosis of cervical spine spondylosis, cone beam, 2014
7. David C. Hatcher, Cone Beam Computed Tomography: Craniofacial and Airway Analysis, Sleep Med Clin 5 (2010) 59–70.

Conflict of Interest- None Declared

Correspondence Addresses :

Dr. Suresh Ludhwani MDS PGCOI

Email-docsuresh.omr@gmail.com