Cone Beam CT the change of paradigm in modern dentistry—clinical applications in endodontics and periodontology

By Prof Dr Liviu Steier

Panoramic radiography changed the paradigm of diagnosis when introduced in the early 1960s. The limitations of two-dimensionai radiography are:
1. Magnification,
2. Distortion,
3. Superimposition,

Due to this the use is and was limited

Cone beam technology (CBCT) is a recent introduced technology in dentistry which succeeded to change and continues to change diagnosis, treatment indication and treatment approach—having as such a more comprehensive impact than the introduction of panoramic radiography. Of course on of the most impressive topic is the availability of software for 3D—reconstruction.

It is of great importance to mention that CBCT provides data at lower cost and absorbed doses than conventional CT. The author has resumed this article for the purpose of demonstration how CBCT aided tremendous value to routine dental practice.

1. Use of CBCT in endodontics
2. CBCT in periodontics

2.1 CBCT and soft tissue

In 2008 Januario et al published in the Journal of Esthetic Restorative Dentistry (J Esthet Restor Dent 20: 366-374, 2008) a paper called: ‘Soft Tissue Cone Beam Computed Tomography: A Novel Method for the Measurement of Gingival Tissue and the Dimensions of the Dentogingival Unit’. In this paper, the authors described a simple method to diagnose the thickness of the gingiva specially in the anterior aesthetic zone. The scans were performed with an iCAT (Imaging Science International, Inc., Hatfield, PA; USA). The authors positioned the subject for the scan wearing a plastic lip-retractor.

A 28-year-old female patient was referred to our practice for evaluation and treatment planning of the periodontal status. No special remarks regarding medical or dental history. The patient has undergone orthodontic over a couple of years. The patient was referred for the completion of the diagnostic to take a CBCT at CTdent (2 Devonshire Place, W1G 6HJ, London, see also www.ct-dent.co.uk). The CBCT confirmed the preliminary diagnosis. A treatment plan has been elaborated.

2.2 CBCT and hard tissue

Vandenberghe and coworkers researched periodontal bone architecture using 2D CCD and 3D full-volume CBCT-based imaging modalities. Their investigation concluded that CBCT offered a significant benefit over conventional radiography. The authors concluded that CBCT can be used to diagnose the bony support as well as surrounding soft tissue and may reveal valuable informations for example regarding furcation involvement. A 55 old human patient was referred to our practice for evaluation, treatment planning and execution. Of major concern was the first upper molars. After performing the routine diagnostic approaches such as ROP, periodontal probing, etc, the patient was referred to CTdent for a CBCT.

Summary

Information provided by this modern technology represents an invaluable milestone in diagnostic, treatment planning as well as evaluation of treatment outcome specially for periodontal applications, especially in the areas of intrabony defects, dehiscence and fenestration defects, and periodontal cysts, and in the diagnosis of furcation-involved molars.

Conclusion

1. For periodontology, CBCT proves to be superior to 2D imaging for the visualisation of bone topography & lesion architecture as well as for the covering.

2. For endodontics CBCT seems to be the most promising applications for diagnosis, treatment planning and treatment evaluation.

CBCT images and 3D reconstructions allow for visualisation and exact measurement of dimensions. Diagnosis built on the combination of clinics and CBCT are a reliable aid in planning and execution of simple as well as advanced dental procedures.

References are available on request.

About the author

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