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Editorial

CBCT Imaging in Orthodontics

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For decades, the two-dimensional (2D) lateral cephalometric analysis in orthodontics was the primary tool to study growth and development of craniofacial structures, assess and diagnose orthodontic issues, and plan and evaluate orthodontic treatment [1]. Craniofacial structures are three-dimensional (3D) objects that were often obscured in 2D images. Therefore, 2D lateral cephalograms provided limited information during analysis [1,2]. As the field of orthodontics has evolved, its technology has evolved with it. The introduction of cone-beam computed tomography (CBCT) and computer software in orthodontics has allowed orthodontists to study all aspects of 3D craniofacial structure with more precision [3,4].

Combining CBCT with computer software allows proper representation without distortion of craniofacial structures and provides sophisticated information from three different planes of view: coronal, sagittal, and transverse. Analyses of CBCT images are enhanced with magnification, visual adjustments (grey-scale, contrast, etc.), and cursor-driven measurements [2]. Usually, CBCT imaging is not used in place of conventional dental imaging, rather it is used for specific diagnoses [5]. CBCT imaging is useful in assessing craniofacial anomalies and/or abnormalities via 3D superimposition in order to evaluate growth and development. It is also useful in identifying condylar cortical erosion to assess TMJ disorder [5].

The most common use of CBCT imaging is to allow orthodontists to visualize precise tooth position of supernumerary and impacted teeth, especially impacted canines. In doing so, the exact angulation of impaction and measurement of proximity of adjacent roots allow orthodontists to evaluate and choose vector forces for tooth movement while minimizing root resorption [5-8]. While 2D images can be used to view root resorption, there are limitations because craniofacial structures are often obscured. An accurate knowledge of root position improves the determination of success in orthodontic treatment [5-8].

CBCT is a widely accepted tool in orthodontics and numerous studies have reported the accuracy, reliability, and repeatability of CBCT images [9-11]. However, the use of CBCT and patient exposure to radiation has raised a concern, especially with adolescents. Several studies have determined that effective radiation exposure with CBCT technology is significantly lower than conventional multi-slice CT scans used in medicine [12-16]. In comparison to conventional dental imaging, effective CBCT doses are much higher; however, new technology has allowed CBCT exposure to be adjusted [12-16].

The incorporation of CBCT systems in clinical dentistry, especially orthodontics, has allowed health care providers to assess and diagnose from a different perspective. In orthodontics, CBCT imaging has replaced traditional 2D imaging [17]. This advancement of CBCT technology has contributed to more precise and accurate orthodontic treatment plans compared to decades ago.

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