Imaging Science in Dentistry 2016; 46: 145-6
http://dx.doi.org/10.5624/isd.2016.46.2.145

Cone-beam computed tomography usage: An alert to the field of dentistry

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Sir,

Cone-beam computed tomography (CBCT) is a relatively novel technique for visualizing an individual tooth or dentition in relation to the surrounding skeletal tissues and for generating a three-dimensional image of the area to be studied.[1,2] Since CBCT is extensively used in dental and maxillofacial imaging for the treatment planning of dental implants, endodontics, maxillofacial surgery, and orthodontics, it is imperative for operators and referring practitioners to comprehend the basic concepts of this imaging modality.[3] Its widespread use and the fact that it involves greater radiation doses has given rise to numerous concerns regarding the rationalization and optimization of CBCT exposure, the training of CBCT operators, quality assurance for CBCT scanners, variations in image quality, differences in radiation doses in equipment made by different manufacturers, the inappropriate referral of patients for CBCT, and the need to safeguard staff from radiation exposure.[4,5]

Therefore, we absolutely agree with Jaju and Jaju's article[6] entitled "Cone-beam computed tomography: time to move from ALARA to ALADA," that is, moving from a paradigm of "as low as reasonably achievable" to the goal of "as low as diagnostically acceptable." However, due to the absence of strict guidelines and the lack of experience regarding the role of CBCT in dentistry, CBCT has become an alternative to conventional radiography, including periapical, bitewing, and panoramic radiographs. The dosage delivered by CBCT results from several factors, such as the region of the jaw that is scanned, the exposure settings of the CBCT scanner, the size of the field of view (FOV), the exposure time (s), the tube current (mA), and the energy/potential (kV).[7-10] Bearing in mind the greater radiation dose in comparison to conventional radiographs, it is essential that the potential benefits of CBCT outweigh the risks incurred through exposure to ionizing radiation.[11] Dentists must respect their principal ethical obligation to protect patients, and therefore indications for CBCT should be justified appropriately and its usage for screening purposes alone should be strictly avoided. Essentially, CBCT should be considered as an adjunct to standard oral imaging modalities rather than as an alternative.

Unfortunately, guidelines on the clinical usage of CBCT are frequently poorly presented. Prospectively, guideline development panels must aim to carry out and report their work using the AGREE II tool as a means of raising standards and avoiding bias.[5] Guideline creators should be certain to bring together a multidisciplinary team of stakeholders to frame strategies. They should carry out systematic reviews and critically assess the evidence, characterize the limitations of the presented evidence, and clearly link their commendations to the evidence. Guidelines should be methodically reviewed prior to publication. Clear implementation approaches as well as tools for monitoring and clinical assessment should be presented.

CBCT imaging should only be recommended by a clinician who has undergone appropriate training in CBCT radiology and exhibits an acceptable knowledge concerning the applications of CBCT, along with experience in the interpretation of CBCT images and an appreciation of the limitations of CBCT.[12,13] It is imperative for dentists to know and communicate the doses and the associated risks of specific examinations to their patients and referring practitioners. The American Dental Association Council on Scientific Affairs Council has encouraged CBCT operators to contribute to continuing education courses in order to ensure that practitioners have a satisfactory understanding of radiation safety in the dental care setting.[14]

Received January 17, 2016; Revised February 12, 2016; Accepted February 24, 2016
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Imaging Science in Dentistry · pISSN 2233-7822 eISSN 2233-7830

Although the danger from dentomaxillofacial imaging is not especially high for an individual, when multiplied by the enormous number of patients who are exposed to diagnostic imaging, the radiation hazard becomes a noteworthy public health issue. As imaging experts, we should educate our coworkers about the difference in risk between diagnostically acceptable and attractive pictures.[6] Since CBCT is a fundamental tool in innovative advanced dentistry, we strongly feel it must be taught rigorously in the undergraduate dental curriculum. Such a step forward will enrich the knowledge of our young graduates, enabling them to correctly understand its implications and its appropriate usage.

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