

CONTRIBUTIONS TO THE STUDY OF CONE BEAM COMPUTED TOMOGRAPHY IN THE ASSESSMENT OF ENDO-PERIODONTAL PATHOLOGY

abstract

The contemporary endodontic practice is characterized by abundant information regarding scientific discoveries, new technology in instrumentation, magnification and imaging methods, which are a real challenge for dental faculties. This is even more important in postgraduate programs, as young specialists must be able to offer the best quality treatments based on up-to-date knowledge and expertise. The radiographic imaging techniques used in dental practice are essential to diagnosis, treatment planning and control follow-up, but the superimposition of teeth and osseous surrounding structures make the interpretation of a two-dimensional (2-D) image offered by the conventional radiographic examination (CRE) very difficult. These problems can be overcome by using a new imaging technique called cone-beam computed tomography (CBCT) which offers, at lower cost and radiation dose, accurate three-dimensional (3-D) images of the teeth and their surrounding structures .

By the beginning of the 21st century it became clear that CBCT imaging technique may represent a next major achievement in dental imaging, at a lower cost compared to conventional CT, a radiation dose similar to current used methods as panoramic and full-mouth radiographic examination. This new system is more practical and smaller in size, offering the possibility to collect images of the craniofacial region with high resolution. The most clinically useful aspect of this technique is the complicated software that collects a great volume of data, which then can be broken down, processed or reconstructed. In this way the interpretation process is very easy, given that the doctor has the required knowledge and technical skills.

The aim of this study was to compare the efficacy of CBCT in clinical diagnosis and follow-up evaluation of teeth with chronic periapical lesions during endodontic therapy performed by specialists in Endodontics. The 3-D images were compared to 2-D views obtained by CRE in order to evaluate the importance of CBCT scans in the assessment of endodontic pathology.

The thesis includes the general part and the following personal studies:

A comparison study between cone-beam computed tomography (CBCT) and regular radiography in endodontics

Due to the short-comings of current dental imaging methods, represented by conventional radiographs, the researchers were looking for more efficient ways for dental evaluation. The Cone-beam computed tomography (CBCT) is now considered to be a next major achievement in dental imaging, with a wide range of indications at a lower cost and radiation dose compared to conventional computed tomography. The aim of our study is to evaluate the importance of CBCT scans in the assessment of endodontic pathology by comparison with the conventional radiography. The examinations were carried out on 78 patients with 109 root filled teeth in which the quality of the root filling, missed canals or persistence of apical periodontitis were recorded. The results showed a higher

percentage of healed periapical lesions when the evaluation was carried out by conventional radiographic examination compared to CBCT ($p < 0.05$). CBCT proved extremely efficient in endodontic therapy regarding the identification of anatomic variations and number of lesions per root canal ($p < 0.05$). CBCT examinations must be taken into consideration for cases in which the benefits of this investigation overcome the risks, offering additional information compared to conventional radiographic examination.

Cone Beam Computed Tomography used in the assessment of the alveolar bone in Periodontitis

The aim of our study was to highlight the advantages of using Cone Beam Computed Tomography in the study of the extent of the alveolar bone loss, compared to the conventional intraoral radiography and to prove the boon of the CBCT scans for establishing the correct periodontal diagnosis. A total of 16 patients with age between 35-55 years old, and a minimum of 8 teeth per dental arcade, presenting periodontal clinical symptomatology were selected. We used a custom periodontal chart that included the measuring of the gingival recession and the pocket depth in 6 points for 16 teeth, 8 maxillary teeth and 8 mandibular teeth in all cases. For the radiographic assessment we used CBCT imaging and intraoral radiography. CBCT scans offers the possibilities of measuring with accuracy the alveolar bone loss on mesial, distal vestibular and oral sides. It provides images with the exact position of the bone and also the expediency to assess the correct diagnosis. Retroalveolar radiography offers just a hint of the possible position of the alveolar bone in all cases the anatomical details were offered by CBCT. A correct periodontal diagnosis using conventional radiography is not possible because of the superimposition of the anatomical structures. The importance of CBCT imaging is no longer disputed, at the present time it is the best radiographic investigation available.

A Cone Beam Computed Tomography study among dental residents based on a questionnaire

The aim of our study was to analyse the utility of the CBCT systems among the dental residents from the Dental University of Targu-Mures. We conducted an anonymous survey using a questionnaire that included 11 questions. All the 55 participants from all dental specialties studied at the Dental University Center Targu-Mures. The completed questionnaires were collected the results were evaluated and statistically analyzed using chi-square test. Most residents have learnt about the CBCT during the university studied by participating at different radio-imagistic courses outside the curriculum. Only 33 (60%) residents recommend daily a CBCT for supporting their diagnosis most of them being oral surgeons and 7 (12.72%) of them occasionally recommend between 1 and 5 CBCTs a month. The CBCT system used as an imagistic evaluation in all dental specialties is essential and the advantages can be found in the accuracy of establishing a correct diagnosis, creating a treatment plan and results evaluation.

Key Words: Cone Beam Computed Tomography, alveolar bone, periodontal disease, Endodontology, intraoral X-ray