

help improve reporting standards, thereby allowing greater patient care and protection from litigation.

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A RETROSPECTIVE STUDY ON MOLAR FURCATION ASSESSMENT VIA CLINICAL DETECTION, INTRAORAL RADIOGRAPHY, AND CONE BEAM COMPUTED TOMOGRAPHY. W. ZHANG, K. FOSS, B. WANG. UNIVERSITY OF TEXAS SCHOOL OF DENTISTRY AT HOUSTON, HOUSTON, TX

Background: It is challenging to assess molar furcation bone loss by clinical detection and intraoral radiographs in many instances. Cone beam computed tomography (CBCT) is expected to open a new horizon in periodontal assessment.

Objective(s): The aim of this study was to compare and correlate molar furcation assessment via clinical detection, intraoral radiography, and CBCT.

Study Design: Eighty-three patients, seen at the University of Texas School of Dentistry (UTSD), with chronic periodontitis who had existing CBCT scans were included. Furcation involvement was assessed on maxillary and mandibular first molars. Periodontal charts (modified Glickman classification), intraoral (periapical and/or bitewing) radiographs, and sagittal and axial CBCT reconstructions were used to identify furcation involvement on buccal and palatal/lingual sites. The correlation of furcation assessment by the 3 methods was evaluated by Pearson's analysis.

Results: There were significant correlations ($P < .05$) between clinical detection and intraoral radiography, clinical detection and CBCT, and intraoral radiography and CBCT at all the measured sites (r values ranged from 0.230 to 0.644). CBCT exhibited generally higher correlation with clinical detection compared with intraoral radiography, especially at the distal-palatal side of the maxillary first molar ($P < .05$). In addition, CBCT provided more accurate furcation assessment, because it measured up to 2 decimals in millimeters, whereas clinical detection had 3 classes, and the intraoral radiographs usually only detected the presence of furcation involvement in Glickman Class 2 and 3.

Discussion/Conclusions: This study validates that CBCT is a valuable tool in molar furcation assessment in addition to clinical examination and intraoral radiography.

Acknowledgments

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PREVALENCE OF PNEUMATIZATION OF THE CRISTA GALLI IN DENTAL PATIENTS. L.

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Background: A large field of view (FOV) cone beam computed tomography (CBCT) scan can show an anatomic variant, such as pneumatization of the crista galli. The crista galli is a bony projection that extends superiorly from the cribriform plate of the ethmoid bone. It is located at the midline of the anterior cranial fossa and is where the falx cerebri attaches anteriorly. As there is no literature on this topic using CBCT imaging, we undertook this study to add to the research as well as to inform dentists and specialists about pneumatization of crista galli.

Objective(s): The aim of this study was to report the prevalence of pneumatization of the crista galli using CBCT images and to compare the prevalence of pneumatization of crista galli in patients receiving nonsurgical versus surgical dental treatment.

Study Design: The study included 514 diagnostic CBCT scans from 2015 to 2016. Age, sex, treatment provided, and the size of pneumatized crista galli were recorded. The associations between age and sex versus pneumatization of the crista galli were evaluated using the Mann-Whitney U test. The associations between treatment and pneumatization of crista galli were assessed using Pearson's χ^2 and Fischer's exact tests.

Results: The average age of the patients was 15.69 years. Pneumatization of crista galli occurred in 20 out of 514 (3.8%) patients. The median cranial-caudal length of a pneumatized crista galli was 4.78 mm in females and 5.62 mm in males. The median width was 4.49 mm in females and 6.98 mm in males. Patients with pneumatization were statistically significantly older than the patients without pneumatization ($U = 3041.5$; $P = .004$). Among the nonsurgical categories, orthodontic treatment was classified as significant ($P = .008$). Among surgical categories, orthognathic surgery was found to be significant in the presentation of pneumatization of the crista galli ($P = .001$). Fischer's exact test showed there was a significantly higher percentage of surgical patients with pneumatization compared with nonsurgical patients ($P = .003$).

Discussion/Conclusions: Age, orthodontic treatment, and orthognathic surgery were significantly associated with pneumatization of the crista galli. Gender did not contribute substantially to pneumatization of the crista galli.

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RELIABILITY OF 3-D-PRINTED MANDIBLES CONSTRUCTED FROM CONE BEAM CT VOLUMES OF DIFFERENT VOXEL SIZES. S.

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Background: 3-D printing, also known as *additive manufacturing or rapid prototyping*, is a manufacturing process in which layers are sequentially added to create an object. 3-D printing is used in a wide variety of fields, ranging from dentistry and medicine to food manufacturing, toy manufacturing, house manufacturing, and automobile manufacturing and in the fashion industry. 3-D printed models can have a wide variety of uses in dentistry, ranging from anatomic models to surgical implants.

Objective(s): The aim of the present study was to establish the reliability of linear cephalometric measurements made on mandibles and their respective 3-D printed models created from different voxel sizes in cone beam computed tomography (CBCT) scans.

Study Design: Ten dry mandibles were used for this study. All mandibles were scanned using the i-CAT FLX cone beam CT unit (Imaging Sciences International, LLC, Hatfield, PA) using voxel sizes of 0.30 mm, 0.25 mm, and 0.20 mm at 16 × 8 cm field of view and 360° rotation arc. The 3-D models were reconstructed and saved as STL files using 3-D Slicer software and sent to a 3-D printer for printing. Two observers measured the 10 mandibles and 30 3-D printed models. The measurements were repeated on 50% of the samples after at least 1 week. Cronbach's alpha and intraclass correlation coefficient were calculated to measure reliability.

Results: Good to excellent interobserver and intraobserver reliability were achieved across most of the measurements. There was no difference in reliability across models made from different voxel sizes.

Discussion/Conclusions: The present study successfully showed that the reliability of measurements made on 3-D printed models of dry skull mandibles created using the fused deposition modeling technique with images of different voxel sizes from an iCAT FLX CBCT machine are valid, reproducible, and reliable and can be used for diagnostic and clinical purposes.

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METAL ARTIFACT REDUCTION IN STATIONARY INTRAORAL TOMOSYNTHESIS.

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Background: The first generation stationary intraoral tomosynthesis (sIOT) device, developed at University of North Carolina (UNC), provides 3-D information in intraoral imaging with a speed and dose comparable with those of traditional intraoral radiography. Initial research shows promise in several diagnostic tasks, including caries and fracture detection. However, the original iterative reconstruction produces artifacts adjacent to metal restorations. Two new iterative reconstructions with metal artifact reduction (MAR1 and MAR2) have been developed. MAR1 segments the metal out before reconstruction and adds it back after reconstruction. MAR2 minimizes the artifact amplified at each iteration by dividing the projected error by the number of slices.

Objective(s): The aim of this study was to compare the effectiveness of metal artifact reduction in tomosynthesis.

Study Design: Pilot samples of 2 extracted premolars with amalgam restorations were imaged by using the sIOT system. Reconstructions were generated using the original, MAR1, and MAR2 algorithms. Using line density plots, artifact pixel intensity and artifact width were measured for the original, MAR1, and MAR2 algorithms.

Results: The difference between average dentin pixel intensity and artifact pixel intensity for sample 1 was 8016, -5781, and 759 for the original, MAR1, and MAR2 reconstructions, respectively. Artifact width was 2.61 mm, 0.82 mm, and 1.38 mm, respectively. For sample 2, the difference in intensity was 8248, -5399, and 93, respectively. Artifact width was 1.71 mm, 1.06 mm, and 0.81 mm, respectively.

Discussion/Conclusions: MAR1 and MAR2 reduced the intensity of the artifacts; however, reduction by MAR2 was more pronounced. MAR1 produced radiopaque artifacts, whereas MAR2 produced radiolucent artifacts. MAR1 and MAR2 reduced the width of the artifacts, but the extent was reversed between the samples. The results support the value of MAR for tomosynthesis and suggests that MAR2 may be more effective. Continued development of artifact reduction techniques is needed with a more in-depth study using a larger sample size.

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