

DOWN SYNDROME: A RADIOGRAPHIC STUDY AND INCIDENTAL FINDINGS IN SIX CASES.

A.Z. ABDELKARIM^{A,B,C}, A.Z. SAYED^{A,B,C}, J. KOTHEERANURAK^{A,B,C}, S. LOZANOFF^{A,B,C}, A. KHALIFA^{A,B,C}. ^A UNIVERSITY OF HAWAII AT MANOA, MANOA, HI, ^B CASE WESTERN RESERVE UNIVERSITY, CLEVELAND, OH, ^C CAIRO UNIVERSITY, CAIRO, EGYPT

Background: Down syndrome (DS), also known as trisomy 21, is the most well-known chromosomal disorder, characterized by generalized growth and mental deficiency. It affects 1 in 600 to 1 in 2000 live births.

Objective(s): The purpose of this study was to report the radiographic features and incidental findings in 6 cases with Down syndrome.

Study Design: A cephalometric analysis, airway volumetric measurements, temporomandibular joint measurements, and interpretation of 6 cone beam computed tomography (CBCT) scans for a patient with Down syndrome were performed using Dolphin software.

Results: Incidental findings of intracranial calcifications were noted in all the cases.

Discussion/Conclusions: Basal ganglia calcification is more frequently seen in young patients with Down syndrome and may be related to the premature aging characteristic of Down syndrome.

EFFECT OF TOOTH POSITION AND CBCT SETTINGS ON IMAGE ARTIFACT AND CONTRAST-TO-NOISE RATIO GENERATED BY 4 TYPES OF ROOT-END FILLING MATERIALS.

J. KATS, A. SHAHBAZI, M. NOUJEIM. UNIVERSITIES OF TEXAS HEALTH SCIENCE CENTER AT SAN ANTONIO, SAN ANTONIO, TX

Background: After endodontic surgery, radiographic assessment is the method of choice to monitor bone defect healing. Cone beam computed tomography (CBCT) scans are useful to identify the cause of surgical intervention failure or to confirm healing; however, the artifacts generated by some root-end filling material might compromise this objective.

Objective(s): The aim of this study was to compare the artifact and contrast-to-noise ratios generated by four root-end filling materials at multiple CBCT exposure settings and positions within the field of view (FOV).

Study Design: Twelve central incisors were endodontically treated, obturated, and then retrograde-filled using amalgam, Biodentine, SuperEBA (ethoxy benzoic acid), and mineral trioxide aggregate (MTA). A phantom was created; then, tooth samples were inserted and scanned in the center and periphery of a 4 × 4 mm field of view (FOV) using a Morita MCT-1 F8 (at multiple kV and degree acquisition settings). Image J was used to determine the artifact and contrast-to-noise generated at the same relative slice image of each tooth.

Results: *Artifacts FOV position:* periphery had less artifact than central (P value < .0001); scan setting (Degrees): 360° had less artifact than 180° (P value < .0001); tube voltage (kV): artifact decreased with increased kVp (P value < .0001); Materials: Biodentine was associated with less artifact compared with MTA (P value = .031)

CNR FOV position: Periphery had higher contrast-to-noise ratio (CNR) than central (P value < .0001); scan setting (Degrees):

360° had higher CNR compared with 180° (P value < .0001); *Tube voltage (kV):* CNR increased with increased kVp (P -value < .0001); Materials: Amalgam was associated with lower CNR than all others (P value = .002)

Discussion/Conclusions: Biodentine, MTA, and SuperEBA are biomechanically adequate for retrograde obturation because they generated significantly less artifact compared with amalgam. The use of the 360° image slice acquisition mode generated significantly less artifact than the 180° setting for all materials. Finally, a periphery position led to lower artifact and higher CNR compared with the central position, a finding that was contrary to previous findings in the literature.

References

- 1 Helvacioğlu-Yigit D, Demirtürk-Kocasarac H, Bechara B, Noujeim M. Evaluation and reduction of artifacts generated by 4 different root-end filling materials by using multiple cone-beam computed tomography imaging settings. *J Endod.* 2016;42:307-314.
- 2 Demirtürk Kocasarac H, Helvacioğlu Yigit D, Bechara B, Sinanoglu A, Noujeim M. Contrast-to-noise ratio with different settings in a CBCT machine in presence of different rootend filling materials: an in vitro study. *Dentomaxillofac Radiol.* 2016;45:20160012.
- 3 Bechara B, Moore W, McMahan C, Noujeim M. Metal artefact reduction with cone beam CT: an in vitro study. *Dentomaxillofac Radiol.* 2012;41:248-253.
- 4 Fushimi-ku, Kyoto: J. Morita Mfg. Corp; 2008.
- 5 Huda WH, Mettler FA. Volume CT dose index and doselength product displayed during CT: what good are they? *Radiology.* 2011;258:236-242.

EFFECTS OF IMAGE PROCESSING UPON RADIOGRAPHIC IMAGE QUALITY.

D.D. RICE, J. CLARK, C. WADHWANI, K. ABRAMOVITCH, M. KATTADIYIL. LOMA LINDA UNIVERSITY, LOMA LINDA, CA

Background: There is evidence that capture and processing of the digital radiographic images may contain artifacts that could reduce the diagnostic value of dental radiographs. This phenomenon has been reported through various case reports. However, its effect on radiographic image quality has not been studied.

Objective(s): The purpose of this study was to evaluate the effect of image processing on the quality of dental digital radiographs using the most common type of filter—sharpening.

Study Design: Three imaging modalities (2 complementary metal-oxide-semiconductor [CMOS], 1 photostimulable phosphor [PSP]) were used to image a DDQA imaging phantom (Digital Dental Quality Assurance phantom) and to create a flat-field radiograph. Contrast resolution, spatial resolution, dynamic range, and radiographic noise were assessed for image quality. Overshoot artifact was also assessed. Each image was sharpened and then highly sharpened. Images were compared using Friedman's 2-way nonparametric analysis of variance (ANOVA).

Results: Image sharpening significantly affected spatial resolution and noise. Conversely, dynamic range and contrast resolution were not significantly affected by image sharpening. Overshoot artifact increased with image sharpening.

Discussion/Conclusions: Image sharpening can create artifacts that could be misinterpreted. Although image sharpening significantly affects spatial resolution, no significant effect was seen on dynamic range or contrast resolution.

Acknowledgments

This study was supported by a grant from the Center for Dental Research, Loma Linda University. The authors also wish to thank Dental Imaging Consultants, LLC, for their support with the phantom imaging; Cyber Medical Imaging, Inc. for support of sensors and software; Dentsply-Sirona, Inc. for support of software; and Doug C. Yoon, Chief Technology Officer, XDR Radiology for his sacrifice of time and for his extensive knowledge toward this project and the donation of sensors and software.

References

- 1 Brett D, Carmichael F. The impact of digital image processing artefacts mimicking pathological features associated with restorations. *Br Dent J*. 2011;211:167-170.
- 2 Mah P, McDavid WD, Dove SB. Quality assurance phantom for digital dental imaging. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2011;112:632-639.
- 3 Udupa H, Mah P, Dove SB, McDavid WD. Evaluation of image quality parameters of representative intraoral digital radiographic systems. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2013;116:774-783.

EPITHELIOID RHABDOMYOSARCOMA OF THE ORAL CAVITY, NOVEL LOCATION OF A RARE ENTITY: A CASE REPORT. J.P. CASTRO CUELLAR, N. HANDOO, R. BAYON, S. SOUSA MELO. UNIVERSITY OF IOWA, IOWA CITY, IA

Background: Rhabdomyosarcoma, a malignant neoplasm, is characterized by skeletal muscle differentiation. Only 33 cases of the epithelioid variant have been reported, and just 8 of them were located in the head and neck region. This aggressive entity usually presents as a fast-growing, asymptomatic infiltrative mass and presents predominantly in adults.

A 53-year-old male, who was edentulous and a former smoker, presented with enlargement of 2 months' duration in the right maxillary vestibule. A clinically palpable mass was noted under the mucosa. No adenopathy or cranial nerves deficit was observed on physical examination. The initial panoramic radiograph showed a corticated radiolucent entity located on the right maxilla, with extension into the right maxillary sinus. Multidetector computed tomography (MDCT) and positron emission tomography/computed tomography (PET/CT) were performed. CT revealed an enhancing soft tissue mass of the right alveolar ridge with extension to the maxillary sinus, with erosion of the anterior and lateral walls of the sinus and the adjacent alveolar ridge. PET/CT showed a right maxillary fluorodeoxyglucose (FDG) high uptake and right neck level IIA lymph nodes with mild uptake. An incisional biopsy was performed. The histologic appearance and immunohistochemical profile supported a diagnosis of high-grade epithelioid rhabdomyosarcoma. The treatment protocol was right maxillectomy and right neck dissection with adjuvant radiation therapy. After 1.5 years, follow-up CT was performed and did not show any signs of recurrence or metastatic disease.

Discussion/Conclusions: Epithelioid rhabdomyosarcoma is a rare variant of rhabdomyosarcoma. To the best of our knowledge, none has been reported in the oral cavity region; thus, this is the first case of this aggressive variant described in this location. This entity may develop without any apparent symptoms or signs of a malignant entity, thus mimicking the appearance of a benign neoplasm or inflammatory process. A comprehensive multidisciplinary approach is advised to diagnose and treat this entity accordingly.

References

- 1 Neville B, Damm D, Allen C, Chi A. *Oral and Maxillofacial Pathology*. 4th ed. St. Louis, MO: Elsevier; 2016.
- 2 Jo VY, Mariño-Enriquez A, Fletcher CDM. Epithelioid rhabdomyosarcoma: clinicopathologic analysis of 16 cases of a morphologically distinct variant of rhabdomyosarcoma. *Am J Surg Pathol*. 2011;35:1523-1530.
- 3 Yu L, Weng Lao I, Wang J. Epithelioid rhabdomyosarcoma: a clinicopathological study of seven additional cases supporting a distinctive variant with aggressive biological behaviour. *Pathology*. 2015;47:667-672.
- 4 Pappo AS, Dirksen UR. Rhabdomyosarcoma, Ewing sarcoma, and other round cell sarcomas. *J Clin Oncol*. 2018;36:168-179.

EVALUATION OF ARTIFACTS GENERATED BY TITANIUM, ZIRCONIUM, AND TITANIUM-ZIRCONIUM ALLOY DENTAL IMPLANTS IN MRI, CT, AND CBCT IMAGES: AN IN VITRO STUDY. H. DEMİRTURK KOCASARAC^{A,B}, G. USTAOGLU^{A,B}, S. BAYRAK^{A,B}, R. KATKAR^{A,B}, H. GEHA^{A,B}, M. NOUJEIM^{A,B}. ^AUNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT SAN ANTONIO, SAN ANTONIO, TX, ^BABANT IZZET BAYSAL UNIVERSITY, BOLU, TURKEY

Background: Magnetic resonance imaging (MRI) or computed tomography/cone beam computed tomography (CT/CBCT) should be performed in implant therapy when the conventional image is not adequate or when more information is needed to improve the patient's treatment. Therefore, 3-D imaging may be required even when the implants are present in the field of view (FOV). Thus, determining the most suitable imaging technique and setting for each type of implant material will facilitate the radiologists' ability to give the best care to the patient.

Objective(s): The aim of this study was to assess the amount and structure of artifacts caused by titanium grade 4 and 5, zirconium, and titanium-zirconium alloy implants in MRI, CT, and CBCT with several acquisition protocols and to correlate the findings to the radiation dose given by 2 different CT machines and different CBCT exposure settings.

Study Design: Three phantoms were built by embedding titanium, zirconium, and titanium-zirconium alloy implants in ultrasound gel. MRI, CT, and CBCT images were acquired using multiple sequences and settings. For MRI, the artifact was described as the length of signal void beyond the limits of the implant. For CT and CBCT, the artifact was calculated by subtracting the gray level of the darkest pixel from the one of the lightest pixel.

Results: Titanium and titanium-zirconium alloy implants created extensive artifacts in MRI as a result of high