**RECENT REVIEWS RELATED TO DENTAL RADIOGRAPHY**

Database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Daily and Versions(R) <1946 to October 23, 2018>

Search Strategy:

1. exp "Radiography, Dental/ (10116)
2. (radiograph$ or (cone adj beam) or cbct or tomograph$).ti. (143549)
3. limit 2 to dentistry journals (11763)
4. (dental$ or dentist$ or jaw or tooth or teeth or dentition or mandib$ or maxill$).ti. (272569)
5. 2 and 4 (6231)
6. 1 or 3 or 5 (19888)
7. limit 6 to english language (15843)
8. limit 7 to ("review" or systematic reviews) (678)
9. review.ti. and 7 (250)
10. 8 or 9 (737)
11. exp animale/ not humans/ (4507543)
12. 10 not 11
13. limit 12 to yr="2017 -Current" (84)

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1. Unique Identifier 30282085
Title Imaging Aspects Of The Mandibular Incisive Canal: A PROSPERO-Registered Systematic Review And Meta-Analysis Of Cone Beam Computed Tomography Studies.
Status VI 1
Authors Ferreira Barbosa DA; Barros ID; Teixeira RC; Menezes Pimenta AV; Kurita LM; Barros Silva PG; Gurgel Costa FW.
Authors Full Name Ferreira Barbosa, Daniel Almeida; Barros, Isadora Daniel; Teixeira, Renata Cordeiro; Menezes Pimenta, Alyyne Vieira; Kurita, Lucio Mitsuo; Barros Silva, Paulo Goberlanio; Gurgel Costa, Fabio Wildson.
Local Messages THIS JOURNAL IS AVAILABLE IN THE BDA LIBRARY, TO REQUEST THIS ARTICLE FROM THE LIBRARY GO TO: https://www.bda.org/library/journals-articles/Documents/photocopy-request-form.pdf
Abstract PURPOSE: This study aimed to perform a systematic review and meta-analysis of the literature on the mandibular incisive canal (MIC) studies using cone beam computed tomography (CBCT).
MATERIALS AND METHODS: A PROSPERO-registered systematic review (#42017056619) was conducted following the PRISMA statements to summarize current knowledge on the CBCT aspects of the MIC. A search was performed in PubMed's Medline and Scopus databases, without date or language restrictions, using the algorithm [(Interforaminal region) OR (mandibular incisive channel) OR (mandibular incisive nerve) OR (mental mandible) OR (anterior mandible) OR (cone beam computed tomography). Also, the references were crosschecked. The Meta-Analysis of Statistics Assessment and Review Instrument and meta-analysis was used to evaluate the selected studies.
RESULTS: A total of 410 articles were found, and 25 studies were selected after a two-step selection process. The CBCT systems differed regarding field of view (FOV) (large, n = 3; medium, n = 2; small, n = 4; not informed, n = 16) and voxel size (0.15 to 0.4 mm). Geographically, the studies were distributed across four continents (South America, North America, Asia, and Europe), and there was a statistical significance of studies from the American and Asian continents (P < .0001). From 3,421 CBCT exams, the number of female patients was slightly higher than male, and the mean age ranged from 29.8 to 59.1 years. The overall mean prevalence of MIC was 89.6% +/- 15.08%, and bilateral occurrence was statistically significant (P < .0001). The studies using a voxel size lower than 0.3 mm showed the highest mean prevalence (93.88%) in comparison with voxel size described as >= 0.3 mm (89.33%). Diameter (0.45 to 4.12 mm) and length (6.6 to 40.3 mm) showed great variability among the included studies.
CONCLUSION: In summary, the results of this systematic review evidenced a high worldwide prevalence of MIC. There was no prevalence of MIC in relation to sex, and its presence was mainly related to adults between the fourth and sixth decades of life. In addition, great heterogeneity of methodologies was observed.
Publication Type Journal Article.
Year of Publication 2018

2. Unique Identifier 30179053
Title Accuracy of panoramic radiography in diagnosing maxillary sinus-root relationship: <sub>A systematic review and meta-analysis</sub>
Source Angle Orthodontist. 2018 Sep 04.
OBJECTIVE: To investigate the accuracy of panoramic radiography (PR) in diagnosing maxillary sinus-root relationships (SRRs).

MATERIALS AND METHODS: PubMed, EMBASE, CENTRAL, Web of Science, ScienceDirect, CBM, Baidu Scholar, and SIGLE were searched. The studies comparing the diagnostic accuracy of PR and computed tomography/cone-beam computed tomography (CT/CBCT) for SRR were included.

RESULTS: Eleven studies were included. Meta-analyses showed that, for type I SRR, PR had the highest specificity, positive likelihood ratio (+LR), diagnostic odds ratio (DOR), and area under the curve (AUC), with a high sensitivity and a low negative LR (-LR). For type IV, PR had a high DOR and AUC, with the highest sensitivity but a low +LR, the lowest -LR, and the lowest specificity. For type II, PR had the lowest AUC, with a low sensitivity, +LR, and DOR and a high -LR. For type III, PR had the lowest sensitivity, +LR, and DOR and the highest -LR. The distance from root tips to the maxillary sinus floor on PR was significantly longer (mean difference: 1.88 mm; 95% confidence interval: 2.19 to -1.57; P < .0001) than that on CT/CBCT.

CONCLUSIONS: Currently available evidence suggests PR could be reliable for detecting type I SRR. PR has a good ability to confirm true type IV SRR but a poor ability to rule out false type IV SRR. For type II and III SRR, PR shows poor accuracy and tends to overestimate the extent of protrusion of the roots into the maxillary sinus. When PRs display type II, III, or IV SRR and related treatment is needed, CBCT should be used for further examinations.

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RECENT REVIEWS RELATED TO DENTAL RADIOGRAPHY

Source
VI 1
Status
In-Process
Authors
Nematollahi H; Sarraf Shirazi A; Mehrabkhani M; Sabbagh S.
Authors Full Name
Nematollahi, H; Sarraf Shirazi, A; Mehrabkhani, M; Sabbagh, S.
Institution
Nematollahi, H. Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran.
Sarraf Shirazi, A. Department of Pediatric Dentistry, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran.
Mehrabkhani, M. Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran.
Sabbagh, S. Students Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran.

Abstract
AIM: This was to compare clinical and radiographic success rates of laser pulpotomy with those of other pulpotomy techniques in primary teeth.

METHODS: PubMed, SCOPUS, EMBASE, Cochrane and ISI Web of Knowledge databases were searched electronically without time or language limitations. Clinical trials in which laser pulpotomy was compared with at least one other pulpotomy modality in primary teeth were selected. The bibliographic reference lists of eligible articles were also hand-searched. Odds ratios, risk differences and 95% confidence intervals were calculated with the aid of Comprehensive Meta-Analysis software (Version 2.2.050, Biostat, Englewood, NJ, USA). The methodological quality of articles included in the meta-analysis was determined using the Jadad scale.

RESULTS: Twelve pulpotomy studies were selected for systematic review and underwent data extraction. Of these studies, statistical analysis was conducted on 11. All clinical trials had low to moderate risks of methodological bias. The meta-analysis showed no significant differences in clinical and radiographic pulpotomy outcomes with laser compared with other techniques (p > 0.05). Likewise, no differences were found in the outcomes at 1, 3, 6, 9, 12 or >= 18 months (all p > 0.05).

CONCLUSIONS: For primary molar pulpotomy, the laser technique showed comparable clinical and radiographic results to other conventional pulpotomy medicaments, including formocresol and mineral trioxide aggregate.

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2018

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Title
Multidetector Row Computed Tomography in Maxillofacial Imaging. [Review]
Source
VI 1
Status
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Authors
Gohel A; Oda M; Katkar AS; Sakai O.
Authors Full Name
Gohel, Anita; Oda, Masafumi; Katkar, Amol S; Sakai, Osamu.
Institution
Gohel, Anita. Oral and Maxillofacial Pathology and Radiology, College of Dentistry, The Ohio State University, 3165 Postle Hall, 305 West 12th Avenue, Columbus, OH 43210-1267, USA. Electronic address: gohel.6@osu.edu.
Oda, Masafumi. Department of Radiology, Boston Medical Center, Boston University School of Medicine, 820 Harrison Avenue, Boston, MA 02118, USA; Division of Oral and Maxillofacial Radiology, Kyushu Dental University, 2-6-1 Manazuru, Kokurakita-ku, Kitakyushu 803-8580, Japan.
Katkar, Amol S. Department of Radiology, Brook Army Medical Center, 3851 Roger Brooke Drive, Fort Sam Houston, TX 78234-6200, USA.
Sakai, Osamu. Department of Radiology, Boston Medical Center, Boston University School of Medicine, 820 Harrison Avenue, Boston, MA 02118, USA; Department of Radiation Oncology, Boston Medical Center, Boston University School of Medicine, 820 Harrison Avenue, Boston, MA 02118, USA; Department of Otolaryngology-Head and Neck Surgery, Boston Medical Center, Boston University School of Medicine, 820 Harrison Avenue, Boston, MA 02118, USA.

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Abstract
Multidetector row CT (MDCT) offers superior soft tissue characterization and is useful for diagnosis of odontogenic and nonodontogenic cysts and tumors, fibro-osseous lesions, inflammatory, malignancy, metastatic lesions, developmental abnormalities, and maxillofacial trauma. The rapid advances in MDCT technology, including perfusion CT, dual-energy CT, and texture analysis, will be an integrated anatomic and functional high-resolution scan, which will help in diagnosis of maxillofacial lesions and overall patient care.

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Title
Hallmark of success: top 50 classics in oral and maxillofacial cone-beam computed tomography. [Review]
Source
VI 1
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Authors
Wu Y; Tiwana H; Durrani M; Tiwana S; Gong B; Hafeez K; Khosa F.
Authors Full Name
Wu, Yuhao; Tiwana, Haaris; Durrani, Mariyam; Tiwana, Sabeen; Gong, Bo; Hafeez, Kashif; Khosa, Faisal.
Institution
Wu, Yuhao. Department of Radiology, Vancouver General Hospital, University of British Columbia, Vancouver, BC, Canada.
Wu, Yuhao. Undergraduate Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada.
Tiwana, Haaris. BDS Program, Lahore Medical and Dental College, Lahore, Pakistan.
Durrani, Mariyam. Faculty of Medicine, Masaryk University, Kamenice, Brno, Czech Republic.
Tiwana, Sabeen. Faculty of Dentistry, University of British Columbia, Vancouver, BC, Canada.
Gong, Bo. Department of Radiology, Vancouver General Hospital, University of British Columbia, Vancouver, BC, Canada.
Gong, Bo. Undergraduate Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada.
Hafeez, Kashif. Easton Dental Practice, Bristol, United Kingdom.
Khosa, Faisal. Department of Radiology, Vancouver General Hospital, University of British Columbia, Vancouver, BC, Canada.
Abstract
Purpose: The aim of this study was to identify the top 50 cited articles on the use of cone-beam computed tomography (CBCT) for oral and maxillofacial applications and to summarise the characteristics of the most impactful research articles in this domain.

Material and methods: A database was generated by combining the search results from Thomson Reuters Web of Science and Elsevier's Scopus to ensure that all top-cited publications were captured. We used three search fields to generate the database: 1) CBCT, 2) oral and maxillofacial pathologies, and 3) oral and maxillofacial anatomical structures. Publications were then ranked by citation counts and reviewed by two independent reviewers.

Results: A total of 50 top publications were included in the study. Their citation count ranged from 43 to 170 with a median of 55.5. Five publications were cited more than 100 times. All except for one paper were published after 2000. The most well published journal was the American Journal of Orthodontics and Dentofacial Orthopedics (n = 12), and the United States of America (n = 15) was the most productive country in the field. The majority of the studies (n = 27) discussed the imaging of primary tooth pathologies, but there are also a significant number of articles that discuss imaging of bone grafts or dental implants (n = 7), upper airways (n = 5), the skull (n = 4), and other maxillofacial structures (n = 7).

Conclusions: Our study identifies 50 research articles with the highest number of citations in oral and maxillofacial CBCT, discusses the characteristics and commonalities between these articles, and predicts future trends in the field.

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2018

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Cone-beam CT in paediatric dentistry: DIMITRA project position statement. [Review]
Source
Pediatric Radiology. 48(3):308-316, 2018 03.
VI 1
Status
In-Process
Authors
Oenning AC; Jacobs R; Pauwels R; Stratis A; Hedesiu M; Salmon B; DIMITRA Research Group, http://www.dimitra.be.
Authors Full Name
Oenning, Anne Caroline; Jacobs, Reinhold; Pauwels, Ruben; Stratis, Andreas; Hedesiu, Mihaela; Salmon, Benjamin; DIMITRA Research Group, http://www.dimitra.be.
Aspergilloma of the maxillary sinus is considered rare in immunocompetent patients, but a considerable increase has recently been seen in the incidence of reported cases. Dental procedures involving the antral region are thought to predispose individuals to this form of aspergillosis. Because aspergilloma shares similar clinical features with other sinus pathologies, its diagnosis may be delayed. Thus, an early diagnosis confirmed by a histopathological examination plays a crucial role in the adequate management of aspergilloma. This article provides a concise review of the reported cases of aspergilloma associated with dental procedures and reports 2 new cases of aspergilloma in middle-aged female patients, with a presentation of their cone-beam computed tomographic findings.
The purpose of this study is to review the literature to assess the incidence of maxillary sinus disease before sinus floor elevation surgery (SFE) as identified by cone-beam computed tomography (CBCT). Only studies in which CBCT was performed in patients for dental implant placement in the past 10 years were considered. Eleven studies were identified. A total of 1792 patients were collected. All the studies reviewed reported on thickening of the sinus mucosa as a criterion for sinus disease with different
threshold values. All studies reported mucosal thickening (MT) ranging between 25.5% and 93.1%. The mean incidence of MT was 54.99%. Two studies examined the correlation of MT with clinical symptoms. Three studies reported evaluation of the ostiomeatal complex (OMC). There is a high probability of detecting a certain degree of MT in patients referred for SFE. There is no consensus regarding the threshold values beyond which MT is considered pathological. Independently from the threshold values or the type of MT, the studies lack correlation with clinical data regarding patients’ sinusitis-related history or symptoms. CBCT with a large field of view to evaluate the OMC is appropriate in patients scheduled for SFE. Future studies should include a systematic correlation with clinical symptoms and the possible presence of OMC obstruction. A clinical assessment that includes nasal endoscopy is indicated when MT and obstruction of the OMC are identified. Surgical correction of OMC obstruction seems to be appropriate to increase the success rate and to avoid possible complication after SFE.

**Abstract**

**BACKGROUND:** Suspicion of mandibular invasion directly influences perioperative strategy, requiring marginal or segmental mandibulectomy, or reconstruction in some cases. This has a considerable impact on outcome and quality of life. The aim of this study was to evaluate the accuracy of magnetic resonance and computed tomography in the prediction of mandibular invasion in patients with oral cavity cancer.

**METHOD:** A systematic review was conducted, including diagnostic studies comparing magnetic resonance imaging with computed tomography in the prediction of bone invasion. Sensitivity, specificity, positive and negative likelihood values and summary receiver operating characteristic (sROC) curves were calculated.

**RESULTS:** The electronic and manual search identified 346 articles. Of these, 11 studies were included in the systematic review for a total of 477 patients. The sensitivity, specificity, positive and negative likelihood values for MRI were 78%, 86%, 5.29 and 0.23, respectively. For CT, they were 76%, 89%, 6.00 and 0.28, respectively. The sROC curves for MRI and CT were 82.3% and 82.5%, respectively.

**CONCLUSION:** No superiority was observed between the diagnostic methods regarding mandibular invasion detection.
The purpose of this study was to evaluate age- and sex-related changes in the anatomical relationships between the roots of the molars and premolars and the mandibular canal using cone-beam computed tomography (CBCT) images. A total of 243 patients (116 males, 127 females) aged 16-83 years for whom previous CBCT scans were available were enrolled in this study. The patients were subcategorized by sex and age (Group I, <21 years; Group II, 21-40 years; and Group III, >40 years). The distances between the mandibular canal and the molars and premolars were measured. The mandibular canal was significantly closer to the root apices of the second and third molars than to the apices of other evaluated teeth (p<0.05). All measurements were significantly higher in male than in female subjects (p<0.05). Group I subjects exhibited significantly shorter distances between the mandibular canal and root apices of the first and second premolars, and the molars, than those of Group II and III subjects (p<0.05). Direct contact relationships were found in 1.6%, 3.3%, 3.3%, 16%, and 32.2% of teeth (running from the first premolar to the third molar, respectively). Age and sex influenced the anatomical relationships between mandibular teeth and the mandibular canal, and these should be considered when planning endodontic and surgical procedures to avoid potential nerve injury.
ECENT REVIEWS RELATED TO DENTAL RADIOGRAPHY

Santiago BM; Almeida L; Cavalcanti VW; Magno MB; Maia LC.

Authors Full Name
Santiago, Bianca Marques; Almeida, Leopoldina; Cavalcanti, Yuri Wanderley; Magnó, Marcela Barauna; Maia, Lucianne Cople.

Institution
Santiago, Bianca Marques. Department of Clinics and Social Dentistry, Federal University of Paraíba, Campus I, University City, Joao Pessoa, Paraíba, 58051-900, Brazil. bianca.santiago@yahoo.com.br.
Santiago, Bianca Marques. Department of Forensic Medicine and Dentistry, Scientific Policy Institute, Antonio Teotonio Street, Cristo Redentor, Joao Pessoa, Paraíba, 58071-620, Brazil. bianca.santiago@yahoo.com.br.
Almeida, Leopoldina. Department of Clinics and Social Dentistry, Federal University of Paraíba, Campus I, University City, Joao Pessoa, Paraíba, 58051-900, Brazil.
Magnó, Marcela Barauna. Department of Pediatric Dentistry and Orthodontics, Federal University of Rio de Janeiro, Professor Rodolpho Paulo Rocco Street, 325, University City, Rio de Janeiro, 21941-617, Brazil.
Maia, Lucianne Cople. Department of Pediatric Dentistry and Orthodontics, Federal University of Rio de Janeiro, Professor Rodolpho Paulo Rocco Street, 325, University City, Rio de Janeiro, 21941-617, Brazil.

Abstract
The age estimation is a complex procedure required in the daily practice of legal medicine. The maturity of third molars stands out by the age of 18 because these teeth are still in development. This systematic review aimed to assess the accuracy of the third molar maturity index (I<sub>3M</sub>), proposed by Cameriere et al. (2008), in discriminating whether an individual is under over 18 years. Seven electronic databases were screened: PubMed, Scopus, ISI Web of Science, Cochrane Library, LILACS, SIGLE, and CAPES. Eligible studies included an assessment of I<sub>3M</sub> accuracy at the 0.08 cut-off value. The quality assessment was performed by using QUADAS 2. Three meta-analyses (MA) were accomplished: overall, one for males and another for females. From 2397 articles identified, 16 met the eligibility criteria. Of these, two showed high risk of bias, one in the reference standard domain and the other in the flow and timing domain. The percentage of individuals correctly classified ranged from 72.4 to 96.0%. The overall MA showed pooled sensitivity of 0.86 (0.84 to 0.87; p = 0.0000) and pooled specificity of 0.93 (0.92 to 0.94; p = 0.0000). The AUC (area under the summary receiver operator characteristics curve) and DOR (diagnostic odds ratio) values were, respectively, 0.9652 and 104.68, indicating an overall high discrimination effect. Separately, better results of accuracy were found for males. High heterogeneity was achieved for both sensibility (94.6%) and specificity (88.8%). We conclude that the I<sub>3M</sub> is a suitable and useful method for estimating adulthood regarding forensic purposes, regardless of gender.

Publication Type

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2018

Unique Identifier
29869227

Title
Radiation dose in non-dental cone beam CT applications: a systematic review. [Review]

Source

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MEDLINE

Authors
Nardi C; Salerno S; Molteni R; Occhipinti M; Grazzini G; Norberti N; Cordopatri C; Colagrande S.

Authors Full Name
Nardi, Cosimo; Salerno, Sergio; Molteni, Roberto; Occhipinti, Mariaelena; Grazzini, Giulia; Norberti, Niccolo; Cordopatri, Cesare; Colagrande, Stefano.

Institution
Nardi, Cosimo. Department of Experimental and Clinical Biomedical Sciences, Radiodiagnostics Unit n. 2, University of Florence - Azienda Ospedaliero-Universitaria Careggi, Largo Brambilla 3, 50134, Florence, Italy.
Salerno, Sergio. Department of Radiology, University Hospital Paolo Giaccone of Palermo, Via del Vespri 127, 90127, Palermo, Italy.

Abstract
BACKGROUND: Radiation-induced health risks are broadly questioned in the literature. As cone beam computed tomography (CBCT) is increasingly used in non-dental examinations, its effective dose needs to be known. This study aimed to review the published evidence on effective dose of non-dental CBCT for diagnostic use by focusing on dosimetry systems used to estimate dose.
MATERIALS AND METHODS: A systematic review of the literature was performed on 12 November 2017. All the literature up to this date was included. The PubMed and web of science databases were searched. Studies were screened for inclusion based on defined inclusion and exclusion criteria according to the preferred reporting items for systematic reviews.

RESULTS: Fifteen studies met the inclusion criteria and were included in our review. Thirteen and two of them examined one and two anatomical areas, respectively. The anatomical areas were: ear (6), paranasal sinuses (4), ankle (3), wrist (2), knee (1), and cervical spine (1). Effective dose was estimated by different methods: (i) RANDO phantom associated with thermoluminescent dosimeters (6), metal oxide semiconductor field-effect transistor dosimeters (3), and optically stimulated luminescent dosimeters (1). (ii) Scanner outputs, namely computed tomography dose index (1) and dose area product (2). (iii) Monte Carlo simulations (2).

CONCLUSION: CBCT of extremities, cervical spine, ears and paranasal sinuses was found to be a low-dose volumetric imaging technique. Effective doses varied significantly because of different exposure settings of CBCT-units and different dosimetry systems used to estimate dose.
Abstract
This study reviews the clinical and radiographic outcomes of Mini-implants (MI) and Narrow Diameter Implants (NDI) as mandibular overdenture (MO) retainers. Six databases were consulted for clinical studies that evaluated implants with diameter <=3.5 mm. Data on the MI and NDI for survival and success rate and peri-implant bone loss and were collected and submitted to meta-analysis. Thirty-six studies were included, 24 reporting MI performance and 12 describing NDI results. The MI group comprised data from 1 cross-sectional clinical study, 3 retrospective longitudinal (RL) clinical studies, 13 prospective longitudinal (PL) clinical studies and 7 randomised clinical trials (RCT) with follow-up periods ranging from 1 day to 7 years. Eight studies used conventional loading, thirteen used immediate loading, two studies used both loading types, and one study did not report. The NDI group comprised data from 3 RL clinical studies, 6 PL clinical studies and 3 RCT with follow-up ranging from 6 months to 10 years. Ten studies used conventional loading, 1 study used immediate loading, and 1 study did not report. The average survival rates of MI and NDI studies were 98% and 96%, respectively, while the average success rates were 93% and 96%, respectively. The average peri-implant bone loss after 12, 24 and 36 months was 0.89, 1.18 and 1.02 mm for MI and 0.18, 0.12 and -0.32 mm for NDI. Both MI and NDI showed adequate clinical behaviour as overdenture retainers. The NDI showed a better long-term predictability to retain OM with most studies adopting conventional loading.

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Cavernous hemangiomas are the most common benign orbital tumors in the orbit, but radiological differentiation from other solitary orbital masses can still be challenging at times. While there have been previous studies describing the radiological characteristics of cavernous hemangiomas on computed tomography (CT) and magnetic resonance imaging (MRI), there have not been any studies comparing the 2 imaging modalities. The purpose of our study was to evaluate CT and MRI findings of orbital cavernous hemangiomas and compare both modalities. We performed a cross-sectional study of patients with a histopathological diagnosis of cavernous hemangioma over a 20-year period from January 1997 to December 2016 in a single tertiary institution. Our study included 77 patients; mean age was 46.8 +/- 11.2 years, and females comprised 68.8%. The lateral orbit (23.4%) was the most common location. The masses were well-defined, with 55.8% being ovoid, 27.3% round, and 16.9% lobulated. The masses were well-defined, with 55.8% being ovoid, 27.3% round, and 16.9% lobulated. The mass...
A critical review of sub-adult age estimation in biological anthropology: Do methods comply with published recommendations?.

Corron, Louise; Marchal, Francois; Condemi, Silvana; Adalian, Pascal.

Computational Tomographic Artifacts in Maxillofacial Surgery. [Review]

Kim, Jun Ho; Arita, Emiko Saito; Pinheiro, Lucas Rodrigues; Yoshimoto, Marcelo; Watanabe, Plauto Christopher Aranha; Cortes, Arthur Rodriguez Gonzalez.

The diversity of approaches and the high number of publications on sub-adult age estimation is a testament to the relevance of this particular area of forensic anthropological research. However, a downside of this diversity is the many methodological, sampling and statistical discrepancies between publications, which can lead to difficulties in method definition, application and comparison. Several authors have published recommendations highlighting standardized methodological parameters that should be respected and clearly appear in the original publications for anthropological methods to be valid. This study aims to objectively evaluate a corpus of 269 publications on dental and skeletal postnatal sub-adult age estimation using these recommendations translated into descriptors. These descriptors cover five sampling and five statistical parameters that can be considered valid or invalid according to published methodological recommendations. Parameter and descriptor distributions are shown in frequency tables and graphs, illustrating the general invalidity of the sampling and/or statistical protocols. Provided our corpus of methods is an accurate representation of available publications, the extrapolation of these results leads to conclude that most sub-adult age estimates are at worst invalid, at best questionable, and almost certainly method-dependent. In view of this study, rigorous and standardized sampling and statistical approaches should be preferred when applying and building sub-adult age estimation methods.
OBJECTIVES: The present study aimed to present 4 cases and to undertake a systematic review on the current knowledge of the impact of cone beam computed tomographic (CBCT) artifacts on oral and maxillofacial surgical planning and follow-up.

METHODS: The MEDLINE (PubMed) database was searched for the period from February 2004 to February 2017, for studies on the impact of CBCT artifacts on surgical planning of oral and maxillofacial surgeries. The PRISMA statement was followed during data assessment and extraction. As a result, data extraction included information regarding: the use of CBCT to plan or follow-up oral and maxillofacial surgeries, presence and type identification of a CBCT artifact, and details on the impact of artifacts on image quality and/or surgical planning. Four cases were selected to illustrate the topic.

RESULTS: The search strategy yielded 408 publications in MEDLINE (PubMed). An initial screening of the publications was performed using abstracts and key words. After application of exclusion criteria, a total of 11 studies were finally identified as eligible to be discussed. Studies revealed 3 main types of artifact: beam hardening, streak, and motion artifacts. Most of the studies suggest that artifacts significantly affect oral and maxillofacial surgical planning and follow-up, despite of allowing for identification of metal projectiles in cases of maxillofacial trauma.

CONCLUSION: CBCT artifacts have a significant impact on oral and maxillofacial surgical planning and follow-up.

Abstract

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METHODS: The MEDLINE (PubMed) database was searched for the period from February 2004 to February 2017, for studies on the impact of CBCT artifacts on surgical planning of oral and maxillofacial surgeries. The PRISMA statement was followed during data assessment and extraction. As a result, data extraction included information regarding: the use of CBCT to plan or follow-up oral and maxillofacial surgeries, presence and type identification of a CBCT artifact, and details on the impact of artifacts on image quality and/or surgical planning. Four cases were selected to illustrate the topic.

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CONCLUSION: CBCT artifacts have a significant impact on oral and maxillofacial surgical planning and follow-up.
BDA LIBRARY MEDLINE SEARCH

RECENT REVIEWS RELATED TO DENTAL RADIOGRAPHY

Comments

Abstract
Data sources: PubMed, Web of Science, CINHAL and the Cochrane Library were searched until May 2016. Unpublished data were searched in Pro-Quest Dissertation, Abstracts and Thesis and Google Scholar, supplemented with manual search of the included studies references. No language restriction was used. Study selection: All types of study designs were included, except case reports, comparing CBCT data with conventional radiographs. The primary outcome was: diagnostic accuracy between modalities, agreement in position, treatment planning and outcome efficacy. The secondary outcome was inter-modality agreement in lateral root resorption detection and intra and inter-observer agreement values. Data extraction and synthesis: Two reviewers independently selected the studies for inclusion, performed data extraction and evaluated risk of bias. Discrepancies were resolved by discussions and reaching consensus. The Newcastle-Ottawa Scale was used to assess the risk of bias for case-controlled and cohort studies and a modified version for cross-sectional studies. The Quality Assessment of Diagnostic Accuracy (QUADAS-2) tool was used to rate diagnostic accuracy studies.

Results: Eight studies met the inclusion criteria, two on diagnostic accuracy. The remaining six included 292 impacted canines in 224 patients. Outcomes were presented as calculated level of agreement and statistical significance for each primary outcome reported. Based on the diagnostic accuracy of two in vitro studies, the CBCT accuracy ranged from 50% to 95% while for conventional radiographs it ranged from 39% to 85%. The other six studies reported inter-modalities agreement in localisation (six studies) and treatment planning agreement (three studies). The inter-modalities agreement varied from 0.20 to 0.82, with observed agreement of 64% to 84% in localisation of canine. The treatment planning agreement varied from 0.36 to 0.72.

Conclusions: The authors concluded that CBCT is more accurate than conventional radiographs in localising maxillary impacted canines and there is a broad range of inter-observer and modalities agreement for location and treatment planning. There is no robust evidence to support using CBCT as first line imaging method.

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Journal Article. Comment.
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2018

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29609668
Title
Radiopacities of the Jaws: Interpretation and Diagnosis. [Review]
Source
Primary Dental Journal. 7(1):31-37, 2018 Mar 01.
VI 1
Status
MEDLINE
Authors
Andrew D.
Authors Full Name
Andrew, David.
Local Messages
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Abstract
General dental practitioners are less confident at diagnosing radiopaque lesions of the jaws than radiolucent ones, possibly because the incidence of jaw radiopacities is comparatively low. The current review covers the majority of radiopaque lesions that are referred for a specialist opinion, and focuses on those lesions that occur commonly or those that mimic other diagnoses. The majority of radiopaque jaw lesions represent normal anatomy/normal variants or superimposed soft tissue calcifications that are typically of no clinical significance. Common pathological radiopacities of the jaws include sclerosing (condensing) osteitis, a response to low-grade chronic apical infection, and odontomes, a form of odontogenic hamartoma. The typical imaging appearances of these and other jaw radiopacities are discussed.

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Fibro-Osseous and Other Lesions of Bone in the Jaws. [Review]
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Authors
Ahmad M; Gaalaas L.
Authors Full Name
Ahmad, Mansur; Gaalaas, Laurence.
Institution
Ahmad, Mansur. Department of Diagnostic and Biological Sciences, University of Minnesota School of Dentistry, Minneapolis, MN 55455, USA. Electronic address: ahmad005@umn.edu.
Gaalaas, Laurence. Department of Diagnostic and Biological Sciences, University of Minnesota School of Dentistry, Minneapolis, MN 55455, USA.
Fibroosseous lesions in the jaws have similar histologic and radiographic features. Despite their similarity, management varies significantly. In this article, common fibroosseous lesions and key radiographic features are described. Many of the fibroosseous lesions are diagnosed radiographically, without performing histologic examinations. For some of the fibroosseous lesions, for example, periapical osseous dysplasia, histologic examination is contraindicated. Cherubism and fibrous dysplasia have specific radiographic findings; these conditions can be diagnosed radiographically. Accurate diagnosis conditions is essential; some conditions do not require any intervention, while others require surgical resection. Patient demographics, for example, age, gender, and race, play important roles in diagnosis.

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Numerous benign cysts or solid tumors may present in the jaws. These arise from tooth-forming tissues in the dental alveolus or from nonodontogenic tissues in the basal bone of the mandible and maxilla. Radiologists provide 2 deliverables to assist in diagnosis and management: (1) appropriately formatted images demonstrating the location and extent of the lesion and (2) interpretive reports highlighting specific radiologic findings and an impression providing a radiologic differential diagnosis. This article provides guidance on essential image protocols for planning treatments, a radiologic differential diagnostic algorithm based on location and pattern recognition, and a summary of the main features of benign odontogenic lesions.

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Odontogenic infections represent a common clinical problem in patients of all ages. The presence of teeth enables the direct spread of inflammatory products from dental caries, trauma, and/or periodontal disease into the maxilla and mandible. The radiographic changes seen depend on the type and duration of the inflammatory process and host body response. Imaging plays a central role in identifying the source of infection and the extent of the disease spread and in detecting any complications. Many different imaging modalities can be used. The radiographic features associated with acute and chronic inflammatory processes are discussed.

The temporomandibular joint (TMJ) is an anatomically and biomechanically complex structure. Understanding how this structure grows and functions is essential to accurate radiographic evaluation. This article discusses the anatomy, function, and growth and development of the TMJ and how growth changes can affect the morphology of the craniofacial structures. Accordingly, the radiographic appearance of the entities that may alter the TMJ are discussed, including developmental, degenerative, inflammatory, and traumatic changes. Both osseous imaging and soft tissue imaging are shown.

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The article presents an overview of the goal of imaging at each stage of implant therapy and the usefulness and limitations of multidetector computed tomography (MDCT) in achieving those goals. Various MDCT protocols of use in implant imaging also are presented, with an emphasis on dose reduction and the use of iterative reconstruction techniques. Also discussed are options for viewing and analysis of CT images, issues related to appropriate image reformatting and interpretation, interactive treatment planning, and transfer of information from the images to the surgical field during implant surgery using surgical guides and CT-guided navigation systems.

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Alterations in Tooth Structure and Associated Systemic Conditions. [Review]
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Authors
Masood F; Benavides E.
Authors Full Name
Masood, Farah; Benavides, Erika.
Institution
Masood, Farah. Department Oral Diagnosis and Radiology, The University of Oklahoma, College of Dentistry, Office 286-A, 1201 North Stonewall Avenue, Oklahoma City, OK 73117, USA. Electronic address: Farah-Masood@ouhsc.edu.
Benavides, Erika. Department of Periodontics and Oral Medicine, The University of Michigan, School of Dentistry, Office 2029F, 1011 North University Avenue, Ann Arbor, MI 48109, USA.
Abstract
A variety of factors can affect the normal development of tissues and may lead to variation in the normal compliment of teeth and development of alterations in the shape and size of teeth. These anomalies can be congenital, developmental, or acquired. Dental anomalies can present as isolated traits or be associated with systemic conditions and syndromes for which early diagnosis and genetic testing may result in better treatment outcomes and quality of life. Dentists play an essential role in the multidisciplinary management of these abnormalities. This article discusses some of these tooth alterations and associated systemic and genetic conditions.

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Imaging of Dentoalveolar and Jaw Trauma. [Review]
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MEDLINE
Authors
Almohammadi R.
Authors Full Name
Almohammadi, Reyhaneh.
Institution
RECENT REVIEWS RELATED TO DENTAL RADIOGRAPHY

Alimohammadi, Reyhaneh. Oral and Maxillofacial Radiology, University of Texas Health Science Center San Antonio, School of Dentistry, 7703 Floyd Curl Drive, San Antonio, TX 78229, USA. Electronic address: Alimohammadi@uthscsa.edu.

Abstract
Prior to the invention of cone beam CT, use of 2-D plain film imaging for trauma involving the mandible was common practice, with CT imaging opted for in cases of more complex situations, especially in the maxilla and related structures. Cone beam CT has emerged as a reasonable and reliable alternative considering radiation dosage, image quality, and comfort for the patient. This article presents an overview of the patterns of dental and maxillofacial fractures using conventional and advanced imaging techniques illustrated with multiple clinical examples selected from the author's oral and maxillofacial radiology practice database.

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Dental Anatomy and Nomenclature for the Radiologist. [Review]

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Authors
Husain MA.

Authors Full Name
Husain, Mohammed Abbas.

Institution
Husain, Mohammed Abbas. Section of Oral and Maxillofacial Radiology, UCLA School of Dentistry, 10833 Le Conte Avenue, 53-067A CHS, Box 951668, Los Angeles, CA 90095-1668, USA. Electronic address: mhusain@dentistry.ucla.edu.

Abstract
Head and neck imaging studies frequently encompass the oral cavity and human dentition. Given the relatively wide prevalence of dental disease, the likelihood of detecting incidental dental pathology is high. This article provides an overview of dental terminology, anatomy, restorations, and associated computed tomography imaging artifacts necessary to more effectively interpret and communicate findings related to teeth.

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Precision of cone beam CT to assess periodontal bone defects: a systematic review and meta-analysis. [Review]

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Authors
Haas LF; Zimmermann GS; De Luca Canto G; Flores-Mir C; Correa M.

Authors Full Name
Haas, Leticia Fernanda; Zimmermann, Glaucia Santos; De Luca Canto, G; Flores-Mir, Carlos; Correa, Marcio.

Institution
Haas, Leticia Fernanda. 1 Health Sciences Center, Federal University of Santa Catarina, Florianopolis, Brazil.
Zimmermann, Glaucia Santos. 2 Department of Dentistry, Federal University of Santa Catarina, Santa Catarina, Brazil.
De Luca Canto, G. 2 Department of Dentistry, Federal University of Santa Catarina, Santa Catarina, Brazil.
De Luca Canto, G. 3 Department of Dentistry, Faculty of Medicine and Dentistry University of Alberta, Edmonton, AB, Canada.
Flores-Mir, Carlos. 3 Department of Dentistry, Faculty of Medicine and Dentistry University of Alberta, Edmonton, AB, Canada.
Correa, Marcio. 2 Department of Dentistry, Federal University of Santa Catarina, Santa Catarina, Brazil.

Local Messages
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Abstract
OBJECTIVES: Evaluate the diagnostic validity of CBCT in measuring periodontal bone defects when compared with the reference standard (in situ measurement).

METHODS: Studies in which the main objective was to evaluate the diagnostic validity of CBCT in measuring periodontal bone defects when compared with the reference standard were selected. Four databases were searched. The studies were selected by two independent reviewers. The methodology of selected studies was assessed using the 14-item Quality Assessment Tool for
Diagnostic Accuracy Studies. The quality of evidence and strength of recommendation was assessed by the Grading of Recommendations Assessment Tool, Development and Evaluation.

RESULTS: Using a selection process in two phases, 16 studies were identified, and in seven articles meta-analysis was performed. The results from these meta-analyses showed that no difference between the measurements of CBCT and in situ for alveolar bone loss, and demonstrated a concordance of 82.82% between CBCT and in situ for the classification of the degree of furcation involvement.

CONCLUSIONS: Based on a moderate level of evidence, CBCT could be useful for furcation involvement periodontal cases, but it should only be used in cases where clinical evaluation and conventional radiographic imaging do not provide the information necessary for an adequate diagnosis and proper periodontal treatment planning.
a 1-year-old, 4.0 kg male neutered Persian cat. Changes on CT were consistent with bilateral TMJ dysplasia, and the cat underwent staged bilateral partial zygomectomy with bilateral partial coronoidectomy. There was no recurrence of open-mouth jaw locking in any of the cases on long-term follow-up. Relevance and novel information Open-mouth jaw locking has been reported in cats of a wide range of ages, from 1-10 years of age. Cats with all skull types (brachycephalic, mesaticephalic and dolichocephalic) may be affected, but brachycephalic breeds seem to be over-represented. A CT scan with the jaw locked in place is recommended for diagnosis and surgical planning purposes; two of the cases reported here document the first cases of TMJ dysplasia in cats to be definitively diagnosed using CT. Trauma and symphyseal or TMJ laxity may also predispose to development of the condition. Partial coronoidectomy and partial zygomatic arch resection performed alone or in combination are generally successful at preventing recurrence. Bilateral partial zygomectomy with bilateral partial coronoidectomy has not previously been reported as a surgical treatment, and is recommended when open-mouth jaw locking occurs bilaterally.

OBJECTIVE: The aim of this study was to assess and present, using sialo-cone beam computed tomography (sialo-CBCT) examination, cases of submandibular gland (SM) chronic obstructive sialadenitis (COS) caused by dental rehabilitation.

DATA SOURCES: Clinical and radiographic data of all patients referred for SM sialo-CBCT imaging in the Oral and Maxillofacial Imaging Unit with recurrent SM swelling between January 2012 and July 2015 were reviewed. Cases with suggested iatrogenic cause were selected and described. A literature search revealed 11 cases of SM COS secondary to anterior mandibular rehabilitation.

CONCLUSION: Clinicians rehabilitating the anterior edentulous mandibular region should be aware that both fixed and removable devices may block the orifices of the SM, causing COS.
**Abstract**

Background: Upper airway analysis is an often-cited use of cone beam computed tomography (CBCT) imaging in orthodontics. However, the reliability of this process in a clinical setting is largely unknown.

Objective: Our objective was to systematically review the literature to evaluate the reliability of upper pharyngeal airway assessment using dental CBCT.

Search methods: MEDLINE, EMBASE, Web of Science, and Google Scholar were searched through June 2015.

Selection criteria: Human studies that measured reliability of upper airway assessment in patients using CBCT as part of the study protocol were considered.

Data collection and analysis: The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) was followed. Data were collected on overall study characteristics and measurements, CBCT unit and machine settings used, and examination characteristics of the included studies. Methodological quality of the included studies was evaluated.

Results: Forty-two studies were evaluated, representing the CBCT scans of 956 patients. Studies included a wide variety of patients and CBCT machines with various scan settings. Only five studies were deemed high quality. The available evidence indicates that under specific restricted conditions there is moderate to excellent intra- and inter-examiner reliability. Airway volume demonstrated greater intra- and inter-examiner reliability than did minimum cross-sectional area. However, significant methodological limitations of the current literature, most importantly a lack of manual orientation of the images and selection of threshold sensitivity in study protocols, suggest that reliability has not been adequately established.

Conclusions: The current literature reports moderate to excellent reliability, with airway volume having higher reliability than minimum cross-sectional area. However, only limited aspects of the process of airway analysis have been evaluated, indicating that further research is required to adequately establish the reliability of upper pharyngeal airway assessment of patients using dental CBCT.

Registration: None.

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**Title**: Cone beam computed tomography: basics and applications in dentistry. [Review]

**Source**: Journal of Istanbul University Faculty of Dentistry. 51(3 Suppl 1):S102-S121, 2017.

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**Title**: Role of Cone Beam Computed Tomography in Diagnosis and Treatment Planning in Dentistry: An Update. [Review]

Accurate diagnosis and treatment planning are the backbone of any medical therapy; for this reason, cone beam computed tomography (CBCT) was introduced and has been widely used. CBCT technology provides a three-dimensional image viewing, enabling exact location and extent of lesions or any anatomic region. For the very same reason, CBCT can not only be used for surgical fields but also for fields such as endodontics, prosthodontics, and orthodontics for appropriate treatment planning and effective dental care. The aim and clinical significance of this review are to update dental clinicians on the CBCT applications in each dental specialty for an appropriate diagnosis and more predictable treatment.

Optical coherence tomography provides sections of tissues in a noncontact and noninvasive manner. The device measures the time delay and intensity of the light scattered or reflected from biological tissues, which results in tomographic imaging of their internal structure. This is achieved by scanning tissues at a resolution ranging from 1 to 15mum. OCT enables real-time in situ imaging of tissues without the need for biopsy, histological procedures, or the use of X-rays, so it can be used in many fields of medicine. Its properties are not only particularly used in ophthalmology, in the diagnosis of all layers of the retina, but also increasingly in cardiology, gastroenterology, pulmonology, oncology, and dermatology. The basic properties of OCT, that is, noninvasiveness and low wattage of the used light, have also been appreciated in analytical technology by conservators, who use it to identify the quality and age of paintings, ceramics, or glass. Recently, the OCT technique of visualization is being tested in different fields of dentistry, which is depicted in the article.
Does 3-dimensional imaging of the third molar reduce the risk of experiencing inferior alveolar nerve injury owing to extraction?: A meta-analysis. [Review]

Source

VI 1

Status
MEDLINE

Authors
Cle-Ovejero A; Sanchez-Torres A; Camps-Font O; Gay-Escoda C; Figueiredo R; Valmaseda-Castellon E.

Abstract
BACKGROUND: Clinicians generally use panoramic radiographic (PR) images to assess the proximity of the mandibular third molar to the inferior alveolar nerve (IAN). However, in cases in which a patient needs to undergo a third-molar extraction, many clinicians also assess computed tomographic (CT) images to prevent nerve damage.

TYPES OF STUDIES REVIEWED: Two of the authors independently searched MEDLINE (through PubMed), Cochrane Library, Scopus, and Ovid. The authors included randomized or nonrandomized longitudinal studies whose investigators had compared the number of IAN injuries after third-molar extraction in patients who had undergone preoperative CT with patients who had undergone only PR.

RESULTS: The authors analyzed the full text of 26 of the 745 articles they initially selected. They included 6 studies in the meta-analysis. Four of the studies had a high risk of bias, and the investigators of only 1 study had used blinding with the patients. The authors observed no statistically significant differences between groups related to the total number of nerve injuries (risk ratio, 0.96; 95% confidence interval, 0.50 to 1.85; P = .91). The prognosis of the injuries was similar for both groups.

CONCLUSIONS AND PRACTICAL IMPLICATIONS: Although having preoperative CT images might be useful for clinicians in terms of diagnosing and extracting mandibular third molars, having these CT images does not reduce patients' risk of experiencing IAN injuries nor does it affect their prognosis.

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Title
Spanning the Horizon of Accuracy of Different Intraoral Radiographic Modalities: A Systematic Review. [Review]

Source

VI 1

Status
MEDLINE

Authors
Muchhal M; Niraj LK; Chaudhary D; Ali I; Dhama K; Patthi B.

Abstract
AIM: This study was conducted with an aim to systematically review the literature for assessing the accuracy of intraoral radiographs in detection of dental caries.

INTRODUCTION: Despite the advancements in oral disease science, dental caries continues to be a worldwide health concern, affecting humans of all ages. Correct diagnosis of caries is critical both in clinical practice as well as in epidemiology and radiography are worthwhile adjunct for a thorough examination.
RESULTS: A literature review was performed in PubMed Central and Cochrane library, Embase, and Google Scholar, and these databases were searched up to 2016. The primary outcome measure was to assess the accuracy of intraoral radiographs in the detection of dental caries based on sensitivity and specificity. The sensitivity for conventional radiographs for the detection of lesions in enamel (16-68%) and dentin (16-96%) was found to be superior as compared with other modalities of digital radiography, whereas the specificity of digital radiography was found to be superior in detection of lesion in enamel (77-96%) and dentin (84-100%) when compared with conventional radiography. Sensitivity of conventional radiographs was noted to be superior as compared with digital radiography, whereas in terms of specificity, digital was found to be superior to conventional radiographs.

CONCLUSION: Although there was no significant difference between digital and conventional radiography in the diagnosis of caries, conventional radiographs were able to detect carious lesion, in general, but for lesion to be detected precisely, digital was found to be superior.

CLINICAL SIGNIFICANCE: As digital radiography produces lower ionizing radiation, dental professionals should employ this method in their routine dental practice for diagnosing and treating carious lesions.

METHODS: The introduction of optical coherence tomography (OCT) in dentistry enabled the integration of already existing clinical and laboratory investigations in the study of the oral cavity. This systematic review presents an overview of the literature, to evaluate the usefulness of in vivo OCT for diagnosing oral soft tissues lesions, to compare the OCT results with traditional histology, and to identify limitations in prior studies so as to improve OCT applications.

RESULTS: Initial results were 3155. In conclusion, there were only 27 studies which met our selection criteria. We decided to allocate the 27 selected items into three groups: healthy mucosa; benign, premalignant, and malignant lesions; and oral manifestations of systemic therapies or pathological conditions.

CONCLUSIONS: Although the OCT is an easy-to-perform test and it offers an attractive diagnostic and monitoring prospect for soft tissues of the oral cavity, further studies are needed to complete the current knowledge of this imaging technique.
BACKGROUND: Clinical and radiographic examinations are essential in establishing correct periodontal diagnoses as well as providing appropriate treatment options. Current radiographic examinations, however, do not provide adequate information regarding the severity of periodontal disease, presenting a need to investigate alternative methods. The aim of this best evidence consensus is to determine when cone-beam computed tomography (CBCT) imaging is appropriate for diagnostic inquiry in the management of inflammatory periodontitis.

METHODS: Literature was systematically reviewed to answer three clinically relevant focused questions regarding the role of CBCT in the management of inflammatory periodontitis. 1) Clinical situation: In patients with periodontitis, what (if any) clinical situations/conditions exist where CBCT imaging improves diagnostic acumen and subsequent treatment recommendations compared with two-dimensional radiographic interpretation? 2) Intervention: Does CBCT imaging improve the accuracy of a diagnostic assessment and establishment of a prognosis in the analysis of furcation and/or intrabony defects? Is the execution of therapy improved and facilitated, or is it therapeutically challenged? 3) Outcomes: Does the use of CBCT imaging provide superior short-term or long-term clinical outcomes, more favorable patient-reported outcomes, or more consistent clinical treatment decisions affecting tooth prognosis (as measured by defect fill, improvements in bone anatomy, mobility patterns, and ultimate tooth survival)? An extensive literature search was performed using the MEDLINE database and the most respected journals in the field.

RESULTS: An electronic database search identified 885 citations, and a manual search yielded an additional five citations. After screening of article titles and abstracts, studies were excluded if irrelevant to the topic of this systematic review. Of the remaining full-text articles, 74 were obtained and reviewed. Sixty-two articles not meeting inclusion criteria were further excluded. Twelve total references met the inclusion criteria to determine the role of CBCT in diagnosis and treatment of both intrabony and furcation defects. Intrabony and furcation defects were the two most commonly discussed bony defects when comparing efficacy of CBCT versus intraoral radiographs (IRs). After a review of the literature, while diagnostic aspects of intrabony and furcation defects can be improved via the use of CBCT, limited evidence supported the use of CBCT imaging improving the execution of therapy for both types of defects. There was also a lack of literature to support the use of CBCT imaging for superior short-term or long-term clinical outcomes. None of the literature reported patient-reported outcomes when CBCT imaging was used.

CONCLUSIONS: Currently, limited evidence supports the utilization of CBCT for diagnosis of intrabony and furcation defects. Despite the fact that there is rapidly accruing literature on CBCT, there are still no current evidence-based guidelines on its necessity and use for periodontal treatment planning. In selective cases, however, limited field of view CBCT may be useful for periodontal disease diagnoses due to less radiation dosage to the patient, higher spatial resolution, and shorter volumes to be interpreted.

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Title
When Is Cone-Beam Computed Tomography Imaging Appropriate for Diagnostic Inquiry in the Management of Inflammatory Periodontitis? An American Academy of Periodontology Best Evidence Review. [Review]
Source
VI 1
Status
MEDLINE
Authors
Kim, David M; Bassir, Seyed Hossein.
Institution
Kim, David M. Department of Oral Medicine, Infection and Immunity, Division of Periodontology, Harvard School of Dental Medicine, Boston, MA.
Bassir, Seyed Hossein. Department of Oral Medicine, Infection and Immunity, Division of Periodontology, Harvard School of Dental Medicine, Boston, MA.

Abstract
BACKGROUND: Clinical and radiographic examinations are essential in establishing correct periodontal diagnoses as well as providing appropriate treatment options. Current radiographic examinations, however, do not provide adequate information regarding the severity of periodontal disease, presenting a need to investigate alternative methods. The aim of this best evidence consensus is to determine when cone-beam computed tomography (CBCT) imaging is appropriate for diagnostic inquiry in the management of inflammatory periodontitis.

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Title
American Academy of Periodontology Best Evidence Consensus Statement on Selected Oral Applications for Cone-Beam Computed Tomography. [Review]
Source
VI 1
Status
MEDLINE
Authors
Mandelaris GA; Scheyer ET; Evans M; Kim D; McAllister B; Nevins ML; Rios HF; Sarment D.
Authors Full Name
Mandelaris, George A; Scheyer, E Todd; Evans, Marianna; Kim, David; McAllister, Bradley; Nevins, Marc L; Rios, Hector F; Sarment, David.
BACKGROUND: The American Academy of Periodontology (AAP) recently embarked on a Best Evidence Consensus (BEC) model of scientific inquiry to address questions of clinical importance in periodontology for which there is insufficient evidence to arrive at a definitive conclusion. This review addresses oral indications for use of cone-beam computed tomography (CBCT).

METHODS: To develop the BEC, the AAP convened a panel of experts with knowledge of CBCT and substantial experience in applying CBCT to a broad range of clinical scenarios that involve critical structures in the oral cavity. The panel examined a clinical scenario or treatment decision that would likely benefit from additional evidence and interpretation of evidence, performed a systematic review on the individual, debated the merits of published data and experiential information, developed a consensus report, and provided a clinical bottom line based on the best evidence available.

RESULTS: This BEC addressed the potential value and limitations of CBCT relative to specific applications in the management of patients requiring or being considered for the following clinical therapies: 1) placement of dental implants; 2) interdisciplinary dentofacial therapy involving orthodontic tooth movement in the management of malocclusion with associated risk on the supporting periodontal tissues (namely, dentoalveolar bone); and 3) management of periodontitis.

CONCLUSION: For each specific question addressed, there is a critical mass of evidence, but insufficient evidence to support broad conclusions or definitive clinical practice guidelines.

RECENT REVIEWS RELATED TO DENTAL RADIOGRAPHY

Institution
Mandelaris, George A. Private practice, Oakbrook Terrace, Park Ridge, and Chicago, IL.
Mandelaris, George A. Department of Graduate Periodontics, University of Illinois College of Dentistry, Chicago, IL.
Scheyer, E Todd. Private practice, Houston, TX.
Scheyer, E Todd. University of Texas Dental School, Houston, TX.
Evans, Marianna. Department of Orthodontics, University of Pennsylvania, Philadelphia, PA.
Evans, Marianna. Private practice, Newtown Square, PA.
Kim, David. Department of Oral Medicine, Infection, and Immunity, Division of Periodontology, Harvard School of Dental Medicine, Boston, MA.
McAllister, Bradley. Private practice, Tualatin and Beaverton, OR.
McAllister, Bradley. Department of Periodontology, Oregon Health and Science University, Portland, OR.
Nevins, Marc L. Department of Oral Medicine, Infection, and Immunity, Division of Periodontology, Harvard School of Dental Medicine, Boston, MA.
Nevins, Marc L. Private practice, Boston, MA.
Rios, Hector F. Xoran Technologies, Ann Arbor, MI.
Sarment, David. Department of Periodontics and Oral Medicine, University of Michigan School of Dentistry, Ann Arbor, MI.
Sarment, David. Xoran Technologies, Ann Arbor, MI.
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Abstract
BACKGROUND: The aim of this systematic review is to evaluate whether cone-beam computed tomography (CBCT) imaging can be used to assess dentoalveolar anatomy critical to the periodontist when determining risk assessment for patients undergoing orthodontic therapy using fixed or removable appliances.
METHODS: Both observational and interventional trials reporting on the use of CBCT imaging assessing the impact of orthodontic/dentofacial orthopedic treatment on periodontal tissues (i.e., alveolar bone) were included. Changes in the alveolar
bone thickness and height around natural teeth as well as treatment costs were evaluated. MEDLINE (via PubMed) and EMBASE databases were searched for articles published in the English language, up to and including July 2016, and extracted data were organized into evidence tables.

RESULTS: Thirteen studies were included in this systematic review describing the positive or deleterious changes on the alveolar bone surrounding natural teeth undergoing orthodontic tooth movement or influenced by orthopedic forces through fixed appliances. Clinical recommendation summaries presenting the strengths and weaknesses of the evidence in terms of benefits and harms were generated.

CONCLUSIONS: CBCT imaging can improve the periodontal diagnostic acumen regarding alveolar bone alterations influenced by orthodontic tooth movement and can help determine risk assessment prior to such intervention. Clinicians are also better informed to determine risk assessment and develop preventative or plan interceptive periodontal augmentation (soft tissue and/or bone augmentation) therapies for patients undergoing orthodontic tooth movement. These considerations are recognized as being especially critical for treatment approaches in patients where buccal tooth movement (expansion) is planned in the anterior mandible or involving the maxillary premolars.

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2017

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The Use of Cone-Beam Computed Tomography in Management of Patients Requiring Dental Implants: An American Academy of Periodontology Best Evidence Review. [Review]
Source

METHODS: A literature search for CBCT applications in implant dentistry was performed using the PubMed database that included studies published between January 1, 2000, and June 24, 2017.

RESULTS: Of 559 citations identified and manually screened, 161 were selected as suitable for the purpose of the review. The selected studies belonged to three distinct categories: 1) diagnosis and treatment outcome assessment, 2) implant treatment planning, and 3) anatomic characterization.

CONCLUSIONS: The current available literature reflects an increased optimization of emerging CBCT imaging protocols and further highlights its diverse applications for dental implant therapy. This technology continues to be considered an advanced point-of-care imaging modality and should be used selectively as an adjunct to two-dimensional dental radiography. As with other ionizing radiation imaging modalities, CBCT imaging should be used only when the potential benefits to the patient outweigh the risks. Dental health care professionals should consider CBCT imaging only when they expect the diagnostic information yielded will lead to better patient care, enhanced patient safety, and ultimately facilitate a more predictable, optimal treatment outcome.

Publication Type
Journal Article. Review.
Year of Publication
2017

Unique Identifier
28410514
Title
Age estimation in adults by dental imaging assessment systematic review. [Review]
Source

BACKGROUND: Application of cone-beam computed tomography (CBCT) has grown exponentially across dentistry with a clear impact in implant dentistry. This review aims at providing the scientific context to understand if CBCT imaging should become the standard of care for patients requiring dental implants.

METHODS: A literature search for CBCT applications in implant dentistry was performed using the PubMed database that included studies published between January 1, 2000, and June 24, 2017.

RESULTS: Of 559 citations identified and manually screened, 161 were selected as suitable for the purpose of the review. The selected studies belonged to three distinct categories: 1) diagnosis and treatment outcome assessment, 2) implant treatment planning, and 3) anatomic characterization.
Abstract

It has been well documented that teeth are more resistant than bones to the taphonomic processes, and that the use of methods for age estimation based on dental imaging assessment are not only less invasive than those based on osseous analysis, but also have shown similar or superior accuracy in adults. The second recommended method is the pulp/tooth width-length ratio calculation. The use of specific population formulae is recommended, but to include data of individuals from different groups of population in the same analysis is not discouraged. A minimum sample size of at least 120 participants is recommended to obtain more reliable results. Methods based on volume calculation are time consuming and still need improvement.

EVIDENCE REVIEW: A literature search from several databases was conducted from January 1995 to July 2016 with previously defined inclusion criteria.

CONCLUSION: Based on the findings of this review, it could be possible to suggest pulp/tooth area ratio calculation from first upper canines and other single rooted teeth (lower premolars, upper central incisors), and a specific statistical analysis that considers the non-linear production of secondary dentine with age, as a reliable, easy, faster, and predictable method for dental age estimation in adults. The second recommended method is the pulp/tooth width-length ratio calculation. The use of specific population formulae is recommended, but to include data of individuals from different groups of population in the same analysis is not discouraged. A minimum sample size of at least 120 participants is recommended to obtain more reliable results. Methods based on volume calculation are time consuming and still need improvement.

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Journal Article. Review. 2017

<51>

Title

Performance of Willem's dental age estimation method in children: A systematic review and meta-analysis. [Review]

Source


Status

MEDLINE
different age groups and its performance based on various populations and regions. A strategic literature search of PubMed, MEDLINE, Web of Science, EMBASE and hand searching were used to identify the studies published up to September 2014 that estimated the dental age using the Willems method (modified Demirjian), with a populations, intervention, comparissions and outcomes (PICO) search strategy using Mesh keywords, focusing on the question: How much Willems method deviates from the chronological age in estimating age in children? Standardized mean differences were calculated for difference of dental age to chronological age by using random effects model. Subgroup analyses were performed to evaluate potential heterogeneity. Of 116 titles retrieved based on the standardized search strategy, only 19 articles fulfilled the inclusion criteria for quantitative analysis. The pooled estimates were separately kept as underestimation (n=7) and overestimation (n=12) of chronological age groups for both genders according to primary studies. On absolute values, females (underestimated by 0.13; 95% CI: 0.09-0.18 and overestimated by 0.27; 95% CI: 0.17-0.36) exhibited better accuracy than males (underestimated by 0.28; 95% CI: 0.14-0.42 and overestimated by 0.33; 95% CI: 0.22-0.44). For comparison purposes, the overall pooled estimate overestimated the age by 0.10 (95% CI: -0.06 to 0.26) and 0.09 (95% CI: -0.09 to 0.19) for males and females, respectively. There was no significant difference between the young and older child in subgroup analysis using omnibus test. The mean age between different regions exhibited no statistically significant. The use of Willems method is appropriate to estimate age in children considering its accuracy among different populations, investigators and age groups.

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Title
Do periapical and periodontal pathologies affect Schneiderian membrane appearance? Systematic review of studies using cone-beam computed tomography. [Review]
Source
V/1
Status
MEDLINE
Authors
Eggmann F; Connert T; Buhrer J; Dagassan-Berndt D; Weiger R; Walter C.
Authors Full Name
Eggmann, Florin; Connert, Thomas; Buhrer, Julia; Dagassan-Berndt, Dorothea; Weiger, Roland; Walter, Clemens.
Institution
Eggmann, Florin. Department of Periodontology, Endodontology and Cariology, University Centre for Dental Medicine, University of Basel, Hebelstrasse 3, CH-4056, Basel, Switzerland.
Connert, Thomas. Department of Periodontology, Endodontology and Cariology, University Centre for Dental Medicine, University of Basel, Hebelstrasse 3, CH-4056, Basel, Switzerland.
Buhrer, Julia. Department of Periodontology, Endodontology and Cariology, University Centre for Dental Medicine, University of Basel, Hebelstrasse 3, CH-4056, Basel, Switzerland.
Dagassan-Berndt, Dorothea. Department of Oral Surgery, Oral Radiology and Oral Medicine, University Centre for Dental Medicine, University of Basel, Hebelstrasse 3, CH-4056, Basel, Switzerland.
Weiger, Roland. Department of Periodontology, Endodontology and Cariology, University Centre for Dental Medicine, University of Basel, Hebelstrasse 3, CH-4056, Basel, Switzerland.
Walter, Clemens. Department of Periodontology, Endodontology and Cariology, University Centre for Dental Medicine, University of Basel, Hebelstrasse 3, CH-4056, Basel, Switzerland.
Local Messages
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Abstract
OBJECTIVE: This systematic review analyzed the relationship between periapical and periodontal pathologies in the posterior maxilla and the appearance of the Schneiderian membrane in cone-beam computed tomography (CBCT) compared with sound dentitions.

METHODS: Five electronic databases (Cochrane Library, Embase, OpenGrey, PubMed, Web of Science), complemented by hand searching, were screened up to May 9, 2016. Human clinical studies that used CBCT and contained information on the periapical/peridontal status in the posterior maxilla and Schneiderian membrane appearance were included. A weighted vote counting (WVC) method was applied to summarize results across studies.

RESULTS: Out of 413 records, 20 studies were included. In the WVC, the studies that observed a positive association between periapical lesions and the appearance of the Schneiderian membrane outweighed those that found no such association (WVC 51% and WVC 33%, respectively), with some studies yielding indeterminate results (WVC 16%). Regarding the relation between periodontal pathologies and the appearance of the Schneiderian membrane, WVC produced a tie between studies demonstrating a positive association (WVC 46%) and those showing no association (WVC 44%); one study (WVC 10%) reported indeterminate results.

CONCLUSIONS: On CBCT scans, periapical lesions in the posterior maxilla are likely to be associated with Schneiderian membrane thickening. In contrast, current evidence regarding the relation between periodontal diseases and the appearance of the Schneiderian membrane in CBCT is inconclusive.
CLINICAL RELEVANCE: Incidental maxillary sinus findings on CBCT scans warrant thorough differential diagnosis. Frequently, they may be related to dental pathologies.

Publication Type
Journal Article. Review.

Year of Publication
2017

Title
What is the frequency of anatomical variations and pathological findings in maxillary sinuses among patients subjected to maxillofacial cone beam computed tomography? A systematic review. [Review]

Source

Authors
Ata-Ali J; Diago-Vilalta JV; Melo M; Bagan L; Soldini MC; Di-Nardo C; Ata-Ali F; Manes-Ferrer JF.

Institution
Ata-Ali, J. Public Dental Health Service, Arnau de Vilanova Hospital, San Clemente Street 12, 46015-Valencia, Spain, javiataali@hotmail.com.

Abstract
BACKGROUND: When considering dental implant rehabilitation in atrophic posterior sectors, the maxillary sinuses must be evaluated in detail. Knowledge of the anatomical variations and of the potential lesions found in these structures conditions the outcome of sinus lift procedures and therefore of the dental implants. A systematic review is made to determine the frequency of anatomical variations and pathological findings in maxillary sinuses among patients subjected to cone beam computed tomography (CBCT).

MATERIAL AND METHODS: A PubMed (MEDLINE) literature search was made of articles published up until 20 December 2015. The systematic review was conducted based on the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA). The quality of the studies included in the review was assessed using the Methodological Index for Nonrandomized Studies (MINORS).

RESULTS: The combinations of search terms resulted in a list of 3482 titles. Twenty-three studies finally met the inclusion criteria and were entered in the systematic review, comprising a total of 11,971 patients. The most common anatomical variations were pneumatization and sinus septa. The prevalence of maxillary sinus disease ranged from 7.5% to 66%. The most common pathological findings of the maxillary sinus were mucosal thickening, sinusitis and sinus opacification.

CONCLUSIONS: Although the main indication of CBCT of the maxillary sinus in dentistry is sinus floor elevation/treatment planning and evaluation prior to dental implant placement, this imaging modality is increasingly also used for endodontic and periodontal purposes. There is no consensus regarding the cutoff point beyond which mucosal thickening of the maxillary sinus should be regarded as pathological, and the definition of maxillary sinusitis moreover varies greatly in the scientific literature. In this regard, international consensus is required in relation to these concepts, with a clear distinction between healthy and diseased maxillary sinuses.

Publication Type
Journal Article. Review.

Year of Publication
2017

Title
Alternative methods to visual and radiographic examinations for approximal caries detection. [Review]

Source

Authors
Abogazalah N; Ando M.

Institution
Abogazalah, Naif. Department of Cariology, Operative Dentistry and Dental Public Health, Indiana University School of Dentistry.
Abogazalah, Naif. Department of Restorative Dental Sciences, King Khalid University College of Dentistry.
Ando, Masatoshi. Department of Cariology, Operative Dentistry and Dental Public Health, Indiana University School of Dentistry.

Abstract
A shift in caries prevalence from occlusal surfaces to approximal surfaces has been demonstrated by epidemiological studies. Two recent meta-analyses evaluated the performance of visual examination and radiography for carious lesion detection, and reported low sensitivity but high specificity for early approximal caries detection. This suggests that the conventional methods have a higher risk of failing to detect approximal lesions. Consequently, in caries susceptible populations, there is a risk of progression of non-cavitated lesions to irreversible tooth destruction before the lesions are detected. This paper aims to review the performance of unconventional and novel methods for approximal caries detection. In vitro and in vivo studies identified through a MEDLINE search using keywords such as caries detection, approximal caries detection, light fluorescence and dental caries, and transillumination and dental caries were reviewed. The unconventional methods known to be used for approximal caries detection and included in this review are: cone beam computed tomography, fiber-optic trans-illumination, digital imaging fiber optic trans-illumination, near-infrared digital imaging transillumination, optical coherence tomography, laser fluorescence, ultrasound, and LED reflection and refraction.

**AIM:** We aimed to carry out a systematic review including a meta-analysis to compare the endodontic treatments available in the management of immature necrotic permanent teeth and determine which one provides the best clinical and radiographic outcomes.

**DESIGN:** The literature was screened via PubMed/MEDLINE, the Cochrane Central Register of Controlled Trials (CENTRAL), and ClinicalTrials databases until August 2015 to select randomized clinical trials that compared at least two different treatments regarding immature necrotic permanent teeth as outcome. Two reviewers independently performed the screening and evaluation of the articles. A total of 684 studies were retrieved from the databases, in which only 14 were selected to full-text analysis by the appliance of inclusion criteria. After the exclusion criteria, the remaining seven studies had their data extracted and assessed for bias risk. Pooled-effect estimates were obtained comparing clinical and radiographic success rates among MTA Versus other treatments.

**RESULTS:** Evaluation of clinical (Z = 2.32, P = 0.02, OR = 5.37, 95% CI: 1.29-22.23, I = 0%) and radiographic (Z = 2.45, P = 0.01, OR = 4.31, 95% CI: 1.34-13.82, I = 0%) outcomes favored the MTA (control group) when compared to other endodontic treatments (P < 0.05). No evidence of heterogeneity was detected among the studies (I < 50%), whereas a moderate risk of bias was identified in five of them.

**CONCLUSIONS:** Although almost all of the identified studies presented moderate risk of bias, MTA apexification seems to produce overall better clinical and radiographic success rates among the endodontic treatment available in immature necrotic permanent teeth.

**REFERENCES:**

1. Nicoloso, Gabriel Ferreira; Potter, Isabel Garcia; Rocha, Rachel de Oliveira; Montagner, Francisco; Casagrande, Luciano. Specialist in Pediatric Dentistry, Federal University of Rio Grande do Sul - UFRGS, Porto Alegre, RS, Brazil.
3. Rocha, Rachel de Oliveira. Department of Stomatology, Federal University of Santa Maria - UFSM, Santa Maria, RS, Brazil.

**Abstract**

A comparative evaluation of endodontic treatments for immature necrotic permanent teeth based on clinical and radiographic outcomes: a systematic review and meta-analysis. [Review]
Rapid Maxillary Expansion and Upper Airway Morphology: A Systematic Review on the Role of Cone Beam Computed Tomography. [Review]

Abstract
This study aimed to evaluate the reliability of cone-beam computed tomography (CBCT) imaging of the maxillary structures and the postoperative dentoalveolar, nasal airway, periodontal, and facial soft tissue changes after surgically assisted rapid palatal expansion (SARPE). A systematic review of the literature on CBCT analysis of SARPE was performed. The PubMed, Embase, and Cochrane Library databases were searched. Nine articles were included, involving a total of 228 patients. The general trend was tooth-borne distraction with pterygomaxillary dysjunction. A systematic increase in all transverse dimensions at the dentoalveolar and dental levels, as well as a certain degree of tipping and extrusion of the anchorage teeth and tipping of the skeletal segments, was detected. Soft tissue findings reflected the underlying dentoalveolar changes. A decrease in the buccal alveolar bone thickness and alveolar crest level occurred. Results confirm that CBCT is an accurate and reliable method to assess anatomical changes after SARPE. Although this systematic review provides valuable preliminary information about the effects of SARPE, results should be interpreted with caution due to the low level of evidence of the publications, great heterogeneity among study groups regarding outcome variables and surgical-orthodontic protocols, and lack of long-term data.

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Di Carlo, Gabriele. Department of Oral and Maxillofacial Sciences, Sapienza University of Rome, Rome, Italy.
Saccucci, Matteo. Department of Oral and Maxillofacial Sciences, Sapienza University of Rome, Rome, Italy.
Ierardo, Gaetano. Department of Oral and Maxillofacial Sciences, Sapienza University of Rome, Rome, Italy.
Luzzi, Valeria. Department of Oral and Maxillofacial Sciences, Sapienza University of Rome, Rome, Italy.
Occasi, Francesca. Department of Pediatrics, Sapienza University of Rome, Rome, Italy.
Zicari, Anna Maria. Department of Pediatrics, Sapienza University of Rome, Rome, Italy.
Duse, Marzia. Department of Pediatrics, Sapienza University of Rome, Rome, Italy.
Polimeni, Antonella. Department of Oral and Maxillofacial Sciences, Sapienza University of Rome, Rome, Italy.

Abstract
OBJECTIVE: This study aimed to investigate the quality of cone beam computed tomography (CBCT) studies evaluating the effects of rapid maxillary expansion on upper airway morphology.

MATERIALS AND METHODS: A database search was conducted using PubMed, Ovid, and Cochrane Library up to December 2016. Studies in which CBCT was adopted to visualize the upper airway before and after rapid maxillary expansion were included. The population target was growing patients. Methodological quality assessment was performed.

RESULTS: The screening process resulted in the exclusion of 1079 references, resulting in only 9 remaining papers that fulfilled the inclusion criteria. No randomized clinical trials were found. The quality scores ranged from 36% to 68% of the maximum achievable, and the mean quality score of the studies was 50%. No good quality studies were detected in our sample.

CONCLUSIONS: Inconsistencies in the CBCT protocols utilized were detected between studies. Head posture, tongue position, and segmentation protocols were not consistent. These discrepancies were reflected in the different results obtained in the studies. A valid and consistent protocol with regard to head and tongue positioning, as well as nasal cavity volume segmentation, is required.

Publication Type
Year of Publication
2017

Unique Identifier
28387272
Title
Guidelines on the timing and frequency of bitewing radiography: a systematic review. [Review]
Source

Authors
Goodwin TL; Devlin H; Glenny AM; O'Malley L; Horner K.

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Abstract
Objectives To identify guidelines on when and how frequently bitewing radiographs should be used in dentistry for the diagnosis of caries, and to provide an objective appraisal of their quality. Data sources MEDLINE (OVID), US National Guideline Clearinghouse (www.guideline.gov) and the Royal College of Surgeons of England (https://www.rcseng.ac.uk/fds/publications-clinical-guidelines/clinical_guidelines) websites were searched using a variety of relevant search terms (2 August 2016). Data selection Publications were included if they made recommendations on the issue of when and how frequently radiographs should be used in any dentally-related specialty pertaining to the diagnosis of caries; and/or if they were aimed at the individual practitioner (any health professional working within dentistry) and/or patients. Data analysis Thirteen published guidelines were included and assessed using the AGREE II instrument. Conclusions There was a significant variation amongst the guidelines in the recommendations at what age radiography should be undertaken. There was also disagreement on the frequency of repeat radiographs and how this is influenced by the age of the patient and their caries risk.

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2017

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Title
Challenges in X-ray diagnosis: a review of referrals for specialist opinion.
Source
The aim of this study was to determine the common reasons why a dental professional might request a second opinion on a dental radiograph from a Dental and Maxillofacial (DMF) radiologist. The study was a retrospective analysis of consecutive referrals for an opinion received by post or email by one DMF radiologist based in a UK dental hospital. The study period was from March 2009 to November 2015. Referrals came from a mixture of sources: mainly from general dental practitioners and specialists working in primary care, but with some referrals from hospital-based practitioners. An enormous range in diagnoses were made by the DMF radiologist, but the ten most frequent diagnostic categories contributed 57.5% of the total. Normal anatomy and anatomical variations in normal anatomy made up the largest category. Common dental disease was often diagnosed, but idiopathic osteosclerosis and maxillary antrum pathosis were both frequent reasons for seeking a second opinion. This service evaluation may assist in developing curricula for undergraduates and in designing continuing education courses. It also highlights a service that may avoid unnecessary referrals to hospital specialists but which currently is not commissioned by the NHS.

OBJECTIVE: To compare the diagnostic accuracy of cone-beam computed tomography (CBCT) and periapical radiographs (PR) for the detection of external root resorption (ERR).

MATERIAL AND METHODS: An electronic search in databases, including the Cochrane Central Register of Controlled Trials, PubMed, Embase, the China National Knowledge Infrastructure, and System for Information on Grey Literature in Europe (SIGLE), was performed until August 2016. A manual search of relevant journals and reference lists of enrolled studies was conducted. The studies investigating the diagnostic accuracy of CBCT or PR for ERR, with simulated ERR as the reference test, were considered eligible. The diagnostic accuracy of CBCT and PR was statistically pooled using a bivariate model. Meta-regression and subgroup analysis were performed to explore the sources of heterogeneity. Sensitivity analysis was used to test the stability of the overall results in the meta-analysis.

RESULTS: A total of 15 studies were included in this systematic review. The pooled results showed that CBCT had significantly higher sensitivity (0.88; 95% confidence interval [CI]: 0.77-0.96) and area under curve (0.96; 95% CI: 0.77-0.96) than PR (sensitivity: 0.68; 95% CI: 0.56-0.78; area under curve: 0.88; 95% CI: 0.85-0.90). No difference in sensitivity, specificity, and area under the curve between conventional and digital PR was observed.

CONCLUSIONS: Currently available evidence suggests that CBCT could be reliable to detect the presence of ERR in clinical practice and has a higher diagnostic efficacy than PR.
Are three-dimensional airway evaluations obtained through computed and cone-beam computed tomography scans predictable from lateral cephalograms? A systematic review of evidence. [Review]

Source

Status
MEDLINE

Authors
Eslami, Ehsan; Katz, Eliot S; Baghdady, Mariam; Abramovitch, Kenneth; Masoud, Mohamed I.

Abstract
OBJECTIVE: To systematically review the literature correlating upper airway parameters between lateral cephalograms (LC) and cone-beam computed tomography (CBCT) or computed tomography (CT) scans to determine the utility of using LC to predict three-dimensional airway parameters.

MATERIALS AND METHODS: Both electronic and manual searches of the included studies were performed by two reviewers, and the quality of the studies that met selection criteria were assessed.

RESULTS: A total of 11 studies from the literature met the selection criteria. Assessed outcome variables showed correlation \( r < .7 \) between the LC and CT scans. The correlation between the LC and CBCT ranged from weak to strong with \( -.78 \leq r < .93 \) reported in the nasopharyngeal segment. In the oropharyngeal segment, a weak to strong correlation was reported with a range of \( .37 \leq r < .83 \) between the CBCT and LC. All associations in the hypopharyngeal segment showed a weak correlation. Four of studies were of weak quality, five were of moderate quality, and two were rated to be of strong quality.

CONCLUSION: No strong correlations were reported between the LC and CT scans. However, the LC-derived adenoid-nasopharyngeal ratio and the linear measurement (posterior nasal spine, PNS, to posterior pharyngeal wall) had a strong correlation with upright nasopharyngeal area and volume in the CBCTs. The area measurement in conventional LC can be also used as an initial screening tool to predict the upright three-dimensional oropharyngeal volumetric data. The variability of the hypopharyngeal segment cannot be predicted by LCs. However, more well-designed studies are needed to determine the clinical utility of using LC to predict airway size.

Reliability of CBCT diagnosing root fractures remains uncertain. [Review]

Source
Evidence-Based Dentistry. 18(1):23, 2017 03.

Authors
Amintavakoli, Niloufar; Spivakovsky, Silvia.

Abstract
Data sourcesPubMed, Web of Science, Science Direct, Cochrane library, Embase, SCOPUS, CNKI and Wanfang databases were searched until April 2014 followed by hand searching of relevant references. Study selection Using no language restrictions two authors independently assessed for inclusion of in vivo and in vitro studies involving at least ten teeth on the use of CBCT for diagnosing complete root fractures on non-endodontically treated teeth. Data extraction and synthesis Two authors independently assessed for inclusion and performed quality assessment using QUADAS-2 (quality assessment of studies of diagnostic accuracy-2). A random effects model was used to calculate pooled sensitivity, specificity and likelihood ratio (positive and negative). In addition, the correlation between voxel size and diagnostic accuracy was calculated. Results Twelve studies were included in the review. Seven used i-CAT with 372 teeth and four used 3D Accuitomo with 237 teeth (one study used both). For i-CAT pooled sensitivity was 0.83 (0.78 to 0.86), while specificity was 0.91 (0.87 to 0.93). For 3D Accuitomo sensitivity was 0.95 (0.90 to 0.96) and the specificity 0.96 (0.92 to 0.99). Correlation between voxel size and diagnostic accuracy was analysed among five subgroups for i-CAT and two subgroups on the 3D Accuitomo group. No statistically significant difference was observed based on voxel size. Conclusions According to the authors CBCT provides clinically relevant accuracy and reliability to detect root fractures in untreated teeth independently of the voxel size.
Assessment of Root Canal Filling Removal Effectiveness Using Micro-computed Tomography: A Systematic Review. [Review]


INTRODUCTION: The removal of obturation materials from the root canal system is a primary objective in root canal retreatment procedures. This systematic review aims to discuss the effectiveness of different instrumentation procedures in removing root canal filling materials assessed by micro-computed tomography.

METHODS: An electronic search in PubMed and major endodontic journals was conducted using appropriate key words to identify investigations that examined the effectiveness of obturation material removal assessed by micro-computed tomography.

RESULTS: Among 345 studies, 22 satisfied the inclusion criteria. Seven studies compared hand instrumentation with Nickel-Titanium rotary or reciprocating systems. Three studies investigated rotary systems, and another three studies explored reciprocation. Eight studies compared rotary systems and reciprocation in removing filling materials from the root canal system. Other factors, such as the role of solvents and irrigant agitation, were discussed.

CONCLUSIONS: The application of different instrumentation protocols can effectively, but not completely, remove the filling materials from the root canal system. Only hand instrumentation was not associated with iatrogenic errors. Reciprocating and rotary systems exhibited similar abilities in removing root filling material. Retreatment files performed similarly to conventional ones. Solvents enhanced penetration of files but hindered cleaning of the root canal. The role of irrigant agitation was determined as controversial.

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What is the best position for palatal implants? A CBCT study on bone volume in the growing maxilla.


OBJECTIVE: The objectives of the present study are the following: (a) to investigate limitations (bone height, proximity to nasopalatine nerve and roots) in juvenile patients, (b) to review the recommended site for surgical insertion (level of the maxillary first premolars), and (c) to reassess the rationale behind the manufacturer's age limitation (12 years).
PATIENTS AND METHODS: Cone beam CT images of 100 patients aged 10 to 20 years were analyzed. Vertical bone heights were measured in the median plane as well as 3- and 6-mm paramedian along the prospective axis of insertion, at the level of the first premolars (level 0), 3 mm anterior (level 1) and 3 mm posterior (level 2). The Mann-Whitney U test was used to compare bone heights between gender groups.

RESULTS: The risk of damage to the nasopalatine nerve is highest in the median region on level 1 (46 %). The risk was lowest in the midsagittal region on level 0 (recommended insertion site; 3 %) and level 2 (0 %), as well as paramedian on levels 0 and 2. The risk of damaging roots was irrelevant for median insertion at all levels; the only critical region was 6-mm paramedian on level 1.

CONCLUSIONS: The recommendation of surgical insertion at the level of the maxillary first premolars is still justified, but a slightly more posterior implant position might improve safety. We found no relevant growth-related changes in the vertical bone heights in the median palatal area. Thus, our data do not support the strict 12-year age restriction for palatal implants.

Abstract

Although cone-beam computed tomography (CBCT) is just 15 years old, it has revolutionized the practice of dentistry, so much so, there is hardly a dental specialty which has not been affected by this technology. Nevertheless, it presents the dentist with a number of important challenges. An initial steep learning curve must be addressed without unnecessary exposure to the patient. This is particularly important when the patient is a child.
gonadal shielding are not recommended, due to negligible radiation dose reduction. Thyroid lead shielding should be used in case the organ is in or close to the primary beam. Specifically for CBCT, leaded glasses, thyroid collars and collimation (smaller field of view (FOV) especially for paediatric patients) minimize the dose to organs outside the FOV.

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**Title**
Is Willems method universal for age estimation: A systematic review and meta-analysis. [Review]

**Source**

**Authors**
Wang J; Ji F; Zhai Y; Park H; Tao J.

**Abstract**
Dental age (DA) has been widely accepted as a way to evaluate chronological age (CA) in recent years. However, the applicability of Willems method, as one of the most popular radiographic ways, still remains controversial in different areas. The aim of this study is to assess the difference between DA and CA with Willems method. Relevant studies published up to February 28th, 2017 were selected via PubMed, Embase, the Cochrane Library, CNKI, CBM and manual search. Studies that examined Willems dental age and chronological age were selected. 11 articles with 9347 individuals whose age ranged from 3.0 to 18.9 years old were ultimately included in this study. The general polled data indicated that Willems method overestimated CA by 0.18 years and 0.06 years for males and females respectively. Subgroup analysis for ethnicity showed significant difference for different ethnicities. Our aggregated data demonstrated that Willems method may not be an overall applicable tool to estimate chronological age for the reason of the difference of ethnicity and rational validity is suggested when necessary.

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AIMS: To test the applicability and accuracy level of Willems method of dental age estimation in diverse population samples by quantifying the variations between the chronological and estimated ages of an individual.

METHODOLOGY: A systematic search of online databases (Pubmed, Scopus, Embase, Medline, Trip and Web of Science) was performed for identifying the articles utilizing Willems dental maturity scaling method for age estimation in children. All the research articles published in peer-reviewed English language journals between 2001 and January 2017 were included for present systematic review and meta-analysis.

RESULTS: Out of the total 973 selected articles; thirty one studies were recruited for qualitative analysis and out of them, 15 studies were selected/identified for quantitative and meta-analysis. It was found that Willems method overestimates the age of children to a comparatively lesser extent (-0.04 and -0.02 years) than the Demirjian method (around six months).

CONCLUSION: Willems method of dental age estimation gives comparatively lesser overestimations of age than other methods reported in the available literature and is thus, accurate and reliable enough to be utilized for forensic purposes.

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The emerging role of maxillofacial radiology in the diagnosis and management of patients with complex periodontitis. [Review]

Purpose: Contemporary periodontal therapy has evolved to become more interdisciplinary and increasingly involves more complex treatments, including bone and soft-tissue regenerative procedures. Therapeutic options require an imaging modality or combination of techniques that are capable of providing a diagnostic osseous baseline and facilitating quantification of smaller increments of bony change, both loss and additive, which are comparable over time. Intra-oral and panoramic radiography are the modalities most commonly used to identify the location, quantify the amount and the pattern of alveolar bone loss and determine response to therapy. Cone-beam computed tomography imaging offers specific advantages for periodontal diagnosis in that three-dimensional images of dental and alveolar bone structures can be rendered with accuracy. Cone-beam computed tomography has been shown to be clinically efficacious in demonstrating localized defects, such as furcation involvement and intrabony vertical and buccal/lingual defects, and in assessing the effects of regenerative therapy. In these situations, limited-field-of-view, high-resolution protocols are indicated.

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Accuracy and reproducibility of dental measurements on tomographic digital models: a systematic review and meta-analysis. [Review]

Purpose: This systematic review aimed to evaluate the accuracy and reproducibility of dental measurements performed on tomographic digital models. A total of 12 relevant articles were included in the meta-analysis. The results showed that the accuracy of dental measurements on tomographic digital models is high, with a mean root mean square error of 0.02 mm. The reproducibility was also good, with a mean intra-class correlation coefficient of 0.85. These findings suggest that tomographic digital models can be reliably used for dental measurements in clinical settings.

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Abstract

Diagnostic radiology is an essential component of treatment planning in the field of implant dentistry. This narrative review will present current concepts for the use of cone beam computed tomography imaging, before and after implant placement, in daily clinical practice and research. Guidelines for the selection of three-dimensional imaging will be discussed, and limitations will be highlighted. Current concepts of radiation dose optimization, including novel imaging modalities using low-dose protocols, will be presented. For preoperative cross-sectional imaging, data are still not available which demonstrate that cone beam computed tomography results in fewer intraoperative complications such as nerve damage or bleeding incidents, or that implants inserted using preoperative cone beam computed tomography data sets for planning purposes will exhibit higher survival or success rates. The use of cone beam computed tomography following the insertion of dental implants should be restricted to specific postoperative complications, such as damage of neurovascular structures or postoperative infections in relation to the maxillary sinus. Regarding peri-implantitis, the diagnosis and severity of the disease should be evaluated primarily based on clinical parameters and on radiological findings based on periapical radiographs (two dimensional). The use of cone beam computed tomography scans in clinical research might not yield any evident beneficial effect for the patient included. As many of the cone beam computed tomography scans performed for research have no direct therapeutic consequence, dose optimization measures should be implemented by using appropriate exposure parameters and by reducing the field of view to the actual region of interest.
OBJECTIVES: Many studies to evaluate the accuracy of root fracture diagnosis have been conducted. However, there is a scarcity of studies to assess the quality and the sources of heterogeneity in the literature. For this reason, the aim of this study was to conduct systematic reviews and meta-analyses to summarize the available evidence on detection of root fractures by cone beam CT (CBCT) and periapical radiograph (PR) images and the interference of artefact by investigating possible sources of heterogeneity.

METHODS: Studies reporting root fracture detection, from January 2010 to February 2016, were selected. All selected studies were subjected to selection criteria and then, comparative and qualitative analyses by using the quality assessment of diagnostic accuracy studies (QUADAS-2) tool were performed. Pooled sensitivity, specificity and diagnostic odds ratios were calculated. Also, receiver operator characteristics (ROC) curves were built to summarize the results. SROC curve analyses were performed to investigate the heterogeneity among studies.

RESULTS: Initially, 799 articles were selected. After screening titles and abstracts, 743 articles were excluded. After reading the remaining 56 full-texts, 47 relevant articles were included in this study. Diagnostic odds ratio values revealed a wide range of results across the studies and determined a higher heterogeneity for PR compared with CBCT. The analyses of the SROC curves compared CBCT imaging versus PR in the diagnosis of root fracture, favouring CBCT modality.

CONCLUSIONS: CBCT was the imaging exam that rendered a higher diagnostic accuracy for root fractures.
The aim of this study was to systematically review the literature about the capability of CBCT images to identify individuals with low bone mineral density (BMD). As the literature is scarce regarding this topic, the purpose of this systematic review is also to guide future research in this area. A detailed search was performed in five databases without restrictions of time or languages. Additionally, a grey literature search was conducted. The Quality Assessment Tool for Diagnostic Accuracy Studies-2 was applied to evaluate the methodological design of selected studies. With the inclusion of only six studies, the evidence is limited to endorse the use of CBCT assertively as a diagnostic tool for low BMD. All of the three studies that analyzed radiomorphometric indices found that the linear measurements of the mandibular inferior cortex were lower in osteoporotic individuals. CBCT-derived radiographic density vertebral and mandibular measurements were also capable for differentiating individuals with osteoporosis from individuals with normal BMD. The analysis of the cervical vertebrae showed high accuracy measurements. This systematic review indicates a scarcity of studies regarding the potential of CBCT for screening individuals with low BMD. However, the studies indicate that radiomorphometric indices and CBCT-derived radiographic density should be promising tools for differentiating individuals with osteoporosis from individuals with normal BMD.

METHODS: An open-ended electronic search of PubMed, Web of Science, ProQuest, and other databases for both published and unpublished articles up to May 2016 was performed. The reference lists of the included studies were screened. Two authors performed the searches with no language restrictions. The research questions were outlined based on a hierarchical model. The primary outcomes were diagnostic accuracy, level of intermodalities agreement, effect of these images on treatment planning and treatment outcomes, and societal efficacy between the CBCT and CR in the localization of impacted canines. Two reviewers evaluated the risk of bias assessment by using the Quality Assessment of Diagnostic Accuracy Studies tool and the Newcastle Ottawa Scale.

RESULTS: Eight studies met the inclusion criteria. Two studies reported diagnostic accuracy, 6 reported intermodalities agreement in impacted canine localization, and 3 reported treatment planning agreement between the modalities. No therapeutic and societal efficacy study found. The accuracy of CBCT ranged from 50% to 95%, and the accuracy of CR ranged from 39% to 85%. A wide range of kappa intermodalities agreement from 0.20 to 0.82, with observed agreement of 64% to 84%, was reported in canine localization. Broad kappa treatment planning agreement values from 0.36 to 0.72 were reported. Most studies suffered from a high risk of bias in subject selection.

CONCLUSIONS: The fair to moderate intermodalities agreement in maxillary canine localization might mean that the information obtained through these modalities is deviant and ultimately might affect treatment planning. Although there is still a lack of strong evidence, CBCT is more effective than CR in evaluating cases that are difficult to diagnose in the initial evaluation with CR.
The Value of Cone Beam Computed Tomography in the Management of Dentigerous Cysts - A Review and Case Report.

Allison JR; Garlington G.

OBJECTIVES: To undertake a systematic review on quality assurance (QA) phantoms for CBCT imaging, including studies on the development and application of phantoms.

METHODS: The MEDLINE (PubMed) bibliographic database was searched until May 2016 for studies evaluating the development and use of phantoms in CBCT image QA. The search strategy was restricted to English language publications using the following combined terms: (Cone Beam CT) OR (Cone Beam Computed Tomography) OR (Cone-Beam Computed Tomography) OR (CBCT) AND (quality OR phantom).

RESULTS: The search strategy yielded 37 studies, which had developed and used (25 studies) or only used (12 studies) a phantom in CBCT image QA. According to the literature, in 7 phantoms, it is possible to evaluate 4 or more image quality parameters while in 11 phantoms, merely 1 parameter can be evaluated. Only two phantoms permit the evaluation of the six
image quality parameters stated by the European Commission. The parameters, which can most often be evaluated using a phantom, are image density values, spatial resolution and geometric accuracy. The SEDENTEXCT phantom was used most frequently. In two studies, all quality parameters suggested by the European Commission were evaluated.

CONCLUSIONS: QA phantoms rarely allow all image quality parameters stated by the European Commission to be evaluated. Furthermore, alternative phantoms, which allow all image quality parameters to be evaluated in a single exposure, even for a small field of view, should be developed.

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**Title**
The Demirjian versus the Willems method for dental age estimation in different populations: A meta-analysis of published studies.

**Source**

**Authors**
Esan TA; Yengopal V; Schepartz LA.

**Institution**
Esan, Temitope Ayodeji. Human Variation and Identification Unit, School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa.
Esan, Temitope Ayodeji. Faculty of Dentistry, Obafemi Awolowo University, Ile-Ife, Nigeria.
Yengopal, Veerasamy. Department of Community Dentistry, School of Oral Health Sciences, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa.
Schepartz, Lynne A. Human Variation and Identification Unit, School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa.

**Abstract**
**BACKGROUND:** The accuracy of radiographic methods for dental age estimation is important for biological growth research and forensic applications. Accuracy of the two most commonly used systems (Demirjian and Willems) has been evaluated with conflicting results. This study investigates the accuracies of these methods for dental age estimation in different populations.

**METHODS:** A search of PubMed, Scopus, Ovid, Database of Open Access Journals and Google Scholar was undertaken. Eligible studies published before December 28, 2016 were reviewed and analyzed. Meta-analysis was performed on 28 published articles using the Demirjian and/or Willems methods to estimate chronological age in 14,109 children (6,581 males, 7,528 females) age 3-18 years in studies using Demirjian's method and 10,832 children (5,176 males, 5,656 females) age 4-18 years in studies using Willems' method. The weighted mean difference at 95% confidence interval was used to assess accuracies of the two methods in predicting the chronological age.

**RESULTS:** The Demirjian method significantly overestimated chronological age (p<0.05) in males age 3-15 and females age 4-16 when studies were pooled by age cohorts and sex. The majority of studies using Willems' method did not report significant overestimation of ages in either sex. Overall, Demirjian's method significantly overestimated chronological age compared to the Willems method (p<0.05). The weighted mean difference for the Demirjian method was 0.62 for males and 0.72 for females, while that of the Willems method was 0.26 for males and 0.29 for females.

**CONCLUSION:** The Willems method provides more accurate estimation of chronological age in different populations, while Demirjian's method has a broad application in terms of determining maturity scores. However, accuracy of Demirjian age estimations is confounded by population variation when converting maturity scores to dental ages. For highest accuracy of age estimation, population-specific standards, rather than a universal standard or methods developed on other populations, need to be employed.

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**Title**
Predictive Value of Panoramic Radiography for Injury of Inferior Alveolar Nerve After Mandibular Third Molar Surgery. [Review]

**Source**
PURPOSE: The purpose of the present systematic review was to assess the added value of panoramic radiography in predicting postoperative injury of the inferior alveolar nerve (IAN) in the decision-making before mandibular third molar (MM3) surgery.

MATERIALS AND METHODS: MEDLINE and EMBASE were searched electronically to identify the diagnostic accuracy of studies that had assessed the predictive value of 7 panoramic radiographic signs, including root-related signs (darkening of the root, deflection of the root, narrowing of the root, and dark and bifid apex of the root) and canal-related signs (interruption of the white line of the canal, diversion of the canal, and narrowing of the canal) for IAN injury after MM3 surgery.

RESULTS: A total of 8 studies qualified for the meta-analysis. The pooled sensitivity and specificity of the 7 signs ranged from 0.06 to 0.49 and 0.81 to 0.97, respectively. The area under the summary area under the receiver operating characteristic curve ranged from 0.42 to 0.89. The pooled positive predictive value (PPV) and negative predictive value (NPV) ranged from 7.5 to 26.6% and 95.9 to 97.7%, respectively. The added value of a positive sign for ruling in an IAN injury (PPV minus the prior probability) ranged from 0.06 to 0.49 and 0.81 to 0.97, respectively. The added value of a positive sign for ruling in an IAN injury (PPV minus the prior probability) ranged from 3.4 to 22.2%. The added value of a negative sign for ruling out an IAN injury (NPV minus [1 minus the prior probability]) ranged from 0.1 to 2.2%.

CONCLUSIONS: For all 7 signs, the added value of panoramic radiography is too low to consider it appropriate for ruling out postoperative IAN in the decision-making before MM3 surgery. The added value of panoramic radiography for determining the presence of diversion of the canal, interruption of the white line of the canal, and darkening of the root can be considered sufficient for ruling in the risk of postoperative IAN injury in the decision-making before MM3 surgery.
genotoxicity or cytotoxicity. Thus, the aim of this review was to present a critical analysis regarding the studies published on genotoxicity and cytotoxicity induced by dental X-rays in oral mucosa cells. Such studies have revealed that some oral cell types are more sensitive than others following exposure to dental X-rays. Certainly, this review will contribute to a better understanding of this matter as well as to highlighting perspectives for further studies. Ultimately, such data will promote better safety for both patients and dental professionals.

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Title
Dental, dermatological and radiographic findings in a case of Gorlin-Goltz Syndrome: report and review. [Review]

Source

Authors
Nilesh K; Tewary S; Zope S; Patel J; Vande A.

Institution
Nilesh, Kumar. Department of Oral & Maxillofacial Surgery School of Dental Sciences, KIMS/DU, Karad, Maharashtra, India.
Tewary, Shivsagar. Department of Prosthodontics School of Dental Sciences, KIMS/DU, Karad, Maharashtra, India.
Zope, Sameer. Department of Periodontics School of Dental Sciences, KIMS/DU, Karad, Maharashtra, India.
Patel, Jinesh. Department of Oral & Maxillofacial Surgery School of Dental Sciences, KIMS/DU, Karad, Maharashtra, India.
Vande, Aaditee. Department of Prosthodontics School of Dental Sciences, KIMS/DU, Karad, Maharashtra, India.

Abstract
Gorlin-Goltz syndrome (GGS) is a rare autosomal dominant disorder. The disease shows multiple organ involvement with variable clinical presentation. Thus a multidisciplinary approach is required for its prompt clinical diagnosis and management of this condition. This paper highlights a case of GGS presenting in a young male patient with cranial, facial, dermatological, dental and skeletal involvement. The diagnosis of the syndrome was based on its clinical presentation, radiological features and histopathological findings. A review of the diagnostic criteria is also presented.

Publication Type
Case Reports. Journal Article. Review.
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Title
Cone beam computed tomography incidental findings of the cervical spine and clivus: retrospective analysis and review of the literature. [Review]

Source

Authors
Alsufyani NA.

Institution
Alsufyani, Noura A. Assistant Professor, Oral & Maxillofacial Radiology, School of Dentistry, Faculty of Medicine and Dentistry, University of Alberta, Canada; Assistant Professor, College of Dentistry, King Saud University, Saudi Arabia. Electronic address: Alsufyan@ualberta.ca.

Abstract
OBJECTIVE: The aim of this study was to analyze and describe incidental findings in the cervical spine (C-spine) and the clivus encountered in cone beam computed tomography (CBCT) imaging. The wide range of possible anatomic variants and pathoses is discussed in the context of the medical and dental literature to clarify their radiographic appearance and clinical implications as a guide for the oral and maxillofacial radiologist.

STUDY DESIGN: A retrospective analysis of radiographic reports was conducted based on CBCT images from 2 oral and maxillofacial imaging centers. Reports documenting incidental findings in the C-spine or the clivus were selected. Data on patient age and sex were collected, and each incidental finding was categorized as degenerative, congenital, or developmental/pathologic. Each finding is discussed with clinical importance and is pictorially presented.
RESULTS: From a total of 7689 CBCT reports, there were 732 incidental findings (9.5%) in the C-spine or the clivus. Most findings were in the C-spine (92.3%), were degenerative in nature (78.7%), and occurred in females in their sixth decade. Logistic regression analysis showed that the odds of presenting with a degenerative incidental finding in the C-spine or the clivus did not differ based on sex but were 5.5 times (95% confidence interval, 3.77-8.04) higher if the patient was aged 50 years or older.

CONCLUSIONS: This review is the largest and the first to characterize incidental findings in the C-spine and the clivus. Such findings were reported in 9.5% of radiographic reports. Several presented as uncommon congenital variants that are not usually spotlighted during oral and maxillofacial radiology training.

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Abstract

3D Multislice and Cone-beam Computed Tomography Systems for Dental Identification. [Review] Source

Abstract

3D Multislice and Cone-beam computed tomography (CBCT) in forensic odontology has been shown to be useful not only in terms of one or a few of dead bodies but also in multiple fatality incidents. 3D Multislice and Cone-beam computed tomography and digital radiography were demonstrated in a forensic examination form. 3D images of the skull and teeth were analysed and validated for long ante mortem/post mortem intervals. The image acquisition was instantaneous; the images were able to be optically enlarged, measured, superimposed and compared prima vista or using special software and exported as a file. Digital radiology and computer tomography has been shown to be important both in common criminalistics practices and in multiple fatality incidents. Our study demonstrated that CBCT imaging offers less image artifacts, low image reconstruction times, mobility of the unit and considerably lower equipment cost.
Over the last 15 years, cone beam computed tomographic (CBCT) imaging has emerged as an important supplemental radiographic technique for orthodontic diagnosis and treatment planning, especially in situations which require an understanding of the complex anatomic relationships and surrounding structures of the maxillofacial skeleton. CBCT imaging provides unique features and advantages to enhance orthodontic practice over conventional extraoral radiographic imaging. While it is the responsibility of each practitioner to make a decision, in tandem with the patient/family, consensus-derived, evidence-based clinical guidelines are available to assist the clinician in the decision-making process. Specific recommendations provide selection guidance based on variables such as phase of treatment, clinically-assessed treatment difficulty, the presence of dental and/or skeletal modifying conditions, and pathology. CBCT imaging in orthodontics should always be considered wisely as children have conservatively, on average, a three to five times greater radiation risk compared with adults for the same exposure. The purpose of this paper is to provide an understanding of the operation of CBCT equipment as it relates to image quality and dose, highlight the benefits of the technique in orthodontic practice, and provide guidance on appropriate clinical use with respect to radiation dose and relative risk, particularly for the paediatric patient.