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RESEARCH ARTICLE

OCCULT PATHOLOGIES DISCLOSED IN PANORAMIC RADIOGRAPHS- A RETROSPECTIVE STUDY

***Dr. Yoga, S., Dr. Vishwanath, R., Dr. Sitra, G., Dr. Vandana, Dr. John Baliah and Dr. Kayalvizhi**

Oral Medicine and Radiology, Indira Gandhi Institute of Dental Sciences, SBV, Pondicherry, India

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ABSTRACT

Background: Panoramic radiograph serves as an indispensible screening and diagnostic tool in oral and maxillofacial imaging. This study was designed to detect the frequency of occult pathologies using the panoramic radiograph.

Aim and Objective: To estimate the occult pathologic findings in panoramic radiographs unrelated to the chief complaint and clinical diagnosis.

Methodology: This study was conducted at the Department of Oral Medicine and Radiology in a teaching dental hospital using 1032 panoramic radiographs retrieved from May 2015 to October 2015. The images were evaluated for the presence of occult pathologic findings which were unrelated to the chief complaint and clinical diagnosis. Statistics was calculated with simple percentage analysis was done.

Result: Out of 1032 panoramic radiographs examined, occult lesions unrelated to the chief complaint and clinical diagnosis were observed in 165 (15.98%) panoramic radiographs. The percentage of the incidental findings in 165 panoramic radiographs were periapical pathologies (26.67%), periodontal pathologies (23.6%), tooth anomalies (4.84%), congenitally missing teeth (5.45%), supernumerary teeth (3.63%), generalized rarefractions (9.7%), carotid artery calcifications (1.81%), cysts and tumors (7.89%), TMJ pathologies (9.1%), and styloid process elongation (3%). The study reiterates on the diagnostic utility of panoramic radiograph in routine clinical situations, school health program and forensics.

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INTRODUCTION

In recent times, imaging techniques has evolved significantly to provide specific diagnosis of diseases and plays a major role in treatment planning. However conventional radiographs such as Panoramic radiograph is one such depicts the entire maxilla, mandible and TMJ on a single exposure. Hence, it allows wide range of visualization of structures which may not be seen on other conventional radiographic techniques. Panoramic radiographs serves as an indispensible diagnostic tool in patients with trismus, trauma, exaggerated gag reflex. (Colquhoun *et al*., 2002) Numerous asymptomatic unsuspected pathological conditions are routinely detected on panoramic radiographs, which may continue to remain dormant or eventually develop into soft or hard tissue swellings. Carotid artery calcifications being a life threatening predisposing factor for stroke is also being diagnosed in panoramic radiographs. Delayed diagnosis affects the prognosis of the lesion, which necessitates early intervention. (Levy and Mandel, 2010; Sisman *et al*., 2007; Bayer *et al*., 2011) Hence, this study was designed to detect the frequency of occult pathologies in maxilla, mandible, and adjacent structures visualized in panoramic radiograph.

Corresponding author:* **Dr. Yoga, S.
Oral Medicine and Radiology, Indira Gandhi Institute of Dental Sciences, SBV, Pondicherry, India.

MATERIALS AND METHODS

The study was conducted after obtaining clearance from Institutional Review Board and Institutional Ethical Committee. This retrospective study was conducted at a dental teaching hospital using 1032 panoramic radiographs retrieved from the Department of Oral Medicine and Radiology during May 2015 to October 2015. Radiographs were evaluated for the presence of occult pathologic findings, which were unrelated to the chief complaint and clinical diagnosis. Patient's dental case sheets were retrieved from the Medical Records Department to correlate the chief complaint and clinical diagnosis with the panoramic findings. The panoramic radiographs were taken with OrthophosXG, Sirona (Bensheim, Germany) with80kVp and 12 mA. The pathologic findings which were not related to the chief complaint and clinical diagnosis were recorded. Assessment of the digital panoramic radiographs was performed directly on the monitor screen (HP Pavilion w2408 LCD, 24 inch wide screen, 1920x1200). The images were

exported and saved in Joint Photographic Experts Group (JPEG) file and no adjustment of contrast, brightness and magnification were performed. In order to reduce radiographic misinterpretation and error caused by fatigue, only 15 panoramic radiographs were evaluated per day. A systematic approach for examining the panoramic radiographs including methodical evaluation of all radiographs, looking at each anatomical region carefully and evaluation of potential lesions including location, size, borders, opacity and texture, and its impact on adjacent structures were followed. Three observers who were a professional radiologistanalyzed the radiographs as per the method described by White and Pharoah and recorded the incidental findings. (White and Pharoah, 2004) Panoramic radiographs which were correlating with the chief complaint, clinical diagnosis and radiographic diagnosis were excluded. Missing teeth due to extraction, third molar impaction, thickening of sinus floor were excluded since all these were frequently observed as non-pathologic findings. (Geist and Katz, 1990) Since dental caries may not be clearly evident due to proximal overlaps in panoramic radiographs, it was also excluded as a pathologic finding in this study. The statistical analysis done was percentage analysis. SPSS (version19) was used to analyse the data. All radiographs with pathological findings or abnormalities were re-examined by anoral and maxillofacial radiology specialist. (Friedlander, 1995) Agreement percentages and kappa indices for inter and intraexaminer variations were calculated. (Fleiss and Cohen, 1969)

RESULTS

The intraexaminer agreement percentages and kappa indices were 0.92, 0.96 and 0.98 for three observers and the mean intraexaminer reliability was 0.95. Among 1032 panoramic radiographs, occult pathologies were observed in 165 (15.98%) radiographs. The occult pathologies observed in panoramic radiographwere listed in Table 1.

Table 1. Frequency of incidental pathologies detected in panoramic radiographs (n=165)

S.No.	Pathologies	Number and percentage (%)
1	Periapical pathology	44 (26.67%)
2	Periodontal pathology	39(23.64%)
3	Tooth anomalies	8(4.84%)
4	Congenitally missing	9(5.45%)
5	Supernumerary	6(3.63%)
6	Generalised rarefactions	16 (9.70%)
7	Cysts and tumours	13 (7.89%)
8	Idiopathic osteosclerosis	04 (2.42%)
9	Impaction	03 (1.81%)
10	Temporomandibular joint pathology	15 (9.1%)
11	Styloid process elongation	05 (3.0%)
12	Carotid artery calcifications	03 (1.81%)

Most of the occult lesions were commonly seen among the female patients (62.1%) than in male patients (37.5%) and were noticed in the mandible without any significant variation between right and left side. Styloid process elongation was an interesting occult lesion which was found in five cases (3%). Carotid artery calcification was yet another important finding observed in three cases (1.8%) Figure 1, which is an indicator for subsequent stroke. (Lumbreras *et al*., 2010; Cohen *et al*., 2002; Pornprasertsuk-Damrongsri *et al*., 2006; Carter *et al*., 1997; Friedlander and Baker, 1994; Friedlander *et al*., 1994; Friedlander *et al*., 1999; Freymiller *et al*., 2000; Yoon *et al*., 2008; Friedlander *et al*., 2000) These occult findings would be of significant value and an eye opener to provide a niche in diagnosing an underlying pathologic condition with a lesser radiation exposure dosage. (Freeman and Brand, 1994)

Figure 1.

Panoramic radiograph showing multiple radiopacities such as right side carotid artery calcification, bilateral elongated styloid process, and multiple hypercementosis.

DISCUSSION

In our study, every sixth patient who was subjected to panoramic radiograph was observed to have occult pathologies, which was unrelated to the chief complaint and clinical diagnosis. The most common occult lesions were periapical and periodontal pathologies and the least common were carotid artery calcification. Periapical pathologies, periodontal pathologies, cysts and tumours required immediate management. Carotid artery calcification is one important occult pathology which will be of help in diagnosing an underlying systemic disease including cardiomyopathy, hypertriglyceridemia, etc, which requires immediate medical attention. (Ohba *et al*., 2003; Bayram *et al*., 2006; Tamura *et al*., 2005; Ertas and Sisman, 2011) In order to minimize the visualization error, re-examination were observed by an experienced maxillofacial radiologist. The kappa indices for intra examiner variability evaluated showed agreement ranging from (0.92-0.98) which shows a good to excellent agreement, which indicates that the results were highly reliable. A study by Bondemark *et al* showed 8.7% of patients with occult pathology in panoramic radiographs among patients indicated for orthodontic treatment. Among the incidental findings, 32.1% of the pathologies including periapical inflammatory lesions, dentigerous cysts and other cysts within alveolar bone, marginal bone loss, and odontomasrequired additional management regardless of the orthodontic treatment. High frequency of periapical inflammatory lesion (17.6%) and the presence of occult lesions in females (64.4%) in their study are consistent with the present study. (Bondemark *et al*., 2006) Pekiner *et al.* observed incidental findings in 72 (14.4%) of the 500 panoramic radiographs. The lesions were found in patients ranging from 2 years to 14 years old. The results with respect to apical osteitis, missing teeth, and supernumerary tooth were consistent with the present study. (Pekiner *et al*., 2011) According to a study done by Ignelzi MA, supernumerary teeth were detected as occult lesion in 2.4% of individuals which is comparable with the present study. (Ignelzi *et al*., 1989) Antonio Gracco *et al* in their study detected the percentage of pseudocyst and mucosal thickening using Cone Beam Computed Tomography; however dental and alveolar features were not recorded in that study. (Gracco *et al*., 2012)

Gokce *et al* observed carotid artery calcifications in panoramic radiographs among end stage renal disease patients. In a total of 26 patients, 11 (34.4%) had carotid artery calcifications on the right side and 21(65.6%) on the left side. Carotid artery calcifications may be seen on panoramic radiographs adjacent to the cervical vertebrae at the level of C3 – C4 as radiopaque mass or line inferior to the angle of the mandible. Carotid artery calcifications require additional investigations with cervical spine radiographs, angiography or Doppler ultrasound analysis and imaging. (Gokce *et al*., 2008) A review by Lumbreras *et al.* summarised the frequency and management of incidental findings in imaging diagnostic tests. They observed the mean frequency of incidental finding which was 23.6% and stated that the frequency of incidental findings was higher in studies involving CT. (Lumbreras *et al*., 2010) The frequency on incidental findings in panaromic radiographs were consistent to our study which is 15.98%. Jose *et al*, presented a series of case reports were he insists that panoramic radiographs should be advised prior to any dental procedures since it is helpful in detecting the hidden lesions which are unrelated to chief complaint. (Jose and Varghese, 2011) Friedlander *et al* observed greater prevalence of calcified carotid artery atheromas in panoramic radiographs of individuals with dilated cardiomyopathy (DCM) compared to controls and concluded that calcified atheromas were seen in nine of 27 patients with DCM which is again coincides with our findings. (Sung *et al*., 2004)

In our study the limitation was that we have utilized panoramic radiograph which is a very basic radiographic technique. And to vizualize the details accurately we need to rely upon intra oral periapical radiographs and other higher imaging modalities. Panoramic radiographs despite its limitations, still serves as an indispensible screening tool from which we can obtain myriad information. The radiological findings are not only useful for planning the dental treatment protocol, they even give us an insight of patients general health status for which appropriate investigations and treatment can be done prior to any serious complications. As part of our study, patients with occult lesions were recalled and appropriate treatment was rendered.

Conclusion

Though Panoramic radiography is a conventional mode of imaging, it is routinely carried out in most of dental health care centres. In our study out of 1032 panoramic radiographs re-examined,15.9% images showed occult lesions, which throws light on a possible fact that every sixth person exposed to panoramic imaging might have an occult pathology, being vigilant about such occult pathologies is extremely important as it can be a serious cause of concern and timely intervention can be lifesaving.

REFERENCES

Bayer S, Helfgen E-H, Bös C, Kraus D, Enkling N, Mues S. 2011. Prevalence of findings compatible with carotid artery calcifications on dental panoramic radiographs. *Clin Oral Investig*., 15:563–569.

Bayram B, Uckan S, Acikgoz A, Müderrisoğlu H, Aydinalp A. 2006. Digital panoramic radiography: a reliable method to diagnose carotid artery atheromas? *Dento Maxillo Facial Radiology*, 35(4):266–270.

Bondemark L, Jeppsson M, Lindh-Ingildsen L, Rangne K. 2006. The prevalence and location of incidental findings of pathology and abnormality in pretreatment orthodontic panoramic radiographs. *The Angle Orthodontist*, 76(1):98-102.

Carter LC, Haller AD, Nadarajah V, Calamel AD, Aguirre A. 1997. Use of panoramic radiography among an ambulatory dental population to detect patients at risk of stroke. *J Am Dent Assoc*., 128:977–984.

Cohen SN, Friedlander AH, Jolly DA, Date L. 2002. Carotid calcification on panoramic radiographs: an important marker for vascular risk. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*., 94:510–514.

Colquhoun A, Cathro I, Kumara R, Ferguson MM, *et al*. 2002. Bilateral coronoid hyperplasia in two brothers. *DentomaxillofacRadiol*., 31(2):142-6.

Ertas ET. and Sisman Y. 2011. Detection of incidental carotid artery calcifications during dental examinations: panoramic radiography as an important aid in dentistry. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*., 112:e11–e17.

Fleiss CL. and Cohen E. 1969. Large sample standard errors of kappa and weighted kappa. *Psychol Bull*., 72:323–327.

Freeman JP. and Brand JW. 1994. Radiation doses of commonly used dental radiographic surveys. *Oral Surg Oral Med Oral Pathol*., 77:285–289.

Freymiller E, Sung E, Friedlander A. 2000. Detection of radiation-induced cervical atheromas by panoramic radiography. *Oral Oncol*., 36:175–179.

Friedlander AH, Friedlander IK, Yueh R, Littner MR. 1999. The prevalence of carotid atheromas seen on panoramic radiographs of patients with obstructive sleep apnea and their relation to risk factors for atherosclerosis. *J Oral Maxillofac Surg*., 57:516–521.

Friedlander AH, Manesh F, Wasterlain CG. 1994. Prevalence of detectable carotid artery calcifications on panoramic radiographs of recent stroke victims. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*., 77:669–673.

Friedlander AH. 1995. Panoramic radiography: the differential diagnosis of carotid artery atheromas. *Spec Care Dentist*. 15:223–227.

Friedlander AH. and Baker JD. 1994. Panoramic radiography: an aid in detecting patients at risk of cerebrovascular accident. *J Am Dent Assoc*., 125:1598–1603.

Friedlander AH. and Maeder LA. 2000. The prevalence of calcified carotid artery atheromas on the panoramic radiographs of patients with type 2 diabetes mellitus. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*., 89:420–424.

Geist JR. and Katz JO. 1990. The frequency and distribution of idiopathic osteosclerosis. *Oral Surg Oral Med Oral Pathol*., 69:388–393

Gokce C, Sisman Y, Sipahioglu M, *et al*. 2008. The Prevalence of Carotid Artery Calcification on the Panoramic Radiographs of End-stage Renal Disease Patients with Peritoneal Dialysis: Do Incidental Findings Provide Life-saving Information. *The Journal of International Medical Research*, 36:47–53.

Gracco A, Parenti SI, Ioele C, Bonetti GA, Stellini E. 2012. Prevalence of incidental maxillary sinus findings in Italian orthodontic patients: A retrospective cone beam computed tomography study. *Korean J Orthod*., Dec;42(6):329-334

Ignelzi MA, Fields HW. and Vann WF. 1989. Screening of panoramic radiographs in children: prevalence data and implications. *The American Academy of Pediatric Dentistry*, 11(4).

Jose M. and Varghese J. 2011. Panoramic radiograph a valuable diagnostic tool in dental practice-Report of three cases. *International Journal of Dental Clinics*, 3(4):47-49.

Levy C. and Mandel L. 2010. Calcified carotid artery imaged by computed tomography. *Int J Oral Maxillofac Surg*., 68:218–220.

Lumbreras B, Donat L, Hernández Aguad I. 2010. Incidental findings in imaging diagnostic tests: A systematic review. *The British Journal of Radiology*, 83:276–289.

Ohba T, Takata Y, Ansai T, *et al*. 2003. Evaluation of calcified carotid artery atheromas detected by panoramic radiograph among 80-year-olds. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*., 96:647–650.

Pekiner FN, Borahan MO, Gumru B, Aytuga E. 2011. A retrospective study to assess the rate of pathology and dental anomalies and to examine the value of panoramic radiographs in detecting these anomalies in paediatric patients. *J Maramara Univ Dent Fac*., 1(2):112-116.

Pornprasertsuk-Damrongsri S, Thanakun S. 2006. Carotid artery calcification detected on panoramic radiographs in a group of Thai population. *Surg Oral Med Oral Pathol Oral Radiol Endod*., 101:110–115.

Sisman Y, Ertas ET, Gokce C, Menku A, Ulker M, Akgunlu F. 2007. The prevalence of carotid artery calcification on the panoramic radiographs in Cappadocia Region population. *Eur J Dent*., 1:132.

Sung EC, Friedlander AH, Kobashigawa JA. 2004. The prevalence of calcified carotid atheromas on the panoramic radiographs of patients with dilated cardiomyopathy. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*., 97(3):404-7.

Tamura T, Inui M, Nakase M, Nakamura S, Okumura K, Tagawa T. 2005. Clinicostatistical study of carotid calcification on panoramic radiographs. *Oral Dis*., 11:314–317.

White SC. and Pharoah MJ. 2004. Oral Radiology Principles and Interpretation. St. Louis, Mosby5th ed. Extraoral Radiographic Examination, 191-206.

Yoon S, Yoon W, Kim O, Lee J, Kang B. 2008. Diagnostic accuracy of panoramic radiography in the detection of calcified carotid artery. *Dentomaxillofac Radiol*., 37(2): 104–108.

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