PREVALENCE OF SOFT TISSUE CALCIFICATIONS ON DIGITAL PANORAMIC RADIOGRAPHS: A RETROSPECTIVE STUDY

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Abstract

Introduction: When calcified salts are deposited in an unorganized fashion in soft tissue, it is called heterotropic calcification .Calcification of various structures located in the head and neck region are detected accidentally on panoramic radiographs during routine examination. Prevalence of soft tissue calcifications is fairly common & these should be identified to distinguish innocuous lesions from pathologies.

Aims & Objectives: To determine prevalence of visible soft calcifications in digital panoramic radiographs.

Materials & Methodology: A collective Data of digital panoramic radiographs were analysed in department of oral medicine & Radiology. A total of 500 digital panoramic radiographs were analysed for soft tissue calcifications. Out of these radiographs Males and females were included. Calcifications were recorded taking their anatomical site and the box in which they appeared into consideration and were categorized as rhinolith, antrolith, phlebolith, calcified lymph node and calcified atheromatic plaque.

Results : Patients identified with soft tissue calcifications comprised 0.02% & 0.014% tonsillolith 13% & 7.2% phlebolith, calcified lymph node , 50.6% & 43.4% calcified stylohyoid ligament , 6% & 4.6% carotid artery calcifications on right and left side of the radiographs respectively. The association of presence of calcification was analyzed with the chi square test (p= 0.82 & 0.03).

Conclusion: In the present study we found high prevalence of calcified stylohyoid ligament in comparison to other calcifications which was statistically significant (p= 0.82 & 0.03).

Key words: Dystrophic calcification, idiopathic calcification, metastatic calcification, panoramic radiography, prevalence, soft tissue calcifications.

INTRODUCTION

When calcium salts are deposited in an unorganized fashion in soft tissue, it is called heterotopic calcification, which is divided into three categories: Metastatic, idiopathic and dystrophic.

When the serum levels of calcium or phosphate increase, minerals precipitate into normal tissue causing metastatic calcification. Which usually occurs bilaterally and symmetrically. However, idiopathic calcification occurs in soft tissues even when there are normal serum calcium and phosphate levels. Dystrophic calcification is pathologic and occurs in degenerative and dead tissue despite normal serum calcium and phosphate levels, soft tissue damage caused by trauma, inflammation, injections, presence of parasites, changes arising from disease and calcifications localized to the site of injury. [1]

Calcification of various structures located in the head and neck region are detected accidentally on panoramic radiographs (OPGs) during routine examination of patients seeking dental care. Prevalence of soft tissue calcifications is fairly common and these should be identified to distinguish innocuous lesions from pathologies. Important criteria to be considered are the anatomic location, number, distribution and shape of the calcification.[2,3]

AIMS AND OBJECTIVES

1. To estimate the prevalence of soft tissue calcifications seen in digital OPGs.
3. To evaluate incidence of tonsillolith, sialolith, phlebolith, and lymph node, stylomandibular ligament, stylohyoid ligament and any other soft tissue calcifications seen in digital OPGs.

MATERIALS AND METHODOLOGY

A collective Data of digital panoramic radiographs were analysed in department of oral medicine & Radiology. A total of 500 digital panoramic radiographs were analysed for soft tissue calcifications. Calcifications were classified according to the site, number, distribution, shape and appearance and they were categorized by dividing the panoramic radiograph into 12 boxes arbitrarily, by a line drawn horizontally across the occlusal plane and another line drawn parallel to it along the lower border of mandible. Vertical lines were drawn along the posterior aspect of the ramus on both sides and along the centre followed by two other additional vertical lines drawn in between them. Accordingly, the OPG was divided arbitrarily into 12 boxes and numbered 1-12 as shown in Figure 1. Calcifications were recorded taking their anatomical site and the box in which they appeared into consideration. Following criteria were used to

identify different types of soft tissue calcifications According to Janisha Vengalnath et al in 2014)[1]

Rhinolith
Calcification was identified as a rhinolith if it was found in the third or fourth box on the medial aspect.

Antrolith
Calcification was identified as an antrolith if it was found in the antrum of the maxillary sinus in the third or fourth box.

Phlebolith
Calcification was identified as a phlebolith if it appeared as small, multiple concentric radiolucent and radiopaque rings, with the internal aspect homogenously radiopaque, giving a bulls eye or target appearance. This was confirmed if present in the 8th or 11th box.

Arteriosclerosis or calcified vessels
Calcification was identified as arteriosclerosis if it appeared as a parallel pair of thin radiopaque lines that had a straight/tortuous path involving the facial artery or the Carotid artery. This was confirmed if present in the 8th or 11th box.

Tonsillolith
Tonsilloliths are dystrophic calcifications as a result of chronic inflammation of tonsils. Calcifications were identified as tonsilloliths if they appeared as unilateral and multiple small radiopacities clustered together over the oropharyngeal air space, with or without overlapping the ramus. This was confirmed if present in the 2nd or 5th box.

Sialolith of submandibular gland
Calcification was identified as sialolith in the duct of the submandibular gland when it appeared cylindrical and very smooth in outline, single or multiple in number, and in the hilus, when they appeared larger and more irregularly shaped. This was confirmed if present in the 2nd or 5th box.

Calcified stylohyoid ligament
Calcification was identified as calcified stylohyoid ligament if it appeared as a linear ossification extending forwards from the region of the mastoid process and crossing the posterio-inferior aspect of ramus toward the hyoid bone. The ossified ligament was straight in outline and in some cases irregularity was seen in its outer surface. The calcification was considered a calcified stylohyoid ligament, if it started from the 6th box extending to the 11th box or from the 1st to 8th box.

Calcified lymph node
The most common location was the submandibular region at or below the inferior border of mandible near the angle. Calcification was identified as calcified lymph node affecting a single node or a series of nodes, when they appeared with a well-defined and irregular periphery with a lobulated appearance, similar to the outer shape of a cauliflower. It was considered if present
in the 8th or 11th box.

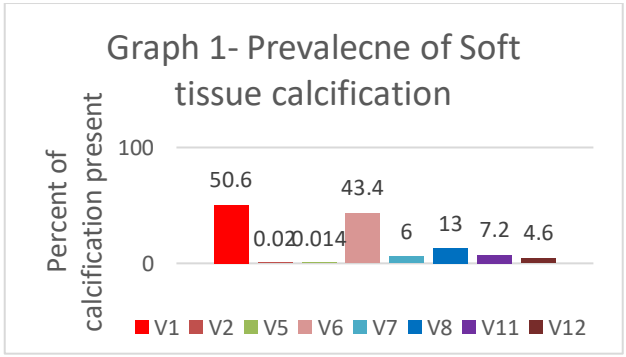
Calcified atherosclerotic plaques
Calcification was identified as atheromatous plaques when visible in the external carotid vasculature, superior or inferior to the greater cornua of hyoid bone and adjacent to the cervical vertebra, C3, C4 or the intervertebral space between them. It was considered if
Present in the 8th or 11th box.

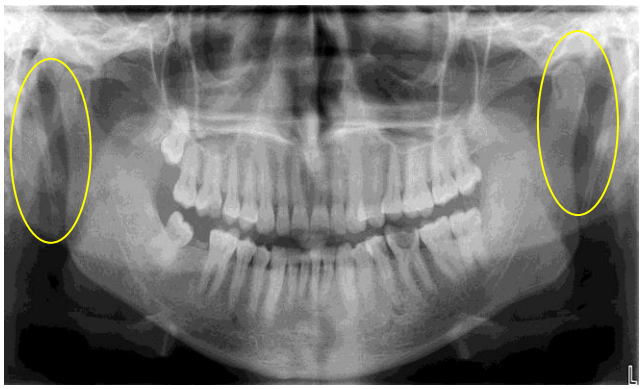
RESULTS AND DISCUSSION
All these radiographs were taken in a digital panoramic radiographic unit and Out of the 500 patients whose radiographic findings are noted for the evidence of calcifications. The number of radiographs with evidence of calcification was 254.
The radiographs were identified with soft tissue calcifications, Patients identified with soft tissue calcifications comprised 0.02% & 0.014% tonsillolith 13% & 7.2% phlebolith, calcified lymph node , 50.6% & 43.4% calcified stylohyoid ligament , 6% & 4.6% carotid artery calcifications on right and left side of the radiographs respectively. The association of presence of calcification was analyzed with the chi square test (p= 0.82 & 0.03).[4]
Soft tissue calcifications are fairly common in OPGs, but they are most commonly detected incidentally because they do not cause any signs or symptoms. Many of the structures in the head and neck region are in close proximity to one another which makes localization and identification difficult.[7,8]
In our study a total of 500 digital panoramic radiographs were viewed for evidence ofsoft tissue calcifications, the number of radiographs with evidence of calcification was 254(50.8%). Patients identified with soft tissue calcifications comprised 0.02% & 0.014% tonsillolith 13% & 7.2% phlebolith, calcified lymph node , 50.6% & 43.4% calcified stylohyoid ligament , 6% & 4.6% carotid artery calcifications on right and left side of the radiographs respectively. The association of presence of calcification was analyzed with the chi square test (p=0.000) According to Ram and Mansour in 1991 found more prevalance of tonsillolith under the age group of 40 years . We also found in high prevalence of tonsillolith in females. Hence our study is in accordance with Ram and Mansour et al .[5]
Previous studies reported a 2-11% prevalence rate of carotid artery calcifications in the dental patient population in a hospital based study, almost in agreement with the results of our study.[6]
In a study by Dov et al., the mean age of the people in the final positive count was 64 years, with a range of 55-84 years.[7] In a study done by Ohba et al. for evaluation of carotid artery atheromas detected by panoramic

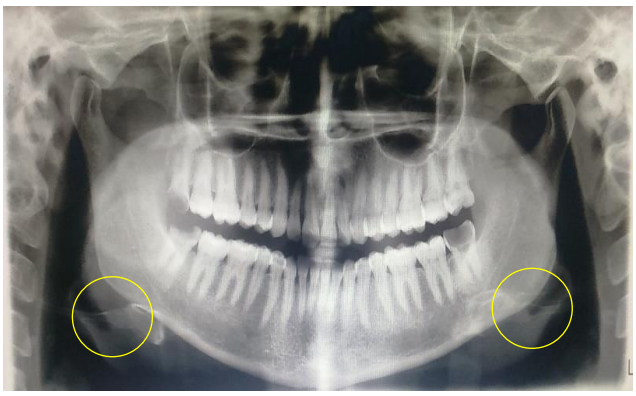
radiographs among 80-year-old individuals, 659 radiographs were obtained of which 33 were noted to have carotid artery atheromas, eight in males and 25 in females .[10]

Studies done by Mansour et al indicate that 4% of soft tissue calcifications are detected in OPGs.[3] Khan et al reported that 35% of patients had some form of soft tissue calcifications in the maxillofacial region in studies done on com puted tomography. Several studies have reported that carotid artery calcifications comprise a fairly greater amount of calcification. They also indicate that they can be used in the identification of soft tissue calcifications.

Bayer in 2000 reported that the images compatible with carotid artery calcification were more common in women (64.8%) than in men (32.5%). Our study is consistent with Bayer et al. although with a higher percentage difference between men (22%) and women (78%). Phleboliths and other calcifications were not observed in this research.







CONCLUSION

Majority of the calcifications encountered in the present sample were styloid chain calcifications compared with other soft tissue calcifications. It was concluded that panoramic radiography can be used as a tool to detect calcifications in the common carotid artery. Digital panoramic radiographs can serve as economic diagnostic tools for initial diagnosis of atherosclerotic conditions. Though we can accidentally detect the calcification in a radiograph which was taken for dental use, we cannot estimate the risk of stroke with the incidental finding of carotid artery calcifications on panoramic radiography only. Better designed studies should be done that report the result of long-term follow-up among patients with carotid artery calcifications compared with those without carotid artery calcifications. Further research is warranted before any suggestions can be made regarding detection of carotid artery calcifications on panoramic radiograph.

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