Dental, Oral and Craniofacial Research

Editorial ISSN: 2058-5314

Detection of calcifications within the course of internal carotid artery as incidental findings in CBCT scans. Is it important for patients?

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Stroke was the second most frequent cause of death after coronary artery disease in 2013, accounting around 6.4 million deaths (12% of the total). About 3.3 million deaths resulted from ischemic stroke [1]. A study embedded in the population-based Rotterdam Study that has comprised 2521 persons (mean age 69.7 ± 6.8 years) that underwent an MDCT scan has used multivariable logistic regression to investigate the associations of calcification in the internal carotid artery (ICA) with presence of stroke. It was found a strong and graded association of prevalent stroke with ICA calcification, independent of cardiovascular risk factors [2].

Calcification in atherosclerotic plaques is a marker of atherosclerosis and is related to cardiovascular disease [3]. The severity of intracranial artery calcification on brain CT is significantly correlated with coronary artery calcium scores as determined by CT coronary angiography among patients previously believed free of atherosclerotic heart disease [4]. Several non-invasive imaging technologies now make it possible to identify subclinical atherosclerosis before symptoms appear or major vascular events occur. These include B-mode ultrasound to measure carotid intima-media thickness, CT to measure coronary artery calcification, and high-resolution magnetic resonance imaging to evaluate plaque size and composition [5].

Many risk factors for atherosclerosis are known: diabetes, dyslipoproteinemia, tobacco smoking, dietary habits and elevated serum C-reactive protein concentrations [6,7]. Stroke risk is modifiable through many risk factors, one being healthy dietary habits. A study assessed the association between intake of total fiber and fiber sources and stroke incidence on 69,677 healthy Swedish adults (aged 45-83 y). During 10.3 y of follow-up, 3680 incident stroke cases were ascertained. The findings indicate that intake of dietary fiber, especially fruit and vegetable fibers, is inversely associated with risk of stroke [8].

Although several modifiable cardiovascular risk factors are associated with carotid calcification growth, a time and baseline calcification load remain the most important determinants of calcification development [9]. Face to these data and the high cost of treatment of stroke, preventive strategies should be thought [10].

Studies show that the quality of carotid atherosclerosis visualization by conventional CT does not differ from that of CBCT [11,12]. A study that evaluated the incidence of extracranial calcifications in course of ICA (ExCICA) and intracranial calcification in ICA (InCICA) on cone beam computed tomography scans shows that the possibility of detectable ExCICAs and InCICAs increases with increasing age; this is more prominent for InCICAs. The possibility of detecting ExCICAs and InCICAs in the 60-69 age group increased, respectively, up to 12.46 and 20.32 times compared with the 40-49 group [13]. Other study with CBCT scans reveals that the identification of certain anatomic landmarks enables the detection of calcifications as incidental findings along the course of the segments of the ICA, including the extracranial C1 segment and the intracranial petrous (C2), lacerum (C3), cavernous (C4), clinoid (C5), and ophthalmic (C6) segments. Furthermore, carries that the stringency of calcification increases with increasing age, especially in the C1, C4, and C5/ C6 segments [14].

The CBCT imaging protocol should include the smallest FOV necessary and available [15]. However, in several situations, patients are undergone larger FOV for dental purposes, as in cases of implants placement in both dental arcs and mostly for orthognathic surgery planning. Either way all CBCT volumes, regardless of clinical application, should be evaluated for signs of abnormalities systematically [15]. Oral radiologists should be attent and aware that ICA calcification is a serious incidental finding that should unquestionably involve referring of these patients to physicians for further evaluation [16].

Thus, knowing the chance of calcifications detection in the intra and extracranial segments of the ICA according to the age group, the magnitude and location more frequent in each intracranial segment, can make identification easier by oral and maxillofacial radiologists. Finally, we can assume that CBCT is an opportunity for the early identification of calcifications in the ICA and this way to contribute unequivocally to more accurate medical treatment strategies.

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Received: February 04, 2017; **Accepted:** February 16, 2017; **Published:** February 20, 2017

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