EDITORIAL

Cone beam CT incidental findings: intracranial carotid artery calcification—a cause for concern

Dentomaxillofacial Radiology (2013) 42, 20130347. doi: 10.1259/dmfr.20130347

Cite this article as: Schulze R, Friedlander AH. Cone beam CT Incidental findings: intracranial carotid artery calcification—a cause for concern. *Dentomaxillofac Radiol* 2013; 42: 20130347.

You may wonder why, as an exception, this editorial is co-authored by Arthur Friedlander from UCLA Dental School, LA. Well, he is currently actively involved in a discussion of obvious importance to the DMFR community. A recently published article noted that intracranial carotid artery calcifications (ICACs) were identified in 4 (2.4%) individuals (statistics recalculated by this correspondent) who were likely nested in the oldest cohort ($n=169$; age range, 50–85 years) of dental school clinic attendees having cone beam CT scans, in the main for implant placement.¹ Using the best available evidence at the time, the authors concluded that no referral or intervention was warranted for these individuals because a study involving 406 (mainly Caucasian) patients (males, 60%; mean age, 62 ± 14 years) with ischaemic cerebrovascular symptoms (amaurosis fugax, transient ischaemic attack, stroke) could not associate the presence or volume of ICAC (as determined by multidetector CT angiography) with the patients' symptomatic side.² A review of more recent research, however, demonstrates the need to refer such patients to a physician because the data demonstrate that ICAC is a risk indicator of atherosclerotic disease burden across ethnic lines in both the cerebrovascular and cardiovascular distribution of healthy and symptomatic individuals.

Specifically, the results of a recent study completed in Rotterdam, Netherlands, demonstrated that ICAC evidenced on non-contrast enhanced CT was prominently associated with the concomitant presence of MRI markers of vascular brain disease in healthy individuals.³ This investigation, conducted amongst 885 community-dwelling adults (males, 49.2%; mean age, 66.7 ± 5.5 years), demonstrated that higher calcifi-

cation load and volume in the ICAC were prominently associated with MRI-determined increasing volume of white matter lesions known to be associated over time with development of cognitive impairment. These findings are substantiated by a study conducted in the USA which evaluated 108 consecutive multiethnic (African-American, Hispanic, Caucasian) patients (males 46%; mean age, 57.3 ± 12 years) admitted to the stroke service at Parkland Hospital in Dallas, TX.⁴ The researchers noted that extensive calcification of the ICAC on head CT was associated with high-grade stenosis (greater than or equal to 50%) on follow-up catheter-based cerebral angiographic study. These findings are supported by two other studies conducted in the Republic of Korea among groups of Asian patients admitted to major medical centers with symptomatic (acute ischaemic stroke/transient ischaemic attack) cerebrovascular disease. In the first project conducted amongst 159 consecutively treated patients (males, 61%; mean age, 66 ± 12 years), the extent of ICAC calcifications (as determined by unenhanced CT) was significantly associated with MRI-demonstrated periventricular and deep white matter hyperintensities and lacunar lesions.⁵ In the second Korean study evaluated, 314 patients (males, 65%; mean age, 66.3 ± 12.6 years), the severity of ICAC calcification on brain CT was significantly correlated with coronary artery calcium scores as determined by CT coronary angiography among patients previously believed free of atherosclerotic heart disease.⁶

Atherosclerosis is a generalized process affecting multiple vascular beds with arterial calcifications

associated with more advanced states of disease. Cerebral calcification is a validated risk indicator of a diffuse atherosclerotic process in cerebral circulation and coronary artery atherosclerosis. The intention of this editorial is to make oral and maxillofacial radiologists aware that ICAC is a severe incidental finding that should definitely result in referral of these patients to physicians for further evaluation.

Ralf Schulze
Editor

Arthur H. Friedlander
Professor, Oral and Maxillofacial
Surgery
UCLA Dental School
Director, Graduate Medical
Education
VA Medical Center
LA
USA

References

1. Price JB, Thaw KL, Tyndall DA, Ludlow JB, Padilla RJ. Incidental findings from cone beam computer tomography of the maxillofacial region: a descriptive retrospective study. *Clin Oral Implants Res* 2012; **23**: 1261–1268. doi: [10.1111/j.1600-0501.2011.02299.x](https://doi.org/10.1111/j.1600-0501.2011.02299.x)
2. de Weert TT, Cakir H, Rozie S, Cretier S, Meijering E, Dippel DWJ, van der Lugt A. Intracranial internal carotid artery calcifications: association with vascular risk factors and ischemic cerebrovascular disease. *AJNR Am J Neuroradiol* 2009; **30**: 177–184. doi: [10.3174/ajnr.A1301](https://doi.org/10.3174/ajnr.A1301)
3. Bos D, Ikram MA, Elias-Smale SE, Krestin GP, Hofman A, Witteman JCM, van der Lugt A, Vernooij MW. Calcification in major vessel beds relates to vascular brain disease. *Arterioscler Thromb Vasc Biol* 2011; **31**: 2331–2337. doi: [10.1161/ATVBAHA.111.232728](https://doi.org/10.1161/ATVBAHA.111.232728)
4. Kassab MY, Gupta R, Majid A, Farooq MU, Giles BP, Johnson MD, et al. Extent of intra-arterial calcification on head CT is predictive of the degree of intracranial atherosclerosis on digital subtraction angiography. *Cerebrovasc Dis* 2009; **28**: 45–48. doi: [10.1159/000219296](https://doi.org/10.1159/000219296)
5. Chung P-W, Park K-Y, Moon H-S, Kim Y-B, Youn Y-C, Byun JS, Kwon OD. Intracranial internal carotid artery calcification: a representative for cerebral artery calcification and association with white matter hyperintensities. *Cerebrovasc Dis* 2010; **30**: 65–71. doi: [10.1159/000314622](https://doi.org/10.1159/000314622)
6. Ahn SS, Nam HS, Heo JH, Kim YD, Lee S-K, Han KH, Choi BW, Kim EY. Ischemic stroke: measurement of intracranial artery calcifications can improve prediction of asymptomatic coronary artery disease. *Radiology* 2013; **268**: 842–849. doi: [10.1148/radiol.13122417](https://doi.org/10.1148/radiol.13122417)