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Carotid calcifications in panoramic radiographs in relation to carotid stenosis

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Avhandlingen kommer att försvaras på engelska.

Fakultetsopponent: Professor, Kostas Tsiklakis, National and Kapodistrian University of Athens, Athens, Greece.

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Abstract

Calcifications in carotid atheromas can be detected in a panoramic radiograph (PR) of the jaws. A carotid artery calcification (CAC) can indicate presence of significant (≥ 50%) carotid stenosis (SCS). The aim of this thesis was to (1) determine the prevalence of SCS and burden of atherosclerotic disease among patients revealing CACs in PRs, (2) determine the prevalence of CACs in PRs among patients with SCS, (3) analyze whether the amount of calcium and/or (4) the radiographic appearance of the CACs, can improve the positive predictive value (PPV) for SCS detection among patients with CACs in PRs.

The thesis is based on four cross-sectional studies. Two patient groups were prospectively and consecutively studied. Group A represented a general adult patient population in dentistry examined with PR presenting incidental findings of CACs. These patients were examined with carotid ultrasound for presence or absence of SCS and their medical background regarding atherosclerotic related diseases and risk factors was reviewed. An age and gender matched reference group was included for comparisons. Group B comprised patients with ultrasound verified SCS, examined with PR prior to carotid endarterectomy. The PRs were analysed regarding presence of CACs. The extirpated plaques were collected and examined with cone-beam computed tomography (CBCT) to determine the amount of calcium. The radiographic appearance of CACs in PRs from Group A and B were evaluated for possible association with presence of SCS.

In Group A, 8/117 (7%) of patients with CAC in PRs revealed SCS in the ultrasound examination, all were found in men (8/64 (12%)). Patients with CACs in PRs revealed a higher burden of atherosclerotic disease compared to participants in the reference group ($p < 0.001$). In Group B, where all patients had SCS, 84% revealed CACs in PRs and 99% of the extirpated plaques revealed calcification. CACs with volumes varying between 1 and 509 mm^3 were detected in the PRs. The variation in volume did not correlate to degree of carotid stenosis. The radiographic appearance that was most frequently seen in neck sides with SCS (65%) was also frequently found in neck sides without SCS (47%) and therefore the PPV did not improve compared to the PPV solely based on presence of CACs.

CACs in PRs are more associated with SCS in men than in a general population and patients with CACs in PRs have a higher burden of atherosclerotic disease. The majority of patients with SCS show CACs in PRs and the majority of extirpated carotid plaques reveal calcification. The volume of CAC and specified radiographic appearance does not increase the PPV for SCS in patients with CACs in PRs. In conclusion patients with CACs in PRs, and without previous record of cardiovascular disease, should be advised to seek medical attention for screening of cardiovascular risk factors.

Keywords
Carotid stenosis; panoramic radiography; calcification; atherosclerosis

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