Association between coronary plaque vulnerability and periodontal disease in patients with unstable angina - results from the ATHERODENT study

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Background: The role of periodontal disease as a mediator of systemic inflammation and as a cardiovascular risk factor has been well established; however its role as a marker of coronary plaque vulnerability in patients with acute coronary syndromes has not been elucidated so far.

Purpose: To evaluate the interrelation between severity of periodontal disease (PD) and coronary plaque vulnerability, in patients with unstable angina, who undergo coronary computed tomography angiography (CCTA).

Methods: The study included 52 patients with unstable angina, enrolled in the ATHERODENT clinical trial (NCT03395041), who underwent: (1) complex dental examination for assessment of periodontal diseases as expressed by periodontal index (PI), composed by gingival index, plaque index, tratrum index, furcation index, mobility, loss of attachment, pocket depth and papillary bleeding index and (2) CCTA for analysis of morphology, composition and vulnerability features of the culprit coronary plaques causing myocardial ischemia. The study population was divided into two groups according to the median value of the total PI, which was set at 22. Group 1 included 26 patients with low periodontal index and group 2 included 26 patients with high total PI.

Results: The total PI significantly correlated with the total coronary artery calcium score ($r=0.45$, $p=0.0008$). Compared to patients with low PI, those with high PI presented a significantly higher coronary calcium score ($505.29±478.64$ vs. $93.82±233.0$, $p=0.0001$), and a significantly higher plaque volume in the culprit lesion ($p=0.019$), with more increased non-calcified plaque volume ($p=0.002$). At the same time, patients who exhibited high risk features in the culprit coronary plaques (positive remodeling, low density atheroma, spotty calcification and napkin-ring sign, all markers of increased vulnerability) presented significantly higher degree values of indices for the severity of the periodontal disease: loss of gingival attachments ($3.6±2.91$ vs. $1.66±1.8$, $p=0.009$), papillary bleeding index ($4.5±3.06$ vs. $2.04±1.96$, $p=0.002$) and a significantly higher PI compared to those with low risk plaques ($28.20±13.34$ vs. $18.71±11.31$, $p=0.001$).

Conclusions: In patients with unstable angina, the presence of periodontal disease (as expressed by a higher PI) is associated with a more vulnerable phenotype of the atheromatous coronary plaque. Furthermore, patients who exhibit high-risk features of the culprit coronary plaques causing myocardial ischemia, present an increased severity of the PD as compared to patients with low-risk atheromatous lesions.