The unstable coronary plaque rupture, followed by clot and the subsequent calcium deposit formation, is an integral and widely recognized process involved in atherogenesis. The calcium deposits are believed to be found in the atherosclerotic lesions within the arterial wall (fig. 1) and not in normal vessels. The coronary calcifications are more common in the elderly, however they have been also occasionally reported in individuals in their twenties, which may reflect the early stages of atherogenesis. The coronary artery calcium score (CACS), assessed by means of computed tomography, is an acknowledged indicator of coronary atherosclerotic plaque burden [1]. Percentile charts have been developed to represent the expected extent of coronary calcification, depending on age and sex (fig. 2). In line with previous observations on gender differences in the prevalence of coronary calcification, on depending on age and sex (fig. 2). In line with previous observations on gender differences in the prevalence of atherosclerotic vascular disease, the CACS values up to the age of 60 are typically higher in males; in older subjects the difference between males and females diminishes. Some regional differences in calcification distribution have also been noted. The CACS values obtained in European population tend to be lower than those in the North Americans, particularly in individuals with no cardiologic treatment record [2].

The need for intensive prevention of cardiovascular diseases remains beyond discussion in patients with a 10-year risk of coronary artery disease (CAD) exceeding 20% - the high risk group according to Framingham Risk Score (FRS). The majority of coronary events, however, occur in CAD patients with the intermediate long-term risk (10–20% risk of coronary events within 10 years). Numerous reports indicate a particular value of CACS, along with the FRS, in the prediction, if evaluated in combination, of coronary events in that group of patients [3,4].

The probability of the presence of CAD remains strictly related to CACS. The cut-off values, which are considered to differentiate between groups with low, intermediate and high risk of hemodynamically significant CAD incidence, are 100 and 400 Agarston units (A.u.), respectively. According to the published data, the myocardial perfusion determined in single photon emission computed tomography (MP-SPECT) proves impaired in less than 1% of patients with CACS below 100 A.u. The value of CACS exceeding 400 A.u. conveys a 40–50% risk of abnormal MP-SPECT findings. The intermediate values of CACS reflect approximately 12% risk of myocardial perfusion defect [5,6]. A head-to-head study, involving 140 patients, has been performed to compare MP-SPECT and full-protocol (both CACS and coronary angiography - CA) multislice spiral computed tomography (MSCT). Strikingly, only about a half of patients with unaltered myocardial perfusion in MP-SPECT were found to have a normal MSCT result [7]. These data indicate that both diagnostic methods along with high efficacy of MSCT and CACS complement in identifying the subclinical coronary arteriosclerosis.

Detection of particularly high CACS values (>800 or >1000 A.u. – center-dependable) most likely justifies performing invasive CA without prior MSCT CA. Such a view is...
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**validated by a remarkably high probability of hemodynamically significant stenosis occurrence in high-CACS patients.**

Furthermore, extensive coronary calcifications may severely hinder the reliability of CA interpretation in MSCT. The amount of coronary calcifications correlates with the presence and severity of stenoses demonstrated using invasive CA, no
It should be emphasized that CACS maintains a highly favorable benefit to risk ratio. The effective radiation dose conveyed by a contemporary 64-slice computed tomography protocol is estimated at about 11.0 ± 4.1 mSv [20]. Limitation of the procedure to CACS testing solely reduces the effective radiation dose to approximately 1–4.1 mSv [21]. This constitutes about a half of a yearly environmental radiation dose [22]. For comparison, a chest X-ray delivers an effective radiation dose of 0.2 mSv [22], while an invasive CA – roughly 2.1–5.6 mSv [22,23]. The CACS testing is a non-invasive procedure carries no additional risk of vessels cannulation complications, nor does it require contrast agent administration.

Despite the above mentioned observations the American College of Cardiology (ACC) statement, published in October 2006, remained rather conservative [24]. No indication for CACS testing in asymptomatic patients was found fully appropriate. Only in intermediate and high long-term CAD risk patients (>10% within 10 years according to FRS) was the method’s level of appropriateness defined as uncertain. In asymptomatic low risk subjects CACS testing was declared inappropriate. More favorable judgment of the technique has been introduced in the 2007 ACC/AHA guidelines. They emphasize the usefulness of CACS testing in asymptomatic intermediate CA risk patients (possibility of upgrading the high-CACS patient to the high risk group) as well as in low CAD risk patients with atypical symptoms (to reliably exclude CAD) [4].

We sincerely hope that further studies on a role of coronary calcium in estimating the total coronary risk along with the increasing accessibility of CACS testing, will increase the routine use of that valuable parameter.

REFERENCES


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