Coronary Artery Calcium Score - A Risk Predictor

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Editorial

Coronary artery disease (CAD) is manifestations of coronary atherosclerosis and symptomatic manifestations of CAD vary from sudden cardiac death, acute along with chronic coronary syndromes and heart failure. In certain individuals the process is relentlessly aggressive and accelerated clinical manifestations may lead to premature death. It is also known that almost 50% of all cardiovascular disease related deaths happen in patients with no prior symptoms or diagnosis.

CAD is single most important cause of mortality and morbidity across the globe irrespective of gender, social and economic status. It is thus quite natural that for years researchers are trying to understand the mechanism of evolvement of disease and predict those who are at high risk for accelerated disease progression.

Risk stratification would enable close monitoring and applying disease modifying therapies for those at enhanced cardiovascular risk. A patient with non-obstructive vulnerable plaque with luminal patency for blood flow in coronary arteries may have a normal stress test. This greatly limits the utility of stress test decreasing its positive predictive value. There are few other patients who are unable to exercise such as those with osteoarthritis and where risk stratification is even more needed. Coronary artery calcium (CAC) is an established non-invasive tool for assessing risk stratification and overall atherosclerotic plaque burden in asymptomatic primary prevention population. Infact it is the most robust risk calculator for intermediate risk population with more accuracy than other predictors such as estimation of high-sensitivity C-reactive protein and ultrasound testing for carotid-intima media thickness [1].

CAC is detected by using computed tomography and is quantified with the help of Agatston method (Table-1). It does not involve high radiation dose as coronary CT angiography and avoids injection of contrast media. Approximate

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radiation dose for a single test is 1 mSv. Thus, the fact that it is accomplished quickly without exercise effort by patient is a major advantage.

**Table 1: The risk category of myocardial infarction and coronary mortality at 10 years by coronary artery calcium score [2]**

<table>
<thead>
<tr>
<th>CAC Score</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>A zero score confers a very low risk</td>
</tr>
<tr>
<td>Jan-99</td>
<td>Low risk</td>
</tr>
<tr>
<td>100-399</td>
<td>Intermediate risk</td>
</tr>
<tr>
<td>101-399 and &gt;75th Centile</td>
<td>Moderately high risk</td>
</tr>
<tr>
<td>≥ 400</td>
<td>High risk</td>
</tr>
</tbody>
</table>

*CAC- coronary artery calcium

The greatest utility of CAC is in patients who are in low risk or intermediate risk categories. We must remember that those who are at elevated high risk would not be impacted even if CCS is low or zero. Utility of CAC helps us in identifying high risk individuals in intermediate risk population so that aggressive pharmacotherapy and intervening early if needed could be applied in them.

A low or even zero CAC should always be interpreted in high-risk individuals in presence of other comorbidities. It must be kept in mind that zero score would not rule out obstructive CAD, if the patient is at otherwise high risk due to presence of multiple risk factors. CAC remains a viable tool for patients with intermediate pre-test probability. This fact has been highlighted by a study published in this journal by Kagita et. al. Thus, it is not worthwhile to perform the test in those with established CAD or those with highly symptomatic status with multiple comorbidities [3-4].

CAC progression may happen over each passing decades and it also depends on risk factors present in the patient and the lifestyle patient pursues. It is important to understand the Understanding the risk stratification with the help of CAC, as that would enable a personalized approach for initiation of therapies such as aspirin, statins and aggressive risk factor management in high-risk individuals [5]. This also helps in forming decisions regarding rescanning of CAC time intervals.

Keeping in mind the current guidelines and thus summarising the ideal patient who would benefit from CAC would be more than 40 years of age, with intermediate-risk profile and who are mostly asymptomatic.

How best we can decide treatment based on CAC? A score more than 100 is an indication to start statins. On the other hand, if the score is 0, we may downgrade the risk and reassess the scan after 5 years. This observation is based on MESA (Multi-Ethnic Study of Atherosclerosis) in which it was observed 10 years MACE were 1.3%-5.6% for CAC.
= 0, and from 13.1%-26.6% for CAC >300. With other CV risk factors held constant, the MESA study estimated a 14% relative risk increment for every doubling of CAC [6-7].

Perhaps the greatest utility of CAC is in it being non-invasive, quick and without the need for exercise, which is quite a limiting factor for many patients such as with osteoarthritis. It also helps in patients with kidney disease where contrast conservation is an important prerequisite. It helps in risk stratification much more than other parameters such as HsCRP and carotid-intima media estimation. CAC also helps in giving the right patient the best current prevention medication such as aspirin and statins.

References: