Update on Coronary CT Calcium Score

Coronary artery disease is a condition in which fatty material and plaque buildup in the walls of the coronary arteries surrounding the heart muscle. When this happens, the artery narrows or becomes blocked, preventing adequate blood flow from reaching the heart, causing angina or heart attack.

PATHOPHYSIOLOGY OF CORONARY CALCIUM DEPOSITION Coronal classification occurs as part of the ongoing process. Overtime, lipid filled plaques undergo, dystrophic, calcification, a process mediated by inflammatory cells, vascular smooth muscle cells, and oxidative stress.

While calcification is typically associated with stable Plaques, a high calcium score correlates with greater burden of atherosclerosis and increased risk of heart attack and strokes.

FACTORS CONTRIBUTING TO CORONARY ARTERY CALCIFICATION -Age related vascular changes -Hypertension and abnormal functioning of the innermost layer of the coronary arteries(Endothelial dysfunction). -Abnormal lipids and chronic inflammation -Diabetes and pre-diabetes -Smoking and chronic oxidative stress -Genetic predisposition to arterial calcification -Chronic kidney disease and calcium-phosphorus metabolism disorders

CORONARY ARTERY CALCIUM AND PLAQUE STABILITY Studies have suggested that calcified Plaques maybe more stable compared to non-calcified soft Plaques, which are prone to rupture and cause acute cardiovascular events. However, a high overall coronary artery calcium score, still signifies an extensive atherosclerotic burden which necessitates aggressive prevention measures.

IDENTIFTING RISK Before coronary CT calcium scoring was available, risk was assessed with the physical examination and lab work. An individuals age, weight, blood pressure, cholesterol, and body mass index were entered into a formula, which calculates whether they were at low, intermediate or high risk.

However, some individuals thought to be at low risk still have heart attacks and strokes, so obviously, we were miscalculating risk in some individuals. This is where CT calcium scoring is useful. It helps to identify high risk, patience who were otherwise missed.

CALCIUM SCORE MEASUREMENT AND INTERPRETATION Coronary artery calcium scoring is performed using a non-contrast, cardiac CT and quantified using AGATSTON SCORING METHOD.

The total calcium score is stratified into these risk categories. -0: no detectable calcified plaque (very low risk) -1 to 100: Minimal to mild plaque (low to moderate risk) -101 to 400: moderate to severe plaque (high risk) -More than 400: Extensive plaque (very high risk)

LIMITATIONS OF CALCIUM SCORING While coronary artery, calcium scoring is a useful risk stratification tool, it doesn't provide information on noncalcified soft plaques, which can still cause significant cardiovascular risk. Complementary imaging method such as coronary CT angiogram. (CCTA), may provide additional insights into plaque composition

CALCIUM SCORE BY AGE AGE 20-39: - Most individuals have calcium score of zero - Any detectable calcium in this age group is concerning and suggest early atherosclerosis and should undergo aggressive risk factor modification AGE 40-49 -a calcium score of zero remains common in lower risk, individuals, but some Calcification may begin to appear in those with cardiovascular risk factors.

AGE 50-59 -The prevalence of coronary calcium increases significantly in this age group. A calcium score of 1 to 100 is common in this age group and scores more than 400 indicate high likelihood of coronary artery disease AGE 60 AND OLDER -most individuals in this age group will have some degree of coronary calcification.

Calcium score more than 400 are frequently observed, necessitating aggressive risk factor, modification, and further cardiac evaluation.

WHO SHOULD GET A CALCIUM SCORE TEST A calcium scoring test can assist your physician in making treatment decisions for people with borderline risk of heart disease. Calcium score testing results could help you if you are between the ages of 40 and 70 and increased risk for heart disease but don't have symptoms.

People at increased risk include -Have a family history of heart disease -use tobacco products, now or in the past -Have a history of high cholesterol, diabetes, or prediabetes or high blood pressure -Have overweight with a body mass index of greater than 25 or obesity with the body mass index of greater than 30 -Have inactive lifestyle If you are younger than 40 years old and high cholesterol runs in your family (familiar hyper cholesterolemia) , you might consider calcium score testing

WHO SHOUDN'T GET CALCIUM SCORE TEST Pregnant women should not have calcium scoring test because a CT scan could harm a fetus A calcium score test may not be helpful if you -Don't have any risk factors for heart disease -Have high risk of heart disease -Have a diagnosis of coronary disease or had prior treatment for coronary artery disease -Have symptoms that may suggest coronary artery disease -Want to know if your treatment for heart disease is working. -You are taking a high intensity, statin as a preventive measure, you don't need this test

HOW OFTEN SHOULD YOU HAVE A CALCIUM SCORE TEST You may see a benefit from having a calcium score test every 3 to 5 years. It's only helpful to repeat a scan if you had normal score meaning calcium score of zero, the first time and want to know if your risk is still low.

However, it is not helpful to repeat the test if you ever had an abnormal results before, meaning a calcium score greater than zero.

A coronary city calcium scoring test cost about $100 and usually insurance doesn't pay for it. The test itself takes less than a minute to perform. To have the test done, you need an order from a physician.

In summary, you want to be sure the test will answer your question. Calcium scoring does not identify soft, young plaques that can rupture causing a heart attack. Therefore, normal test may not be reassuring, if someone has just discomfort or difficulty in breathing. However, in someone who feels well, a calcium score of zero can indicate low risk of heart attack and stroke.

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