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A Novel Approach to Coronary CT Angiography Risk Stratification

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ABSTRACT

CCTA (Coronary Computed Tomographic Angiography) has been shown to be a promising noninvasive method for assessing Coronary Artery Disease (CAD) and cardiovascular risks. The existence, extent, and severity of CAD; coronary plaque burden; and features that are highly correlated with those on invasive coronary angiography can all be determined with CCTA. Furthermore, new CCTA techniques enable for the assessment of CAD's hemodynamic importance. CCTA has the potential to be utilised in place of other invasive or noninvasive treatments. This study outlines risk classification for coronary artery disease (CAD) based on morphological and hemodynamic information, coronary plaque features, and burden observed on CCTA. Coronary Artery Disease (CAD) continues to be the world's leading cause of significant morbidity and mortality. Recent sophisticated technologies allow patients with suspected CAD to estimate future cardiovascular risks by correcting a variety of CAD factors using a variety of invasive and noninvasive techniques. Multiple methodologies, such as anatomical information, which includes the presence, extent, and severity of CAD, hemodynamic information, and coronary plaque vulnerability, have all been widely employed for risk classification and discriminating. The recent FAME studies addressed an important question about how to best manage patients who would benefit from revascularization based on the hemodynamic or anatomical importance of their CAD. The prospect trial also demonstrated the usefulness of using Intravascular Ultrasonography (IVUS) to assess coronary plaque architecture, including severity, volume, and vulnerability, in predicting future cardiovascular risks. Because these CAD aspects help with risk classification and medical management, it's crucial to know how to pick the right patients and exams in a clinical context. Coronary Computed Tomographic Angiography (CCTA) is a noninvasive technique for assessing the existence and severity of Coronary Artery Disease (CAD) and risk stratification in people who have it. CCTA gives anatomical information, coronary plaque burden, and coronary plaque morphology that are not visible with ICA because to the great spatial and temporal resolution. A recent upgraded technology of CCTA may also allow identifying the hemodynamic relevance of CAD in addition to this benefit.The efficacy of CCTA in measuring anatomical and hemodynamic factors, as well as detecting plaque shape and burden for risk stratification.

INTRODUCTION

For many years, ICA has been the gold standard for determining the anatomical relevance of CAD. However, over two-thirds of participants receiving ICA did not have obstructive CAD, according to a recent comprehensive research by the American College of Cardiology National Cardiovascular Data Registry. Candidates for ICA should be carefully selected and have obstructive CAD in symptomatic patients or perhaps obstructive stenosis of the left main in asymptomatic patients, according to the most recent suitable usage guidelines.

Coronary Computed Tomographic Angiography is used to assess the functional status of coronary arteries

Even while CCTA has high diagnosis accuracy, the severity of anatomically significant coronary stenosis does not consistently predict CAD hemodynamic ischemia. Given recent advances in technology, three techniques for estimating the functional relevance of CAD by CCTA are currently available. CT Perfusion (CTP), like myocardial perfusion SPECT (MPS), can be used to assess myocardial ischemia caused by pharmacological stress. Several studies have indicated that CTP has high diagnosis accuracy when compared to MPS and MRI. This multicenter study found that when compared to the standard strategy of employing SPECT and ICA to identify patients with hemodynamic and anatomical significant CAD, this noninvasive approach using only CCTA can provide excellent diagnostic accuracy. Because a perfusion image during both rest and stress is required for diagnosis, CTP may provide an issue because it necessitates pharmaceutical administration, extra radiation, and contrast material for stress imaging.

Risk stratification for asymptomatic patients

Traditional clinical risk assessment, such as Framingham Risk Scores (FRS), has long been used to stratify asymptomatic individuals' predicted 10-year cardiovascular risk. FRS, on the

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other hand, may be underestimating the risk. Coronary Artery Calcium (CAC) scanning, on the other hand, is a noncontrast CT-based diagnostic tool for determining the presence and extent of calcified plaque in coronary arteries, as well as an examination for early detection of CAD and risk stratification for people with low-intermediate or intermediate CAD risk.

CONCLUSION

CCTA is the only noninvasive technique that can assess the existence and extent of CAD, its morphological and hemodynamic severity, the type and vulnerability of coronary plaques, and the atherosclerotic burden. All available data of CAD observed on CCTA may improve identification, discrimination, and reclassification of future cardiovascular risk by utilising these CCTA skills.