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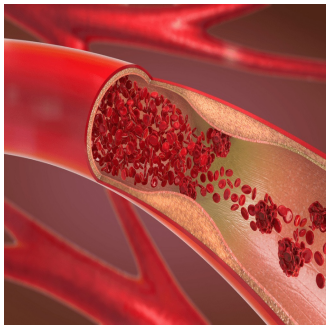
Coronary CTA Versus Functional Stress Testing for Diagnosing CAD



Coronary artery disease (CAD) is a leading cause of morbidity and mortality worldwide. Early and accurate diagnosis of obstructive CAD is crucial for preventing severe cardiac events. Two primary non-invasive methods are used for diagnosing CAD: coronary computed tomography angiography (CTA) and functional stress testing, which includes exercise electrocardiography (ECG) and single-photon emission computed tomography (SPECT). The Collaborative Meta-Analysis of Cardiac CT (COME-CCT) study aims to evaluate and compare the effectiveness of CTA with functional stress testing for the diagnosis of obstructive CAD, offering insights into which modality provides better diagnostic accuracy.

The Role of Coronary CTA in CAD Diagnosis

Coronary CTA has emerged as a valuable tool for diagnosing CAD, offering direct visualisation of coronary artery anatomy and identifying obstructive lesions. The COME-CCT study found that CTA has a significantly higher sensitivity and specificity than traditional stress tests like exercise-ECG and SPECT. Specifically, CTA achieved a sensitivity of 94.6% and a specificity of 76.3%, outperforming both ECG and SPECT, which had lower sensitivity and specificity values. These findings suggest that CTA is particularly effective at identifying obstructive CAD and may reduce the number of false negatives, ensuring that fewer patients with significant diseases go undiagnosed.

In clinical practice, coronary CTA is recommended for patients with intermediate pretest probabilities of CAD, where the likelihood of the disease is not too low to justify testing nor too high to require invasive procedures immediately. According to the study, CTA is also helpful in ruling out CAD, with a post-test probability of below 15% in patients with a pretest probability as high as 74%. This indicates that a negative CTA result can reliably exclude obstructive CAD, minimizing the need for further invasive testing such as coronary angiography.

Limitations of Functional Stress Testing

Functional stress testing, including exercise-ECG and SPECT, has been widely used for diagnosing CAD, particularly when there is uncertainty about whether chest pain is related to myocardial ischemia. However, the COME-CCT study highlighted significant limitations in these functional tests. Exercise-ECG showed a sensitivity of 54.9% and specificity of 60.9%, while SPECT had slightly better sensitivity at 72.9% but lower specificity at 44.9%. These lower diagnostic accuracies result in a higher likelihood of false negatives and false positives compared to CTA.

One key limitation of functional stress testing is that it does not provide direct anatomical information about the coronary arteries. Instead, it evaluates the physiological response to stress, which may miss subclinical or non-obstructive coronary lesions that could still be clinically significant. Furthermore, functional tests can be less reliable in certain patient populations, such as those with a high burden of coronary artery calcium or existing conditions that affect the heart’s response to stress.

Clinical Implications of the COME-CCT Findings

The findings from the COME-CCT study have significant clinical implications for how CAD is diagnosed and managed. CTA's superior diagnostic performance suggests that it should be considered the preferred non-invasive test for patients with stable chest pain and intermediate risk of CAD. This recommendation aligns with the growing evidence supporting CTA as a first-line diagnostic tool. For instance, guidelines from the National Institute for Health and Care Excellence (NICE) recommend CTA as the initial test for patients with suspected angina.

Incorporating CTA into routine clinical practice could improve patient outcomes by providing more accurate diagnoses, reducing the need for unnecessary invasive procedures, and enabling earlier initiation of preventive therapies, such as statins or aspirin. Moreover, CTA can identify non-obstructive plaque associated with an increased risk of future cardiovascular events, allowing clinicians to stratify patients' risk more effectively and tailor treatment accordingly.

Conclusion

The COME-CCT study clearly demonstrates that coronary CTA offers superior diagnostic accuracy over functional stress testing for diagnosing obstructive CAD. With its high sensitivity and specificity, CTA provides a more reliable assessment, especially in intermediate-risk patients. This makes it a valuable tool not only for diagnosing obstructive CAD but also for ruling it out, helping to avoid unnecessary invasive procedures. As a result, coronary CTA should be more widely adopted in clinical settings to improve the diagnosis and management of CAD. While still useful in certain contexts, functional stress testing has limitations that make it less suitable as a first-line diagnostic test for stable chest pain.

Source: Insights into Imaging

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