Abstract: Positive predictive value of computed tomography coronary angiography vs exercise stress test in the diagnose of obstructive coronary artery disease

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Topic(s):
Coronary CT Angiography

Citation:
Introduction: European Society of Cardiology (ESC) guidelines on the management of stable coronary artery disease (2013) suggests a stress test, either treadmill exercise stress test (EST) or, preferably, stress imaging test for the diagnosis of stable coronary artery disease. Computed tomography coronary angiography (CTCA), according to ESC, is reserved as an alternative or after a non-conclusive stress imaging test in a very specific group of patients within the lower range of intermediate pre-test probability. On the other hand, NICE guidelines, from United Kingdom (UK), suggests that new onset stable chest pain patients, as well as those with non-cardiac chest pain and an abnormal resting electrocardiogram, may be offered CTCA, as a diagnostic test.

Purpose: Authors aim to compare the positive predictive value of these two very different approaches to diagnose obstructive coronary artery disease: CTCA versus EST.

Methods: Audit study including two centres: one in the UK whose patients with stable chest pain are investigated with CTCA and one centre in Portugal whose patients with stable chest pain are investigated preferably with EST. The inclusions criteria were the following: for the UK centre, consecutive patients with stable chest pain referred to CTCA; for the Portuguese centre, consecutive patients with stable chest pain, a positive EST and referred to invasive coronary angiography (ICA). Obstructive CAD was defined as =50% stenosis in any epicardial coronary artery. Demographic, CTCA, EST and ICA data were collected. Statistical analysis was performed using STATA v14. p<0.05 was considered statistically significant.

Results: 800 patients were included in total, 400 from each centre. Patients from the UK centre were slightly younger (61 vs. 63.7 years, p<0.001) but with similar sex distribution (men: 52.6% vs 58%, p>0.05) and similar BMI (28.9 vs. 28.4 kg/m², p>0.05). In the UK centre, 387 (96.8%) CTCA were diagnostic. Positive CTCA, defined by obstructive CAD (CAD-RADS 3 – 5), was present in 92 (23.8%) patients. From these 92 patients with positive CTCA, 67 (72.8%) patients were referred to ICA and from these latter, 61 (91%) patients had obstructive CAD on ICA. The positive predictive value for CTCA in our sample was 91%. In the Portuguese centre, obstructive CAD on ICA was present in 205 (51.3%) patients, giving a positive predictive value in our sample for EST of 51.3%. The difference between positive predictive value of CTCA (91%) vs. positive predictive value of EST (51.3%) is statistically significant (p<0.0001).

Conclusion: In our study, CTCA had a higher positive predictive value than EST (91% vs. 51.3%). The strategy to use CTCA as first line test to investigate patients with stable chest pain can potentially avoid an important number of unnecessary ICA, driven by the higher positive predictive value of CTCA, when compared to the modest positive predictive value of EST.