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ORIGINAL ARTICLE

Pre- and post-test probability of obstructive coronary artery disease in two diagnostic strategies: Relative contributions of exercise ECG and coronary CT angiography☆

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Coronary artery disease;
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Abstract
Introduction: The aim of this study was to assess the change in the theoretical probability of coronary artery disease (CAD) in patients with suspected CAD undergoing coronary computed tomographic angiography as the first-line test compared to CCTA after an exercise ECG.
Methods: Pre- and post-test probabilities of CAD were assessed in 158 patients with suspected CAD undergoing dual-source CCTA as the first-line test (Group A) and in 134 in whom CCTA was performed after an exercise ECG (Group B). Pre-test probabilities were calculated based on age, gender and type of chest pain. Post-test probabilities were calculated according to Bayes' theorem.
Results: There were no significant differences between the groups regarding pre-test probability (median 23.5% [13.3–37.8] in group A vs. 20.5% [13.4–34.5] in group B; p=0.479). In group A, the percentage of patients with intermediate likelihood of disease (10–90%) was 90% before testing and 15% after CCTA (p<0.001), while in group B, it was 95% before testing, 87% after exercise ECG (p=NS), and 17% after CCTA (p<0.001).
Conclusion: Unlike exercise testing, CCTA is able to reclassify risk in the majority of patients with an intermediate likelihood of obstructive CAD. The use of CCTA as the first-line diagnostic test for CAD may be advantageous in this setting.

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PALAVRAS-CHAVE
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Probabilidade teórica de doença coronária pré- e pós-teste em duas estratégias diagnósticas – Contributo relativo da prova de esforço e da angio-Tc cardíaca

Resumo
Introdução: A prova de esforço (PE) continua a ser o exame de 1.ª linha no diagnóstico de doença coronária (DC), mas por vezes a angio-TC é já o primeiro estudo solicitado. O objetivo deste estudo foi avaliar a evolução da probabilidade teórica de DC obstrutiva em doentes que efetuaram angio-TC cardíaca como exame de 1.ª linha *versus* doentes submetidos a angio-TC após PE.
Métodos: De um registo prospetivo de angio-TC cardíaca, selecionámos 292 doentes avaliados por suspeita de DC, dos quais 158 efetuaram AngioTC como exame de 1.ª linha (Grupo A) e 134 após PE (Grupo B). Em cada doente, a probabilidade pré-teste de DC obstrutiva foi estimada com base no sexo, idade e sintomatologia. As probabilidades pós-teste foram calculadas de acordo com o teorema de Bayes.
Resultados: Não se registaram diferenças significativas entre os dois grupos quanto à probabilidade pré-teste inicial (mediana 23,5% [13,3-37,8] no grupo A *versus* 20,5% [13,4-34,5] no grupo B; p=0,479). No grupo A, a percentagem de doentes com probabilidade intermédia (10-90%) foi de 90% antes do exame, e de 15% após a Angio-TC (p<0,001). No grupo B, a percentagem de doentes com probabilidade intermédia foi de 95% antes dos exames, de 87% após a PE (p=NS), e de 17% após a Angio-TC (p<0,001).
Conclusão: Ao contrário da PE, a angio-TC permite reclassificar o risco na maioria dos doentes que apresentam probabilidade intermédia de DC obstrutiva. O uso da angio-TC como exame diagnóstico de primeira linha poderá ser vantajoso neste contexto.

Introduction

Clinical assessment of patients with suspected stable coronary artery disease (CAD) often includes non-invasive exams. An exercise ECG is usually the first-line exam in this context,[1] complemented by other functional tests such as stress echocardiography (SE) and myocardial perfusion scintigraphy (MPS). In recent years, coronary computed tomographic angiography (CCTA) has been increasingly used as a valid alternative in patients with intermediate or low pre-test probability[2] and in some cases it is now the first exam requested. The value of any diagnostic test depends on how the result changes the patient's pre-test probability, ideally either increasing it to a level that justifies invasive coronary angiography or reducing it to a level where the diagnosis can be excluded. The aim of this study was to assess the change in the theoretical probability of obstructive CAD in patients undergoing CCTA as the first-line exam compared to CCTA after an exercise ECG.

Methods

From a prospective registry of 575 patients who underwent CCTA at Hospital dos Lusíadas between January 2009 and April 2011, we selected those for whom the indication was clinical suspicion of CAD. Asymptomatic patients and those with documented CAD, particularly those with a history of acute coronary syndrome, myocardial revascularization or coronary stenosis $\geq$50% on previous invasive coronary angiography, were excluded. Patients who had been referred following imaging studies of myocardial ischemia (SE or MPS) were also excluded. The 292 patients included in the analysis were divided into two groups according to the diagnostic approach: CCTA as the first-line exam (group A) or an exercise ECG followed by CCTA (group B).

Pre-test probability

The pre-test probability of obstructive CAD was determined for each patient using the predictive model of Genders et al.,[3] who updated and extended the previous model of Diamond and Forrester.[4] The variables considered in the latest model are age, gender and symptoms (classified as typical chest pain, atypical chest pain or non-specific chest pain). The probability function, estimated by the logistic regression model used, is expressed as: $f(z)=1/(1+e^{-z})$, in which z represents the contribution of each of the variables involved and is equal to $-4.37+0.04\times$ age (in years) + 1.34 (in men) + 1.9 in the case of typical angina or 0.64 in the case of atypical angina.

Exercise ECG

Patients in group B underwent CCTA after an exercise ECG performed in the previous six months. The exercise ECGs