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ORIGINAL RESEARCH

Safety of early performance of the six-minute walk test following acute myocardial infarction: a cross-sectional study

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Abstract
Background: The six-minute walk test (6MWT) is a simple, low cost, reliable, and valid method for evaluating the functional capacity of cardiac patients. However, its early use and safety following acute myocardial infarction (AMI) is recent and has been little investigated.
Objective: To evaluate and to compare the safety and the cardiac behavior of early performance of the 6MWT in patients following uncomplicated AMI up to 4 days or more than 4 days after the event.
Methods: Following discharge from the Coronary Care Unit, 152 stable asymptomatic patients diagnosed with uncomplicated AMI performed the 6MWT. During the test, in addition to the distance walked, heart rate (HR), blood pressure (BP), and adverse events were also recorded. Electrocardiography was recorded using a Holter monitor in 105 patients. Patients were allocated considering two groups according to the number of days since AMI: Up to 4 Days Group and After 4 Days Group.
Results: All patients completed the 6MWT, 66 in the Up to 4 Days Group and 86 in the After 4 Days Group. The walking distance was similar in both groups (85% of the predicted value), as well as the physiological responses (increase in systolic BP and HR), reaching 63% (median) of maximum HR. Only 3.9% of patients had major complications (angina, drop in BP, or ventricular tachycardia), with no difference between the groups. None of the complications regarded as severe led to truly significant complications or death.

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Conclusion: The 6MWT was proven to be safe and feasible for early functional evaluation following uncomplicated AMI.

Introduction

The six-minute walk test (6MWT) is a simple, low-cost, valid and reliable method for evaluating functional capacity.[1,2] This test is widely used in the clinical management of patients suffering from chronic lung[3,4] and heart[5,6] diseases, but its use in acute myocardial infarction (AMI) prior to hospital discharge is still recent and has been little investigated.[7] A possible reason would be that the main guidelines for the 6MWT[2] do not recommend its performance within 30 days of an AMI event. There is no evidence to support restricting the use of the 6MWT after a recent AMI.[8]

Early exercise testing after AMI can be used to assess functional capacity and the ability to perform tasks at home and at work, to evaluate the efficacy of medical therapy, and to assess the risk of a subsequent cardiac event.[8] It is also important to initiate cardiac rehabilitation programs early, which is associated with decreased mortality[9,10] and improved quality of life.[9] The 6MWT may be a safe and viable option for the early evaluation of functional capacity following AMI,[11] as it is a self-regulated effort test that can reflect the level of activities of daily living.[1]

The improvement in treatment strategies for AMI is reflected by hospitalization time and patients without complications are often discharged in less than 5 days,[12] a fact that may hamper exercise testing before discharge. However, according to the guidelines of the American College of Cardiology/American Heart Association (ACC/AHA),[8,13] submaximal exercise tests can be performed 3–5 days after AMI in patients without complications. Despite this, limited data is available on the safety of early exercise testing after AMI[8] to support the performance of exercise testing before discharge.

Therefore, the objective of this study was to evaluate the safety of early performance of the 6MWT in patients following uncomplicated AMI from the moment of discharge from the Coronary Care Unit and to compare cardiac behavior between patients who performed the test up to 4 days or more than 4 days after the event. We hypothesized that the percentage of severe complications (i.e., angina, drop in blood pressure, and arrhythmias[14] as identified by Holter) during the test would be less than 2% and that they would not be influenced by the time since AMI.

Methods

The study was approved by the Research Ethics Committee of Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, MG, Brazil (approval no. ETIC 0515.0.203.000-10) and developed at the University Hospital of UFMG from March 2011 to April 2013.

Possible candidates were identified among patients admitted to the Coronary Care Unit with a diagnosis of uncomplicated AMI (Killip class I or II),[15] with or without ST-segment elevation (STE AMI or non-STE AMI) regardless of the reperfusion therapy – conservative, thrombolysis, percutaneous coronary intervention, or waiting for coronary artery bypass grafting. Different physicians using the same Coronary Care Unit protocol carried out the diagnosis. Furthermore, patients were required to meet the following inclusion criteria: age equal to or greater than 18 years, clinical and hemodynamic condition enabling discharge from the Coronary Care Unit and approval of the medical staff. The study did not include patients whose AMI event had taken place one week prior to the study or more, candidates with persistent arrhythmias (identified daily by electrocardiography), previous conditions associated with exercise intolerance (like pulmonary or peripheral arterial disease), signs and/or symptoms of angina at rest, unstable blood pressure levels, signs of active infection, or individuals/patients who presented changes that affected ambulatory ability. Killip class II patients with third heart sound and with extensive pulmonary crackles were also excluded.

Patients who met the research criteria were identified within 24 h of discharge from the Coronary Care Unit (even if they stayed in Coronary Care Unit waiting for a room) by means of medical record analysis, clinical evaluation, and discussion with the medical staff. When all of the criteria were met, the selected patient received clarification regarding the study and its objectives, risks, and benefits. Patients were then provided with an informed consent form and invited to participate in the study. At this time, depending on the number of days since AMI, patients were allocated into two groups: Up to 4 Days Group or After 4 Days Group. This cut-off point (4 days) was based on the time proposed by ACC/AHA Guidelines[8,13] for conducting submaximal exercise tests after AMI.

Six-minute walk test

The 6MWT was conducted following the guidelines proposed by the American Thoracic Society (ATS)[2] in a 30-m hallway adjacent to the Coronary Care Unit, marked by cones, and at a time with less circulation of people (''a real life condition''). The test was supervised by a physical therapist and the medical staff of the unit could be called if necessary. Heart rate (HR), blood pressure (BP), saturation of peripheral oxygen (SpO_2), and perceived exertion were assessed before and after the test (at the end and after five minutes), by means of the cardio frequency meter (Polar®, FS2c, Finland), auscultatory method, wrist oximeter (Mindray®, PM50, China) and the modified Borg Scale, respectively. HR

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