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The Effect of Supine and Sitting Recovery Positions on Heart Rate Recovery and Rate Pressure Product Following Six Minute Exercise Test in Patients Undergoing Coronary Artery Bypass Grafting

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Abstract

Aim & Objective: Ischemic heart disease is among the most common causes of death and disability in the world. The Indian subcontinent has among the highest rates of cardiovascular disease globally, which is estimated to be six fold higher in the urban areas. This has led to an increase in number of Coronary artery revascularization surgeries. The aim of this study was to determine whether there is any effect of recovery positions on heart rate recovery and myocardial oxygen consumption in patients undergoing CABG following six minute exercise test. **Methods:** This experimental study was based on the pre operative assessment for inclusion and exclusion criteria, the patients were randomly assigned to the two groups. Two six minute walk tests were performed each on the day before surgery and following CABG on fourth and seventh postoperative day and the dependent variables were measure. **Conclusion:** The study thus concluded that there is improvement in the heart rate measures and functional capacity following CABG. The heart rate recovery was found to vary with different recovery positions and was better in the supine lying position, when compared to sitting position.

Keywords: Autonomic nervous system; Phase I cardiac rehabilitation; Six minute walk test; Revascularization; Hear rate recovery.

Introduction

Ischemic heart disease is among the most common causes of death and disability in the world. The Indian subcontinent has among the highest rates of cardiovascular disease globally, which is estimated to be sixfold higher in the urban areas. Coronary heart disease manifests, on an average, almost 10 years earlier in the subcontinent compared with the rest of the world, resulting in substantial number of CHD deaths. This has led to an increase in number of Coronary artery revascularization surgeries. Myocardial revascularization by coronary artery bypass grafting (CABG) surgery is an effective measure for reducing the symptoms and mortality in patients with unstable or severe coronary artery disease.[1,2]

Profound derangement of the autonomic regulation of cardiac function has been reported after CABG and in severe cardiac diseases like myocardial infarction (MI) and Coronary Artery Disease. Several factors have been proposed to be responsible for the attenuation of vagal control of the sinoatrial node immediately after CABG such as nonspecific effects of recovery from general anesthesia, myocardial infarction or ischemia, reduced left myocardial function, perioperative stress responses, concomitant medication, or procedure-related causes, such as direct mechanical injury to vagus nerve, phrenic nerve or sinus node.[3,4]

Imbalance in the autonomic cardiovascular control has been shown to increase the risk for adverse cardiac events and sudden cardiac death, in patients with CAD and ischemic heart disease (IHD). Thus, the status of the autonomic nervous system (ANS) is a major

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determinant of cardiovascular health and prognosis.[5]

The heart rate response to dynamic exercise follows a well-defined pattern modulated by the balance between vagal and sympathetic activity. During exercise, the heart rate increases (initial transient) due to withdrawal of parasympathetic tone and increase in sympathetic tone. The fall in heart rate immediately after exercise (final transient) is considered a function of vagal reactivation. Thus, impaired vagal-dependent cardio protection can be assessed through varied patterns of heart rate behavior at rest, during initial and the final heart rate transients. Various studies have demonstrated that impaired initial and final HR transient (as measured during the first 1 or 2 min. of the post exercise period, both during maximal and sub-maximal exercise) are significantly powerful and independent predictors of cardiovascular mortality. In fact, these measures are more straightforward and easily obtained measurements than other indices of cardiac vagal tone.[6]

Though, there are certain issues that deserve further investigation due to great diversity of methods used to investigate heart rate recovery (HRR) including- test characteristics (maximal vs submaximal); different recovery times (from 30s to 5 min); recovery position (standing, sitting, supine or lateral decubitus), variable criterion for abnormality.[7]

The six-minute walk test (6MWT) is a simple test that is commonly used to assess the functional status of patients in a number of conditions including severe cardiopulmonary disease. It is safe, feasible, well tolerated and reproducible measurement of functional capacity in stable patients even within a week of uncomplicated myocardial infarction. Therefore, the test might be useful for the evaluation of exercise tolerance in phase I of inpatient cardiovascular rehabilitation programs in adult and older patients shortly after uncomplicated cardiac surgery.[8]

The review of literature suggests that various studies have examined improvement in HRR

Schematic Representation of Methodology