Abstract

Introduction: Individuals with coronary artery dissections are strictly limited in the type and intensity of activities in which they participate. This primarily is due to the fear of elevating blood pressure too quickly over a short amount of time and worsening the current dissection, or even causing a new dissection to form. These restrictions vary in each clinical setting, resulting in many individuals abandoning their occupations and exercise routines altogether in fear of exacerbating the condition. The current recommendations are mostly anecdotal and lack validity; therefore, specific measurements of physiological variables during resistance training are essential before placing needless restrictions on physical activity.

Purpose: The purpose of this case study is to provide a numerical value, dP/dT, to represent the increase in blood pressure over time during specific core exercises frequently restricted in SCAD patients, and compare these values to normal physical responses such as coughing, sneezing and the Valsalva maneuver.

Design: For this study, an in-depth, single subject observational and intervention design was used.

Methods: The participant performed five core resistance exercises and was instructed to cough, sneeze and attempt the Valsalva maneuver while being monitored using the Finometer continuous blood pressure monitor and telemetry. Changes in pressure over change in time (dP/dT) were calculated in mmHg/ms and recorded for each exercise.

Results: The mean dP/dT calculations are reported in order from highest to lowest: coughing (1.16 mmHg/ms), the Valsalva maneuver (1.08 mmHg/ms), sneezing (1.07 mmHg/ms), the plank (0.85 mmHg/ms), push up (1.01 mmHg/ms) at sit ups (1.00 mmHg/ms), mason twist (0.85 mmHg/ms), and lastly, the crunch (0.66 mmHg/ms). A one sample t-test was performed on the mean dP/dT of each core exercise in comparison to the cough and the p-values are p=.000, .003, .002, .000, and .000 respectively. No adverse events were recorded.

Conclusions: The conclusions reached by the data are that the core exercises, traditionally contraindicated due to the fear of increasing blood pressure too quickly, all have dP/dT values that are significantly less than the average cough. Each core exercise also had dP/dT values less than the sneeze and the Valsalva maneuver. This indicates that there are no restrictions on patients regarding coughing, sneezing or performing the Valsalva maneuver, there is no justification for restricting these core exercises. These results suggest that many restrictions to physical activity in SCAD patients need to be reconsidered or reevaluated using a measurement similar to the dP/dT method used in this study.

Introduction

Spontaneous coronary artery dissection (SCAD) is a phenomenon in which a tear in the intimal wall of the cardiac artery allows for blood to flow to be diverted into the wall of the artery in the heart. This condition potentially occludes the artery, restricting blood flow to the tissue and causing ischemia or infarction to the affected area of the cardiac muscle. Some theories suggest that it is the quick increase in pressure exerted on the blood vessels that potentially causes or exacerbates existing vascular dissections. This has led many clinical professionals to place strict guidelines and limitations on exercise participation for this patient population. Many of the current recommendations for patients with vascular dissections include low to moderate intensity, continuous exercise such as walking, and limiting or eliminating resistance training, especially core exercise, altogether. However, due to the limited amount of research involving SCAD, most exercise restrictions are anecdotal and unfounded in literature. Habitual physical activity is known to cause a decrease in blood pressure and heart rate over time, which would be a benefit to individuals in which elevated blood pressure is a detriment to their health. In addition, it is likely that such strict limitations to physical activity, specifically resistance training, may reduce functional capacity and quality of life in these patients. Consequently, involvement in regular physical activity may improve quality of life, mental health and functional capacity in patients with vascular dissections.

Methods

The participant performed two sets of five different core exercises commonly prescribed in a fitness setting: a 30 second plank, push-ups, Mason twists, sit ups and crunches. Her blood pressure was being continuously monitored by the Finometer Midi (ADInstruments) and LabChart data analysis system. The participant also was recorded while coughing, sneezing, and performing the Valsalva maneuver, in order to compare the restricted exercises to everyday activities that are not restricted. From this data, the change in pressure over the change in time (dP/dT) was calculated in order to obtain a numerical value of the abrupt, transient change in blood pressure that has been theorized to be the culprit causing SCAD. The data were analyzed using NCSS 11 Data analysis software.

Conclusions

Results of the t-test indicated a significantly lower change in pressure over time when performing a cough, the Valsalva maneuver and a sneeze than measured in any of the restricted core exercises: plank, push-up, sit up, Mason twist, abdominal crunch. Because coughing, sneezing and performing the Valsalva maneuver (often employed when having a bowel movement) are not restricted or advised against, it is reasonable for individuals with spontaneous coronary artery dissection to perform core exercises in regards to the transient blood pressure change. These results suggest that a measurement such as dP/dT can be used as an assessment of exercise safety in individuals living with spontaneous coronary artery dissection. Since physical activity improves quality of life, physical fitness, mental well-being, glycemic control as well as cardiorespiratory fitness, specific exercises should be evaluated by this measurement tool before placing needless restrictions on activity.