26248 - A SIMPLE MEANS OF EVALUATING PERI-OPERATIVE ENDOTHELIAL FUNCTION?

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Introduction: Flow mediated dilation (FMD) of the brachial artery is a widely used method of evaluating endothelial function and has been demonstrated to be a predictor of peri-operative outcome(1). In order for the brachial artery to dilate in the absence of an increase in pressure, there must be an increase in brachial artery compliance. This change in compliance should, according to the Bramwell-Hill equation, be manifest through a decrease in pulse wave velocity (PWV). This study was designed to test the effect of post-tourniquet release hyperemia on conduit artery PWV.

Methods: The study was approved by the CREB. In 20 healthy volunteers (10 male, 10 female) between the ages of 18 and 35 years old, the guidelines for measurement of tourniquet-induced FMD were applied(2). Arterial waveforms were recorded simultaneously from the right carotid artery, left and right radial arteries using microtip tonometers. The ECG was also recorded. Following control measurements, a tourniquet was inflated on the study arm to 100 mmHg above systolic pressure, and deflated after 5 minutes. Arterial waveform measurements were recorded for 90 seconds post-tourniquet release. Oscillometric blood pressures were recorded before control measurements and after the post-tourniquet measurements. PWV of each arm was calculated from the pressure wave transfer function for the control and post-tourniquet period.

Results: Following tourniquet release the PWV of the tourniquet arm changed from 751 (32) to 623 (21) cm/s ($P=0.0009$). The PWV of the control arm (772 (36) vs. 772 (35) cm/s, $P=0.92$), the mean blood pressure (84 (2) vs 83 (2) mmHg, $P=0.27$) and heart rate (60 (2) vs 60 (2) BPM, $P=0.84$) were unchanged following tourniquet release.

All values are mean (SE). P values are paired, two-way t-tests, comparing values before and following tourniquet release.

Discussion: The post-tourniquet release hyperemia was associated with a significant decrease in the PWV of the arteries of the upper extremity. This change represents the mechanical equivalent of the FMD, and is a function of brachial artery dilation and increased compliance. This technique may represent simple and robust method for quantifying peri-operative endothelial function.

1. Circulation 105: 1567-72, 2002.
2. JACC 39: 257-65, 2002.