Effect of Preload Changes on Pleth Variability Index during Liver Transplants.

Lobo E., Niemann C., Talke P. *Anesth Analg* 2009; 108:S-171

Introduction

Pleth Variability Index (PVI) is a measure of the dynamic changes in perfusion index (PI) that occur during the respiratory cycle. These variables are derived from the infrared light absorption waveform of a pulse oximeter (photoplethysmography). Theoretically PVI should reflect changes in intravascular fluid volume (preload). Reduction in preload should increase respiratory cycle induced changes in peripheral perfusion (increase PVI). The aim of this study was to determine if PVI would respond to acute preload changes during liver transplant operation.

Methods

PVI and PI and pulse rate (PR) data were downloaded every 2 seconds from Masimo Radical-7 pulse CO-Oximeters. Data from 16 consecutive liver transplant operations were used for analysis. Data were extracted for three different epochs: 1) immediately before clamping (10 min average), 2) average during clamping, and 3) immediately after unclamping (10 min average) of the inferior vena cava (IVC). Student's t tests were used to analyze data. Data are mean +/- SD.

Results

PVI increased in all individuals in response to IVC clamping (from 11.4 +/- 4.3 to 25.2 +/- 4.4. $p<0.0001$) and decreased in all individuals after unclamping (from 25.2 +/- 4.4 to 8.9 +/- 3.8. $p<0.0001$). PVI changed rapidly in response to clamping and unclamping of IVC. PI decreased from 2.9 +/- 0.7 to 1.0 +/- 1.4. ($p<0.0001$) in response to clamping and increased from 1.0 +/- 1.4 to 1.9 +/- 0.6 ($p<0.0001$) after unclamping of the IVC. Clamping and unclamping of the IVC had no effect on PR.

Discussion

These data demonstrate that PVI changed significantly in response to known acute changes in preload (clamping and unclamping of IVC). The decrease in PI during IVC clamping most likely reflects reduction of stroke volume and use of vasoactive drugs. These data suggest that PVI may have a role in monitoring intravascular volume in mechanically ventilated patients. Ongoing intraoperative studies will evaluate the clinical utility of PVI to assess intravascular fluid volume noninvasively.