**SCA 105**

## ASSESSMENT OF HEART-LUNG INTERACTIONS FOR FUNCTIONAL PRELOAD MONITORING IN MECHANICALLY VENTILATED CARDIAC SURGERY PATIENTS: INFLUENCE OF TIDAL VOLUME ON STROKE VOLUME VARIATION AND PULSE PRESSURE VARIATION

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**Background**: The specific interactions of the lungs and the cardiovascular system under mechanical ventilation cause cyclic variations of left ventricular stroke volume (stroke volume variation, SVV) and consequently variations of arterial pulse pressure (pulse pressure variation, PPV). (1,2) Functional preload monitoring by real-time measurement of SVV using arterial pulse contour analysis as well as measurement of PPV are useful to predict volume responsiveness and to monitor volume therapy in mechanically ventilated patients. (2,3) Aim of this study was to investigate the influence of the depth of tidal volumes (Vt) on SVV and PPV both, during volume responsiveness and after fluid resuscitation in patients following cardiac surgery.

**Methods**: 20 hemodynamically stable patients were studied immediately after CABG surgery. At baseline, SVV and PPV were measured at Vt of 5, 10 and 15 ml $kg^{-1}$ body weight in randomized order. Subsequently, patients were stepwise volume loaded until stroke volume index did not increase by more than > 10%. Then measurements of SVV and PPV were repeated at the respective Vt.

**Results**: All data are mean ± SEM. 13 patients responded to volume loading with an increase in stroke volume index > 10% proofing volume responsiveness at baseline. Those were included in further analysis. At baseline, i.e. during volume responsiveness, SVV at Vt of 5 ml $kg^{-1}$ (7 ± 0.7%) and SVV at Vt of 15 ml $kg^{-1}$ (21 ± 2.5%) differed significantly from SVV at Vt of 10 ml $kg^{-1}$ (15 ± 2.1%). Also PPV at Vt of 5 ml $kg^{-1}$ (9.2 ± 1) and PPV at Vt of 15 ml $kg^{-1}$ (18.8 ± 1.8) differed significantly from PPV at Vt of 10 ml $kg^{-1}$ (14.2 ± 1.8). SVV ($R = 0.57$; $p < 0.001$) and PPV ($R = 0.41$; $p < 0.01$) correlated significantly with Vt. After volume loading, SVV and PPV at the respective Vt were significantly reduced. Still, SVV at Vt of 5 ml $kg^{-1}$ (5.3 ± 0.6%) and SVV at Vt of 15 ml $kg^{-1}$ (16.2 ± 2.0 %) differed significantly from SVV at Vt of 10 ml $kg^{-1}$ (10.2 ± 1.0%). Also PPV at Vt of 5 ml $kg^{-1}$ (6.3 ± 0.6%) and at Vt of 15 ml $kg^{-1}$ (14.8 ± 1.8%) differed significantly from those at Vt of 10 ml $kg^{-1}$ (8.6 ± 0.9). SVV ($R=0.67$; $p<0.0001$) and PPV ($R=0.58$; $p<0.001$) correlated significantly with Vt.

**Conclusions**: Under mechanical ventilation, SVV and PPV are significantly influenced by the depth of tidal volumes. Correlation between Vt and SVV as well as PPV becomes closer after volume loading. This influence has to be regarded when using SVV or PPV for functional preload monitoring.

**References:**

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