Precision Resuscitation

Hemodynamic monitoring is thought to be useful in guiding resuscitation therapies, though static hemodynamic variables, like CVP, Ppao or LV end-diastolic volume do not define volume responsiveness. However, if Pra increases rapidly (>2 mmHg) during fluid resuscitation, fluid infusion should be stopped and RV function reassessed.

Dynamic hemodynamic measures show better utility, and their interpretation reflect functional hemodynamic monitoring. During positive pressure breathing, measures of left ventricular outflow variation quantified by either arterial pulse pressure (PPV) or stroke volume variation (SVV) vary in proportion to the host's volume responsiveness. The greater the degree of PPV or SVV the more cardiac output will increase to volume challenge. Similarly, the increase in arterial pulse pressure during transient end-expiratory pauses from positive pressure ventilation also predict volume responsiveness. In spontaneously breathing subjects or those with arrhythmias, one must use either the dynamic change in cardiac output in response to a passive leg raising maneuver or the effect of a small bolus fluid infusion.

The ratio of PPV to SVV defined the lumped dynamic arterial input elastance (Ea') and has a normal range of 1 to 2. If Ea' is < 0.8 then pathological vasodilation is present. Thus, in a hypotensive patient, if PPV/SVV is < 0.8 even if volume resuscitation increases cardiac output, blood pressure may not increase sufficiently to restore pressure-dependent organ blood flow and the combined use of vasopressors plus fluid resuscitation would be used.