The effects of vasoactive drugs on pulse pressure and stroke volume variation in postoperative ventilated patients

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Introduction: Although pulse pressure variation (PPV) and stroke volume variation (SVV) during mechanical ventilation have been shown to predict preload responsiveness, the effect of vasoactive therapy on PPV and SVV is unknown.

Methods: Pulse pressure variation and SVV were measured continuously in 15 cardiac surgery patients for the first 4 postoperative hours. Pulse pressure variation was directly measured from the arterial pressure waveform, and both PPV and SVV were also calculated by LiDCO Plus (LiDCO Ltd, Cambridge, United Kingdom) before and after volume challenges or changes in vasoactive drug infusions done to sustain cardiovascular stability.

Results: Seventy-one paired events were studied (38 vasodilator, 10 vasoconstrictor, 14 inotropes, and 9 volume challenges). The difference between the measured and LiDCO-calculated PPV was 1% ± 7% (1.96 SD, 95% confidence interval, r(2) = 0.8). Volume challenge decreased both PPV and SVV (15% to 10%, P < .05 and 13% to 9%, P = .09, respectively). Vasodilator therapy increased PPV and SVV (13% to 17% and 9% to 15%, respectively, P < .001), whereas increasing inotropes or vasoconstrictors did not alter PPV or SVV. The PPV/SVV ratio was unaffected by treatments.

Conclusion: Volume loading decreased PPV and SVV; and vasodilators increased both, consistent with their known cardiovascular effects. Thus, SVV and PPV can be used to drive fluid resuscitation algorithms in the setting of changing vasoactive drug therapy.