Correlation between carotid artery peak velocity variation with radial artery pulse pressure variation for prediction of fluid responsiveness in mechanically ventilated patient.

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Introduction: Nowadays, there are so many tools used to predict the hemodynamic response to fluid expansion in critically ill patients, most of them are invasive or require complicated monitoring devices. Most commonly used and reliable method to determine volume status is measuring pulse pressure variation(PPV) from the arterial line. There is one study that shows the good correlation between peak velocity variation of brachial artery and PPV, but sometimes, in the real practice, brachial artery is a bit difficult to measure by ultrasonography device due to its small size. So, the aim of this study is to determine the correlation between PPV and the peak velocity variation of the larger arteries which are carotid, subclavian, and femoral artery, and also the same correlation with brachial artery.

Methods: Ninety two patients was the result calculated based on previous study to make this study has 81% power. The peak velocity variation of each artery was measured and recorded by blinded anesthesiology resident using GE Logiq book XP ultrasonography device. Simultaneous PPV showed on the monitor was recorded by another blinded anesthesiology resident in the ICU.

Results: Twenty six patients were enrolled; twenty one in fluid non-responder group(PPV < 13%) and five in fluid responder group(PPV $\geq$ 13%). The peak velocity variation of subclavian and femoral artery was not measured because of the difficulty on finding. The peak velocity variation of carotid artery correlates well with PPV(r=0.42, P-value=0.05) and the optimal cutoff point is 9.88% for highly predictive PPV $\geq$ 13%(sensitivity, 60%; specificity, 100%). Unfortunately, in this study, the peak velocity variation of brachial artery does not correlate well with PPV(r=0.20, P-value=0.37).

Conclusions: The peak velocity variation of carotid artery with a cutoff point at $\geq$ 9.88% could be a feasible and noninvasive technique to determine the fluid responsiveness in critically ill patients with mechanical ventilation.