

Is the pulse pressure variation a good predictor of fluid responsiveness in mechanically ventilated patients with low tidal volume?

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Introduction

Dynamic preload indicators are superior to static indicators for predicting fluid responsiveness [1-3]. The aim of this study is to evaluate the influence of a low tidal volume on the capacity of pulse pressure variation (PPV) to predict fluid responsiveness.

Methods

A transversal and interventional study that included 30 critically ill patients with acute circulatory failure, sedated and mechanically ventilated with a tidal volume of 6 to 7 ml/kg. Mechanical ventilatory measurements including positive end-expiratory pressure plateau and peak pressures, static compliance and hemodynamic measurements including PPV, heart rate, mean systemic and pulmonary arterial pressures, central venous pressure, pulmonary capillary wedge pressure and cardiac index were obtained before and after fluid challenge, performed with 1,000 ml crystalloids or 500 ml colloids. Fluid responsiveness was defined as an increase in cardiac index of at least 15%.

Results

Thirty patients were enrolled: aged 56 ± 16.8 years, APACHE score = 28 ± 8 , male = 15; 19 patients with septic shock, one patient with sepsis, five patients in postoperative liver transplantation, three patients with acute pancreatitis, one patient with cardiogenic shock and one patient in postoperative aortic aneurysm. Before fluid challenge: total positive end-expiratory pressure = 09 ± 3.7 cmH₂O, static compliance = 34.3 ± 16.3 cmH₂O, pulmonary capillary wedge pressure = 13.8 ± 5 mmHg, central venous pressure = 11.6 ± 5 mmHg. Fourteen patients were fluid responders (Figure 1). The best threshold value of PPV was 10% (receiver operating characteristic curve area = 0.7, 95% CI = 0.51 to 0.9), sensibility of 50%, specificity of 94%, a positive predictive value of 88%, a negative predictive value of 68%, a positive likelihood ratio of 8.0 and a negative likelihood ratio of 0.53.

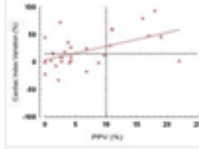


Figure 1. Relationship between the PPV and the cardiac index variation.

Conclusion

The baseline PPV is a good predictor of fluid responsiveness in mechanically ventilated patients with low tidal volume. The threshold value of 10% was associated with a significant increase in cardiac index after volume expansion.

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