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End-tidal carbon dioxide and arterial pressure for predicting volume responsiveness by the passive leg raising test: a commentary

Accepted: 20 March 2013
Published online: 25 April 2013
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A reply to this comment is available at
doi:[10.1007/s00134-013-2920-1](https://doi.org/10.1007/s00134-013-2920-1).

Dear Editor,

We read with interest the manuscript by Monnet et al. [1] concerning the role of end-tidal carbon dioxide (etCO₂) in predicting volume responsiveness by the passive leg raising (PLR) test. If we agree with these distinguished experts that it is important to study indices of preload dependence, in order to limit the deleterious effects of overfilling of critically ill patients, we just want to draw readers' attention to some limitations of this study. Indeed, we believe that the inclusion criteria for patients were not optimal to reach the same conclusions as the authors. First, the authors included 65 patients of which 17 % had arrhythmias [1]. We agree with the authors that the aim of this work is not to study the prediction of volume responsiveness

by the pulse pressure analysis and, as reported by the authors [1] as well as in a meta-analysis [2], the sensitivity of PLR remains good despite arrhythmia. However, a comparison of results between patients with or without arrhythmia could enhance the benefit of etCO₂ on volume responsiveness by the PLR test. In addition, the article does not mention the proportion of patients with arrhythmia that were included in the PLR test.

Second, 97 % of the patients included were in septic shock with ARDS [1]. As described by the same authors in other works, introduction of or change in norepinephrine dosage could influence the cardiac preload and minimize the variation of pulse pressure. Were modifications of norepinephrine between measurements in the patients studied?

Moreover, do we see the same results in patients without norepinephrine?

Third, the tidal volume used (6.4 ± 0.8 ml/kg of predicted body weight) in these patients was in the range recommended for this particular population. However, it is important to remember the effects of mechanical ventilation on the measurement of the pulse pressure variation as a low tidal volume [3], impaired respiratory system compliance or elevated respiratory rate [4], as all these patients should certainly have had. In other words, the results obtained were perhaps different in patients without ARDS. The authors should be commended for their excellent work, and as mentioned in the discussion, for the importance of

these findings in treating the very specific population studied [1]. Further studies on other categories of patients (severe sepsis, without low tidal volume) may confirm the interest of etCO₂ as a measure of preload dependence in critically ill patients.

Conflicts of interest The authors declare no conflict of interest.

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