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Reply to the commentary on "Integrated ultrasound protocol in predicting weaning success and extubation failure: a prospective observational study"

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Dear Editor,

We would like to thank Blanco *et al*. [1] for their comments on our study.

In our study protocol, we measured the lung ultrasound score (LUS) before and after the performance of spontaneous breathing test (SBT). However, we measured the diaphragmatic thickness fraction (DTF) and velocity time integral (VTI) change to passive leg raising (PLR) after SBT only. We are unsure whether measuring them twice at the beginning and end of an SBT would help us to predict weaning failure more reliably. It has been considered that diaphragmatic dysfunction is unlikely to manifest in the short duration of SBT due to accessory muscles compensating for diaphragmatic weakness in the initial period [2]. However, it would be interesting to see how VTI changes to a PLR manoeuvre would change after an SBT.

We chose to study the VTI response to PLR given its ease of bedside measurement and its ability to predict preload responsiveness, which has been found to mimic the workload imposed by increased venous return during spontaneous breathing. During a passive leg raise, an increase in venous return is caused by the translocation of blood from the legs and splanchnic circulation towards the heart. This leads to a sequential increase in preload of the right followed by the left ventricle. A normally functioning RV would respond to this increase in preload with an increase in stroke volume, which would lead to an increased preload of the left ventricle. A normally functioning left ventricle would then respond in sequence with an increase in stroke volume. In patients in whom the heart was unable to respond to a PLR with an increase in cardiac output, it was found that they had a higher likelihood of failing an SBT due to weaning-induced cardiac dysfunction [3]. Therefore, the PLR response to VTI seems to be a reliable proxy measure of preload intolerance, as was found in our study [4].

We agree with the authors that using the VExUS score can give us more information about congestion at the tissue level, and it would be interesting to observe its relation to extubation failures. However, we conducted this study long before VExUS scoring came into vogue, and therefore it was not a part of our study protocol.

Finally, we agree with the authors that more research is needed in this area to improve our understanding of various factors contributing to weaning failure and the ability of bedside sonography to predict it accurately.

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