

## Ultrasound in the critically ill: Look for Lung water!

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The use of ultrasound in the intensive care unit (ICU) is growing rapidly because of the problem of radiation hazard, the transportation of critically ill patients, and so on. Most of all, the most prominent area of ICU ultrasound is the lung ultrasound (LUS), with which it is really possible to look at the air inside the lung, previously considered only a kind of obstacle in the evaluation with ultrasound, from another perspective.<sup>[1]</sup> That is, in the normal lungs, the reverberation artifact caused by the air was referred to as "A-line," and we are able to define the ultrasonically normal lung with the finding of the "lung sliding." On the other hand, in pathologic lungs, excluding pneumothorax, and pleural effusion, lungs are filled by water or fluid, not air and able to be distinguished in terms of severity as "air-fluid ratio." Therefore, the situation that alveolus is still aerated, but interstitium is filled with water is called ultrasonically the "interstitial syndrome" which can be quantified in degree in terms of the "B lines"<sup>[2]</sup>.

Bouhemad *et al.*<sup>[3]</sup> observed that lung reaeration can be accurately estimated with bedside LUS in patients with ventilator-associated pneumonia treated by antibiotics. Ultrasound reaeration score was used to assess quantification of reaeration such as N - Normal; B1, multiple abutting ultrasound lung "comets" emanating from the pleural line or a small subpleural consolidation; B2, multiple irregularly spaced B-lines; C - Consolidation. They also showed that positive end-expiratory pressure-induced lung recruitment can be adequately estimated with bedside LUS by the same ultrasound aeration scoring system.<sup>[4]</sup>

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From this point of view, the interesting study in this issue of the Indian Journal of Critical Care Medicine<sup>[5]</sup> is a noteworthy investigation to widen the application of LUS in the ICU. The authors mentioned the change of extravascular lung water (EVLW) as similar to the interstitial syndrome, that it could be measured by the change of B-lines by ultrasound, and showed that the number of B-lines increase in shock patients with positive net fluid balance and correlated with impaired oxygenation. Even with too short a study period and with only 27 enrolled patients, this study has some value in casting some light on the relationship between ultrasound findings and physiological parameters in terms of fluid balance in shock patients. However, some cautious interpretations are needed because of including pneumonia patients and missing measurements of cardiac function.

Recently, important insights were published about initial fluid management and protocol-based care for septic shock. Still further debate is needed, as the results of large-scale randomized controlled trials<sup>[6,7]</sup> were not positive in terms of mortality and as Russell<sup>[8]</sup> pointed out that the target a mean arterial pressure (MAP) among patients of septic shock are probably critical to the success of the strategy and deserving of greater investigation. This means, we need more delicate surrogate parameters as resuscitation targets, not just MAP and therefore, EVLW measured by LUS might be one such marker. Why not all intensivists grab the probe and touch the lung?

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