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CORRESPONDENCE

Possible overestimation of chest wall driving pressure and underestimation of airway closure

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We were impressed by the report by Chen and colleagues [1]. Although we had expected transpulmonary driving pressure (DP_L) to be more prognostically relevant than airway driving pressure (DP_{aw}), this large cohort study, to the best of our knowledge, showed for the first time that DP_{aw} and DP_L had equivalent predictive power for mortality in patients with acute respiratory distress syndrome (ARDS). However, we would like to point out three concerns regarding this study.

First, the authors suggest that chest wall driving pressure (DP_{cw}) was associated with severity and outcome; however, this is controversial for the following reasons. There was no difference in DP_{cw} between survivors and non-survivors (Table 1), and the correlation between DP_{cw} and non-pulmonary sequential organ failure assessment (SOFA) (Pearson's correlation coefficient = 0.150) is weak. In addition, the association between DP_{cw} and 60-day mortality in Cox regression should be tested after adjusting for variables such as age, SOFA, and DP_L. Since DP_{cw} could have little effect on outcome, DP_L and DP_{aw} might have been equivalent predictors of outcome.

Second, there may be an error in the calculations for the elastance-derived plateau P_L shown in the supplement. The formula is shown as "$E_L/E_{rs} \times$ Directly-measured end-inspiratory P_L" however, we believe "$E_L/E_{rs} \times$ Pplat" is correct [2]. Since this may influence the prognostic value of elastance-derived plateau P_L, we suggest modifying the values or the calculation if necessary.

Third, in the limitation, the section on airway closure and airway opening pressure (AOP) may be misleading. The authors mentioned "only 4 (8.8%) patients received a clinical positive end-expiratory pressure (PEEP) below AOP;" however, we believe the authors should express that "only 4 (8.8%) patients received a $PEEP_{high}$ (15 or 18 cmH_2O) below AOP." Table 1 of the authors' previous study shows that 8.8% of their patients had AOP > $PEEP_{high}$ (15 or 18 cmH_2O), not clinical PEEP [3]. Since this present study's median clinical PEEP was 12, there might be more patients with airway closure than

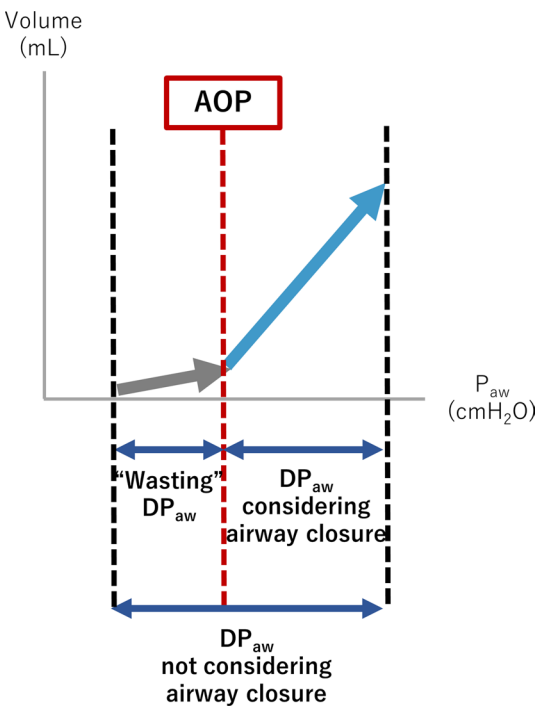

Fig. 1 Conceptual diagram of driving pressure of the patient with airway closure. *AOP* airway opening pressure, P_{aw} airway pressure, DP_{aw} airway driving pressure

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predicted. The presence of airway closure requires the pressure needed to open the distal airway, which can be termed “wasting” driving pressure (Fig. 1). Therefore, this "wasting" drive pressure due to airway closure can cause misinterpretation of the compliance as low. Although the association between driving pressure and mortality was found for obese and non-obese ARDS patients combined, no association was found when limited to obese patients only [4]. We assumed that this may be due to the “wasting” driving pressure generated by airway closure, which is frequent in obese patients [5]. If possible, we suggest that the authors compare whether DP_{aw} and DP_{L} are predictors of mortality separately for obese and non-obese patients. In addition to driving pressure, airway closure should always be evaluated in patients with ARDS, especially if obese, and future studies should evaluate whether driving pressure considering AOP is a predictor of outcome.

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Declarations

Conflicts of interest
The authors declare that they have no conflicts of interest.

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