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Comment on “Relationship between gas exchange response to prone position and lung recruitability during acute respiratory failure”

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Sir: We read with interest Dr. Protti et al.'s [1] investigation into the decrease of PaCO₂ during ventilation in the prone position and its relationship with lung recruitability measured via whole-lung computed tomography scanning (CT).

In their representative CT images of the low and high percentage of recruitable lung in Fig. 1, the heart size of the patient with high lung recruitability appears to be rather large prior to recruitment, suggesting the presence of an element of left ventricular failure. Although all patients fulfilled, according to the authors, consensus committee criteria for ALI or ARDS [2], the definition of

absence of clinical evidence of left atrial hypertension may be too loose in identifying a subset of individuals where left heart failure may at least be a contributing factor for arterial hypoxemia.

The high level of PEEP during the recruitment maneuver could have therefore led to significant pre- and afterload reduction, which in the failing left ventricle will, according to La Place's law, result in reduced chamber dimensions and wall stress and hence improved myocardial performance with reduction in pulmonary edema (second image at 45-cm PEEP).

Secondly, as previously described by J.J. Rouby and co-workers [3], the weight of the heart plays an important role in loss of aeration, especially of the lower lobes, which will be exacerbated in the context of heart failure and cardiomegaly [4]. In prone position the weight of the heart is supported by the sternum, reducing the anteroposterior pressure gradient on the dependent lung areas.

Although Malbouisson described a significant increase in cardiac dimensions in ARDS patients compared to healthy controls on CT imaging [3], it would be interesting to know if the heart size at baseline between high percentage “recruiters” and those showing a reduction in PaCO₂ during prone ventilation was significantly different to the rest of the study population in the present study. If this were to be the case, we wonder whether in addition to

recruitability during CT scanning, cardiac chamber size on CT imaging may be predictive of PaCO₂ response and recruitment during prone position.

References

1. Protti A, Chiumello D, Cressoni M, Carlesso E, Mietto C, Berto V, Lazzarini M, Quintel M, Gattinoni L (2009) Relationship between gas exchange response to prone position and lung recruitability during acute respiratory failure. *Intensive Care Med* 35:1011–1017
2. Bernard GR, Artigas A, Brigham KL, Carlet J, Falke K, Hudson L, Lamy M, LeGall JR, Morris A, Spragg R (1994) Report of the American-European consensus conference on ARDS: definitions, mechanisms, relevant outcomes and clinical trial coordination. The Consensus Committee. *Intensive Care Med* 20:225–232
3. Malbouisson L, Busch C, Puybasset L, Lu Q, Cluzel P, Rouby JJ (2000) Role of the heart in the loss of aeration characterizing lower lobes in acute respiratory distress syndrome. *Am J Respir Crit Care Med* 161:2005–2012
4. Weiner CM, McKenna WJ, Myers MJ, Lavender JP, Hughes JM (1990) Left lower lobe ventilation is reduced in patients with cardiomegaly in the supine but not the prone position. *Am Rev Respir Dis* 141:150–155

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