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Author's Reply to "APRV as a rescue for ARDS but use early to prevent it!"

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We thank Dr. Shiber for this letter (1). Evidence in favor of using airway pressure release ventilation (APRV) as a ventilation modality for ARDS is limited. The older studies cited in the letter include a randomized trial in trauma patients without and without ARDS (2), a retrospective study in trauma patients with and without ARDS (3), and a non-randomized trial with inverse ratio pressure control ventilation serving as the comparison (4). Other retrospective work has found an association between APRV and an increase in days requiring mechanical ventilation in trauma patients (5).

Dr. Shiber's letter also cites a potentially encouraging trial of APRV in ARDS patients (6). However, this trial had some important limitations. There was a significant difference in the baseline comorbidity burden in the APRV and control groups. In addition, although 61% of the control group had a $\text{PaO}_2/\text{FiO}_2 < 150$ mmHg, only 13% of this group received neuromuscular blockade, which is considerably lower than what would be expected for patients with this severity of ARDS. For these reasons we are hesitant to place much weight on this single-center study.

One additional study is worth considering: Maxwell et al. reported the results of a trial of 63 trauma patients with ARDS who were randomized to either APRV or low tidal volume ventilation (7). No significant differences in outcomes were observed. Based on the limited data for APRV in contrast to the strong data supporting a lung-protective low tidal volume strategy, in addition to the mounting evidence of harm for sustained periods of high mean airway pressure, we do not believe there is sufficient evidence to recommend APRV as a rescue therapy for patients with severe ARDS.

Finally, in our view, APRV should not be used in patients with risk factors for ARDS to prevent progression to ARDS. Dr. Shiber cites a study that compared outcomes from a single center retrospective review with results from a systematic review of other observational

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studies, excluding randomized controlled trials (8). While this type of research helps generate hypotheses and motivates further investigation, we do not think there is enough evidence to recommend APRV as a preventative therapy for ARDS.

References

1. Shiber JR: APRV as a rescue for ARDS but use early to prevent it! *Crit Care Med* 2019; in press.
2. Putensen C, Zech S, Wrigge H, et al. Long-term effects of spontaneous breathing during ventilatory support in patients with acute lung injury. *Am J Respir Crit Care Med*. 2001;164(1):43–49. [PubMed: 11435237]
3. Dart BW, Maxwell RA, Richart CM, et al. Preliminary experience with airway pressure release ventilation in a trauma/surgical intensive care unit. *J Trauma*. 2005;59(1):71–76. [PubMed: 16096541]
4. Kaplan LJ, Bailey H, Formosa V. Airway pressure release ventilation increases cardiac performance in patients with acute lung injury/adult respiratory distress syndrome. *Crit Care*. 2001;5(4):221–226. [PubMed: 11511336]
5. Maung AA, Schuster KM, Kaplan LJ, et al. Compared to conventional ventilation, airway pressure release ventilation may increase ventilator days in trauma patients. *J Trauma Acute Care Surg*. 2012;73(2):507–510. [PubMed: 23019679]
6. Zhou Y, Jin X, Lv Y, et al. Early application of airway pressure release ventilation may reduce the duration of mechanical ventilation in acute respiratory distress syndrome. *Intensive Care Med*. 2017;43(11):1648–1659. [PubMed: 28936695]
7. Maxwell RA, Green JM, Waldrop J, et al. A randomized prospective trial of airway pressure release ventilation and low tidal volume ventilation in adult trauma patients with acute respiratory failure. *J Trauma*. 2010;69(3):501–510; discussion 511. [PubMed: 20838119]
8. Andrews PL, Shiber JR, Jaruga-Killeen E, et al. Early application of airway pressure release ventilation may reduce mortality in high-risk trauma patients: a systematic review of observational trauma ARDS literature. *J Trauma Acute Care Surg*. 2013;75(4):635–641. [PubMed: 24064877]