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CORRESPONDENCE

Assessment of respiratory mechanics during pressure support ventilation? Caution required

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Initial correspondence from Drs. Vaporidi, Prinianakis, and Georgopoulos

Dear Editor,

Mezidi and Guérin [1] encourage physicians to assess respiratory mechanics in patients under pressure support ventilation (PS) using the end-inspiratory occlusion maneuver (EIO). Obviously, airway pressure (Paw) during an occlusion is a valid measurement of the elastic recoil pressure only if there is no inspiratory or expiratory muscle activity. With PS, the duration of neural inspiration may be similar, shorter, or larger than that of mechanical inflation, and thus the activity of respiratory muscles (inspiratory or expiratory) during EIO is totally unpredictable [2]. Paw during end-inspiratory occlusion is corrupted 0.25–0.30 s after the start of occlusion [2]. In Fig. 1 in ref. [1], the patient exhibits expiratory asynchrony of premature opening type (mainly in the 1st and 4th breaths) and possibly auto-triggering. If occlusion occurs (by chance) at peak inspiratory muscle pressure (as in the occluded breath), Paw should decrease immediately as a result of elimination of resistive pressure followed by an increase due to relaxation of inspiratory muscles. Nevertheless, contraction of expiratory muscles (i.e., due to expiratory asynchrony) is associated with a similar pattern, while the presence of plateau in Paw is not always associated with absence of respiratory muscle activity. This is particularly true for expiratory muscle activity [3]. In this patient, esophageal pressure (Pes) increased by approximately 2 cmH_2O during EIO, strongly indicating expiratory muscle contraction during this maneuver. This invalidates the statement that "respiratory muscles were relaxed after the end-inspiratory pause". We must be cautious to state that Paw measured during end-inspiratory occlusion in PS represents the elastic recoil pressure of the respiratory system.

Reply from Dr. Guérin

We thank our esteemed colleagues for going through our case report image about EIO during PS. They pointed out that in our case Pes jumped after onset of EIO before it leveled off. This could reflect contraction of abdominal muscles and hence would make plateau Pes partly due to a contribution from expiratory muscles, with the concurrent airway pressure plateau not completely reflecting the elastic recoil of the respiratory system. If it is true that Pes increased after EIO in our patient, this finding has also been repeatedly observed in the previous studies reporting on EIO during PS [4, 5]. If expiratory muscles contracted at the time as EIO in our case, it would have been a continuous tonic contraction, which was not the case clinically. Furthermore, in our case Pes increased slightly at the very end of the EIO. This suggests that the contraction of expiratory muscles happened at this point. Taken together these arguments are rather against a significant contribution of contraction of expiratory muscles in the Pes pattern in our case. Unfortunately, we did not assess the contribution of contraction of abdominal muscles by measuring gastric pressure or any other means like electromyography. To the best of our knowledge, this lack of assessment of expiratory muscles was also true in the previous studies on EIO during PS. In the absence of this measurement, one cannot ascertain the difference

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between active contraction of expiratory muscles and chest wall relaxation.

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Compliance with ethical standards

Conflicts of interest
None of the authors have a conflict of interest.

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