

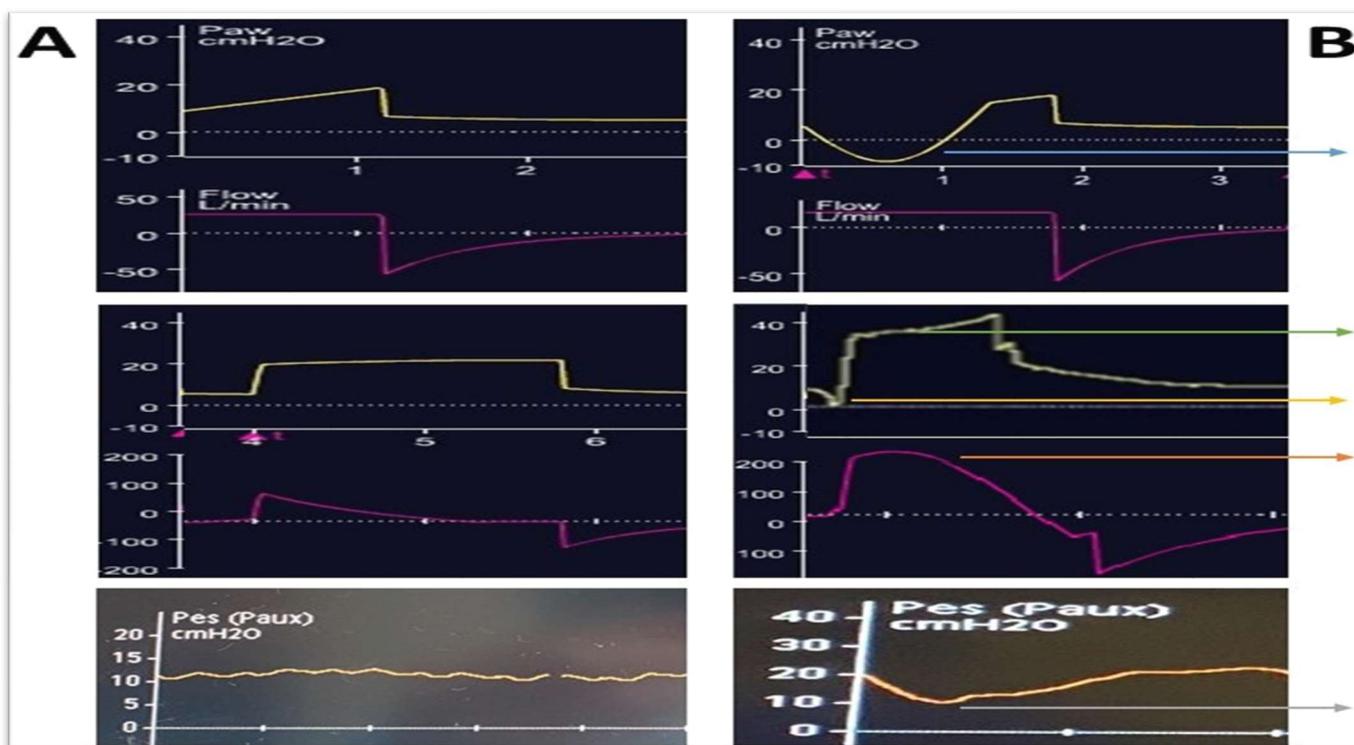


Patient effort at a glance

Mia Shokry¹, Kimiyo Yamasaki²

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A: Patient with little effort. Top: Volume Controlled Ventilation: airway pressure in cmH₂O in yellow, constant flow in L/min in pink.

Middle: Pressure controlled ventilation: airway pressure in cmH₂O in yellow, decelerating flow in L/min in pink.

Bottom: Esophageal pressure in cmH₂O.

B: Patient with high effort. Top: Volume Controlled Ventilation: airway pressure with convex negative deflection during trigger and first half of inspiration (blue arrow).

Middle: Pressure controlled ventilation: airway pressure with negative deflection during the trigger (yellow arrow) and slight convex deflection (green arrow), concave deflection in the flow (orange arrow).

Bottom: Convex deflection in esophageal pressure (grey arrow).

Authors

1. Mia Shokry, premed student, USC, California, USA

2. Yamasaki K. RRT, Adventist Health Castle Medical Center, Hawaii, USA

Corresponding author: miashokry@gmail.com

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Estimating the patient effort during mechanical ventilation and especially during the weaning or the spontaneous breathing effort is extremely important.

Clinical signs of tachypnea, accessory respiratory muscle retractions, abdominal paradoxus, tachycardia, sweating, anxiety, and agitation can provide clues of increased respiratory efforts however, those are objective not very specific.

Multiple specific objective calculations are available but may require additional equipment, calculations and are cumbersome.

Calculating the actual muscle pressure (P_{mus}) is probably the most accurate. ¹ Other indices such as work of breathing (WOB), ² pressure-time product (PTP), ³ trans-diaphragmatic pressure (P_{di}), and electrical activity of the diaphragm (Edi), ⁴ and recently the flow index ⁵ can be useful alternatives.

References

1. de Vries H, Jonkman A, Shi ZH, et al. Assessing breathing effort in mechanical ventilation: physiology and clinical implications. *Ann Transl Med* 2018; 6(19):387.
2. Banner MJ, Jaeger MJ, Kirby RR. Components of the work of breathing and implications for monitoring ventilator-dependent patients. *Crit Care Med* 1994; 22(3):515–523.
3. Bellani G, Patroniti N, Weismann D, et al. Measurement of Pressure–Time Product during spontaneous assisted breathing by rapid interrupter technique. *Anesthesiology* 2007; 106:484–490.
4. Bellani G, Mauri T, Coppadoro A, et al. Estimation of patient's inspiratory effort from the electrical activity of the diaphragm. *Crit Care Med* 2013; 41(6):1483–1491.
5. Albani F, Pisani L, Ciabatti G, et al. Flow Index: a novel, non-invasive, continuous, quantitative method to evaluate patient inspiratory effort during pressure support ventilation. *Crit Care* 2021; 25(1):196.

Glancing at the airway pressure-time, flow-time, esophageal pressure-time curves might get an estimative clue of the patient inspiratory effort.

During the trigger phase, a large negative deflection indicates a strong effort (Figure B top and middle).

During the inspiratory phase, a convex deflection in the airway pressure indicates a strong effort, the higher the effort, the higher the convexity (Figure B top and middle). The effect on the flow is usually apparent on the decelerating or the descending flow but not the constant flow, with a concavity of the curve correlates to the patients' muscle pressure (Figure B top and middle).

If esophageal pressure monitoring is used, the larger the negative deflection during the inspiratory phase correlates with the increased inspiratory effort ((Figure B bottom curve).

Though those are easy estimates and non- quantitative of excessive effort the patient, they are objective findings and should not be ignored.



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