Clinical image

Ineffective trigger, the always missed sign

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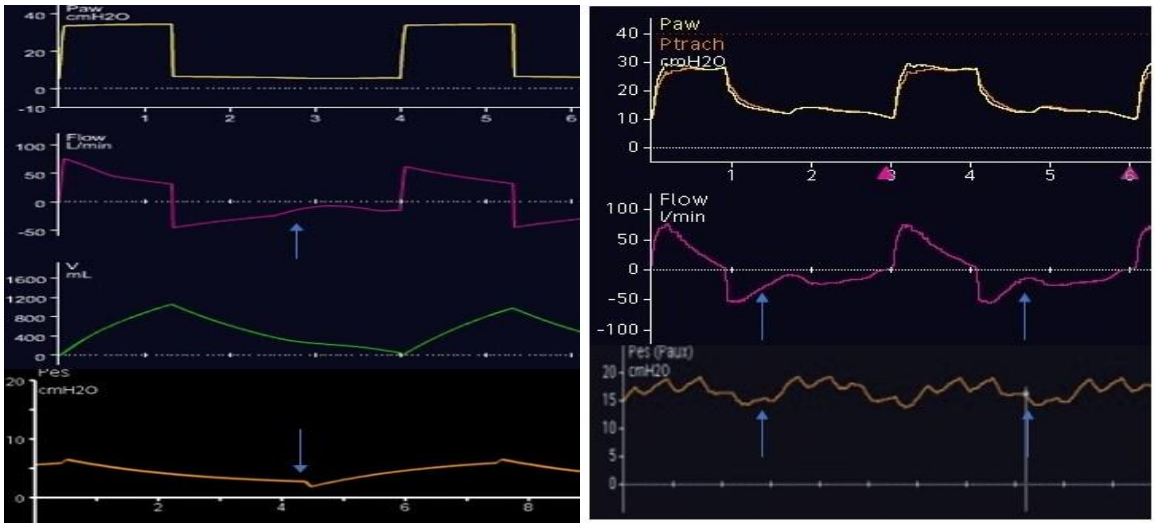
DOI: https://doi.org/10.53097/JMV.10014

Cite: Shokry M, Yamasaki K. Ineffective trigger, the always missed sign. J Mech Vent 2020; 1(2):57-58.



Yellow curve: Pressure (cmH2O) on X-axis and Time (seconds) on Y-axis
Pink curve: Flow (L/sec) on X-axis and Time (seconds) on Y-axis
Green curve: Tidal volume (ml) on X-axis and Time (seconds) on Y-axis
Orange curve: Esophageal pressure (cmH2O) on X-axis and Time (seconds) on Y-axis
The blue arrows point to the inspiratory effort on flow and esophageal curves that is not followed by a breath

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Conflict of interest/Disclosures: None
Funding: None

Patient-ventilator asynchronies are quite common during mechanical ventilation, with many different types and causes. [1] Unfortunately, it typically goes undetected as the ventilator does not alarm the clinicians about this problem. Recently such asynchronies or disharmonies between the patient and the ventilator has gained some attention, with reports of increased ventilator stay and even mortality. [2] This highlights the importance of early detection and correction of those asynchronies with a hope for better outcomes.

The figure above points to two different patients who make inspiratory efforts, yet they cannot trigger the ventilator to deliver a breath. This is called missed trigger, ineffective trigger or wasted effort. There are many potential reasons for such a problem. Patient related issues include muscle weakness, low respiratory drive, excessive sedation, but most importantly presence of auto-PEEP. Ventilator related issues include excessively high trigger value, whether flow or pressure, too high of tidal volume or pressure support, high respiratory rate and high inspiratory time.

In the first patient, we can see the esophageal pressure drop by about 1-2 cmH_2O and the up convexity in the flow curve. Also, it is important to recognize that the expiratory flow does not reach the baseline or zero flow before the next breath is delivered by the ventilator. This phenomenon depicts auto-PEEP, however, it can not quantify its amount without an expiratory pause maneuver. [3]

In the second patient, the pressure drop of the esophageal pressure is about 2 cmH2O with no obvious auto-PEEP. In this case the patient has severe muscle weakness secondary to Guillain-Barre syndrome.

References

1. Bulleri E, Fusi C, Bambi S, et al. Patient-ventilator asynchronies: types, outcomes and nursing detection skills. Acta Biomed. 2018;89(7-S):6-18.

2. Blanch L, Villagra A, Sales B, et al. Asynchronies during mechanical ventilation are associated with mortality. Intensive Care Med 2015; 41(4): 633-641.

3. Reddy VG. Auto-PEEP: how to detect and how to prevent--a review. Middle East J Anaesthesiol 2005; 18(2):293-312.