

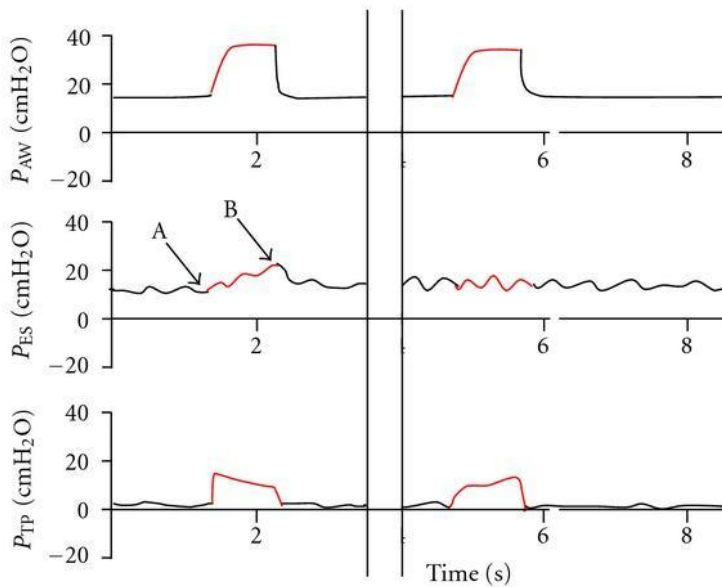
Esophageal pressure: Work of breathing

Esophageal pressure (P_{es}) can be used to estimate transpulmonary pressures that are consistent with known physiology and can provide meaningful information, otherwise unavailable, in critically ill patients.

From a previous keyword:

Pressure difference across the lung (transpulmonary pressure, P_L):

$$P_L = P_{aw} - P_{pl} \rightarrow P_L \approx P_{aw} - P_{es}$$



The left part of the pressure tracing shows a compliant lung that transmits part of the applied airway pressure to the pleura. The difference in pressure between points A and B represents the actual pressure transmitted to the pleura. The right part of the pressure tracing demonstrates a noncompliant lung that transmits little or no pressure to the pleura. P_{AW} = airway opening pressure, P_{ES} = esophageal pressure, P_{TP} = transpulmonary pressure.

During mechanical ventilation when positive end expiratory pressure (PEEP) and inspiratory driving pressures were adjusted with the aim of achieving tidal volume of 6 to 8 mL/kg based on ideal body weight (IBW), while not exceeding end inspiratory transpulmonary (EITP) pressure of 25 cm H₂O, resulted in improving O₂, decreasing CO₂ and avoided ECMO

WOB = Pressure x Volume

Pearl: By adjusting the ventilator to the findings of the P_L as measured by P_{es} we might be able to improve WOB, oxygenation, CO₂ and avoid ECMO in ARDS patients

Question:

A patient with ARDS is intubated and his Paw is 40 cmH₂O. An esophageal probe correctly placed shows a pressure of 20 cmH₂O. His PaO₂ is 50 and his arterial CO₂ is 88. The best approach would be to:

- a. Avoid further increase in PEEP
- b. Immediate use of ECMO
- c. Increase PEEP
- d. Increase TV to 10 cm/Kg

Answer: C. During mechanical ventilation when positive end expiratory pressure (PEEP) and inspiratory driving pressures were adjusted with the aim of achieving tidal volume of 6 to 8 mL/kg based on ideal body weight (IBW), while not exceeding end inspiratory transpulmonary (EITP) pressure of 25 cm H₂O, resulted in improving O₂, decreasing CO₂ and avoided ECMO