



Mechanical Ventilation Part 2

Answers

1) C

Placing the patient in the prone position might be the best option as patient is already on high PEEP and high plateau pressure ($22+17 = 39$). Though the other answers might improve oxygenation but could be on the expense of causing ventilator lung injury. Prone position has shown to improve oxygenation, ventilation and mortality in ARDS especially if initiated early.

2) C

In this case, the driving pressure is 13 (difference between P High and P Low) and resulting release tidal volume is low at 240. Hence the patient is obviously tachypneic at 35 with high muscle effort resulting in high spontaneous tidal volume of 800 and respiratory alkalosis. Best action is either increasing the P High, reducing P Low while increasing T High and reducing the T Low to increase the mean airway pressure.

3) A 4) A

Double triggering refers to two mechanical breaths with a single patient inspiratory effort. The first breath cycles prematurely and as the patient is still making an inspiratory effort, a second mechanical breath is triggered.

Double triggering is due to premature cycling and/or insufficient pressure support, which forces the patient to make strong inspiratory efforts.

Therefore, when the waveforms indicate double triggering, the expiratory trigger should be prolonged and/or pressure support increased.

5) B 6) D

The yellow line point to a missed trigger or missed patient effort. There is an upward deflection in expiratory flow, but the ventilator does not give the breath at this moment.

The most common reason for this phenomenon is auto-PEEP as patient need to exert much effort to trigger the ventilator especially in COPD/Asthma patients or muscle weakness for example from sedation or inappropriately high flow trigger.

In this case the etiology of the missed effort is auto-PEEP as noted by the redline pointing to the expiratory flow not returning to baseline before next breath. To quantify the amount of auto-PEEP, an expiratory hold maneuver needs to be done.

Best way of resolving auto-PEEP is to treat the condition, reduce the tidal volume (by reducing the inspiratory pressure) and respiratory rate. Applying more PEEP to match 70-80% of auto-PEEP might help too.

7) D

Figure A has a linear normal compliance. figure B: has very poor compliance indicated by the high amount of pressure required to start moving the volume in, additionally, the tidal volume is lower than figure A, and there is a wide hysteresis (difference between inspiratory limb and expiratory limb of the P-V curve. Figure C: has a very high compliance as noted by the very high tidal volume induced by the same amount of pressure compared to figure A and B.

8) D

The patient is most likely has pneumothorax post bronchoscopy and biopsy, the best action is to confirm the diagnosis by chest x-ray or ultra sound. If the condition is critical, needle decompression is required before even the diagnosis is made.

9) A

Turning the patient with the left (good) side down will improve the ventilation/Perfusion matching through the gravitational forces and should help oxygenation.

10) D

Though all the answers can cause worsening hypoxia and chest xray. VILI is most likely given the high tidal volume and zero PEEP. VAP by definition happens after 48 hours of mechanical ventilation. Lung contusion is less likely to appear after 24 hours of the trauma.