

Surgical Education and Self-assessment Program (SESAP)

Category 14, Item 27

Question

A 38-year-old 65-kg woman sustains a severe pulmonary contusion and requires mechanical ventilatory support. Which of the following is most likely to lead to ventilator-induced lung injury?

- (A) F_{IO_2} 0.5
- (B) Positive end-expiratory pressure (PEEP) + 10 cm H_2O
- (C) Pressure support 12 cm H_2O
- (D) Inverse ratio ventilation 2:1
- (E) Tidal volume 800 mL

For the question above, select the lettered answer that is best of the 5 given.

Critique

Ventilator-induced lung injury is associated with repetitive expansion and collapse of small airways and alveoli with positive pressure ventilation. It is believed to contribute to the lung inflammation seen in the acute respiratory distress syndrome (ARDS). The principal strategy for reducing the risk of ventilator-induced lung injury is to use smaller tidal volumes than the 12 to 15 mL/kg that were used previously. An initial tidal volume of 8 to 10 mL/kg is currently recommended.

A tidal volume of 800 mL for this 65-kg woman is excessive. A pressure support level of 12 cm H_2O would be unlikely to deliver a high tidal volume in the setting of pulmonary contusion. The other settings listed primarily affect oxygenation and may be required in this situation to maintain PO_2 .

E

References

1. Meade MO, Cook DJ, Kernerman P, Bernard G: How to use articles about harm: The relationship between high tidal volumes, ventilating pressures, and ventilator-induced lung injury. *Crit Care Med* 25:1915-1922, 1997
2. Ranieri VM, Suter PM, Tortorella C, et al: Effect of mechanical ventilation on inflammatory mediators in patients with acute respiratory distress syndrome: A randomized controlled trial. *JAMA* 282:54-61, 1999

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