Fresh CRQ (written by me)

Airway Pressure Release Ventilation

a. What does APRV stands for?
   - Airway Pressure release ventilation.

b. What is APRV?
   - It is a **pressure controlled mode of ventilation** that delivers continuous positive pressure with intermittent, time cycled, short releases at lower pressure.
   - Spontaneous ventilation is encouraged.

c. What are the indications for APRV?
   - Patients who are recruitable i.e are considered to have collapsed/atelectatic areas of lung.
   - Patients with diffuse disease processes e.g ARDS and multifocal pneumonia.
   - Patients in which prone positioning is contraindicated or in those who have not responded to a trial of prone positioning.
   - Patients at high risk of respiratory deterioration e.g traumatic chest injuries, aspiration, inhalational injury and pancreatitis.
   - Patients with sepsis and multiple organ failure requiring invasive ventilation.
   - Obese patients.
   - Patients in which low tidal volume ventilation has failed.

d. What are the contraindications of APRV?
   - Profound CVS instability particularly if secondary to untreated hypovolemia.
   - Recent pulmonary resection with staple lines and anastomosis i.e postoperative lobectomy and pneumonectomy.
   - Severe bronchospasm
   - Pulmonary hypertension with right ventricular decompensation.
   - Broncho pleural fistula.
   - Untreated pneumothorax.
   - Restrictive lung disease.

e. Describe Physiological rational of APRV?
   - Maintains a prolonged high pressure (P-high), APRV maximises the recruitment of lung tissue and improves Oxygenation.
   - Open lung approach to invasive ventilation.
   - Short and infrequent periods of lower pressure (P-low) to facilitate CO2 clearance.
   - Constant recruitment manoeuvre as compared to conventional ventilation in which there is brief period of recruitment, followed by PEEP to prevent airway collapse.
   - Homogenous recruitment of lung results in inflation of lung to optimal point of its compliance on compliance curve and adequate gas distribution of differing compliances of lung units.
• Maintains adequate end expiratory volume and minimal dynamic strain.
• De-recruitment is prevented by short period of reduction in T low.
• Prevents wasting of respiratory muscle due to spontaneous ventilation throughout respiratory cycle.
• Continued recruitment of lung tissues.

f. What are respiratory benefits and risks?

• Benefits:
  1. Attenuates VIL injury.
  2. Alveolar recruitment.
  3. Improve lung homogeneity
  4. Increase FRC.
  5. Spontaneous breathing

• Risks:
  1. High trans pulmonary pressures
  2. Tachypnoea
  4. Atelectrauma.
  5. High intra-thoracic pressure

g. What are CVS benefits and risks?

• Benefits
  1. Decrease in trans mural left ventricular pressure
  2. Reduce work of contraction.
  3. Improve cardiac output.
  4. Improves arterial oxygenation
  5. Improve myocardial oxygen delivery and myocardial function
  6. Reduced dose of sedative and vasoactive drugs resulting in improvement in haemodynamic state.

• Risks:
  1. Decrease venous return.
  2. Increase afterload
  3. Increase pulmonary vascular resistance.
  4. Strain in case of Right heart failure.

h. Mention physiological derangements with APRV with responses?

• Hyperoxemia.
  Response: reduce FiO2 first and then reduce P high, once FiO2 is below 40%

• Hypoxemia.
  Response: increase P high
  Increase T high
  Consider reducing T low
  Increase FiO2.
• Hypercapnia.
  Response: Permissive hypercapnia if ph > 7.2
  Reduce sedation and encourage spontaneous ventilation.
  Decrease T high.
  Check HME filter and ventilator circuit.
  Increase P high.

• Hypocapnia.
  Response: Increase T high
  Decrease P high.

• Hypotension.
  Response: Administer a fluid bolus of 250-500ml crystalloid.
    Vasoactive drugs.
    Urgent Echocardiography to assess filling status and biventricular function.

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