Immediate Post-Intubation Care for Critically Ill COVID-19 Patients

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17TH April 2020
What Could Go Wrong Immediately After Intubation?

- Desaturation
- Hypotension

SpO₂: 56

Hypotension
Desaturation: Functional Reserve
## Desaturation: Functional Reserve

### P: Ratio & Shunt Fraction

<table>
<thead>
<tr>
<th>Pressure Range</th>
<th>Shunt Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 - 500 mmHg</td>
<td>2-3%</td>
</tr>
<tr>
<td>300 - 399 mmHg</td>
<td>7-10%</td>
</tr>
<tr>
<td>200 - 299 mmHg</td>
<td>10-20%</td>
</tr>
<tr>
<td>100 - 199 mmHg</td>
<td>20-40%</td>
</tr>
<tr>
<td>&lt;99 mmHg</td>
<td>&gt;40%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ABG</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.32</td>
</tr>
<tr>
<td>PaCO₂</td>
<td>49</td>
</tr>
<tr>
<td>HCO₃⁻</td>
<td>24</td>
</tr>
<tr>
<td>BE</td>
<td>0</td>
</tr>
<tr>
<td>PaO₂</td>
<td>58</td>
</tr>
<tr>
<td>SaO₂</td>
<td>87</td>
</tr>
<tr>
<td>PaO₂/FiO₂</td>
<td>73</td>
</tr>
</tbody>
</table>
Desaturation: Mechanisms of Hypoxemia

• Poor functional reserve
• No bagging approach

Time to Hemoglobin Desaturation

COVID-19
Desaturation: Mechanisms of Hypoxemia

• Atelectasis
  • Supine position & FRC
  • Muscle relaxants & FRC

• Difficult Airway
  • Esophageal intubation
Dealing With Desaturation

• Start ventilation with FiO2 100%
• Check for chest rise
• Capnography?

• Suction?
Informal Lung Recruitment Maneuver & and Initial PEEP Selection

• Initial Ventilation with a high transpulmonary pressure

Initial PEEP
2 cmH2O above upper $P_{flex}$
Optimum PEEP

• Gives:
  • The best oxygenation (best shunt reduction)
  • Minimum dead space
  • The best lung compliance
  • Without adverse cardiopulmonary effects
    • Hypotension
    • Acute LV Failure
## Optimum PEEP

<table>
<thead>
<tr>
<th>PEEP (cm H$_2$O)</th>
<th>0</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minutes/time</td>
<td>15</td>
<td>30</td>
<td>45</td>
<td>60</td>
<td>75</td>
<td>90</td>
<td>105</td>
</tr>
<tr>
<td>Blood pressure (mm Hg)</td>
<td>117/80</td>
<td>120/85</td>
<td>120/80</td>
<td>110/70</td>
<td>115/75</td>
<td>115/75</td>
<td>90/65</td>
</tr>
<tr>
<td>$C_S$ (mL/cm H$_2$O)</td>
<td>36</td>
<td>36</td>
<td>37</td>
<td>35</td>
<td>40</td>
<td>45</td>
<td>36</td>
</tr>
<tr>
<td>$PaO_2$ ($FIO_2 = 1.0$)</td>
<td>43</td>
<td>59</td>
<td>65</td>
<td>73</td>
<td>103</td>
<td>152</td>
<td>167</td>
</tr>
</tbody>
</table>
Optimum PEEP

GOALS:
- PIP < 40 cm H₂O
- P_{plateau} < 30 cm H₂O
- Resistance < 10 cm H₂O/L/sec
- Compliance 50–100 mL/cm H₂O
Hypotension

• Resulting from:
  • Vasodilation & Myocardial depression from induction agents
  • Pre-existing hypovolemia
  • Septic shock
  • Myocarditis
  • Adverse cardiopulmonary interactions

• Dealing with Hypotension
  • 4 cc/kg of RL
  • Any of:
    • Adrenaline 100 mcg
    • Phenylephrine 5 mcg/kg
    • Ephedrine 3 mg
    • May be repeated every 5 minutes
    • Remember to set NIBP cycling at 3 minutes initially
  • Noradrenaline (long term)
Dealing with Hypotension

- Check tidal volume
- Check PEEP/ auto-PEEP

- POCUS
• The end .......