Setting Optimal Positive Expiratory Pressure Utilizing Transpulmonary Monitoring and a Pressure Volume Measurement.

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## SETTING OPTIMAL POSITIVE EXPIRATORY PRESSURE UTILIZING TRANSPULMONARY MONITORING AND A PRESSURE VOLUME MEASUREMENT

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### CONCLUSIONS

- Setting optimal positive end expiratory pressure (PEEP) is beneficial in improving gas exchange, promoting alveolar inflation, and minimizing ventilator induced trauma.
- The setting of PEEP has historically been done many different ways, FIO2/PEEP algorithmic approach, compliance assessment, etc.
- Recently, we have employed the use of trans-pulmonary monitoring along with a pressure/volume measurement (P/V) to set the optimal PEEP.
- By utilizing both of these strategies the optimal PEEP can be set to maximize clinical objectives.

### METHODS

- We inserted an esophageal balloon (Cooper Surgical, USA) to monitoring TranspE.
- We performed a pressure/volume(G-5 Hamilton Medical, Switzerland) to determine the lower inflection point on twelve patients diagnosed with severe to moderate ARDS. (Berlin definition)
- All patients were sedated and placed on a paralytic infusion.
- Esophageal balloon placement was verified via ventilator waveform and chest X-ray.
- Our goal was to set the PEEP to maintain a TranspE between -2 to +2cm/H2O and 2 cmH2O above the lower inflection point via the P/V measurement (G-5 P/V Tool).
- In nine of the patients the optimal PEEP was the same via the TranspE and P/V measurements. (Table 1)
- In three patients, all >125kg there was a greater than 4cm/H2O difference between the TranspE and P/V measurement lower inflection (LIP) point regarding the optimal PEEP setting.
- On these three patients we set the PEEP between the two measurements and assessed clinical performance.
- Post PEEP setting in all twelve patients TranspI was maintained<25cm/H2O and hemodynamic performance remained stable.

### RESULTS

<table>
<thead>
<tr>
<th>Wt/Kg</th>
<th>TranspE cm/H2O</th>
<th>LIP cm/H2O</th>
<th>PEEP Set cm/H2O</th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>-1.5</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>150</td>
<td>+6</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>90</td>
<td>-1</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>75</td>
<td>+2</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>115</td>
<td>-2</td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>175</td>
<td>-4</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>50</td>
<td>+1</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>89</td>
<td>-3</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>105</td>
<td>+1.5</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>72</td>
<td>-3</td>
<td>10</td>
<td>12</td>
</tr>
</tbody>
</table>

Post esophageal balloon placement.

Peak airway pressure minus esophageal pressure equals: Transpulmonary pressure (pressure the lung is receiving) Goal=25 cm

Note peak airway pressure is 42cm

Esophageal pressure 21cm thus transpulmonary pressure (the lung receiving) only 19cm

PEEP set at 14mm

Based on Ptrans E

Balloon at 30 to 20cm

### INTRODUCTION

- Setting optimal positive end expiratory pressure (PEEP) is beneficial in improving gas exchange, promoting alveolar inflation, and minimizing ventilator induced trauma.

### TABLE 1. TranseP and P/V Measurements

- Factors in chest wall impedance may cause a difference in these measurements and enhanced clinical assessment should be utilized to determine the optimal PEEP in that patient population.
- The effect of these measurements on mortality and morbidity still needs to be determined.

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