ACCURACY OF EXHALED TIDAL VOLUME (MEASURED AND ESTIMATED) OF TWO SUBACUTE/HOME CARE VENTILATORS IN A SIMULATED NEONATE/INFANT MODEL

Gerald Moody, RRT-NPS, Andre Finley, RRT-NPS - Children’s Medical Center Dallas, TX

Abstract

The Trilogy 202 and LTV 1200 were tested with their respective active and passive (Trilogy) circuits. Each vent/circuit configuration was attached to a test lung (Ingmar ASL 5000) using the neonate/apneic model with a C: 7 ml/cmH2O and R: 10 cm H2O/L/s. 10 Vent breaths were read for each configuration and compared to the ASL 5000 readings at 3 different pressure levels using the following settings: PC-SIMV mode, PIP of (12, 15 & 20 cmH2O), PEEP 5 cmH2O, RR 25 breaths/min, Ti: 5, rise of 1 on Trilogy rise of 3 on LTV (typical rise times for each vent used in our practice), leak compensation “on”, all configurations were tested with no leaks.

Results

Table 1 shows results for each vent/circuit configuration. The LTV 1200 was the most accurate, followed by the Trilogy with active circuit. As hypothesized the Trilogy with the passive circuit was least accurate, but provided the most consistent VT’s at lower PIP’s, at a PIP of 20 the Trilogy with active circuit had the most consistent VT readings. The Trilogy with passive circuit also delivered less VT’s compared to each active circuit configuration.

Percentage of error (Vent reading vs ASL measure)

<table>
<thead>
<tr>
<th>Circuit</th>
<th>PIP 12</th>
<th>PIP 15</th>
<th>PIP 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trilogy Passive</td>
<td>28.00%</td>
<td>11.00%</td>
<td>19.00%</td>
</tr>
<tr>
<td>Trilogy Active</td>
<td>11.00%</td>
<td>3.00%</td>
<td>5.00%</td>
</tr>
<tr>
<td>LTV</td>
<td>25.00%</td>
<td>10.00%</td>
<td>9.00%</td>
</tr>
</tbody>
</table>

Methods

The Trilogy 202 and LTV 1200 were tested with their respective active and passive (Trilogy) circuits. Each vent/circuit configuration was attached to a test lung (Ingmar ASL 5000) using the neonate/apneic model with a C: 7 ml/cmH2O and R: 10 cm H2O/L/s. 10 Vent breaths were read for each configuration and compared to the ASL 5000 readings at 3 different pressure levels using the following settings: PC-SIMV mode, PIP of (12, 15 & 20 cmH2O), PEEP 5 cmH2O, RR 25 breaths/min, Ti: 5, rise of 1 on Trilogy rise of 3 on LTV (typical rise times for each vent used in our practice), leak compensation “on”, all configurations were tested with no leaks.

Introduction

When transitioning ventilator dependent patients to home care ventilators we commonly place patients in PC-SIMV mode using tidal volumes (VT) as a parameter for setting pressures. Patients ventilator settings are first established on critical care ventilators and then transposed to their subacute/home care ventilators. Some patients don’t tolerate the transition and are placed back on a critical care ventilator, delaying transfer out of the ICU. There has been some question as to the accuracy of exhaled VT readings on our subacute/home care ventilators, especially on smaller patients (around 5 kg) when using a passive circuit with no proximal flow sensor at the patient airway. We conducted tests of two brands of subacute/home care ventilators used in our hospital to determine accuracy of exhaled VT readings with passive circuits and active circuits with proximal flow sensors. We hypothesized there would be no difference in accuracy between the LTV 1200 (Carefusion, Yorba Linda, CA) and the Trilogy 202 (Phillips Healthcare, Andover, MA) when using each manufacturers’ proprietary active circuits with proximal flow sensors; there would be a difference in VT accuracy when using the Trilogy 202’s passive circuit.

Conclusion

Based on these data the LTV 1200 displayed the most accurate VT readings and may be the best choice for ventilating patients whom VT is of greater concern. We were also surprised by the large variance in measured VT between the passive and active circuits and caution should be applied when placing patients on different vent/circuit combinations with the same settings.

Disclosure of presenter conflict(s) of interest – none
Disclosure of any research funding, sponsorship, or financial support – none