Evaluation of Pressure Drop Using the Respironics Remstar Pro C Flex and the ResMed S8 Elite at 3 levels of CPAP

<table>
<thead>
<tr>
<th>CPAP</th>
<th>CFlex Setting</th>
<th>Low Pressure</th>
<th>CPAP</th>
<th>EPR Setting</th>
<th>Low Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 cmH2O</td>
<td>3</td>
<td>8.5 cmH2O</td>
<td>10 cmH2O</td>
<td>3</td>
<td>9.8 cmH2O</td>
</tr>
<tr>
<td>5 cmH2O</td>
<td>3</td>
<td>3.7 cmH2O</td>
<td>5 cmH2O</td>
<td>3</td>
<td>3.9 cmH2O</td>
</tr>
<tr>
<td>5 cmH2O</td>
<td>1</td>
<td>4.3 cmH2O</td>
<td>5 cmH2O</td>
<td>1</td>
<td>3.9 cmH2O</td>
</tr>
</tbody>
</table>

Results: The low pressure was averaged over 5 breaths.

Background:

ABSTRACT

According to manufacturer the expiratory pressure release (EPR) setting is programmed as follows: setting 1 = 1 cm H2O; setting 2 = 2 cm H2O; and setting 3 = 3 cm H2O.

The ResMed S8 Elite is a new type of CPAP machine that allows for a decrease in pressure at the onset of exhalation. The relief pressure varies breath to breath depending on the patient's expiratory flowrate.

The Respironics Remstar Pro C Flex (C Flex) has a pressure drop at the start of expiration based on expiratory flow and the C-Flex setting. ResMed S8 Elite with EPR (EPR) uses three comfort levels to determine the degree by which pressure will drop, in cm H2O, throughout expiration.

Method:

A Respironics Remstar Pro C Flex (C Flex) and a ResMed S8 Elite were attached to the Hans Rudolph Electronic Breathing Simulator (HR 1101). HR 1101 settings were: resistance 10 cm H2O/L/sec; compliance 20 mL/cm H2O; Respiratory Rate of 12 breaths per minute; amplitude 5 cm H2O; and target volume 3000 mL. Each machine was set with a CPAP of 5, 10 and then 15 cm H2O with the C Flex and EPR settings of 1, 2 and 3 for each CPAP pressure. The lowest pressure at the beginning of expiration was identified and averaged over 5 consecutive breaths; this value was identified as the drop in pressure at all the CPAP levels.

The two CPAP machines resulted in different averaged low pressures during the expiratory phase despite the test settings being the same. The differences may be due to the expiratory pressure increases to the set CPAP level before inspiration begins. The relief pressure varies breath to breath depending on the expiratory flowrate.

Newer machines that allow for a decrease in pressure at the onset of expiration are now being used; the algorithm for this pressure change varies by manufacturer.

Results: A comparison between the Respironics Remstar Pro C Flex and the ResMed S8 Elite at 3 levels of CPAP shows different averaged low pressures during the expiratory phase. The lowest pressure at the beginning of expiration was identified and averaged over 5 consecutive breaths; this value was identified as the drop in pressure at all the CPAP levels.

Conclusion: With C-Flex there was an immediate drop in pressure at the beginning of exhalation. The set CPAP was quickly restored for the remainder of exhalation. With EPR data there was a gradual decrease in pressure at the beginning of exhalation. The differences may be due to the expiratory pressure increases to the set CPAP level before inspiration begins. The relief pressure varies breath to breath depending on the patient's expiratory flowrate.