Successful Use of a Prolonged Inspiratory Time on the Bunnell Life Pulse HFJV in Treating Pneumonia Refractory to Conventional and HFO Ventilation in a NICU Patient

Kimberly Barner BS, RRT-NPS  
*Lehigh Valley Health Network, Kimberly.Berner@lvhn.org*

Laura Monroe RRT-NPS  
*Lehigh Valley Health Network, Laura.Monroe@lvhn.org*

Patrick Fitzsimmons BS, RRT-NPS  
*Lehigh Valley Health Network, Patrick.Fitzsimmons@lvhn.org*

Follow this and additional works at: [http://scholarlyworks.lvhn.org/medicine](http://scholarlyworks.lvhn.org/medicine)  
Part of the [Circulatory and Respiratory Physiology Commons](http://scholarlyworks.lvhn.org/medicine), and the [Respiratory System Commons](http://scholarlyworks.lvhn.org/medicine)

Published In/Presented At  

This Poster is brought to you for free and open access by LVHN Scholarly Works. It has been accepted for inclusion in LVHN Scholarly Works by an authorized administrator. For more information, please contact LibraryServices@lvhn.org.
Successful Use of a Prolonged Inspiratory Time on the Bunnell Life Pulse HFJV in Treating Pneumonia Refractory to Conventional and HFO Ventilation in a NICU Patient

Kimberly Barner BS, RRT-NPS; Laura Monroe, RRT-NPS; Patrick Fitzsimmons BS, RRT-NPS
Respiratory Care Department, Lehigh Valley Health Network, Allentown, PA

Table I. Capillary Results

<table>
<thead>
<tr>
<th></th>
<th>pH</th>
<th>PCO$_2$</th>
<th>PO$_2$</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-SIMV DOL #57</td>
<td>7.21</td>
<td>90</td>
<td>34</td>
<td>40 PEEP 8 cm, IP 22 cm</td>
</tr>
<tr>
<td>HFOV #67 DOL</td>
<td>7.34</td>
<td>70</td>
<td>38</td>
<td>PIP 25 cm, Amp 93, Hertz 6</td>
</tr>
<tr>
<td>HFJV</td>
<td>7.30</td>
<td>75</td>
<td>37</td>
<td>45/55 P:80</td>
</tr>
<tr>
<td>HFJV</td>
<td>7.32</td>
<td>70</td>
<td>30</td>
<td>45/55 P:80</td>
</tr>
<tr>
<td>HFJV x 7 hrs.</td>
<td>7.35</td>
<td>62</td>
<td>37</td>
<td>44/24</td>
</tr>
<tr>
<td>Transition x 8 days</td>
<td>7.42</td>
<td>55</td>
<td>58</td>
<td>31/61 P:240</td>
</tr>
</tbody>
</table>

Clinical Indications For HFJV Utilization
- Improve the distribution of inspired gas to the consolidated lung area
- Enhance secretion removal
- Allow for equilibration of time constants in non-homogenous lung while maintaining adequate expiratory time
- Reduce FiO$_2$ requirements and improve gas exchange

Clinical Course Via HFJV
- Increased I-time from 0.02 to 0.03 sec
- Clinical improvement noted within three hours of implementation
  - Increased aeration seen on CXR
  - Improved CBG results
- PIP, PEEP, and FiO$_2$ were reduced while maintaining a consistent P$_A$P
- DOL #75 transition back to P-SIMV
- Adequate gas exchange was maintained until liberation

Discussion
- Utilizing an increased I-time promoted lung recruitment in the consolidated area
- Paw was maintained while allowing a reduction in the PEEP level
- HFJV helped facilitate secretion removal

Conclusions
- Our patient with refractory pneumonia improved by:
  - Changing ventilatory strategies from HFO to HFJV
  - Increasing I-time which optimized gas exchange
  - Maintaining delta pressure for CO2 removal

Patient’s Pathology and Physiology
- 28 5/7 week pre-term infant
- Intubated and mechanically ventilated at birth
- Received surfactant
- Extubated on day of life three
- Maintained on high flow nasal cannula
- Developed a right upper lobe (RUL) pneumonia secondary to gram negative organisms on day of life (DOL) fifty-six and required intubation and mechanical ventilation

Clinical Course
- Within twenty-four hours developed a RUL consolidation requiring increased ventilatory support
- Capillary blood gas results revealed poor gas exchange noted by an increased PCO$_2$ and a reduced PaO$_2$
- Decision was made to place on High Frequency Oscillation (HFO)
- Minimal improvement noted in gas exchange
- Increased amplitude and mean airway pressure (Paw) via HFO
- Administered IV and inhaled antibiotics
- Performed aggressive pulmonary hygiene
- Gas exchange continued to deteriorate
- Decision was made on DOL #68 to place on High Frequency Jet Ventilation (HFJV)

X-Rays

Pre HFJV

Post HFJV Day 8