A Descriptive Study of Pulmonary Function Testing and Chest Computed Tomography in Survivors of Veno-Venous Extracorporeal Membrane Oxygenation

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A Descriptive Study of Pulmonary Function Testing and Chest Computed Tomography in Survivors of Veno-Venous Extracorporeal Membrane Oxygenation

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Purpose

• Veno-Venous Extracorporeal Membrane Oxygenation (VV ECMO) is a therapy for refractory hypoxemia due to Acute Respiratory Distress Syndrome (ARDS).
• Previous studies of ARDS patients not treated with VV ECMO described radiographic changes post ARDS which showed chronic reticular CT changes.1
• A longitudinal study of patients five years post ARDS showed near normal pulmonary function tests (PFTs).2
• Little is known about the radiographic and functional pulmonary recovery of the most severe subgroup of ARDS patients who required ECMO.

Methods

This is a single center descriptive study to evaluate radiographic changes and PFTs in post ARDS patients treated with VV ECMO. Two female and two male adults with ARDS, averaging 46.4 +/- 7 years were included. Etiologies of ARDS included Influenza A H1N1, community acquired pneumonia, Influenza A H1N1 with community acquired pneumonia and unknown etiology. All presented with severe, persistent hypoxia with a PF ratio <100 requiring VV ECMO.

Table 1. Pulmonary Function Tests of Post VV ECMO Patients

<table>
<thead>
<tr>
<th>Time from ECMO to PFT (Days)</th>
<th>FVC (L)</th>
<th>FEV1 (L)</th>
<th>FEV1/FVC</th>
<th>TLC (L)</th>
<th>RV (L)</th>
<th>DLCO %</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>177</td>
<td>1.96 (60%)</td>
<td>1.87 (72%)</td>
<td>95%</td>
<td>3.14 (64%)</td>
<td>1.17 (63%)</td>
</tr>
<tr>
<td>B</td>
<td>328</td>
<td>1.3 (40%)</td>
<td>0.93 (32%)</td>
<td>72%</td>
<td>3.01 (69%)</td>
<td>1.58 (131%)</td>
</tr>
<tr>
<td>C</td>
<td>84</td>
<td>2.21 (50%)</td>
<td>1.97 (56%)</td>
<td>89%</td>
<td>3.09 (43%)</td>
<td>0.83 (34%)</td>
</tr>
<tr>
<td>D</td>
<td>117</td>
<td>4.99 (92%)</td>
<td>4.19 (99%)</td>
<td>84%</td>
<td>7.13 (98%)</td>
<td>2.13 (92%)</td>
</tr>
</tbody>
</table>

Table 2. Murray Scores Prior to ECMO

<table>
<thead>
<tr>
<th>Patient</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.75</td>
</tr>
<tr>
<td>B</td>
<td>3.50</td>
</tr>
<tr>
<td>C</td>
<td>3.75</td>
</tr>
<tr>
<td>D</td>
<td>3.75</td>
</tr>
</tbody>
</table>

Conclusion and Clinical Implications:

• Patients who presented with severe ARDS requiring VV ECMO, had significant residual pulmonary abnormalities on PFT’s.
• Post VV ECMO patients also had persistent chest CT abnormalities including interstitial opacities.
• Further research is needed to evaluate long-term recovery in post ARDS VV ECMO patients.

References:


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