Incidence of Deep Vein Thrombosis in Patients Undergoing Right Internal Jugular Vein cannulation for Veno-Venous Extracorporeal Membrane Oxygenation

Taryn Samet MD

Nicole Stansbury

Tim S. Misselbeck MD
Lehigh Valley Health Network, Timothy_S.Misselbeck@lvhn.org

James K. Wu MD
Lehigh Valley Health Network, james.wu@lvhn.org

Follow this and additional works at: https://scholarlyworks.lvhn.org/research-scholars-posters

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.

Taryn Samet1, Nicole Stansbury1, Rita Pechulis, MD2, James Burke, MD3, Timothy Miselebeck, MD1, James Wu, MD1
Division of Cardiothoracic Surgery1, Division of Pulmonary and Critical Care Medicine2, Division of Cardiology3.
Lehigh Valley Health Network, Allentown, Pennsylvania

BACKGROUND

• Veno-Venous Extra Corporeal Membrane Oxygenation (VV ECMO) has been used more frequently for adult patients experiencing respiratory failure over the past decade. Using dual lumen cannula through the internal jugular vein (IJV) has revolutionized another field (Fig 1). However, because of RJ cannulation, there may be an increased incidence of right IJ DVT which result negatively for central IV access and thromboembolism in these sick patients.

• Study seeks to find the incidence of RIJ DVT in patients whom were weaned off VV-ECMO
• Determine whether correlations between incidences exist

METHODS

• A retrospective study that reviewed all VV-ECMO patients recorded from 2013 - 2016 at the Lehigh Valley Health Network through the in-house database and EHR.
  – Vas Venous Duplex Upper Extremity Bilateral images were analyzed to indicate the presence of DVT

RESULTS

• 75% of Males ≥ 50 developed DVT (0.05 level of significance)
• 45.4% of Females ≥ 50 developed a DVT (0.2 level)
• More significant for males—lower # of endothelial progenitor cells, and increase in IJV cross sectional area
• 51.6% of patients treated ≥ 7 days developed DVT (.05 level)
• long periods of immobility cause improper blood flow
• ½ of females and all males ≥ 50 and on ECMO for ≥ 7 days had DVT (0.02 level of significance)

CONCLUSIONS

• Large bore cannulation to the RJ resulting in DVT is observed in less than half of patients. Of those observed, the majority were occlusive. For males age ≥ 50, and an increased duration on ECMO increases the incidence.

Table 1: Summary of DVT incidences for Independent Variables

<table>
<thead>
<tr>
<th>Category</th>
<th>Num. of Patients</th>
<th>Num. of DVT</th>
<th>Percent DVT (%)</th>
<th>p-value</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Population</td>
<td>41</td>
<td>18</td>
<td>45.00249302</td>
<td>0.05</td>
<td>N/A</td>
</tr>
<tr>
<td>Total Male (M)</td>
<td>10</td>
<td>10</td>
<td>52.63157895</td>
<td>0.053</td>
<td>0.8531</td>
</tr>
<tr>
<td>Total Female (F)</td>
<td>31</td>
<td>8</td>
<td>26.56016818</td>
<td>0.056</td>
<td>0.8333</td>
</tr>
<tr>
<td>Population 50 and older</td>
<td>10</td>
<td>9</td>
<td>57.89473684</td>
<td>0.053</td>
<td>0.8531</td>
</tr>
<tr>
<td>Population 50 and older</td>
<td>19</td>
<td>11</td>
<td>57.89473684</td>
<td>0.053</td>
<td>0.8531</td>
</tr>
<tr>
<td>Male ≤ 50 yrs old</td>
<td>8</td>
<td>6</td>
<td>75</td>
<td>0.053</td>
<td>0.8531</td>
</tr>
<tr>
<td>Male ≥ 50 yrs old</td>
<td>11</td>
<td>4</td>
<td>36.36363636</td>
<td>0.053</td>
<td>0.8531</td>
</tr>
<tr>
<td>Female ≤ 50</td>
<td>11</td>
<td>5</td>
<td>45.45454545</td>
<td>0.053</td>
<td>0.8531</td>
</tr>
<tr>
<td>Female ≥ 50</td>
<td>11</td>
<td>3</td>
<td>27.27272727</td>
<td>0.053</td>
<td>0.8531</td>
</tr>
<tr>
<td>On ECMO ≥ 7 days</td>
<td>10</td>
<td>2</td>
<td>20</td>
<td>0.053</td>
<td>0.8531</td>
</tr>
<tr>
<td>Male on ECMO ≥ 7 and over 50</td>
<td>5</td>
<td>5</td>
<td>100</td>
<td>2.08</td>
<td>0.8812</td>
</tr>
<tr>
<td>Female on ECMO ≥ 7 and over 50</td>
<td>11</td>
<td>5</td>
<td>45.45454545</td>
<td>0.053</td>
<td>0.8531</td>
</tr>
</tbody>
</table>

Values of ≥ 0.05 illustrates that the results are significant at the 0.05 level. Thus, we would be 85% sure that the results produced are statistically significant and that if the trails were to run under the same conditions, similar results would be produced.

References:


Figure 1: RJ Cannulation for VV ECMO

A double lumen cannula is placed through the RIJ into the right atrium (RA). Desaturated blood is withdrawn from the RA and moves to a pump which pushes this blood to an oxygenator where O2 will be added and CO2 will be removed. The blood is then rewarmed through a heat exchanger and is returned through the inner lumen of the catheter across the tricuspid valve so the heart can pump the blood to the rest of the body.

Figure 2: Flow chart of population of interest

Of the 171 ECMO patients, 88 underwent RIJ Cannulation for VV ECMO. However, only 41 patients eventually received the duplex study to evaluate the presence of DVT in the RIJ.

Figure 3: Upper Extremity Venous Duplex Studies of the patients who were weaned off RIJ VV Cannulation

From the population of interest, the left most image is of a patient who did not develop a DVT. The middle image represents a patient who experienced an occlusive DVT in the RIJ and the right most figure is that of a non-occlusive RIJ DVT. Of the DVT’s developed, 55.5% were occlusive and 44.5% were non-occlusive.

Figure 4: Number of DVT during certain intervals of time on ECMO

Prior to 7 days, there had only been three incidence of DVT which then doubles if you look at the interval of 7 to 14 days. This pattern that incidence increases with duration of treatment and further illustrated by the increase of incidence once a patient has been on ECMO for over 14 days