Abstract: P477

Inadequate left ventricular unloading during venoarterial extracorporeal membrane oxygenation: a ten-year experience in a tertiary hospital

Authors:
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Topic(s):
Acute Cardiac Care – Cardiogenic Shock

Citation:
Introduction

Venoarterial extracorporeal membrane oxygenation (VA-ECMO) is a widely used form of mechanical circulation support in patients with refractory cardiogenic shock. A common disadvantage of VA-ECMO is a resultant increase in left ventricular (LV) afterload. Its main limitation is the inadequate LV unloading.

Methods

Between 2009 and 2019, 145 VA-ECMO devices were implanted in 141 consecutive patients. The purpose of this observational study is to describe the incidence, predictors, prognosis and management of inadequate LV unloading.

Results

Table 1 summarizes baseline characteristics of the patient population. The etiology of cardiogenic shock is detailed in figure 1.

Among a total of 145 VA-ECMO, inadequate LV unloading occurred in 53 cases (36.6%). An intra-aortic balloon pump (IABP) was used before the VA-ECMO implant in 33 of them (62.3%). LV unloading strategy was performed using medical treatment (11.3%), IABP (50.9%), left ventricular venting (17%) and bridging to a short-term ventricular assist device (20.8%).

Regarding the etiology of cardiogenic shock, the main risk factors for inadequate LV unloading were dilated cardiomyopathy (OR 11.7; CI95% 2.4-55.5; p<0.05), ECMO in cardiac arrest (OR 8.2; CI95% 2.8-24.3; p<0.001) and postcardiotomy shock (OR 4.9; CI95% 2.1-11.9; p<0.001).

In patients treated with VA-ECMO, inadequate LV unloading was associated with a significant increase in intrahospital mortality compared with patients without LV unloading (73.6% vs. 41.3%, p<0.001).

Inadequate LV unloading was a predictive factor of intrahospital mortality (OR 3.8; CI95% 1.3-11.2; p<0.05), in addition to higher age (>65 years of age) (OR 3.9; CI95% 1.1-15; p<0.05) and the use of ECMO in refractory cardiac arrest (OR 15.6; CI95% 1.7-146.4; p<0.05).

Intrahospital mortality in patients with inadequate LV unloading was 71.7% (n = 38). The causes of death were: multiple organ dysfunction syndrome (23.7%), inadequate hemodynamic support with VA-ECMO (15.8%), absence of recovery (15.8%), infection (10.5%), anoxic encephalopathy (10.5%), low cardiac output after ECMO removal (5.2%), mesenteric ischemia (5.2%) and others (13.3%).
Conclusions

Inadequate left ventricular unloading remains a challenge and is associated with increased intrahospital mortality during VA-ECMO support. There was an association between this complication and the etiology of cardiogenic shock. It was more likely to happen in patients with dilated cardiomyopathy, ECMO in refractory cardiac arrest and postcardiotomy shock. It is in these cases in which we may implement left ventricular unloading strategies in the optimal timing.

<table>
<thead>
<tr>
<th>Age (years) - mean ± SD</th>
<th>57.48 ±13.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex - % (n)</td>
<td>Male: 75.9 (107); female: 24.1 (34)</td>
</tr>
<tr>
<td>INTERMACS - % (n)</td>
<td>1: 95.9 (139); 2: 4.1 (6)</td>
</tr>
<tr>
<td>Cardiac arrest - % (n)</td>
<td>.</td>
</tr>
<tr>
<td>- Non-cardiac arrest</td>
<td>66.9 (97)</td>
</tr>
<tr>
<td>- ECMO post cardiac arrest</td>
<td>17.2 (25)</td>
</tr>
<tr>
<td>- ECMO in refractory cardiac arrest</td>
<td>15.8 (23)</td>
</tr>
<tr>
<td>Main objective of VA-ECMO - % (n)</td>
<td>.</td>
</tr>
<tr>
<td>- Bridge to recovery</td>
<td>69 (100)</td>
</tr>
<tr>
<td>- Bridge to decisión</td>
<td>22.8 (33)</td>
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<tr>
<td>- Bridge to ventricular assist device</td>
<td>4.1 (6)</td>
</tr>
<tr>
<td>- Bridge to heart transplant</td>
<td>2.8 (4)</td>
</tr>
<tr>
<td>- Support for interventions</td>
<td>1.4 (2)</td>
</tr>
<tr>
<td>Duration of VA-ECMO support (days) - mean ± SD</td>
<td>5 ± 4.3</td>
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Etiology of cardiogenic shock

- Postcardiotomy shock: 55 cases
- Heart transplant: 29 cases
- Myocardial infarction: 27 cases
- Dilated cardiomyopathy: 9 cases
- Pulmonary embolism: 7 cases
- Myocarditis: 4 cases
- Others: 14 cases

Age (years) - mean ± SD
- Male: 75.4 ± 13.3
- Female: 24.1 ± 13.3

Sex - % (n)
- Male: 75.9% (107)
- Female: 24.1% (34)

INTERMACS - % (n)
- 1: 95.9% (139)
- 2: 4.1% (6)

Cardiac arrest - % (n)
- Non-cardiac arrest: 66.9% (97)
- Cardiac arrest: 17.2% (25)
- ECMO post-cardiac arrest: 15.8% (23)

Main objective of VA-ECMO - % (n)
- Bridge to recovery: 69% (100)
- Bridge to decision: 22.8% (33)
- Bridge to ventricular assist device: 4.1% (6)
- Bridge to heart transplant: 2.8% (4)
- Support for interventions: 1.4% (2)

Duration of VA-ECMO support (days) - mean ± SD
- 5 ± 4.3