MHIF FEATURED STUDY:
WARRIOR - Women’s Ischemia Trial

DESCRIPTION:
The purpose of WARRIOR (Women’s Ischemia Trial to Reduce Events in Non-Obstructive CAD) is to evaluate if intensive medical therapy (IMT) (potent statin plus ACE-I or ARB) is better than usual care in women who have symptoms of suspected ischemia but no obstructive CAD (defined as <50 stenosis). The hypothesis is that IMT will reduce MACE 20% vs. usual care.

CRITERIA LIST/ QUALIFICATIONS:

<table>
<thead>
<tr>
<th>Inclusion</th>
<th>Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Signs and symptoms of suspected ischemia prompting referral for further evaluation by coronary angiography or coronary CT angiogram within previous 3 years</td>
<td>• Hx NIHCM</td>
</tr>
<tr>
<td>• Non-obstructive CAD defined as 0-50% diameter reduction of a major epicardial vessel</td>
<td>• ACS within 30 days</td>
</tr>
<tr>
<td></td>
<td>• LVEF&lt; 40% NYHA HF class III-IV</td>
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<td></td>
<td>• Prior intolerance to ACE/ARB</td>
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<td></td>
<td>• ESRD on dialysis</td>
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<td></td>
<td>• Severe valvular disease requiring TVAR within 3 years</td>
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<td></td>
<td>• Stroke within 180 days</td>
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</tbody>
</table>

Condition:
Non-Obstructive CAD in Women

PI:
Retu Saxena, MD

Research Contact:
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Stephanie.ebnet@allina.com | 612-863-6286

Sponsor:
University of FL Funded by the Department of Defense

OPEN AND ENROLLING:
EPIC message: Research MHIF Patient Referral
Women who experience chest pain and other signs of ischemia who are evaluated and found to have no significant blockages in their coronary arteries are often released from cardiac care, labeled normal, but continue to have symptoms. WARRIOR is a clinical trial designed to determine how to best treat women with chest pain and no significant coronary artery disease.

Are you a **woman** who within the last **five years** has had chest pain severe enough to be evaluated by either:

- A CT scan of your heart
- A cardiac catheterization

And the finding indicated **no significant** coronary artery blockages?

**PI:**
Retu Saxena, MD

**RESEARCH CONTACT:**
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VA-ECCOMO and ECPR in Adults

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March 16, 2020
Disclosures

• I have no conflicts of interest to disclose

Objectives

• Understand the basics of VA-ECMO, including its history of use in adults

• Review the hemodynamics of cardiogenic shock and VA-ECMO

• Identify the common objectives, indications and contraindications to VA-ECMO use and ECPR

• Highlight MHI's approach to ECPR management and experience in its use
Case Presentation

50 y.o. Female, 911 called

• **HPI:**
  - Dizziness, LH, brief LOC at the end of class
  - Reported chest tightness to bystander
  - On EMS arrival, confused and diaphoretic

• **PMHx/SocHx/FHx/Meds:** Unknown

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Case Presentation

**VS:** HR 76  BP 132/68  SaO2 96% on RA

**Gen:** Diaphoretic, clammy

**CV:** Normal

**Lungs:** CTAB

**Neuro:** Confused, unable to answer questions appropriately
Case Presentation

• Given ASA and nitrotab x3

• Transported to MHI
  • Bradycardia → loss of pulses
  • Manual CPR initiated
Case Presentation

UNABLE TO ACHIEVE ROSC

https://www.ahajournals.org/doi/pdf/10.1161/CIR.0000000000000613

Case Presentation

History of VA-ECMO

Cardiac surgery
- Slow growth in the 1940s
- Heart-lung machine critical
- Poor results in the 1950s

Reasons for Failure
- Multiple parties, limited collaboration
- Complex cardiac surgery still in its infancy
- No institutional review boards until ~1970s
- Sickest patients were referred
- No reliable cardiopulmonary bypass apparatus
History of VA-ECMO

History of VA-ECMO

By Charles J Sharp - Own work, from Sharp Photography, sharpphotography.co.uk, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=84763869
History of VA-ECMO

“I was terribly envious and yet I was terribly admiring at the same moment, and that admiration increased when a short time later a few of my colleagues and I visited Minneapolis and observed a succession of open-heart operations.” – Dr. John Kirklin, Mayo Clinic
History of VA-ECMO

Dr. John Gibbon

- Graduated from Jefferson Medical College 1927
- Research assistant at MGH 1930
- Asked to see patient s/p CCY with suspected PE
  - Plan for pulmonary embolectomy
  - q15min vitals overnight
  - ↑ venous distension, cyanosis, ↓ BP
  - OR in AM, did not survive
History of VA-ECMO

Gibbon-IBM Heart-Lung Machine
- Stainless steel
- Weighed >2000lbs
- Oxygenator:
  - 6 enclosed steel screens
  - Blood flow down the sides, exposed to O2
  - 100% saturation
  - Flow up to 5L/min


History of VA-ECMO

**May 6, 1953**
- 18 y.o. F w/ Rt-sided HF
- ASD closure
- Partial bypass time: 45 minutes
- Total bypass time: 26 minutes
- Complications

“After we finally got ready, it was ridiculously easy.” – Dr. John Gibbon to Dr. Clarence Dennis
History of VA-ECMO

PROLONGED EXTRACORPOREAL OXYGENATION FOR ACUTE POST-TRAUMATIC RESPIRATORY FAILURE (SHOCK-LUNG SYNDROME)

Use of the Bramson Membrane Lung


Abstract A 24-year-old man sustained subadventitial transection of the thoracic aorta and multiple orthopedic injuries resulting from blunt trauma. The aortic injury was repaired. Because respiratory failure occurred four days later and worsened despite maximal conventional supportive therapy, partial venoarterial perfusion with peripheral cannulation, with use of the Bramson-membrane heart-lung machine, was initiated and continued for 75 hours. At a bypass flow of 3.0 to 3.6 liters per minute, oxygen tension increased from 38 to 75 mm of mercury, inspired oxygen concentration was reduced from 100 to 60 per cent, and peak airway pressure decreased from 60 to 35 cm of water. The shock-lung syndrome was reversed, and the patient recovered.

End-stage shock lung may be reversible if the patient receives adequate gas exchange through partial extracorporeal circulation with an appropriate membrane lung.


Courtesy of Elso.org
Bonnachi, M. et al. IJS. 2016; 33(B) 213-217
History of VA-ECMO

Dr. Robert Bartlett
• University of Michigan Medical School 1927
• University of California at Irvine 1970
• Prolonged extracorporeal circulation
  • Membrane oxygenator
  • Cannula
  • Heparin titration protocol based on ACT
  • Servo-regulated pumps
• Returned to University of Michigan 1980
• Helped form ELSO 1989

Esperanza
• 1975
• ARDS
• Recovered after 1wk of ECMO
• First successful newborn supported
History of VA-ECMO


https://www.cambridge.org/core/books/cardiopulmonary-bypass/extracorporeal-membrane-oxygenation/71FE7DBD05634E7BBE4BD797931F595F


History of VA-ECMO

- **1979**: Extracorporeal Membrane Oxygenation in Severe Acute Respiratory Failure
  - A Randomized Prospective Study
  - Warner M. Zepf, MD, Michael T. Soder, MD, PhD, J. Ronald HI, MD, Richard J. Fuster, MD, Robert H. Busch, MD, L. Nancy Eschbach, MD, Ken K. Winters, MD, T. Christian Perez, MD, Steven J. Thomas, MD, Geoffrey L. Frazier, MD, Philip D. Tread, MD, Anne B. Anker, MD, PhD

- **1986**:

- **1994**:

- **2009-2020**

- Extracorporeal Membrane Oxygenation for Severe Acute Respiratory Distress Syndrome

- History of VA-ECMO

- Adult ECMO cases for Respiratory Failure, ELSO Registry July 2013

History of VA-ECMO

Cardiopulmonary resuscitation with assisted extracorporeal life-support versus conventional cardiopulmonary resuscitation in adults with in-hospital cardiac arrest: an observational study and propensity analysis


n=113
HR 0.47, 95% CI 0.28–0.77

Extracorporeal cardiopulmonary resuscitation in patients with in-hospital cardiac arrest: A comparison with conventional cardiopulmonary resuscitation®


p=0.013 by stratified log-rank test

n=406
HR 0.56, 95% CI 0.33–0.77

Growth of Adult Cardiac Extracorporeal Membrane Oxygenation Runs

The Basics of VA-ECMO

- Availability of durable membranes and portable circuits
- Ease of implantation
- Increasing familiarity with the technology and its utility
- Provides full circulatory and oxygenation support
- Bridge to transplant or mechanical support
The Basics of VA-ECMO


https://www.getinge.com/uk/product-catalog/cardiohelp-system/

The Basics of VA-ECMO

The Basics of VA-ECMO
The Basics of VA-ECMO

The Basics of VA-ECMO

[Images of medical procedures]

https://www.aats.org/aatsimis/SiteDownloads/MCS18/Friday%20pdf/Lung_084_Zwischenberger.pdf

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Hemodynamics of CS and VA-ECMO

**Cardiogenic Shock (CS)**

- Persistent hypotension
- Inadequate response to volume replacement
- Clinical features of end-organ hypoperfusion – “cold and wet”
- Hemodynamically: SBP <90  CI <2.2  PCWP >24
- ≥ 2 vasopressors or inotropes, with/without IABP
Hemodynamics of CS and VA-ECMO

Adapted from: Szeto et al. SCAI 2015. 85(7) E175-196.
Hemodynamics of CS and VA-ECMO

Adapted from: Szeto et al. SCAI 2015. 85(7) E175-196.

Hemodynamics of CS and VA-ECMO

PV Loops at Steady State, with Acute MI, and Acute on Chronic Heart Failure Complicated by Cardiogenic Shock

Hemodynamics of CS and VA-ECMO

PV Loops with IABP, pLVAD, and VA-ECMO

Adapted from: Szeto et al. SCAI 2015. 80(7) E175-196

Hemodynamics of CS and VA-ECMO

PV Loops at Steady State, with Cardiogenic Shock, and Increasing Levels of VA-ECMO Flow

Hemodynamics of CS and VA-ECMO

**LV Decompression Strategies**
- Increase forward flow
- Decrease preload
- Decrease afterload
- ECMO titration
- Mechanical decompression


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Indications & Contraindications to VA-ECMO

Indications & Contraindications to VA-ECMO

Common Objectives for Venoarterial Extracorporeal Membrane Oxygenation Insertion

| Bridge to recovery | Temporize circulatory support while definitive and supportive treatment strategies are deployed to restore myocardial recovery and achieve successful weaning |
| Bridge to decision | To determine the reversibility of end-organ damage commonly seen after a catastrophic or critical myocardial event or to decide the next level of action |
| Bridge to bridge | To achieve a brief stability for end-organ perfusion until more definitive pump support (durable mechanical circulatory support) or cardiac replacement therapy (heart transplant or total artificial heart) is performed |
| Bridge to transplant | To achieve a brief stability for end-organ perfusion until cardiac transplantation is performed |

### Indications & Contraindications to VA-ECMO

#### Indications
- Cardiac arrest (ECPR)
- Cardiogenic shock
- Acute MI
- Myocarditis
- Worsening CM, LV or RV failure
- Refractory ventricular dysrhythmia
- Pulmonary embolus
- Hypothermia
- Cardiotoxins
- Periprocedural support
- Failure to wean from CPB
- Graft failure or rejection s/p OHT

#### Contraindications
- End-stage organ failure or disease (ESRD, metastatic cancer, severe anoxic brain injury, etc.)
- End-stage HF without option for transplant or durable mechanical support
- Goals of care scenarios
- Contraindications to systemic anticoagulation
- Aortic dissection
- Severe peripheral vascular disease
Indications & Contraindications to VA-ECMO

**Predictors of morbidity/mortality**
- Older Age
- Longer support time
- High lactate concentration
- Severe peripheral vascular disease
- COPD
- CRRT while on support
- Hepatic failure

ECPR

**ECPR**: Extracorporeal cardiopulmonary resuscitation

**Refractory Arrest**: Sustained cardiac arrest without return of spontaneous circulation (ROSC) despite usual AHA ACLS cares including shock if appropriate and antiarrhythmic use

**No-Flow Time**: Time from arrest to CPR initiation

**Low-Flow Time**: Time from CPR initiation to VA-ECMO cannulation
ECPR

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The MHI Experience

**ACTIVATION**
- Inclusion Criteria
  - Bystander CPR within 5 minutes of arrest
  - Age 18-75 years old
  - Transfer from scene to MHI for cannulation <30 minutes
  - Total CPR time <60 minutes
- Exclusion Criteria
  - DNR/DNI order
  - Known terminal illness
  - “Time is myocardium”
- Appropriate ACLS cares
  - Mechanical CPR with LUCAS
  - All patients are cooled externally
  - Initial labs drawn in preparation for cannulation

**CANNULATION**
- Location: Catheterization laboratory
- Configuration: Majority bifemoral cannulation
- Ultrasound & Fluoroscopic guidance
- 21-25F Inflow cannula, 15-17F Outflow cannula
- Heparin bolus prior to initiation of flow
- Revascularization?
- Distal perfusion catheter

The MHI Experience

CICU MANAGEMENT

**MHIF Shock Team Roles**
- **Advanced HF Cardiology**: Quarterbacks the SHOCK team to provide a unified direction in care decisions, charged with hemodynamic management throughout the day, primary liaison between care team and family
- **Intensivists**: Provides comprehensive critical care support including mechanical ventilation management
- **Interventional Cardiology**: Emergent cannulation +/- percutaneous intervention in the catheterization laboratory, implementation of ancillary devices including IABP and Impella
- **Neurology**: 24/7 continuous EEG monitoring by on-call epilepsy specialist for 48-hours post-cannulation, early involvement of neurocritical care service for prognostication, utilization of NIRS for cerebral oxygen monitoring
- **ECMO perfusionists & Nursing staff**: First-line providers with continuous bedside monitoring and cares, serial CK level checks for compartment syndrome, protocolized cannulation site checks throughout the day
- **Vascular surgery**: Immediate consultation on all ECPR patients with daily assessments of cannula sites and extremities, employs continuous peripheral saturation monitoring, performs decannulation in the operating room
- **Pharm.D**: Assistance with anticoagulation based on established PTT-based nomograms with both low and high-intensity protocols depending on perceived bleeding and thrombosis risk, daily review of in-hospital medications for possible interactions and complications
- **Cardiothoracic surgery**: Determines need for left ventricular decompression with surgical or percutaneous venting, identifies patients that are ready for explantation or may need to transition to durable mechanical support

Adapted from Hryniewicz, K. et al. JASAIO. 2016;62(4):397-402
The MHI Experience

COMPLICATIONS

• Limb Ischemia
• Vascular Complications
• Stroke
• Bleeding
• Infection
• Harlequin Syndrome

Adapted from: Rao, P. Circ: Heart Failure. 2018; 11(9): e1-17

The MHI Experience

WEANING

• Considered after 24 hours of HD stability + PP >20mmHg
• Echocardiograph and Swan-Ganz catheter guided
• Intravenous heparin of 2000-5000U if aPTT was <50
• Pump flow weaned by 0.5–1 L q5 min to 0.5 L of support or clamped
  • VS, echo for biventricular and valvular assessment performed
  • Hemodynamic data: RA, PA, PCWP, FICK CO
DECANNULATION

• Criteria:
  • Mean arterial pressure (MAP) maintained >60 mmHg
  • LVEF >20%
  • CI >2.2 L/minute/m2*
  • If MAP ↓, abort and reassess
  • If ECMO dependent >5 days
    • Evaluate for LVAD
    • Evaluate for transplant

Adapted from: www.medgadget.com/2018/10/heartmate-3-heart-pump-approved-for-patients-not-eligible-for-transplant.html

The MHI Experience

Patient characteristics by location of cardiac arrest

<table>
<thead>
<tr>
<th></th>
<th>All Patients (n=26)</th>
<th>Cath Lab Arrest (n = 8)</th>
<th>In-Hospital Arrest (n = 11)</th>
<th>Out of Hospital Arrest (n = 7)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), mean ± SD</td>
<td>59 ± 11</td>
<td>64 ± 12</td>
<td>62 ± 8</td>
<td>50 ± 11</td>
<td>0.021</td>
</tr>
<tr>
<td>Male, (%)</td>
<td>17 (65)</td>
<td>5 (62)</td>
<td>7 (64)</td>
<td>5 (71)</td>
<td>1.000</td>
</tr>
<tr>
<td>White, (%)</td>
<td>23 (88)</td>
<td>7 (88)</td>
<td>10 (91)</td>
<td>6 (86)</td>
<td>1.000</td>
</tr>
<tr>
<td>History of CAD, (%)</td>
<td>10 (38)</td>
<td>3 (38)</td>
<td>5 (45)</td>
<td>2 (29)</td>
<td>0.878</td>
</tr>
<tr>
<td>History of CHF, (%)</td>
<td>5 (19)</td>
<td>2 (25)</td>
<td>3 (27)</td>
<td>0 (0)</td>
<td>0.457</td>
</tr>
<tr>
<td>History of DM, (%)</td>
<td>4 (15)</td>
<td>1 (12)</td>
<td>3 (27)</td>
<td>0 (0)</td>
<td>0.872</td>
</tr>
<tr>
<td>History of HTN, (%)</td>
<td>13 (50)</td>
<td>1 (12)</td>
<td>10 (91)</td>
<td>2 (29)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>History of tobacco use, (%)</td>
<td>16 (62)</td>
<td>6 (73)</td>
<td>6 (55)</td>
<td>4 (57)</td>
<td>0.685</td>
</tr>
<tr>
<td>Prior CVA, (%)</td>
<td>1 (4)</td>
<td>1 (12)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0.577</td>
</tr>
<tr>
<td>Family History of heart disease, (%)</td>
<td>16 (62)</td>
<td>4 (50)</td>
<td>8 (73)</td>
<td>4 (57)</td>
<td>0.634</td>
</tr>
</tbody>
</table>
The MHI Experience

Clinical characteristics on presentation and during hospitalization based on survival

<table>
<thead>
<tr>
<th></th>
<th>All Patients (n=26)</th>
<th>Survived to Discharge (n=18)</th>
<th>In-hospital Death (n=8)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest pain, (%)</td>
<td>13 (50)</td>
<td>10 (56)</td>
<td>3 (38)</td>
<td>1.000</td>
</tr>
<tr>
<td>Shortness of Breath, (%)</td>
<td>10 (38)</td>
<td>6 (33)</td>
<td>4 (50)</td>
<td>0.303</td>
</tr>
<tr>
<td>Cardiac Arrest, (%)</td>
<td>26 (100)</td>
<td>18 (100)</td>
<td>8 (100)</td>
<td>---</td>
</tr>
<tr>
<td>Witnessed arrest, (%)</td>
<td>26 (100)</td>
<td>18 (100)</td>
<td>8 (100)</td>
<td>---</td>
</tr>
<tr>
<td>CPR, (%)</td>
<td>26 (100)</td>
<td>18 (100)</td>
<td>8 (100)</td>
<td>---</td>
</tr>
<tr>
<td>Initial Rhythm VF/VT, (%)</td>
<td>17 (65)</td>
<td>15 (83)</td>
<td>2 (25)</td>
<td>0.008</td>
</tr>
<tr>
<td>PEA/Asystole, (%)</td>
<td>9 (35)</td>
<td>3 (17)</td>
<td>6 (75)</td>
<td></td>
</tr>
<tr>
<td>Hypothermia, (%)</td>
<td>13 (50)</td>
<td>11 (61)</td>
<td>2 (25)</td>
<td>0.202</td>
</tr>
<tr>
<td>Time from Arrest to ECMO flow (min)</td>
<td>51 (22, 70)</td>
<td>46 (21, 68)</td>
<td>61 (36, 71)</td>
<td>0.317</td>
</tr>
</tbody>
</table>

*Continuous variables reported as median [25th, 75th percentile] unless otherwise noted.

The MHI Experience

Revascularization characteristics of patients based on survival

<table>
<thead>
<tr>
<th></th>
<th>All Patients (n=26)</th>
<th>Survived to Discharge (n=18)</th>
<th>In-hospital Death (n=8)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revascularization at the time of ECMO initiation, (%)</td>
<td>17 (65)</td>
<td>13 (72)</td>
<td>4 (50)</td>
<td>0.382</td>
</tr>
<tr>
<td>Revascularized vessel, (%)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LM, (%)*</td>
<td>3 (18)</td>
<td>2 (15)</td>
<td>1 (25)</td>
<td>0.400</td>
</tr>
<tr>
<td>LAD, (%)*</td>
<td>2 (12)</td>
<td>1 (8)</td>
<td>1 (25)</td>
<td></td>
</tr>
<tr>
<td>RCA, (%)*</td>
<td>3 (18)</td>
<td>2 (15)</td>
<td>1 (25)</td>
<td></td>
</tr>
<tr>
<td>Multivessel, (%)*</td>
<td>9 (53)</td>
<td>8 (62)</td>
<td>1 (25)</td>
<td></td>
</tr>
</tbody>
</table>
The MHI Experience

Complications and Outcomes based on survival

<table>
<thead>
<tr>
<th></th>
<th>All Patients (n=26)</th>
<th>Survived to Discharge (n=18)</th>
<th>In-hospital Death (n=8)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time on ECMO (hours)</td>
<td>109 (69, 147)</td>
<td>110 (71, 175)</td>
<td>105 (32, 119)</td>
<td>0.16</td>
</tr>
<tr>
<td>ECMO to VAD, (%)</td>
<td>3 (12)</td>
<td>2 (11)</td>
<td>1 (12)</td>
<td>1.000</td>
</tr>
<tr>
<td>CRRT, (%)</td>
<td>9 (35)</td>
<td>4 (22)</td>
<td>5 (62)</td>
<td>0.08</td>
</tr>
<tr>
<td>CPC 1-2</td>
<td>17 (65)</td>
<td>10 (69)</td>
<td>1 (12)</td>
<td>0.001</td>
</tr>
<tr>
<td>&gt;3 units PRBCs in 24 hrs</td>
<td>18 (69)</td>
<td>12 (67)</td>
<td>6 (75)</td>
<td>1.000</td>
</tr>
<tr>
<td>Major vascular complications, (%)</td>
<td>6 (23)</td>
<td>4 (22)</td>
<td>2 (25)</td>
<td>1.000</td>
</tr>
<tr>
<td>Discharge Disposition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home, (%)</td>
<td>6 (23)</td>
<td>6 (33)</td>
<td>0 (0)</td>
<td>NA</td>
</tr>
<tr>
<td>Rehabilitation, (%)</td>
<td>7 (27)</td>
<td>7 (39)</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Long Term Care, (%)</td>
<td>5 (19)</td>
<td>5 (28)</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Expired, (%)</td>
<td>8 (31)</td>
<td>0 (0)</td>
<td>8 (100)</td>
<td></td>
</tr>
<tr>
<td>Survival at 30 Days, (%)</td>
<td>18 (69)</td>
<td>100 (100)</td>
<td>0 (0)</td>
<td>---</td>
</tr>
<tr>
<td>Survival at 6 months, (%)</td>
<td>18 (69)</td>
<td>100 (100)</td>
<td>0 (0)</td>
<td>---</td>
</tr>
</tbody>
</table>

The MHI Experience

Kaplan Meier survival curves for all cardiac arrest patients by location of arrest
### The MHI Experience

#### Limitations

- Small sample size
- Witnessed arrest
- Immediate bystander CPR
- Large number of cath lab arrests
- Inclusion criteria

---

### The MHI Experience

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**LARGER MULTICENTER RANDOMIZED TRIALS NEEDED**
Case Presentation

UNABLE TO ACHIEVE ROSC

https://www.ahajournals.org/doi/pdf/10.1161/CIR.0000000000000613

Case Presentation

https://www.dictionary.com/e/wpcontent/uploads/2020/01/WisdomvsKnowledge_1000x700_jpg_OHIVAM1Io.png
Case Presentation

[Images of cardiac imaging]

Case Presentation

[Images of cardiac imaging]
Case Presentation

• Hospital Course
  • Peak Tpn-I 947 μg/mL
  • Non-oliguric renal failure requiring CRRT
  • ARDS
  • Shock Liver
  • DIC
  • Compartment syndrome s/p bilateral fasciotomies
  • Cerebellar stroke, unclear neuro status
Case Presentation

- Multiple family conferences with extremely guarded prognosis
  - HD #11: opening eyes, not tracking
  - HD #13: squeezed hand with lightened sedation
  - HD #15: reliably following commands

- Extensive discussion with family on merits of LVAD

Case Presentation

- HD #31 underwent decannulation and HeartMate II LVAD placement
Case Presentation

- Hospital Course
  - HD #11: opening eyes, not tracking
  - HD #13: squeezed hand with lightened sedation
  - HD #15: reliably following commands
  - HD #31: underwent decannulation and HeartMate II LVAD placement
  - Underwent tracheostomy, Rt foot TMA

Case Presentation

- 6/2015 underwent OHT
Conclusion

- Understand the basics of VA-ECMO, including its history of use in adults
- Review the hemodynamics of cardiogenic shock and VA-ECMO
- Identify the common objectives, indications and contraindications to VA-ECMO use and ECPR
- Highlight MHI's approach to ECPR management and experience in its use

Thank you!