Δορυφορικό Σεμινάριο
ΕΛΛΗΝΙΚΗ ΚΑΡΔΙΟΛΟΓΙΚΗ ΕΤΑΙΡΕΙΑ
21-23 Φεβρουαρίου 2019 | Θεσσαλονίκη

ΤΕΛΙΚΟΥ ΣΤΑΔΙΟΥ ΚΑΡΔΙΑΚΗ ΑΝΕΠΑΡΚΕΙΑ

Προκλήσεις & αδιέξοδα

Νεκτάριος Ε Κογεράκης
Καρδιοχειρουργός
Μονάδα Μεταμοσχεύσεων & Μηχ Υποστήριξης
Ωνάσειο Καρδιοχειρουργικό Κέντρο
Conflict of Interest

- Speaker Grant from Abbott
A.A.

- 22 years old Female
- B Rh +
- Familial HOCM - Mother
- Death in Family – Brother 10 y.o
- Our patient on β-blockers –
- 1st Diagnosis - 8 years old
- 16 y.o. Syncope – ICD – P/M Dependent
- Heavy smoker
- Alcohol abuse
- Chasis and cocaine abuse

- January 2017 Acute on chronic decompensation - 3 months
- Failed Upgrade CRT
- Fever
- TOE – Vegetations atrial electrodes ICD
- Surgical Extraction – Positive Blood cultures
- Staph. hominis - Cardiogenic Shock
- Pulmonary Embolism

- Onassis
- Inotropes / Vasopressants
- Epicardial Leads – TPM

- Labs
- MTHFR – positive
- Nt pro BNP > 35.000 pg/ml
- Crea : 2.8 mg/dl
- Tbil > 3.5 mg/dl
- Transaminaemia
A.A.

- TOE
- Vegetations numerous >1.9 cm

- La: 38 mm
- LV: 43/27
- Walls: 15/11
- Aneurysm inf/basal RVSP: 46 mmHg
- LVEF: <25%
- RV: compromised

- RHCath
- Ra: 21
- RV: 70/21
- Pa: 75/38
- PAM: 47
- PCWP: 38
- CO/CI: 2.63/1.49
What Next?

- INTERMACS 2
- IABP
- ECMO
- Permanent ICD
- Pre transplant Work up
- Is she really a transplant candidate
- Blood cultures still positive
- Patient of border psychiatric evaluation
- Non agreeing for VAD
- Pulmonary embolism history, Mild RV dysfunction
Real Life shows the Way

- Ventricular tachycardia
- VF arrest
- Resuscitated
- IABP
- Blood cultures – negative
- Pulmonary Embolism
- Psychotherapy
- Not taking Abs
- Graft suitable for her – Highly sensitized
- What Next?
Background
Continuous flow left Ventricular Assst Systems (LVAS) improve survival and quality of life in patients with advanced heart failure refractory to medical therapy.¹²

The HeartMate II LVAS is a mechanical bearing axial continuous-flow blood pump approved for both Bridge-To-Transplant (BTT) and Destination Therapy (DT) patients.

The HeartMate 3 LVAS is a centrifugal-flow, fully magnetically levitated blood pump engineered to minimize destruction of red blood cells and thrombosis.

Outcomes with a Magnetically Levitated Cardiac Pump in Heart Failure

Multicenter, Unblinded, Randomized Trial

366 patients with advanced heart failure

Centrifugal flow
N = 190
Survival free of disabling stroke or reoperation for pump malfunction at 2 yr
79.5%  P < 0.001
Any stroke
10.1%  P = 0.02
Reoperation for pump malfunction
1.6%  P < 0.001

Axial flow
N = 176
60.2%
19.2%
17.0%

The NEW ENGLAND JOURNAL of MEDICINE
Mehra et al. 2018
N.T.

- 30 years old Female
- No previous medical history – mother sudden death during pregnancy and uncle sudden death due to asthma
- Dyspnea and dry cough 20 days post partum (delivery of a healthy girl caesarian section)
- 11/11/2016—New onset Heart Failure – Cardiogenic Shock
- IABP and inotropes

- Referral to our Hospital for the final work up (13/11/2016)
- Upon arrival acute pain (l.limb)
- Thrombosis of the LCFA
- PAI and MTHFR positive
- CTs infarcts spleen and kidneys
LV :60/55
Walls:7/10
LVEF:20-25%
Poor RV

- RHcath
- Ra:14
- RV:32/14
- PA:29/17/24
- PCWP:17
- Ao:103/53/69 CO:2.87
- CI:1.37

- Improved RV function
- Ra :4
- RV:22/13
- PA:22/7/15
- PCWP:12
- Ao:100/75/65
- CO:3.0
- Ci:1.6
Questions

- Pre-HTx Evaluation
- IABP
- Durable Device
- ICD
- Pneumonia
- Wait for a suitable graft –AB+
Nine months after LVad
D.M.A.

- 40 years old Female dentist
- Ulcer Colitis on anti TNF treatment
- ARVC
- Acute on chronic decompensation
- Pericardial effusion
- Cardiogenic shock
- Inotropes and IABP
- Frailty

Echo –
LV:70/65
RVSP:35-40 mmHg
RHCath
| Ra:9
RV:37/15  | PA:37/22/27
PCWP:25  | AO:101/53/76
CO/CI:2,75/1.15

? Temporary Device
? Durable Device
? Frailty
? Candidate for HTX
D.M.A
After ECMO

Day 1

Day 5
D.M.A

biVentricular
CENTRIMAG SUPPORT
Abbott

LA
RA
Aorta
PA
D.M.A.
S.K.

- 61 years old Male orthopaedic
- DCM diagnosed 8 months ago
- CRT D
- Low cardiac output on inotropes – electrical instability
- Onassis – Pre transplant evaluation

• Electrical storm
• Intubated
• IABP
• VF arrest

What is the ideal solution?
? IABP
? ECLS
? BiVAD
? Do Nothing
8 Days after ECMO Support
N.V.

- 56 years old Male
- B Rh +
- Thrombophilia positive
- ICHF
- 2 AMI (inf/ant)
- PCI – RCA and LAD
- EPStudy – ICD
- Pulmonary Embolism
- Septic Shock – Acinetobacter baumanii

- 2 Decompensations
- Pretransplant work up
- Listed 02/10/2018

- Labs
  - Nt-pro BNP >20.00 pg/ml
  - Tbil >1.8 mg/dl
  - Crea: 1.9 mg/dl
<table>
<thead>
<tr>
<th>Date</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>25/06/2018</td>
<td>Ra: 4, RV: 45/6, Pa: 46/23/3, PCWP: 24, Ao: 115/70/86, CO: 2,5 CI: 2,8</td>
</tr>
</tbody>
</table>

**ECHO (07/11/2018)**

- La: 60
- AO: 32 TDI 11 cm/sec
- Walls: 8,5
- LV: 80/70
- LVEF: 30%
- MR: 2-3+/4
- RVSP: 60 mmHg
- RV TDI 11 cm/sec
- MR: 3+/4+
- RVSP: 70 mmHg

- Apex – dyskinesia
- Akinesia inf/posterior
- RV: normal size and function

**Questions:**
- Ideal Candidate for LVAD?
- RV Failure post LVAD?
- TV Repair?
P.T.

- 46 years old Female
- DCM
- ICD
- 2-3 decompensation
- Pre transplant evaluation
- TPG

- New decompensation
- Electrical storm
- ECMO 01/12
- LVAD

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**ECHO**

- La : 42
- AO : 27
- Walls : 7/7
- LV : 68/58
- LVEF : 25%
- TDI (RV) : 8CM/SEC
- RVSP : 75mm/Hg

**RH Cath**

- RA : 6
- RV : 61/4
- PA : 61/16/37
- PCWP : 18
- AO : 123/66/83
- CO : 2,91/min
- CI : 1.61 Li/min/m²
 Electrical Storm
 Temporary Device
 Durable Device
 Which VAD
Day 1 Ecmo

P.T.

Day 1 LVad
Chance for Heart Transplantation

![Graph showing survival rates for LVAD and BiVAD patients over years.](image-url)
Type of VAD

Transplantations (47)

- BiVAD: 84
- LVAD: 32
Average waiting time

[Bar chart showing average waiting times for LVAD and BiVAD with years ranging from 0 to 1.4 on the x-axis and waiting times on the y-axis]
Devices used
Heart Transplantation Survival

<table>
<thead>
<tr>
<th></th>
<th>OSCS</th>
<th>Europe</th>
<th>ISHLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>88.60%</td>
<td>81.30%</td>
<td>86.90%</td>
</tr>
<tr>
<td>3 years</td>
<td>85.80%</td>
<td>76.20%</td>
<td>81.10%</td>
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</table>
Heart transplant recipients characteristics

<table>
<thead>
<tr>
<th></th>
<th>No VAD</th>
<th>BiVAD</th>
<th>LVAD</th>
<th>Levitronix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>86</td>
<td>49</td>
<td>24</td>
<td>1</td>
</tr>
<tr>
<td>Transplant</td>
<td>VADs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proven QOL durability</td>
<td>QOL durability unknown</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute and long-term infection</td>
<td>Acute and long-term infection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic rejection risk</td>
<td>No rejection (<em>sensitized pts</em>)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVR has to be low</td>
<td>RV has to work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low stroke risk</td>
<td>Stroke and TIA are problems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-term effect of drugs</td>
<td>Unclear which drugs are key</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low availability of donors</td>
<td>Off the shelf technology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent living</td>
<td>Tethered life with ? need for companion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transplant arteriopathy, and increased cancer risk</td>
<td>Bleeding, aortic insufficiency, and late arrhythmias</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Intermacs - Implants per Year by Device Strategy
Primary Prospective Implants: June 23, 2006 to September 30, 2016

- Bridge to Transplant - Listed
- Bridge to Candidacy
- Destination Therapy
- Bridge to Recovery
- Other

Number of Patients

Year (Jun-Dec)

2006: 434
2007: 146
2008: 355
2009: 503
2010: 502
2011: 598
2012: 708
2013: 827
2014: 1,039
2015: 1,441
2016: 945

Year (Jan-Sep)

2006: 151
2007: 48
2008: 147
2009: 36
2010: 36
2011: 429
2012: 430
2013: 656
2014: 693
2015: 863
2016: 462
Thank you!
<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Points</th>
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<tbody>
<tr>
<td>Severe RV dysfunction</td>
<td>2</td>
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<tr>
<td>RA/PCWP $\geq 0.54$</td>
<td>2</td>
</tr>
<tr>
<td>INTERMACS class 1-3</td>
<td>2</td>
</tr>
<tr>
<td>Need for $\geq 3$ intravenous inotropes</td>
<td>2.5</td>
</tr>
<tr>
<td>Hemoglobin $\leq 10$ g/dL</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total points</strong></td>
<td></td>
</tr>
<tr>
<td>0-2</td>
<td>Risk</td>
</tr>
<tr>
<td>2.5-4</td>
<td>Low</td>
</tr>
<tr>
<td>&gt; 4</td>
<td>Intermediate</td>
</tr>
<tr>
<td></td>
<td>High</td>
</tr>
</tbody>
</table>

Abbreviations: INTERMACS, Interagency Registry for Mechanically Assisted Circulatory Support (class 1, severe cardiogenic shock despite positive inotropes and/or mechanical circulatory support; class 2, rapid clinical deterioration despite use of positive inotropes; and class 3, hemodynamic stability dependent on inotropes); PCWP, pulmonary capillary wedge pressure; RA, right atrial; RV, right ventricular

*EUROMACS-RHF risk score variables with respective points and risk score categories.*

[^44]: