Caring for the Ventricular Assist Device Patient in the Community

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Disclosures

• none
Who gets a VAD?

• **Indications**
  
  – “*Bridge to transplantation*” for cardiac transplant candidates who are at risk of imminent death from non-reversible left ventricle failure.

  – It is also indicated for use in patients with New York Heart Association (NYHA) Class IIIIB or IV end-stage left ventricular failure, who have received optimal medical therapy for at least 45 of the last 60 days, and who are not candidates for cardiac transplantation “*Destination Therapy*”
Types of VADs

• Continuous Flow Pump (CFP): Axial Flow
  – Helical blades on a central shaft which rotates on bearings; blood flows through the pump as a continuous stream (some pulsatile flow from native heart)
  – BTT and DT
  – Example: HeartMate II
Types of VADs continued

Continuous Flow Pump (CFP): Centrifugal

HeartWare LVAD – approved for BTT

HeartMate 3 in trial!
- Magnetically-levitated flow technology
- Artificial Pulse technology
- Textured Blood-Contacting Surfaces
Post-implant care is similar to other open heart surgeries

• Adequate hydration (preload) and controlled afterload (blood pressure) are important for acceptable LVAD flow
  – Encourage fluid intake
  – Manage blood pressure medications
• Sternal Precautions
• Anticoagulation management
• Home Health
• Cardiac rehab
• Return to work / school

But...
• Frequent follow up in VAD Clinic
• Need for Caregiver
VAD Implant

• Pre-op, Post-op & Follow up education
  o equipment care & maintenance
  o alarms
  o activities of daily living
  o driveline care
  o diet
  o medications
  o lab
Discharge

• Rehab

• Community prep
  – EMS
  – Electric co
  – Local ED
Discharge

• Community Preparation (cont)
  – Home Health
  – Cardiac Rehab
  – PCP

• Follow Up Care
  – VAD Clinic
  – Cardiologist
Patient Assessment

General Assessment
• Vital signs
• Fluid status, weight
• Neurological assessment
• Pulmonary assessment
• Driveline assessment
• Lab work
  • Chemistry profile
  • Liver functions
  • PTT, PT, INR
  • LDH
  • CBC

Cardiac Assessment
• Auscultate chest
• Heart rate and rhythm
• EKG
• Doppler BP
• Assess for signs of heart failure, particularly RV failure
• Assess for adequate perfusion

Assess the patient as you would a patient without a device.
*Treat the PATIENT – not the pump*
Monitoring the CF VAD Patient

What!? No pulse? No blood pressure?

Yes there is a pulse (just not palpable!)

- BP may not be sensed by NIBP – use doppler method
- This is generally considered to correlate to the MAP.
- Recommended MAP 65 - 85 mmHg
- Avoid MAPs exceeding 90 mmHg
A bit more about blood pressure......

There is a pulse, you just cannot always palpate it!
Anticoagulation

• Warfarin: dose for INR range of 2.0 to 3.0 (2.5 – 3.5 first 3 months)

• Aspirin: 81 to 325 mg/day

• Regular testing of anticoagulation profiles (INR) Home machine??
  ✓ If the patient reports gastrointestinal bleeding or epistaxis, report to VAD Center Team
Potential Complications

Adverse Event Rates Improvements Over Time

<table>
<thead>
<tr>
<th>Condition</th>
<th>Trial</th>
<th>PAS</th>
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</thead>
<tbody>
<tr>
<td>Device Related Infection</td>
<td>0.47</td>
<td>0.22</td>
</tr>
<tr>
<td>Bleeding Requiring Surgery</td>
<td>0.023</td>
<td>0.09</td>
</tr>
<tr>
<td>Pump Replacement</td>
<td>0.057</td>
<td>0.026</td>
</tr>
<tr>
<td>ISC Stroke</td>
<td>0.06</td>
<td>0.031</td>
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<tr>
<td>Hem Stroke</td>
<td>0.07</td>
<td>0.052</td>
</tr>
<tr>
<td>Hemolysis</td>
<td>0.06</td>
<td>0.024</td>
</tr>
<tr>
<td>Thrombus</td>
<td>0.024</td>
<td>0.027</td>
</tr>
</tbody>
</table>

What Could Go Wrong?

- Decrease in circulating blood volume
- Thrombus in the pump
- Pump malfunction
  - Device, percutaneous lead damage
  - Magnetic interference
- Damage to the percutaneous line (wire fracture)
  - Trauma
  - Twisting, sharp bend in line
- Loss of power (to pump)
Emergency Care

- **External Defibrillation and Cardioversion**
  - Do not stop the pump

**Cardiac Arrest and Chest Compressions**
Use clinical judgment when deciding to perform compressions

- Potential risks:
  - Disruption of outflow graft & left ventricular apex anastomosis
  - Contact implanting center for direction when possible

**Special Considerations**

- May not be able to obtain cuff pressure (continuous-flow pump)
- Pump does not affect EKG (however, rhythm may affect flow, i.e. VT = low flow)
- All ACLS drugs may be given
- Any emergency mode of transportation is ok; patients are permitted to fly
- Be sure to bring ALL of the patient’s equipment with them
- Allow care provider to remain with the patient
CareGiver

• Program “requirement”
  – Up to 12 weeks
    • Spouse / S.O.
    • Child, parent, sibling, aunt or uncle, cousin
    • Friend
    • SNF / Assisted Living

• Other Support
  – Co-worker
  – Classmate, teacher!
  – Other / extended family
  – Home Health
  – Neighbors
Oh, what to wear?
Traveling....

WHEN WE ASKED YOU TO TURN OFF ALL ELECTRONIC DEVICES, WE DIDN'T MEAN YOUR HUSBAND'S

LVAD
Goal: Improve Quality of Life
Destination Therapy case study: post implant
Art Pierskalla, age 71

24-months post HeartMate II implant

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>24 Months Post Implant</th>
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<tbody>
<tr>
<td>NYHA Class</td>
<td>IV</td>
<td>I</td>
</tr>
<tr>
<td>Cardiac output (LPM)</td>
<td>2.4</td>
<td>7.1</td>
</tr>
<tr>
<td>Serum creatinine (mg/dL)</td>
<td>2.3</td>
<td>1.8</td>
</tr>
<tr>
<td>BUN (mg/dL)</td>
<td>43</td>
<td>21</td>
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<tr>
<td>Total bilirubin (mg/dL)</td>
<td>0.6</td>
<td>0.5</td>
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<tr>
<td>Minnesota Living With Heart Failure Score</td>
<td>72</td>
<td>21</td>
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<tr>
<td>Kansas City Cardiomyopathy Score</td>
<td>49</td>
<td>87</td>
</tr>
</tbody>
</table>

9 years post HeartMate II implant

Art is active and enjoying life
• Gardening at the farm and baking raspberry pie
• Wood working and traveling
• Playing with grandchildren
• Driving the “old folks” to church

“I am busy all the time and I don’t seem to have much free time. I’m always working!”