Ventricular Assist Device

EMS Provider Role

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Sutter Memorial VAD Coordinator’s
Why Are We Doing This?

- HeartMate II is used to treat end stage heart failure
- HeartMate II is used as a Bridge to Transplant Device (BTT) or a Destination Therapy Device (DT)
- Bridge to Transplant (BTT) - Patient’s goal is to receive VAD therapy as a step to cardiac transplantation
- Destination Therapy (DT) - VAD used as pt’s only treatment for heart failure. Typically these pt’s are not transplant candidates.
How It Works

• The HeartMate II pumps blood from the weakened left ventricle to the aorta.
• The inflow graft is connected to the apex of the left ventricle.
• The outflow graft is stitched to the ascending aorta.
• This pump is designed to last for up to ten years.
HeartMate II LVAD

• HM II Components:
  - Implantable titanium blood pump
  - System Controller
  - Display Module
  - Power Sources
    • Power Module
    • UBC (charges batteries)
    • Batteries & Clips
    • Emergency Power Pack
How do you care for patient with a VAD?
Forget Everything You Know

- Non-pulsatile VAD pt’s go against everything you have ever been taught.
  - No pulse
  - No systolic and diastolic blood pressure – they have one number which is typically obtained via doppler
  - O2 sats may or may not be accurate
  - VAD can maintain perfusion even in the presence of V-fib (pt could be walking and talking)
Important Clinical Information

- Pt’s are typically pulseless as this is a continuous flow device.
- Automatic blood pressures are not accurate and usually can’t be obtained as pt’s do not have systolic or diastolic function d/t the continuous flow provided by the VAD.
- May be difficult to obtain an $O_2$ saturation d/t lack of pulsatility.
• **NO CHEST COMPRESSIONS**

  - These patient’s should not have chest compressions performed as it may dislodge their grafts and cause sudden death.
Important Clinical Information

• Pump flow is not intuitive like the native heart and cannot adjust for patient activity. Many pt’s experience orthostatic hypotension.

• The pump is very fluid sensitive as it must have volume to flow through the pump or ventricular “suck down” may occur. Hypovolemia can cause pump malfunctioning and pt’s can become symptomatic even in the presence of mild hypovolemia.

• Pt is anticoagulated on Coumadin.
Assessment

- Vital signs done per protocol
  - Blood pressure via auscultation (more likely) or in very few cases, palpation if able to obtain - automatic blood pressures are not accurate and should not be used as an indication to treat. Pt’s will only have one number which can represent a “mean” blood pressure. This number typically ranges 65-100, but can vary depending on pt’s needs.
  - Heart rate may be obtained by ECG and often by auscultation. Palpation will not be accurate.
  - O2 saturation - also difficult to obtain as pt is pulseless. May also be inaccurate. Please use clinical judgment - if pt appears adequately perfused, no SOB and good cap refill, but sats read 60% do not trust the number.

**Must use rudimentary forms of assessment such as checking capillary refill to check for extremity perfusion**
What You Can Do

- Administer ACLS medications – no medication is contraindicated in relation to the VAD
- Cardiovert and Defibrillate without any risk to the device
- Access the on-call VAD Coordinator 24/7 whether the emergency is pump related or not.
Typically, if able, the VAD pt’s should be routed to the nearest VAD center. Currently Sutter Memorial is the only VAD Center in the Sacramento area.

Reasons not to transport a VAD pt to Sutter Memorial:
- Unable to establish an airway
- Trauma’s (transport to the nearest trauma center and notify SMH on-call VAD Coordinator immediately)
- Burn’s (transport to the nearest burn center and notify the SMH on-call VAD Coordinator immediately)
The Little Black Bag

- VAD pt’s are required to carry an emergency bag with them at all times.
- It contains
  - back-up equipment
  - extra batteries
  - ID card
  - EMS instructions with VAD Coordinator pager numbers
  - Alarm Guide
General Safety

- Patient must wear abdominal binder or driveline anchor at all times with the System Controller properly attached to the binder or other peripheral equipment.
- Must avoid any activities that cause a jarring motion of the driveline.
- Patient must have emergency pack with them at all times (contains back-up controller, extra batteries, emergency card with contact info for VAD Team, medication list, alarm guide)
System Controller

The Brains of the Operation:

- Controls pump speed and power
- Provides hazard and advisory alarms
- Provides complete backup system

** This must be connected to pt at all times**
**Display Monitor**

- The home Display Monitor displays all VAD data.
- It can also display alarms as they occur.

This only displays numbers when pt is connect to the PM – you won’t get a reading if the pt is on battery power.
**Power Module**

- Supplies power to the LVAD
- Repeats alarm conditions

**Note – if transporting a VAD pt this piece of equipment must go with them. It is their power source.**
Universal Battery Charger

- Tests and charges batteries
- Calibrates batteries
Li-Ion Batteries

- Provide 10 hours of battery operated power

**Note – if transporting a pt please take all extra batteries with the pt**
Power Base Unit (PBU)

- Supplies power to LVAD
- Test and charge up to six batteries (8 hours)
- Repeats alarms generated by the System Controller

**Note – this is the old unit. The Power Module and Battery Charger replace this unit – there are still a few pt’s with this machine.**
Batteries

- 3 - 5 hours of support on a pair of batteries
- Eight hour recharge for fully discharged battery

**These are the older batteries that will be associated with the older power machine.**
**This is the alarm guide that can help you in the event of a VAD alarm. Pt’s keep a copy at home (usually on the fridge or by the phone) and a copy in their black emergency bag.**
VAD Coordinator’s

• Pt’s are taught to call 911 in an emergency then page the on-call VAD Coordinator immediately (whether it is pump related or not)
• Typically we will be on the phone waiting to talk to EMS when you arrive
• If pt is not being transferred to Sutter Memorial, the VAD Coordinator needs to know where the pt is going so they can meet the patient in the ED.
Transporting

• The caregiver should transport in the ambulance with the patient. They will be your equipment expert.
• Emergency bag should be with pt at all times.
• Please bring pt’s power source and battery charger with the pt.
HeartMate II® LVAS Patient Assessment Protocol

Patient Calls 911

LVAD Functioning?
- Auscultate left upper abdominal quadrant
- Continuous humming sound = pump is running
- Attention: No pulse at pump
- Patient may not have palpable pulse or measurable BP or pulse oximeter readings; even if pump is working properly

Always:
- Contact implant center
- Keep patient's companion with the patient

Patient Stable
- Other general medical problem
- Treat per medical protocol

Patient Unstable
- Pump connected to controller?
- Controller connected to power?
- Treat per standard protocols
- No compressions
- RKG
- Treat per ACLS protocol
- Transport Urgently to ER
  - If possible, transport to implant center

Controller Alarming (red heart)
- Treat for cardiogenic shock
- Change controller (only if instructed)
VAD Coordinator
Contact Info

- Sherry Martin RN, BSN
  - 916-396-9402 (cell)
  - 916-523-9495 (pager)
  - 916-733-8133 (answering service – after hours to reach on-call VAD Coord)

- Renee Santos, RN
  - 916-281-8561 (cell)
  - 916-762-5840 (pager)
  - 916-733-8133 (answering service – after hours to reach on-call VAD Coord)

** A VAD Coordinator is on-call at all times **