

Left Ventricular Assist Devices “LVAD”

North Country EMS Program Agency
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Objectives

- Describe indications for and functions of ventricular assist devices (LVAD)
 - Differentiate assessment findings of patients with LVAD from other emergency patients
 - Outline treatment and transport options for care of patients with LVAD
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Left Ventricular Assist Device LVAD

- “Bridge to transplant”
 - Indications for LVAD:
 - Non-reversible left heart failure
 - Imminent risk of death
 - Candidate for cardiac transplantation
 - For both in-patient and out-patient use
 - Recent FDA approval
 - End Stage Heart Failure
 - January 2010
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Left Ventricular Assist Devices

- Mechanical Device
 - Surgically Implanted
 - Augments cardiac output or the ability to pump blood
 - Most common type
 - Left-ventricular assist device (LVAD)
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LVAD continued...

- Other types
 - Right ventricular (RVAD)
 - Or in both ventricles (BiVAD)

 - Patients usually have an Internal Cardioverter-Defibrillator implanted

 - Heart Mate II most common
 - Other models:
 - HEARTWARE, JARVIC 2000, HEARTMATE XVE, and THORATEC PVAD/IVAD
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Principles behind LVAD

- Blood follows the normal path through the heart until it reaches left ventricle
 - Cannula placed in apex of the heart drains blood from left ventricle into system pump (internal)
 - Blood is then pumped into the aorta
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Principle behind LVAD

- Drive line (percutaneous cable) exits the abdominal wall, connecting internal pump to external controller

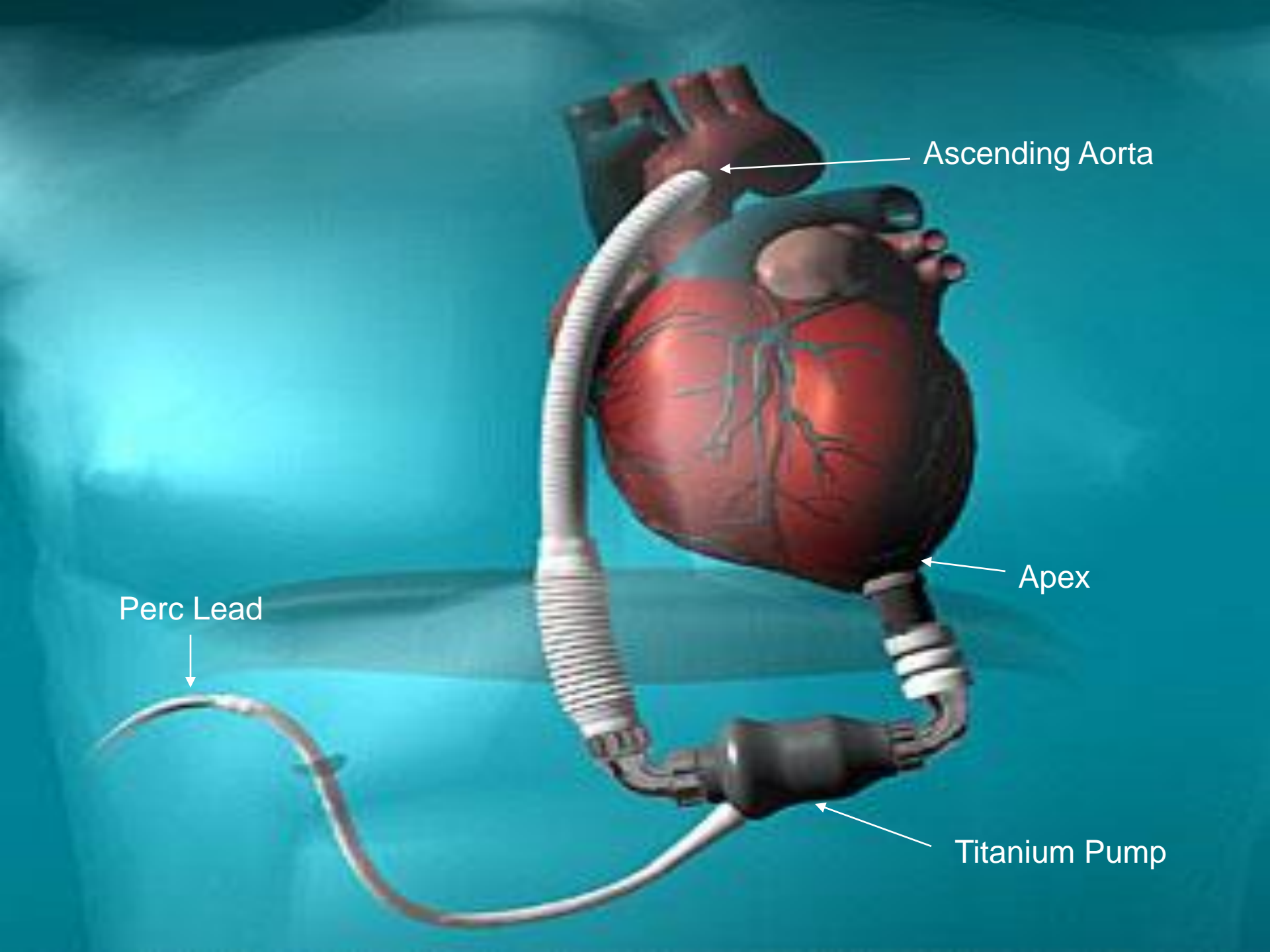
 - External Controller
 - Brains of the device
 - Contains settings, alarms and diagnostic information about the pump.
 - Operates on battery or AC power
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HeartMate II

□ Components

- Titanium blood pump
 - System controller
 - Percutaneous lead
 - System monitor with display module
 - Anastomosed to LV apex and ascending aorta
 - Powered by base unit
 - Portable batteries x 2 [12 hr]
 - Emergency Power Pack [12 hr]
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Ascending Aorta

Apex

Titanium Pump

Perc Lead



HeartMate II

- Speed
 - 8,000 to 9,800 rpm's
 - Flow
 - 3.3 to 7.8 liters/min
 - System Controller – microprocessor that...
 - Delivers power to pump
 - Controls pump speed and power
 - Monitors, interprets and responds to system performance
 - Diagnostic monitor
 - Hazard and advisory alarm
 - Provides complete back-up system
 - Event recording capability
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Special Care Considerations

- Assessment of patient should be the same as any other patient with a few exceptions.
 - Be Careful not to cut, twist or bend the drive-line coming from the patients abdomen
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Special Care Considerations

- Patients will be on anticoagulant drugs
 - ASA, Coumadin, Plavix
 - High risk of bleeding

 - Most Common Complications
 - Bleeding
 - Nasal, gastrointestinal or intracranial
 - Thromboemboli
 - Pulmonary embolism, myocardial infarction or cerebrovascular accident
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Patient Management

- Initial or Primary Assessment
 - Open airway- interventions per protocol
 - Assess breathing- interventions per protocol
 - Assess circulation- control bleeding per protocol, assess skin
 - Auscultate heart sounds to determine if pump is working. Listen at APEX of heart.
 - If working: you will hear “whirling sound”
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Patient Management

- ECG shows concerning arrhythmia
 - Do not intervene without consulting LVAD coordinator
 - It is possible for them to present with VT or VF and be awake and talking
 - If directed by LVAD Coordinator – defibrillate/cardiovert as normal
 - Don't place pads over the device under the patients' skin or implanted ICD

**NO CPR unless directed
to by LVAD Coordinator!**



Vital Signs

- You will be unable to obtain a Pulse or Blood Pressure (manually)
 - Assessing mental status and skin will be the best indicator of oxygenation and perfusion.
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Vital Signs

- Automatic BP device may give you a reading. 60-90 mmHg acceptable (Doppler is most accurate, but not normally available on EMS Units)
 - Pulse Oximetry readings if obtainable, are unreliable due to weak or absent pulses.
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LVAD Alarming

- Make sure driveline and power sources(battery or AC power) are connected to the system controller

 - Contact LVAD Coordinator if possible
 - Family or patient should have contact information
 - Utilize medical control if needed
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LVAD Pump Failure

- Contact LVAD coordinator for guidance
 - Patient may decompensate rapidly or tolerate this condition well.

 - CAUTION!!!
 - Restarting the pump is not recommended
 - Increase risk of stroke or thromboembolism
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Destination

- Pre-planning is key to success
 - Implant center should provide outreach training to local emergency responders when a LVAD patient is discharged to the community
 - Patients should have Emergency Binder with important information in regards to their care and the device
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Destination

- Primary or Initial Assessment should reveal if there is a life threat.
 - Immediate life threat- transport to nearest most appropriate facility (contact medical control and LVAD coordinator for guidance if needed)
 - No life threat- coordinate destination with LVAD Coordinator
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TRANSPORT

- Keep batteries and controller in reach and secured to the patient during transport
 - Keep them dry
 - Take the patients emergency travel bag, it has an extra controller, batteries and LVAD coordinators' contact information
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Conclusion

As with any other special needs patient, your best asset will be referring to their caretakers if present. These patients usually call 911 for problems unrelated to their LVAD, so you shouldn't get distracted from your usual approach to patient assessment and treatment. Be sure to plan treatment regimen in coordination with LVAD coordinator



Resources

- Journal of Emergency Medicine, Feb. 2012, No Pulse? (pg50-57)
 - Useful websites
 - http://www.thoratec.com/videos/mp-vad-training.aspx?id=mp_hml_profEduPro
 - http://www.mylvad.com/assets/ems_docs/0003528-2012-field-guide.pdf
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