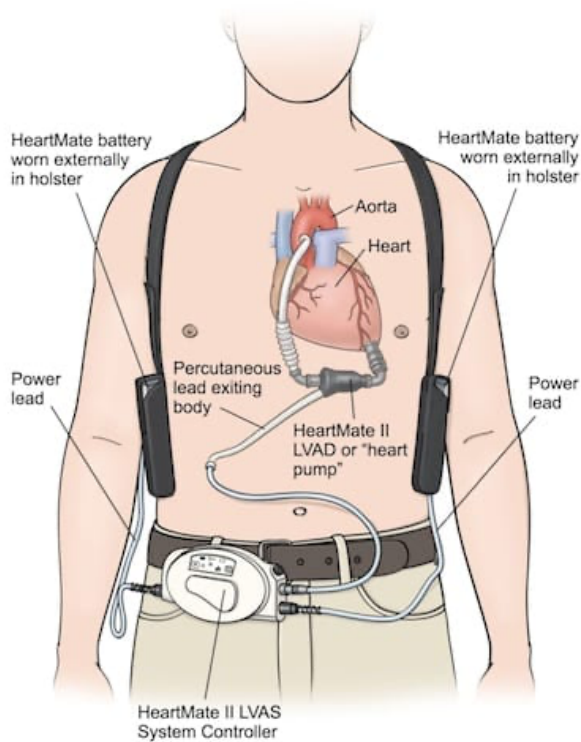


VADs Notes (Source: Dr. Tarian Hedayati, 2017) - Compiled by Anthony Seto

- Left ventricular assist devices
- Goals/reason:
 - o bridge to transplantation
 - o destination therapy (pts who won't get transplant)
 - o bridge to recovery (pts with transient myocardial dysfn like perimyocarditis or post-partum CHF pt)
- 3 types of VAD
 - o LVAD - mostly seen in ER. In-flow is left atrium or left ventricle, outflow is aorta, and pump is pre-peritoneal.
 - o RVAD - pts are not d/c home on this
 - o BiVAD - may see this
- Two types: pulsatile vs continuous flow. The pulsatile version isn't around much anymore. Now you see continuous flow LVAD. There is a rotor in blood that is constantly spinning which draws blood in and pumps blood out. There is no pulsatile flow. So patient will NOT have a pulse.
- VADs are highly preload dependent! If you don't have volume, the RV will not fill. If there is no volume in LV, there is nothing for LVAD to pull into the pump. You will almost never go wrong with giving a bit of fluids.
- VADs also afterload sensitive. The pump is set to push against a certain amount of pressure/resistance. If afterload rises, pump gets compromised and can't push against it. Ensure MAP stays low like 70s.
- **Basic VAD info to get:**
 - o Where is their VAD centre?
 - o Type? E.g., LVAD continuous flow... reason: temporary or bridge to transplant
 - o Normal parameters (ask family). Want to know how far off. Below are normal numbers:
 - Flow: 4-6 L/min
 - Speed: 8000 - 10,000 RPM
 - Power: 4-6 Watts
- **Getting vital signs**
 - o "Pulse" = EKG/monitor, since you cannot palpate pulse
 - o Pulse ox = ABG, b/c no pulse to generate waveform
 - o Perfusion = do clinically with mentation and extremities (warm/cool)
 - o BP = MAP goal 70-85. Need to use Doppler and manual cuff (first sound you hear is the estimation of MAP, since only one flow). Arterial line is most accurate. <https://www.youtube.com/watch?v=FtHxICFx80>



- **Look**

- Battery: fully charged? Running low?
- Connection: things plugged into controller properly?
- Controller
- Driveline (percutaneous lead): does it look infected?
- Pump site: infected? Tender?

- **Listen**

- Listen for the hum. All these devices make a hum. Over the pump, there should be a continuous hum. Otherwise, there may be something wrong.

- **Feel**

- Feel controller. It should be room temp b/c outside pt's body. If hot, something wrong.

- ED considerations

- Thrombosis: b/c blood passing over non-biologic surface. Up to 35% pts affected.
 - Anticoag necessary with target 2.0 - 3.5. Warfarin is what is used.
 - Clues to thrombus = hot controller, high power, low flow (can't draw blood easily), low MAP (decreased CO), abnormal hum (won't be same monotonous hum).
 - High bili, high LDH, low Hb (hemolysis). Echo shows big RV/LV. 1-2% at 2 years.
 - Tx: CT surgery, IR, fluids, heparin, tPA

- Bleeding
 - Most common complication
 - ICH, GIB, hematuria, recurrent epistaxis
 - Avoid reversal of anticoag at all costs! - don't want to generate a thrombus
 - When to treat? In extremis → CT surgery → reverse. PCC, TXA, vitK, FFP, DDAVP, MTP (massive transfusion protocol)
- Infection
 - Locations: driveline (most common), surgical site, device pocket, pump, systemic.
 - W/U: cultures (blood/wound), CT, echo (how well heart is working as well as vegetation)
 - Tx: abx, antifungals (9% had fungal infxn so start antifungal)
 - LVAD pts need abx prophylaxis for procedures
- Right heart failure
 - 25% of pts few days post-op
 - LVAD starts unloading LV so increased CO and increased venous return. RV has not seen venous return like this for a while so it gets overloaded and fails.
 - EKG in all these pts. Could be AMI → cath lab
 - Goal: reduce preload and afterload
 - Inotropic supports: dobutamine, epi (pressor of choice in these pts), diuresis, NTG, ACEi, sildenafil 50mg, operated to get BiVAD
 - Echo to determine issue
 - Big RV/LV: pump failure, thrombosis, obstruction
 - Big RV, small LV: RV failure/STEMI, Pulm HTM, PE
 - Small RV/LV: low preload, sepsis
- Malignant cardiac dysrhythmia
 - 50% of pts
 - Dysrhythmias are usually well-tolerated
 - Make sure to check their lytes (as cause) b/c lots are on diuretics
 - Good news is they all likely have ICD
 - Their VAD can help dysrhythmia
 - Chemical cardioversion preferred
 - If unstable, cardiovert or defib
- Device malfunction
 - Mylvad.com (go to website and get info on how to troubleshoot)
 - Check the connections
 - Change the power source
 - Change the controller
 - Get additional help
 - Call VAD centre/coordinator
 - If pt in extremis, call interventional cardiology, CT surgery

- Concern of CPR b/c of ?risk dislodgement. If the patient is dying, dead is dead, so do what you need to do to get them to survive.

ACLS 2020 VAD Notes

1. Check perfusion (skin colour/temp, cap refill)
2. Check LVAD function (alarms, hum)
3. Restart LVAD if needed (driveline connection, power source connection, controller replacement)
4. CPR if MAP \leq 50 or PECO₂ \leq 20 (intubated), or CPR if LVAD can't be restarted