
 <p>HeartMate II -Continuous Axial Flow -Inflow Cannula- LV Apex -Pump- Below LV Apex -Outflow-Ascending Aorta -Driveline- Abdominal</p> <p>Flow- 4-6 L/min “---” & “+++” normal if other parameters normal & pt VS stable Speed- 8800-9600 RPM, Fixed RPM Power- 4-8 watts, RPM dependant Pulsatility Index (PI)- 4-5, LV function & pre-load dependant Goal: INR 2-3, ASA 325mg</p>	 <p>HeartWare -Continuous Centrifugal Flow -Inflow cannula- LV Apex -Pump- Pericardium/LV Apex -Outflow- Ascending Aorta -Driveline- Abdominal</p> <p>Flow- 4-6 L/min Speed- 2400-3200rpm, Fixed RPM Power- 3-7 watts, RPM dependant Flow Pulsatility (Waveform)- 2-4 L/min variance between peak & trough Goal: INR 2-3, ASA 325mg</p>	<p>HeartMate III -Continuous Centrifugal Flow pump -Inflow cannula on the LV apex -Outflow Cannula to the ascending Aorta -Pump –Pericardium/LV apex -Driveline- tunneled thru the abdomen</p> <p>Flow- average 4-6 Speed- 5200-5800 fixed RPM Power- 3-6 watts, dependent on RPM Pulsatility Index (PI) - 3.0-5.0 Pre-load dependent/afterload sensitive</p> <p>Goal: INR 2.3, ASA 325mg daily</p>
--	--	---

Pump Parameters:

Flow (L/min): Estimate/calculated value based on power, speed and sometimes Hct. Affected by right heart function, volume status, blood pressure, cardiac rhythm and pump speed.

Speed (RPM): Fixed speed-direct measurement. Set based on pt condition by CT attending or VAD coordinator, often verified with ECHO. Optimum speed=intraventricular septum midline. If temporary speed fluctuations of >100rpm speed, suspect suction event (too little volume or too high RPM). Pump running below set speed limit, can indicate pump obstruction/clot in pump motor.

Power (Watts): Direct measurement from the pump. Increase speed=increase power. Increase in power by >2watts NOT r/t increase in speed can indicate a LVAD clot and can cause erroneously high estimated flow readings.

Pulsatility Index(PI)/Flow Pulsatility: Measurement of pulsatility of blood through pump. ↑LV contractility= ↑PI, ↓LV contractility=↓PI, Low LV fill= ↓PI. “Suction Event”= LV suction around inflow cannula d/t low LV volume or RPM’s too high. May see temporary ↓ in flow, rpm fluctuations, ↓ pulsatility in flow wave form. May cause pt to go into VT.

Hemodynamics:

Preload Dependant: VAD flows depend on pre-load (volume status, right heart function, arrhythmias).

Volume-Give colloids/avoid crystalloids. Avoid intravascular dehydration-can cause LV “suction”

Afterload Sensitive: Hypertension decreases LVAD flow/output. Manage BP w/ fluid and BP medications, NOT RPM’s.

Obtaining a Blood Pressure: 1st- Use automated BP machine (difficult to hear systolic/diastolic sounds with stethoscope) If unable to detect with automated cuff then, 2nd- Obtain approximated mean arterial pressure (MAP) with Doppler and manual cuff. Ideal MAP range 65-90.

Cardiac Rhythm: HR & Rhythms that affect LV or RV filling need to be treated. Ventricular rhythms are common, may tolerate partially d/t continuous flow of LVAD. Restore to stable rhythm to prevent deterioration. Most LVAD patients have AICD. All devices are protected against internal/external cardioversion/defibrillation.

VAD Complications:

Bleed GI/Nose: GI consult or ENT consult. Hemodynamically stable-cont ASA and Coumadin and transfuse as necessary. If stable, do not hold anticoagulation for procedures unless you contact the VAD team. INR falls below pt INR goal, start NO BOLUS heparin infusion with goal PTT 40-60. If hemodynamically unstable, hold all anticoagulation and transfuse.

Stroke: Any TIA or stroke symptoms require immediate attention (stroke alert) with appropriate imaging (NO MRI) and neurology/neurosurgery consult. **Ischemic vs Hemorrhagic:** Neurology/neurosurg may recommend holding anticoagulation.

Ischemic stroke - start Heparin Infusion with PTT goal 60-85. (NO Heparin BOLUS!). Page VAD team regarding fibrinolytic therapy possibilities. Do not hold anticoag for procedures until you contact the VAD team.

Driveline: Daily sterile dressing changes. Immobilize at all times. Any hint of driveline infection-Page MD/VAD coord, send labs(CRP, CBCw/diff, blood cultures, driveline cultures), Order US or CT of driveline and pump pocket, Order ID consult, Start abx therapy (IV w/any purulent drainage)(coverage for skin flora including MRSA & gram negatives including pseudomonas). ANY infection in an LVAD patient driveline consider increasing INR goal to 2.5-3.5. (infection can cause hypercoagulable state)

Pump Thrombus: High LVAD watts, may see RPM’s >100rpms below set speed.

Pump may vibrate/ auscultate pump, may sound different with a grinding sound

Page VAD coordinator on-call. Start Heparin infusion with PTT goal 60-85. Send labs (LDH, Plasma free hgb, Haptoglobin, CBC, CMP).