# NO PULSE? NO PROBLEM LVADS IN THE ED

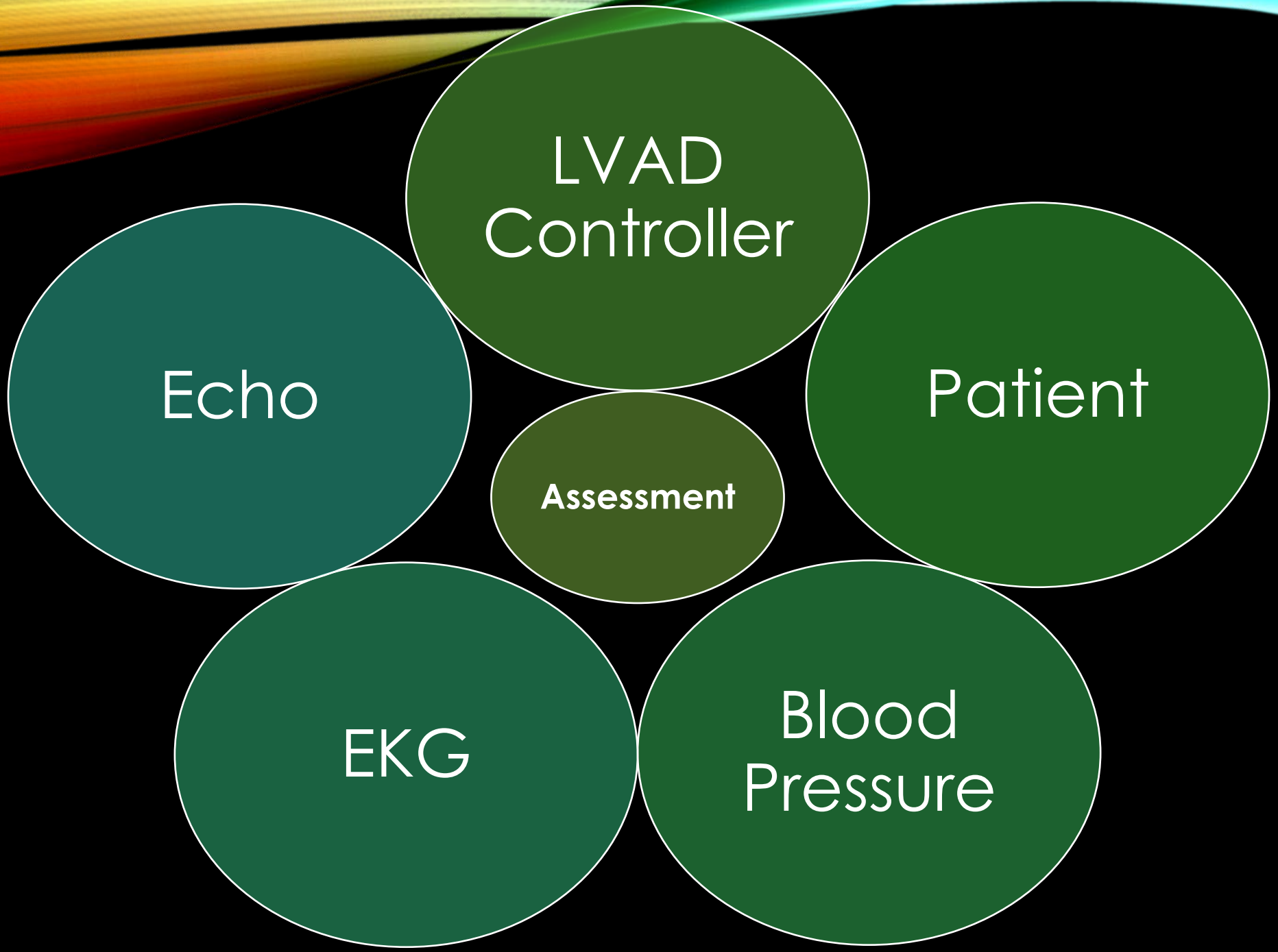
Kevin Hanley, MD
Assistant Clinical Professor, UCSF

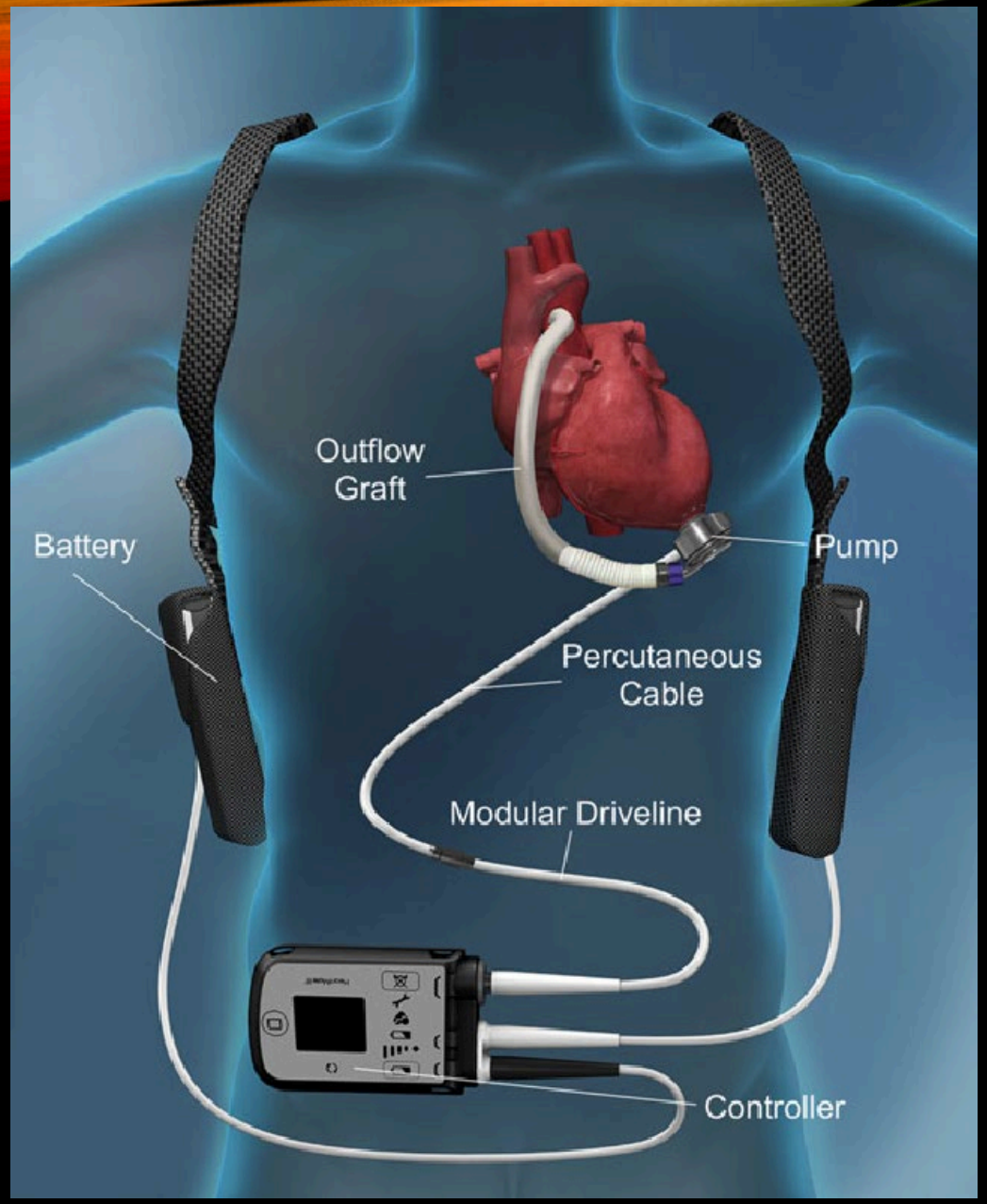
# OBJECTIVES

- Develop an assessment plan for LVAD patients
- Recall LVAD specific complications and their management
- Explain when to do CPR in an LVAD patient

# WHO GETS AN LVAD?

| | |
|---|---|
| **Bridge to Transplant** | **Bridge to Recovery** |
| **Bridge to Decision** | **Destination Therapy** |

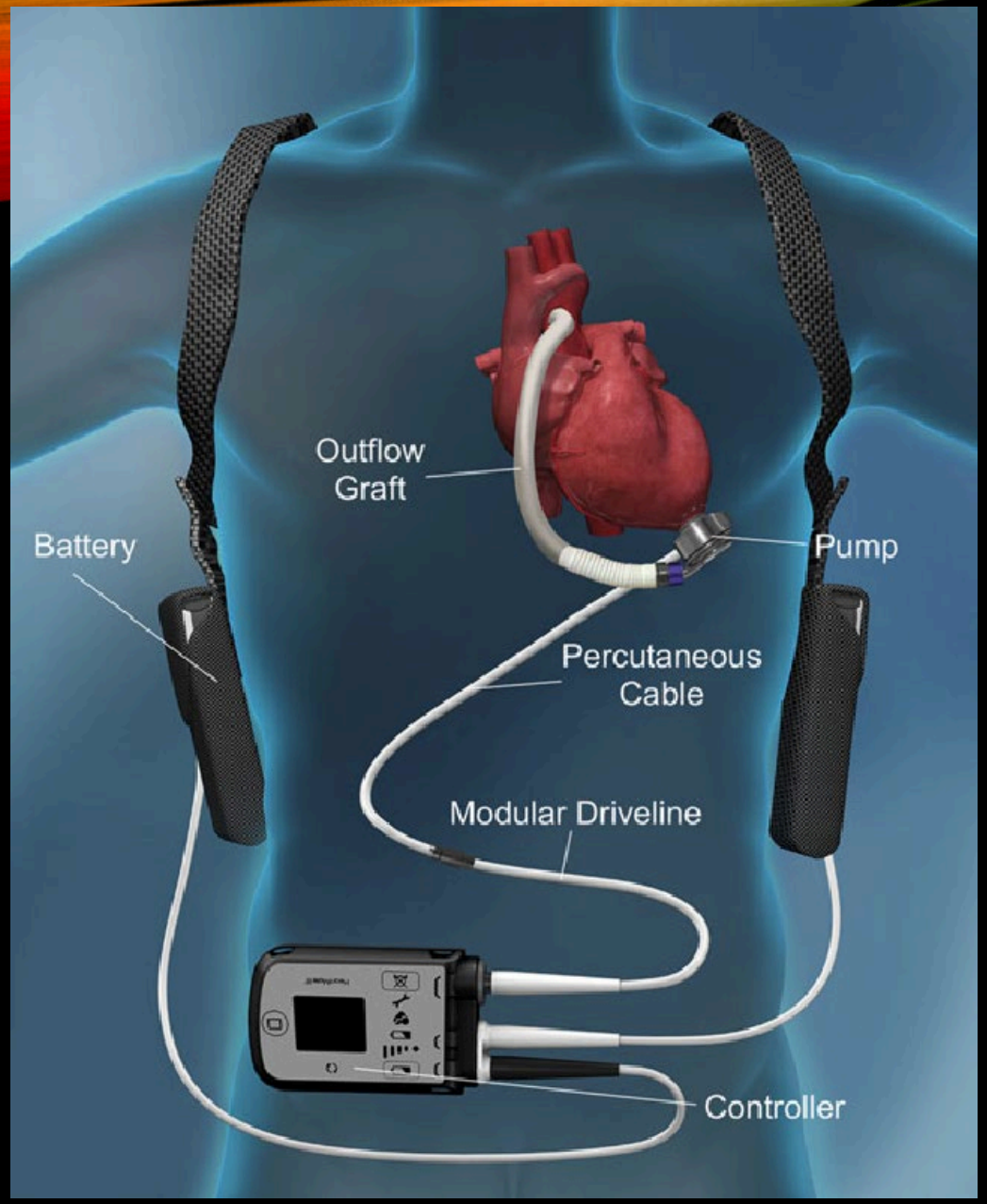

LVAD Controller
Echo
Patient
Assessment
EKG
Blood Pressure




# LVAD CONTROLLER

- Call the LVAD center
- Auscultate for a hum
- Check the Power
- Non-pulsatile flow

No power, no hum? Plug it in!




# LVAD CONTROLLER

Normal power is 3-7 W
Normal flow is 4-7 L/min

# ASSESSMENT: PATIENT

Normal Doorway Exam

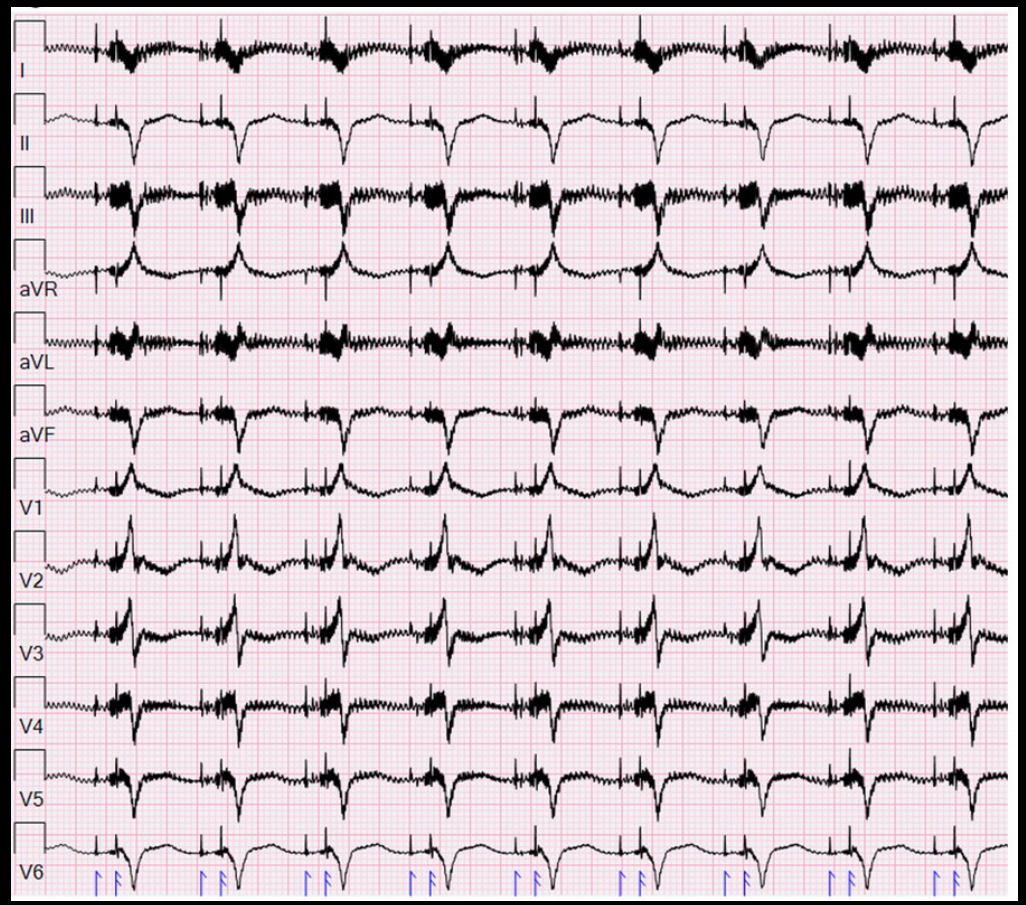
- Mental status
- Skin Color
- Temperature
- Capillary refill
- Blood Pressure

# ASSESSMENT: BLOOD PRESSURE

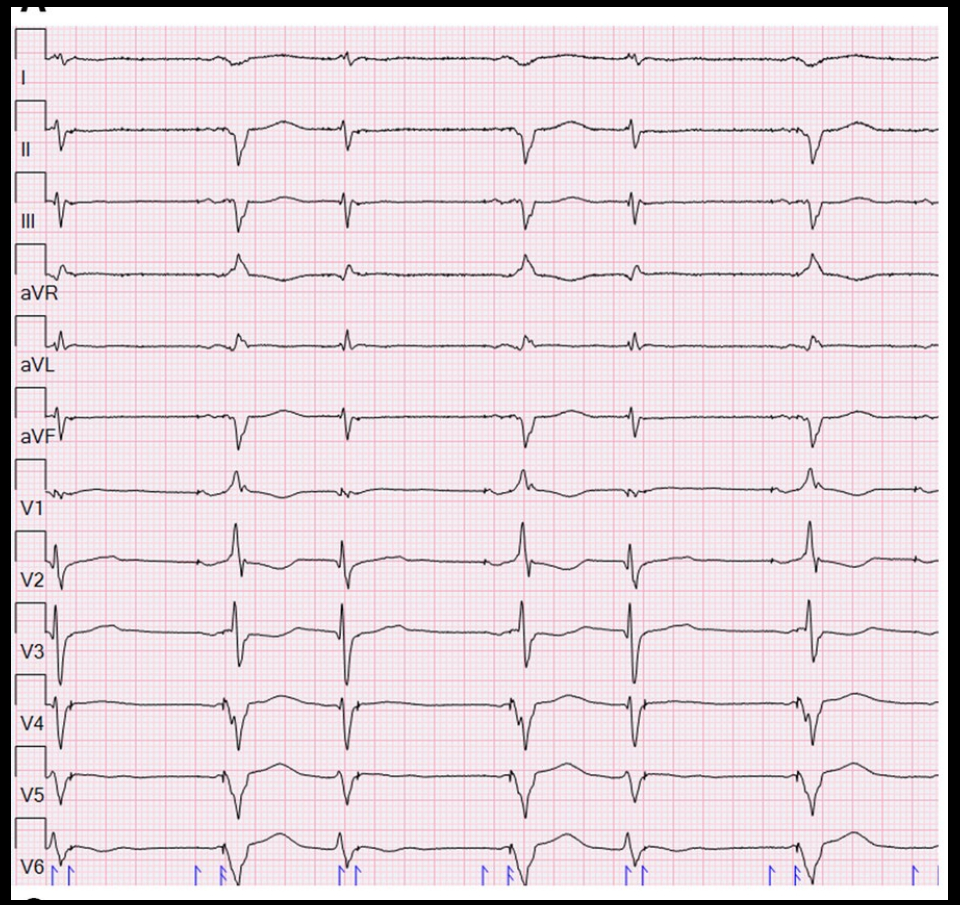
- Use a manual BP cuff
- Doppler the brachial artery
- Increase pressure to 120
- MAP=pressure when hum returns
- Goal is 60<MAP<90

If sick, place an arterial line!

# ASSESSMENT: EKG




Adjust low pass filter from 120 Hz to 20 Hz



# ASSESSMENT: ECHO

| Echo Findings | Small Left Ventricle | Large Left Ventricle |
|---|---|---|
| Small Right Ventricle | • Hypovolemia<br>• Sepsis<br>• Suction Event | • Low preload<br>• Early Pump Thrombosis |
| Large Right Ventricle | • RV failure<br>• Pulmonary HTN<br>• Suction Event | • Pump thrombosis<br>• Fluid overload<br>• Hypertension |

# ASSESSMENT: ECHO

| Echo Findings | Small Left Ventricle | Large Left Ventricle |
|---|---|---|
| Small Right Ventricle | • Hypovolemia<br>• Sepsis<br>• **Suction Event** | • Low preload<br>• **Early Pump Thrombosis** |
| Large Right Ventricle | • RV failure<br>• Pulmonary HTN<br>• **Suction Event** | • **Pump thrombosis**<br>• Fluid overload<br>• **Hypertension** |

# OBJECTIVES

- Develop an assessment plan for LVAD patients
- **Recall LVAD specific complications and their management**
- Explain when to do CPR in an LVAD patient

# COMPLICATIONS: INFECTION

**LVAD Specific**

- Driveline (most common)
- Pump/cannula
- Device pocket

**LVAD-related**

- Infective Endocarditis
- Bloodstream infections
- Mediastinitis

**Non-LVAD**

- Pneumonia
- UTI
- Etc.

Treatment: broad-spectrum antibiotics for MRSA and Pseudomonas

# COMPLICATIONS: BLEEDING

VERY HIGH BLEEDING RISK

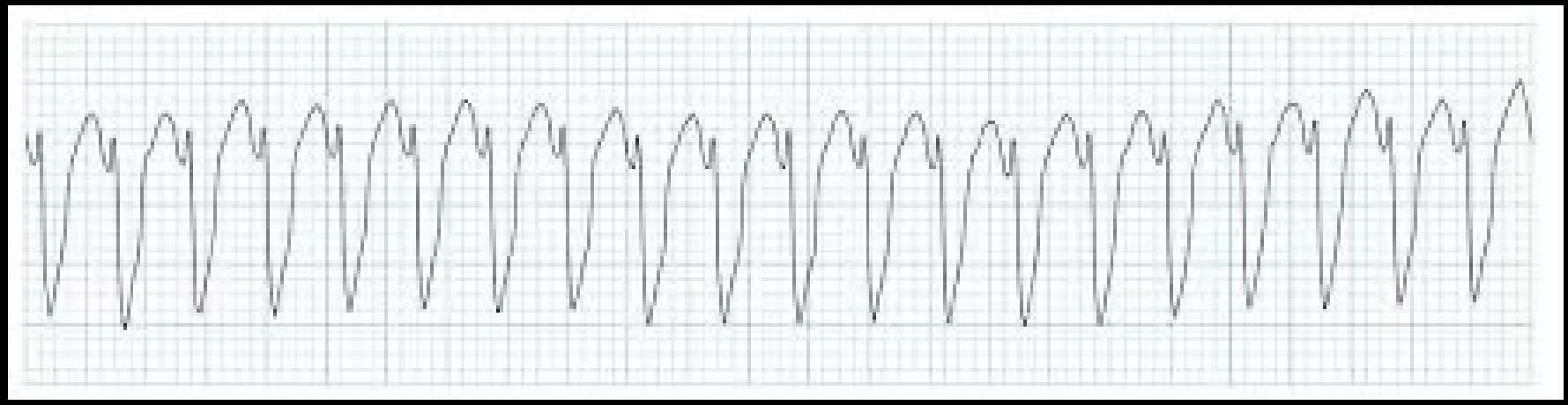
- Anti-coagulation AND anti-platelet medications
- Shearing force create an acquired vWF deficiency
- Non-pulsatile flow leads to GI AVMs

Treatment: Reversal ONLY in life-threatening bleeds

# COMPLICATIONS: ARRHYTHMIA

Ventricular tachycardia can be well-tolerated

Causes: electrolytes, ischemia, underlying cardiomyopathy, suction event



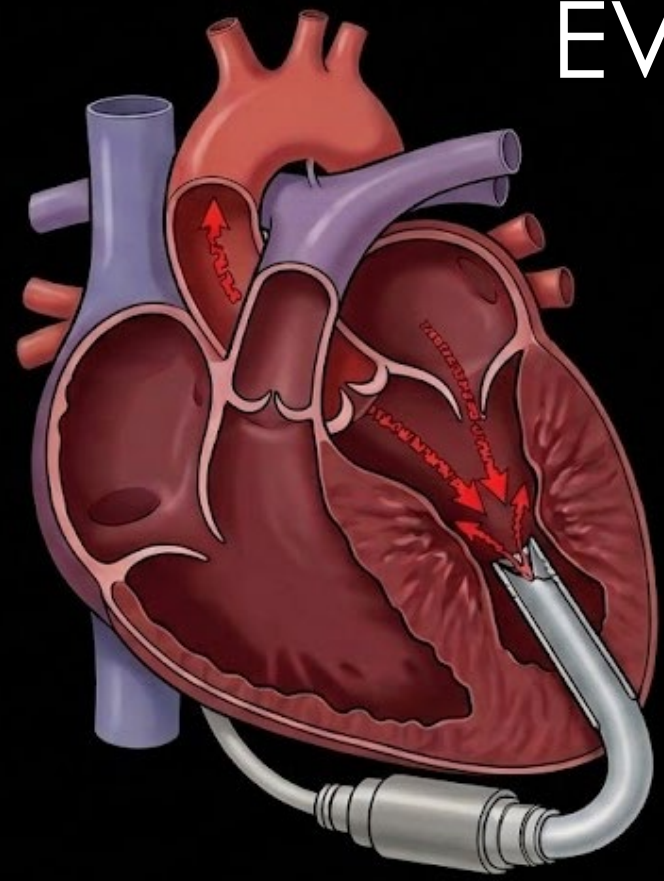
Treatment: anti-arrhythmics

If shock required, anterior-posterior pad placement

# COMPLICATIONS: SUCTION EVENTS

LV collapses from inward pressure of the septum

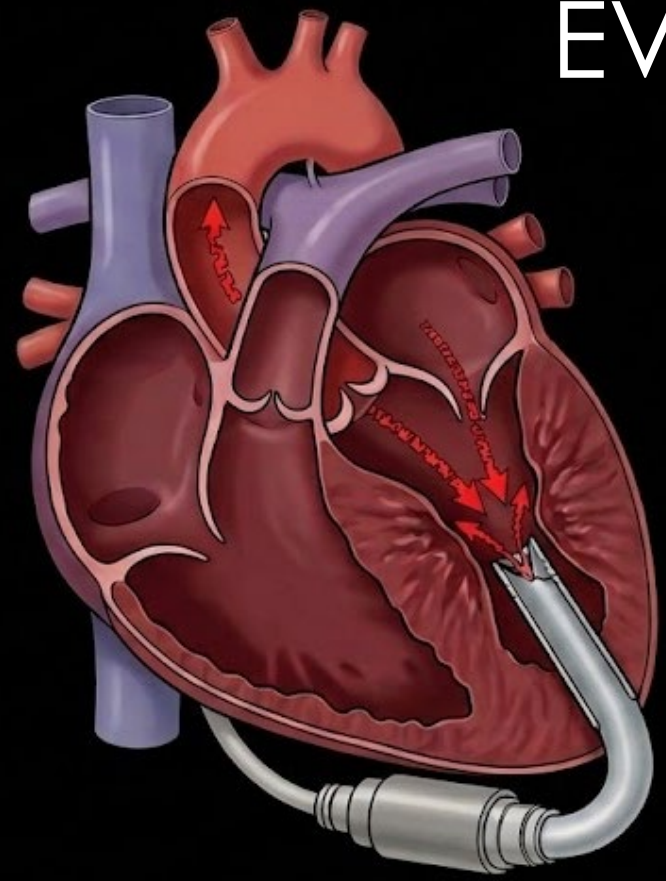
Assessment
Patient: ill-appearing
MAP: <60
LVAD: Low power, Low flow
EKG: possibly VT
Echo: small LV, +/- large RV



# COMPLICATIONS: SUCTION EVENTS

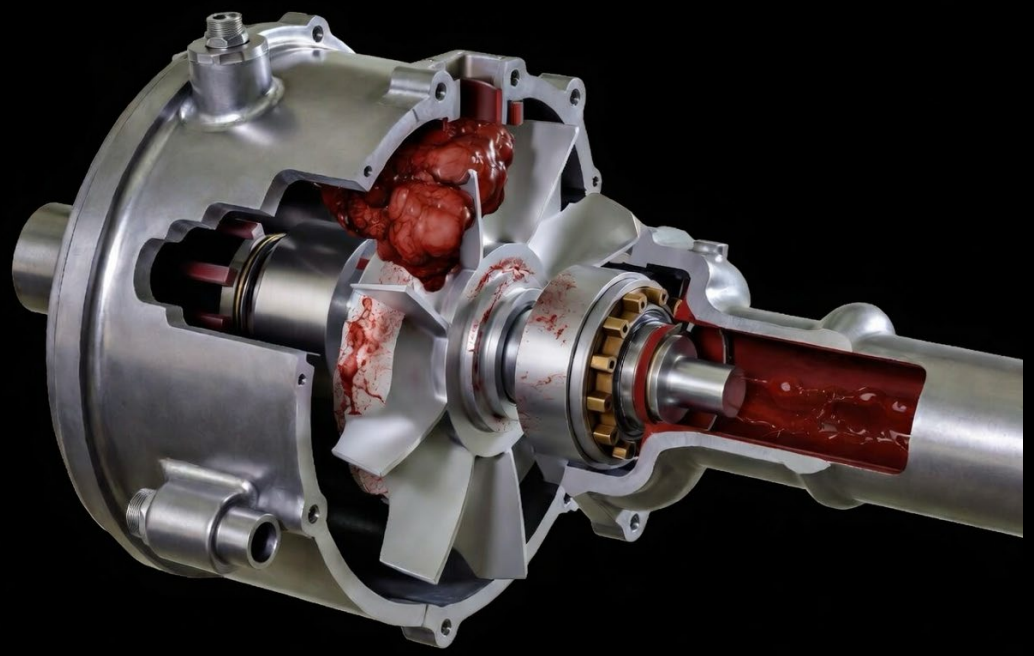
LV collapses from inward pressure of the septum

Causes:
Hypovolemia
Tamponade
Arrhythmias
RV failure
Inflow cannula malposition



Treatment: IV fluids for preload, pulmonary vasodilators for large RV

# COMPLICATIONS: PUMP THROMBOSIS



This is the big, bad, scary

Up to 50% mortality!

Assessment
Patient: ill-appearing/coding
MAP: <60
LVAD: High power, Low flow
Echo: large LV, large RV
Labs: hemolysis

Treatment: immediate AC, consider thrombolysis, TRANSFER

# OBJECTIVES

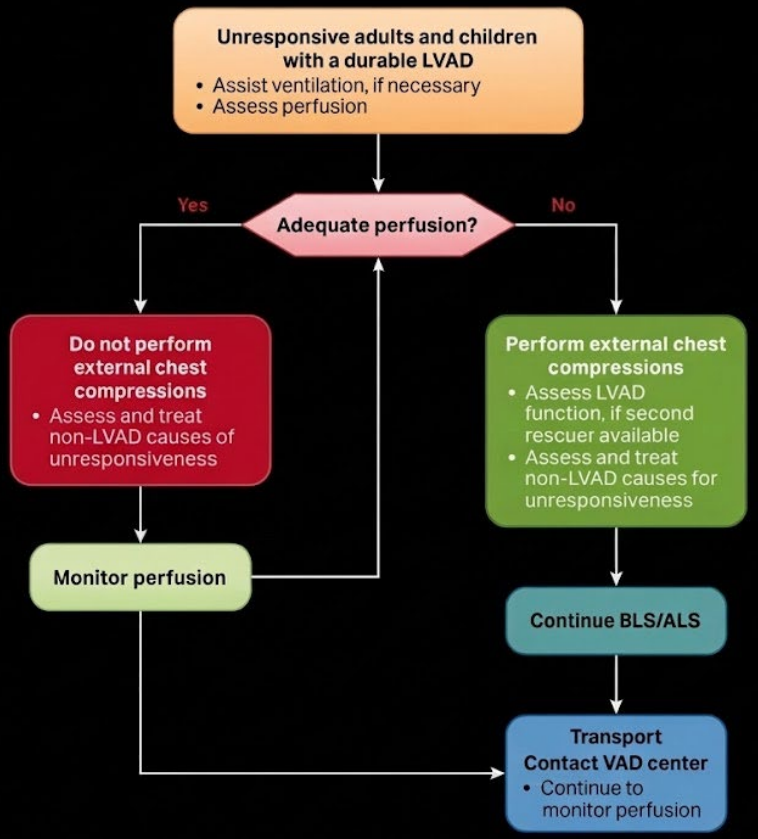
- Develop an assessment plan for LVAD patients
- Recall LVAD specific complications and their management
- **Explain when to do CPR in an LVAD patient**

# CARDIAC ARREST

Yes, you can do CPR!

Indications

- Patient ill-appearing
- No hum
- MAP<50
- EtCO2<20
- Flow<2.5L/min

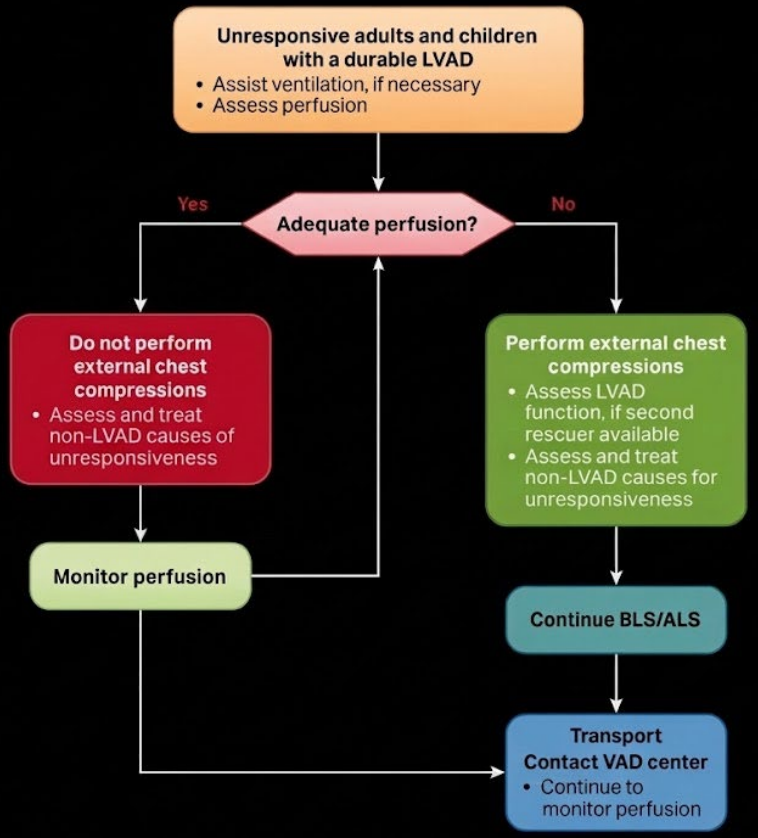


# CARDIAC ARREST

Yes, you can do CPR!

LVAD Assessment

- Look/listen for alarms
- Listen for the hum
- Driveline connected?
- Power source connected?
- Need to replace system controller?



# OBJECTIVES

- Develop an assessment plan for LVAD patients
- Recall LVAD specific complications and their management
- Explain when to do CPR in an LVAD patient

# THANK YOU!