

ICDs and LVADs

# DEVICES USED TO TREAT HEART FAILURE

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- Cleveland Clinic
- No disclosures

# Heart Failure

- Prevalence
- Admissions
- Cost

# Stages

## Classification of Heart Failure: ACC/AHA Stage vs NYHA Class

ACC/AHA Heart Failure Stage	NYHA Functional Class
A. At risk for heart failure but without structural heart disease or symptoms	None
B. Structural heart disease but without heart failure	I. Asymptomatic HF: no symptoms
C. Structural heart disease with prior or current heart failure symptoms	II. Mild HF: symptomatic with moderate exertion III. Moderate HF: symptomatic with minimal exertion
D. Refractory heart failure requiring specialized interventions	IV. Severe HF: symptomatic at rest

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Farrell MH et al. *JAMA*. 2002;287:890-897.

# Devices used for treatment of heart failure

- ⦿ Pacemakers
- ⦿ Defibrillators
- ⦿ Monitoring devices
- ⦿ Ventricular assist devices

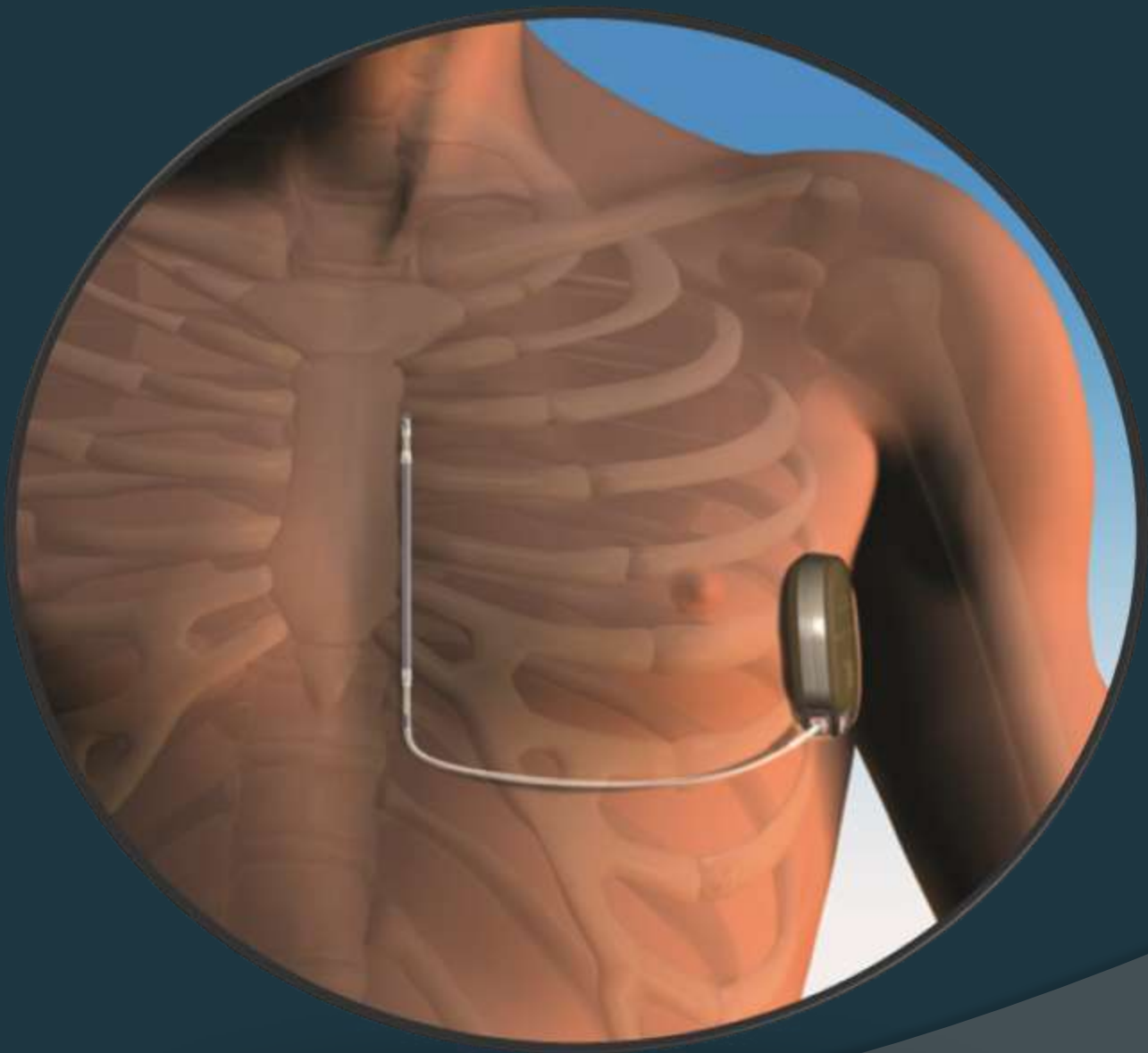
# Pacemakers

- ⦿ Biventricular
- ⦿ Proven dyssynchrony
- ⦿ NYHA functional class
- ⦿ QRS
- ⦿ EF > 35%

# ICDs

## ⦿ Choices

- Single vs. dual chamber
- Bi-Ventricular
- Sub-Q



# ICDs

## ⦿ Indications

- Primary vs. Secondary prevention
- EF

# Biventricular ICDs.

- ⦿ EKG
- ⦿ ECHO
- ⦿ NYHA class

# Follow up

- ⦿ Outpatient visits
  - Frequency
  - Exam
  - Device checks
- ⦿ Home monitoring

# Monitoring devices

- Weight management
- Intrathoracic impedance
- LA pressures
- PA pressures

# Weight management

- ◎ Boston Scientific
  - Latitude
    - Weight
    - BP
    - Symptom report

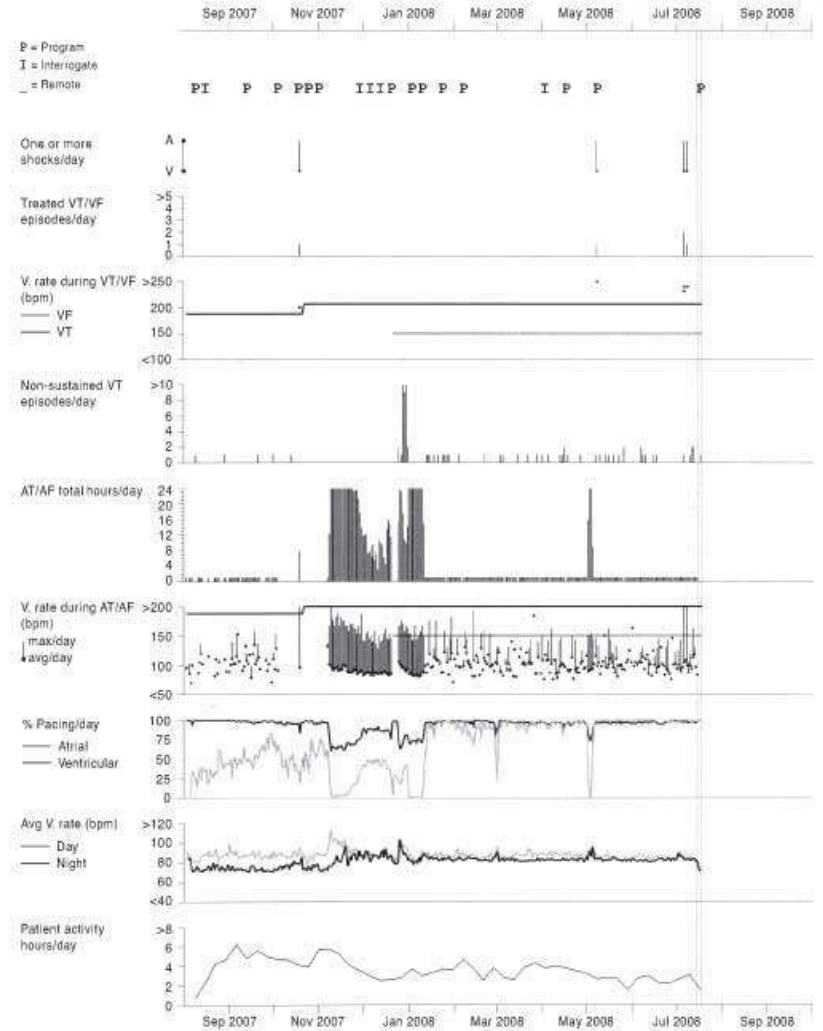
# Intrathoracic Impedance

- ◎ Medtronic
  - OptiVol
    - Impedance measurement
    - Heart rate variability
    - Arrhythmia
    - Activity levels

# Heart Failure Management Report

Device: **Concerto C154DWK** Serial Number: \_\_\_\_\_ Date of Visit: **18-Jul-2008 10:57:00**

Patient: \_\_\_\_\_ ID: \_\_\_\_\_ Physician: \_\_\_\_\_



# Left Atrial Pressure

- ◎ St. Jude Medical
  - LAP/PAM
    - Investigational
    - Daily monitor of LAP
    - Programmed with treatment

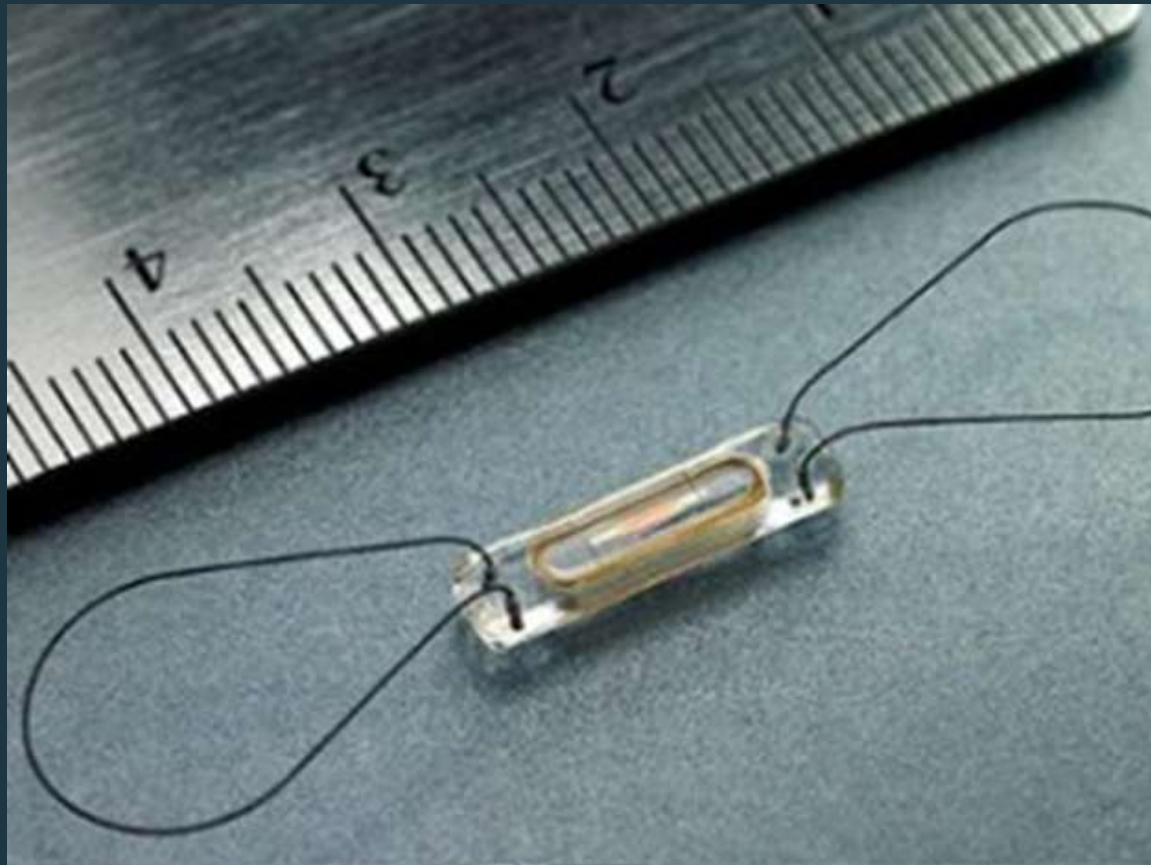
# LAP Overview



# Pulmonary Artery Pressure

## ◎ Cardiomeems

- Investigational
- Wireless
- Battery-less
- Implanted via RHC into PA
- Requires anticoagulation for 1 month



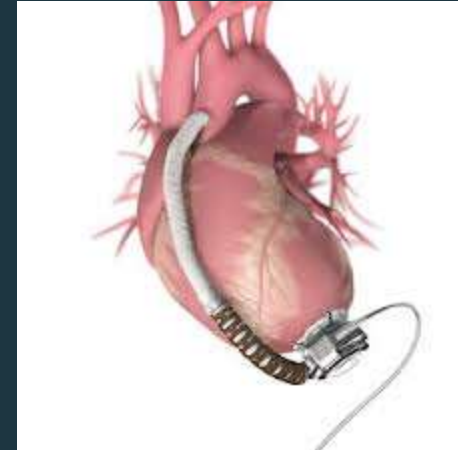
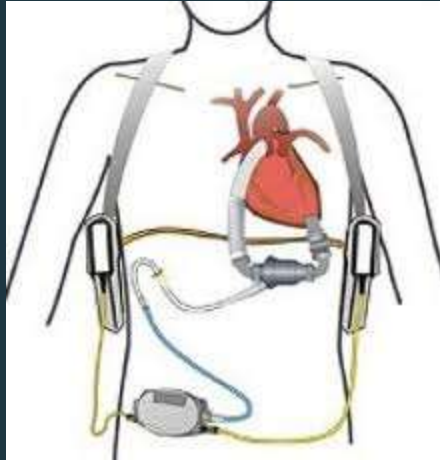
# Outpatient management

- Remote monitoring
- Symptom management
- Medication management
- Appropriate support

# Outpatient management

- ◎ Limitations
  - Appropriate patients
  - Resources
  - Who's responsible?

# Ventricular assist devices



# Assist options

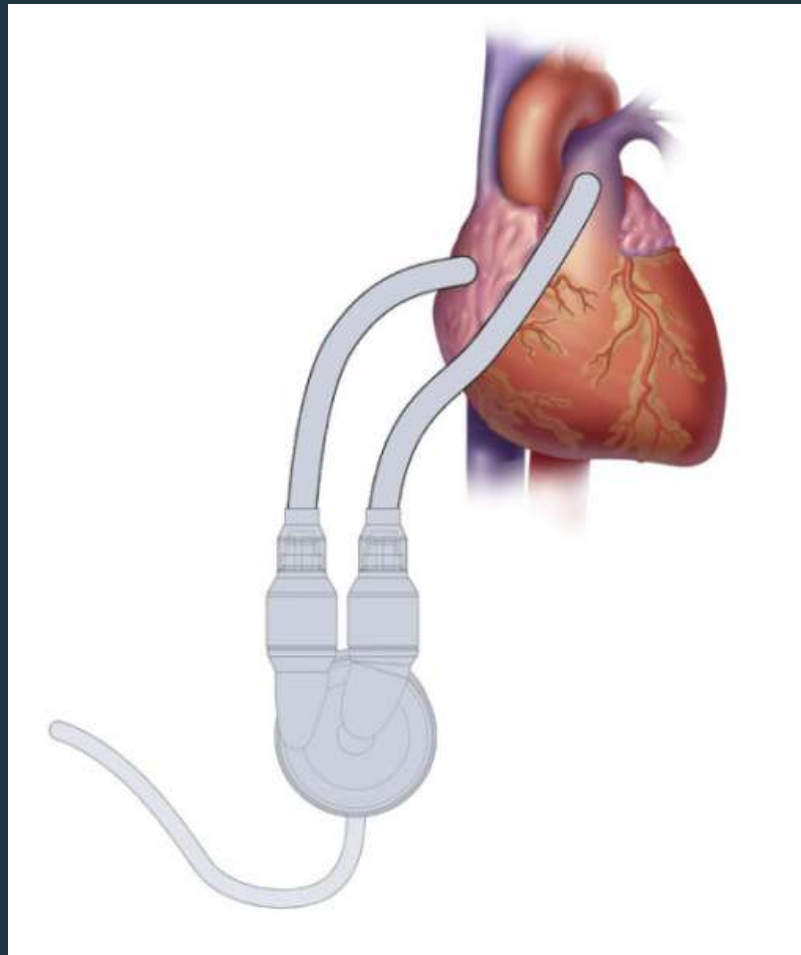
- ⦿ LVAD
- ⦿ RVAD
- ⦿ BiVAD
- ⦿ Total Artificial Heart

# VAD

- Indications
- NYHA class
- Intermacs level
- DT vs. BTT vs. Recovery

Patient Profile†	Patient Characteristics	Time Frame Until Intervention
NYHA indicates New York Heart Association.		
1	Critical cardiogenic shock despite escalating support	Within a few hours
2	Progressive decline with inotrope dependence	Within a few days
3	Clinically stable with mild to moderate inotrope dependence	Elective implantation over the next few weeks
4	Recurrent, not refractory, advanced heart failure that can be stabilized with intervention	Elective implantation over weeks to months
5	Exertion intolerant but is comfortable at rest and able to perform activities of daily living with slight difficulty	Variable; depends on nutrition, organ function, and activity
6	Exertion limited; is able to perform mild activity, but fatigue results within a few minutes of any meaningful physical exertion	Variable, depends on nutrition, organ function, and activity
7	Advanced NYHA functional class III	At this time, mechanical circulatory support is not indicated

# R-VAD

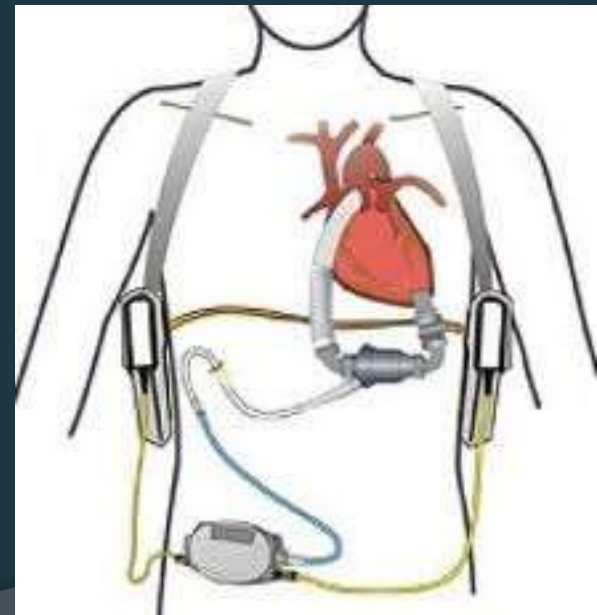
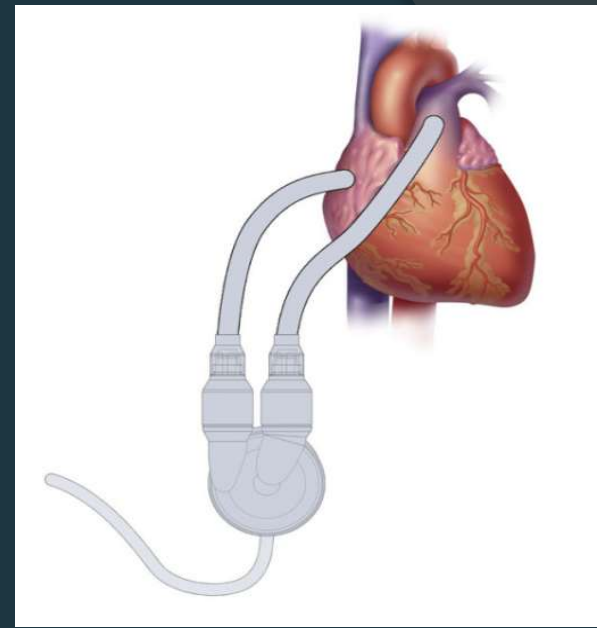


# L-VAD

- ⦿ Heartmate II
- ⦿ Heartware

# BiVAD

- Biventricular failure
- Devices used



# Total Artificial Heart



# Total artificial heart



# Patient selection

- Who's a candidate?
- Who's not?

# Pre-op education

- ⦿ Risks/benefits
- ⦿ Anticipated length of stay
- ⦿ Length of recovery
- ⦿ Follow up expectations
- ⦿ Complications of treatment
- ⦿ Caregiver involvement
- ⦿ Meeting a patient

# Pre-op testing

- ⦿ RHC
- ⦿ ECHO
- ⦿ CT scan?
- ⦿ Lab

# Pre-op consults

- ⦿ Social work
- ⦿ Bioethics
- ⦿ Palliative care – DT
- ⦿ Others depending on testing

# Hospital course

- ⦿ Medications
- ⦿ Testing
- ⦿ Consults
- ⦿ Training
- ⦿ Community contacts

# Echo

- ⦿ RV function
- ⦿ Speed optimization
  - Mitral valve
  - Aortic valve
  - LVID

# Training

- ① Dressing change
- ① Equipment
- ① Caregiver involvement

# Community Contacts

- First responders
- Local ED
- Utilities
- Local MDs

# Outpatient management



# Follow-up

- ⦿ Frequency
- ⦿ Exam
- ⦿ Lab work

# Outpatient testing

- ◎ Echo
- ◎ RHC
- ◎ DT vs. BTT

# Urgent issues

- On-call coordinator
- Alarm management
- Telephone medicine

# Complications

- ⦿ Bleeding
  - GI
  - Epistaxis
  - Anticoagulation management

# Complications

## ⦿ Clotting

- Lab monitoring
- Platelet inhibition
- Power spikes and trends
- CVA

# Complications

## ⦿ Infection

- ID involvement
- Drive line infection management
  - When to treat
  - When to operate
- Bacteremia

# Psychosocial

- ① Depression
- ① Anxiety
- ① Compliance issues
- ① Caregivers

# Moving toward transplant

- Does the patient still want transplant?
- When to reactivate

# End of life issues

- Palliative care
- Hospice
- Caregiver preparation
- Withdrawing support

# Summary

- ① Devices used to treat Heart Failure
- ② Considerations
- ③ Thank you!

# References

- Epstein A.E., et al. ACC/AHA/HRS 2008 Guidelines for Device-Based Therapy of Cardiac Rhythm Abnormalities. *Journal of the American College of Cardiology*, 2008:51.
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