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# A CASE-BASED APPROACH TO CONTEMPORARY HEART FAILURE MANAGEMENT: FROM NEW-ONSET DISEASE TO ADVANCED THERAPIES

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# FACULTY DISCLOSURE

- **Relevant Financial Disclosures:** All speakers report no relevant financial relationships, with the exception of Dr. Chioma Obiokoye, who serves as a speaker for Bristol Myers Squibb

# PRESENTATION OBJECTIVES

- After completing this educational activity, participants will be able to:
  - Describe the evaluation and management of patients with new-onset heart failure, including key diagnostic considerations, guideline-directed medical therapy, and appropriate referral pathways.
  - Discuss the role of device-based therapies in heart failure management.
  - Recognize the presentation and management of cardiogenic shock, including indications for temporary and durable mechanical circulatory support and pathways to advanced therapies such as ventricular assist devices (VADs).

# EXPECTED OUTCOME & EDUCATIONAL NEED/ PRACTICE GAP

- **Practice Gap**: Providers may not consistently apply current heart failure guidelines or recognize when advanced therapies and referrals are needed.
- **Educational Need:** Clinicians need updated knowledge on heart failure evaluation, treatment, device therapies, and pathways to advanced care.
- **Expected Outcome:** Participants will improve the diagnosis, management, and referral of patients with heart failure, leading to earlier intervention and better patient outcome.

# SESSION PRESENTERS



## Maya Ignaszewski, MD

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# Heart Failure: Diagnosis, Guideline – Directed Therapy, and Timely Referral

**Maya Ignaszewski, MD**

**Medical Director, Heart Transplantation**

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# PATIENT CASE

- 52 YO M presents to your office with PMHx of HTN and obesity for new patient evaluation with 6-month history of dyspnea with exertion, reduced exercise tolerance, orthopnea, 20 lb weight gain and swollen legs

- Initial vital signs: BP: 108/72 mmHg, HR 106 BPM, 96% RA

- On examination: Elevated JVD, bilateral lower lung field crackles, 2+ pitting edema and systolic murmur on cardiac auscultation

**Next steps?**

# START WITH THE CLINICAL QUESTION: IS THIS HEART FAILURE?

**Symptoms**

- Dyspnea, orthopnea, PND
- Fatigue, reduced exercise tolerance
- Abdominal distension, peripheral edema

**Signs**

- Elevated JVP, S3
- Pulmonary crackles, edema
- Hepatic congestion, cool extremities

**Objective evidence**

- Natriuretic peptide elevation
- Structural/functional abnormality
- Congestion on imaging or exam

**First decision**

**Is the patient unstable? If shock, hypoxemia, ongoing ischemia, serious arrhythmia or rapidly progressive congestion: urgent hospital-level evaluation.**

# DEFINE AND CLASSIFY HEART FAILURE

**HFrEF**

## ≤ 40%

Reduced ejection fraction. Full four-class GDMT.

**HFmrEF**

## 41–49%

Mildly reduced. SGLT2 inhibitor first; other classes considered.

**HFpEF**

## ≥ 50%

Preserved. Needs objective evidence of congestion.

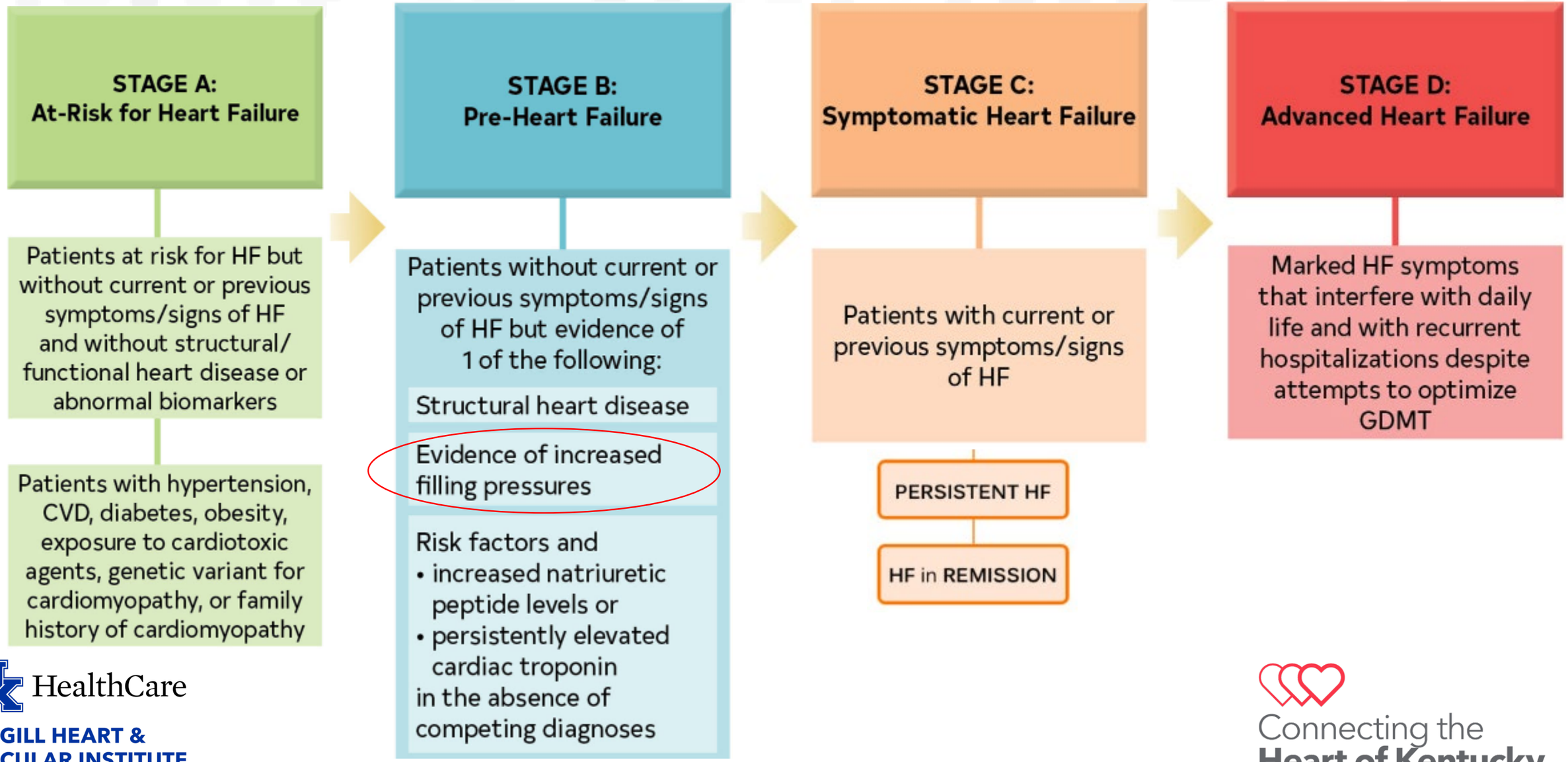
**HFimpEF**

## > 40%

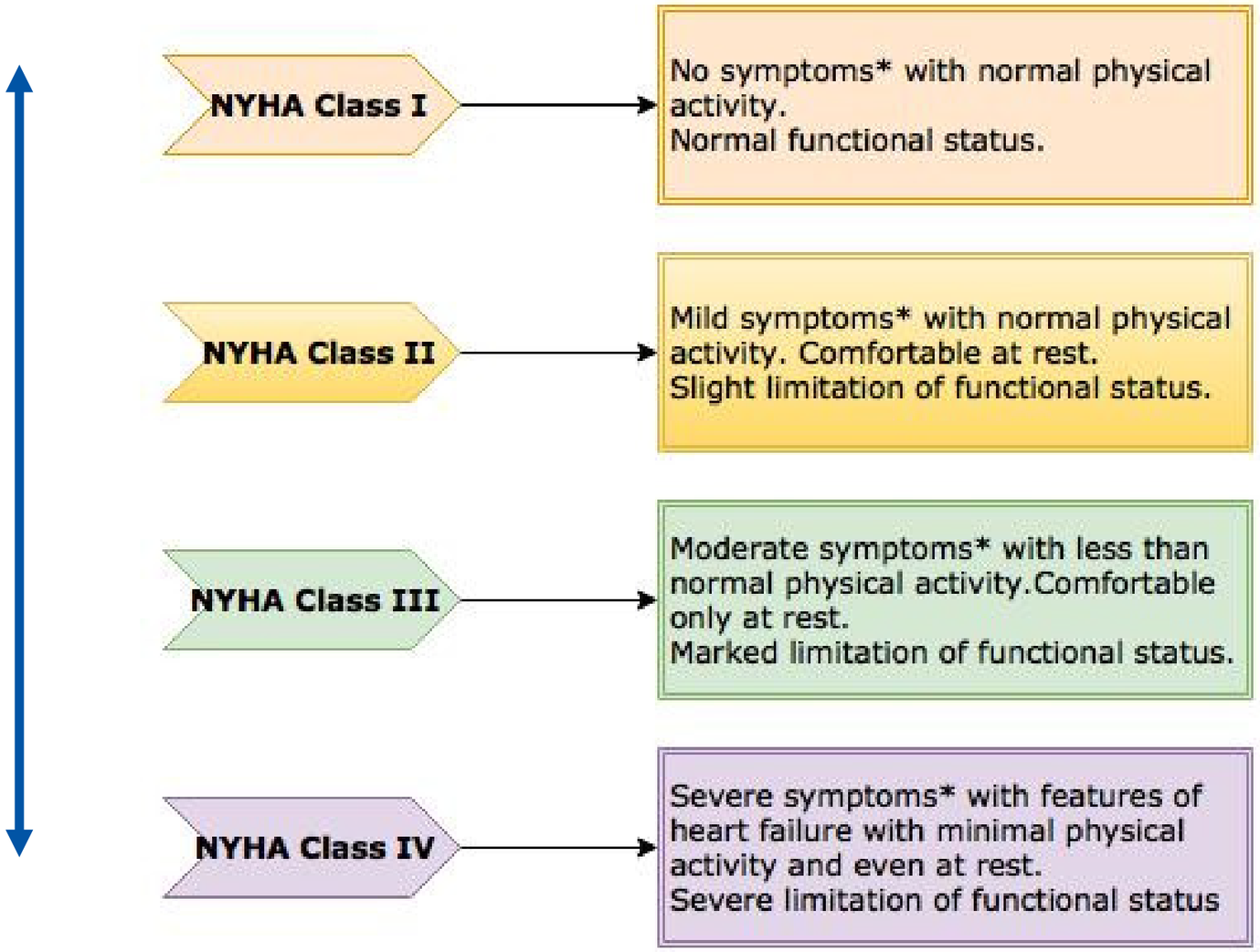
Prior LVEF ≤ 40%, now improved. Continue GDMT.

The 2026 Second Universal Definition reaffirms stages A–D and adds a universal classification by cause. The 2022 AHA/ACC/HFSA guideline remains the operative US guideline; its update is expected in 2027.

# ACC/AHA STAGES OF HF



# NYHA FUNCTIONAL CLASSIFICATION OF HF SYMPTOMS




2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure

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# FIRST LINE DIAGNOSTIC EVALUATION

### History and exam

Congestion and perfusion profile: JVP, edema, orthopnea, cool extremities, syncope.

### ECG

Rhythm, QRS width, LBBB, Q waves, voltage.

### Natriuretic peptides

BNP and NT-proBNP (Lower in obesity; higher with AF, CKD, age)

### Echocardiography

LVEF, chamber size, wall thickness, valves, RV function, filling pressures.

### Laboratory tests

CBC, chemistry, liver tests, TSH, HbA1c, lipids, ferritin with TSAT, urinalysis, troponin.

### Chest X-ray

Pulmonary edema, pleural effusions, cardiomegaly plus alternative diagnoses like pneumonia or COPD

### Why etiology matters

Some causes have disease-specific treatment, implications for family screening, arrhythmic risk, prognosis and potential reversibility. Do not label a new cardiomyopathy “nonischemic” until ischemic evaluation is appropriate and complete.

# FOCUSED ETIOLOGIC WORK UP: CHOOSE TESTS THAT CHANGE MANAGEMENT

| | |
|---|---|
| **Coronary disease** | Symptoms/risk/ECG/TTE → CCTA, stress imaging, or invasive angiography as appropriate |
| **Myocarditis/scar** | CMR with tissue characterization; troponin and clinical context |
| **Infiltrative** | CMR ± FDG-PET; extracardiac evaluation when suspected (sarcoidosis); serum free light chains + serum/urine immunofixation; bone-avid tracer scan when AL excluded (amyloidosis) |
| **Valvular or hypertensive** | Treat BP and structural disease, follow serial imaging to re-evaluate lesions |
| **Genetic/familial** | Three-generation family history; genetic counseling/testing when indicated |
| **Other reversible causes** | Thyroid, iron overload, alcohol/toxins, tachyarrhythmia, peripartum, HIV/Chagas when epidemiologically relevant |

Start GDMT while etiologic work up is in process – these are parallel and not sequential tasks!

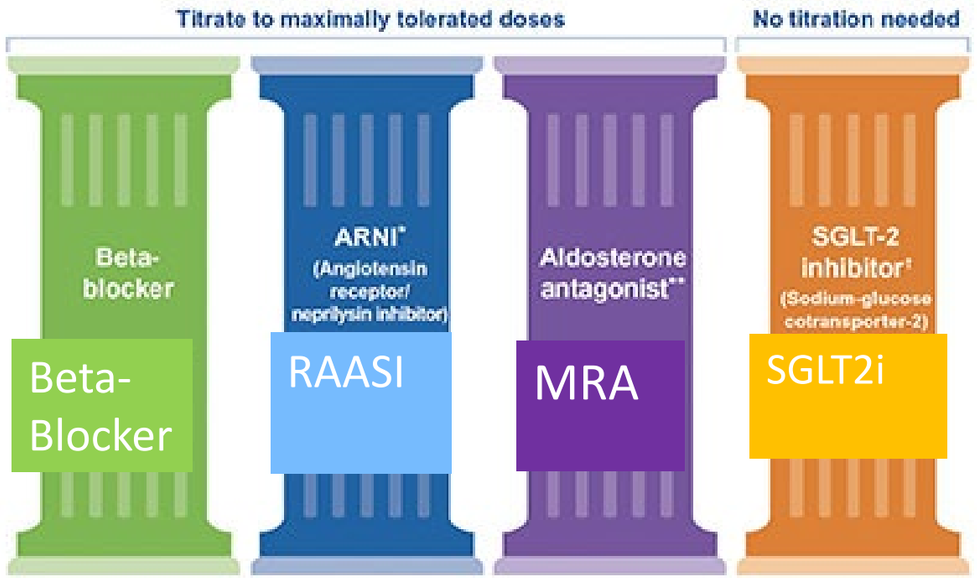
# PATIENT CASE CONTINUED

- EKG: Sinus tachycardia with LBBB, no evidence of prior infarct
- CXR: Cardiomegaly, pulmonary edema and bilateral pleural effusions
- Labs: NTproBNP 3500, Cr 1.4
- TTE: Dilated LV cavity at 6.3 cm, LVEF ~20% with severe MR and dilated LA
- CCTA: No evidence of obstructive CAD

**Next steps?**

# HFREF: INITIATE FOUR FOUNDATIONAL THERAPIES EARLY

**HF with reduced EF (HFrEF)**
- *HF with **LVEF < 40%***




**Aim to start all four at low doses and titrate to maximally tolerated/target doses within ~3 months.**

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https://www.nhcs.com.sg/news/murmurs/for-physicians-management-of-heart-failure-2022

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# MAKE GDMT INITIATION PRACTICAL

### Before starting

- Confirm clinical stability
- Assess BP / heart rate
- Check eGFR and potassium
- Review volume status and diuretic need
- Identify contraindications, cost, access, and adherence barriers

### Sequencing principles

- No single mandatory sequence
- Low doses of all four classes often beats maximizing only one or two
- Start β-blocker when compensated
- SGLT2i and MRA usually have modest BP effect
- Adjust loop diuretic as congestion improves

### Monitoring

- Recheck BP, symptoms, renal function, $K^+$ after changes
- Titrate every 1–2 weeks when feasible
- Mild eGFR decline usually does note require stopping therapy
- Use pharmacist / nurse / virtual titration support

**Clinical pearl: Start what you can today; create a reliable plan to add and titrate the rest**

# MEDICATION TITRATION STRATEGIES






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# PATIENT CASE CONTINUED

- At initial visit:
  - Diuresis: initiated Bumex 2 mg daily
  - GDMT: initiated Sacubitril-Valsartan 24-26 mg BID and Eplerenone 50 mg daily
  - Referred to medication titration clinic with APP
  - Labs in 2 weeks to monitor Cr/K, iron panel + ferritin and home BP log
  - Referred to cardiac rehabilitation. Due to strong family history of HF and SCD, genetic testing obtained

- At medication titration clinic visits:
  - Visit 1: BP 108/75 mmHg, HR 89 BPM
    - Lost 14 lbs and symptoms improved (NYHA Class II) -> reduced Bumex to 1 mg daily. Labs revealed iron deficiency anemia so arranged for infusions
    - GDMT: initiated Dapagliflozin 10 mg daily and up-titrated Sacubitril-Valsartan to 49-51 mg BID, continued Eplerenone
    - Labs in 2 weeks
  - Visit 2: BP 106/82 mmHg, HR 85 BPM
    - Back to baseline weight prior to symptoms/volume overload -> Bumex changed to PRN
    - GDMT: up-titrated Sacubitril-Valsartan to 97-103 mg BID and started Metoprolol succinate XL 50 mg QHS; continued Dapagliflozin 10 mg daily and Eplerenone 50 mg daily
  - Visit 3: BP 106/82 mmHg, HR 78 BPM
    - Stable weight, not requiring PRN Bumex, NYHA Class II symptoms
    - GDMT: up-titrated Metoprolol succinate XL to 100 mg QHS; continued Sacubitril-Valsartan 97-103 mg BID, Dapagliflozin 10 mg daily and Eplerenone 50 mg daily

# DO NOT STOP AT PRESCRIPTION: RE-ASSESS AND TREAT THE WHOLE SYNDROME

### Early follow-up

- Contact / visit within 1–2 weeks after initiation or discharge as clinically appropriate
- Reassess congestion, BP, HR, renal function, $K^+$
- Add / titrate therapies at each touchpoint
- Confirm access, adherence, and understanding

### At ~3 months

- Repeat echocardiogram after GDMT optimization (individualize timing)
- Reassess symptoms, NYHA class, biomarkers when useful
- Consider ICD / CRT eligibility if EF remains reduced
- Evaluate persistent MR, RV dysfunction, pulmonary hypertension

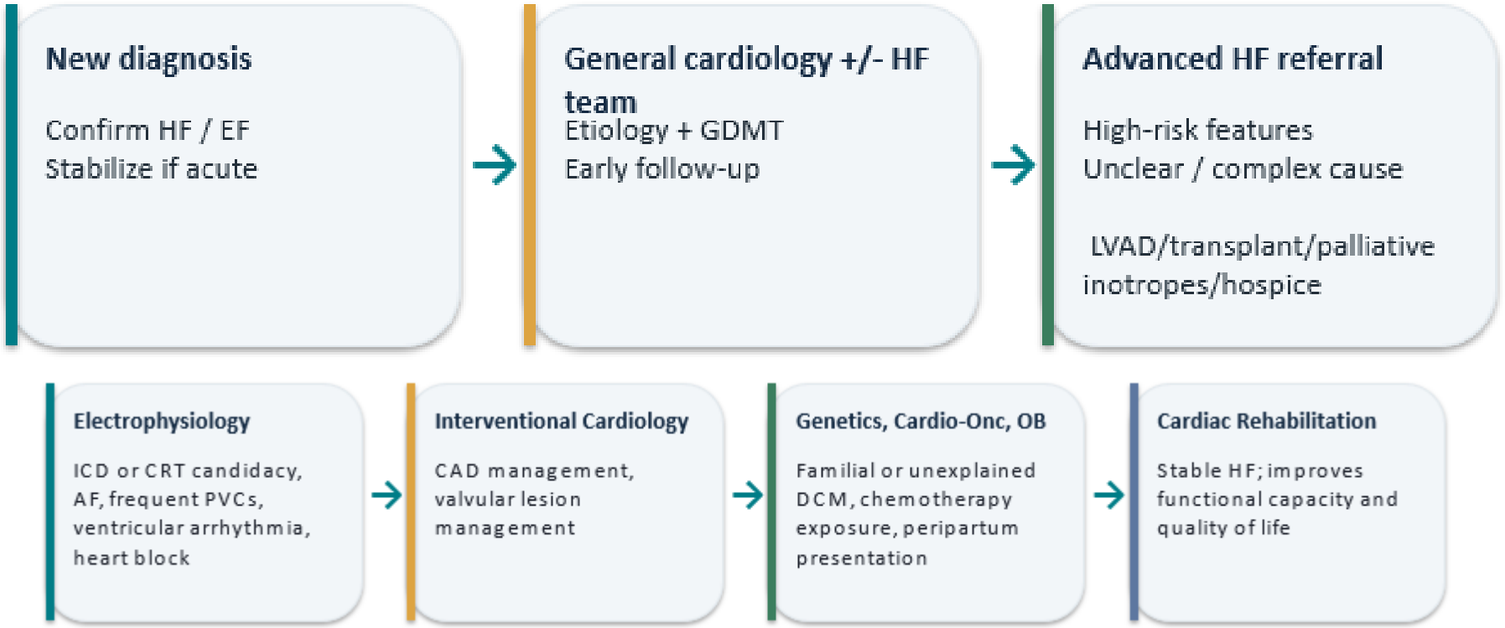
### Across EF phenotypes

- HFmrEF / HFpEF: SGLT2i; manage BP, AF, ischemia, obesity, CKD, diabetes
- Diuretics for congestion
- Iron studies and treat iron deficiency when indicated
- Exercise / cardiac rehabilitation, vaccines, education



2022 AHA/ACC/HFSA Guideline; 2024 ACC Expert Consensus Decision Pathway.

# BUILD A CLEAR REFERRAL PATHWAY




## Urgent/inpatient escalation

- Shock, escalating support, hypoperfusion
- Refractory congestion / diuretic resistance
- Sustained ventricular arrhythmia or suspected fulminant myocarditis

## Routine but timely specialist referral

- New-onset HF needing etiologic clarification
- Persistent symptoms, recurrent admissions, GDMT intolerance
- Consideration of advanced therapies or multidisciplinary care

# WHEN SHOULD YOU REFER TO AN ADVANCED HF PROGRAM?

### "I NEED HELP" — a useful red-flag framework

- **I** — Inotropes / prior inotrope requirement
- **N** — NYHA III–IV / high natriuretic peptides
- **E** — End-organ dysfunction (renal / hepatic)
- **E** — EF ≤35% or declining
- **D** — Defibrillator shocks / recurrent ventricular arrhythmias
- **H** — Hospitalizations: >1 HF admission in 12 months
- **E** — Edema / escalating diuretic requirement
- **L** — Low blood pressure / inability to tolerate GDMT
- **P** — Progressive intolerance to prognostic medications

## Refer Early!

Do not wait for repeated admissions, inotrope dependence or end-organ failure.

Referral is appropriate for selected new-onset HF, unclear etiology, severe dysfunction or difficulty initiating GDMT.

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2024 ACC HFrEF Expert Consensus Decision Pathway; I NEED HELP referral framework.

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# PATIENT CASE CONTINUED

- Returns for MD clinic visit follow up with NYHA Class I symptoms
  - VS: BP 118/67 mmHg, HR 66 BPM, 99% 02 saturation
- Same-day TTE:
  - LVEDD 5.3 cm, LVEF improved to 45-50% and MR now trace-mild
- Updated labs:
  - Cr 0.9, NTproBNP 256
  - Undergoes genetic testing which reveals pathogenic TTN mutation → reflex testing of first degree relatives

**Updated Plan:** Continues on lifelong/tolerable GDMT with ongoing lab monitoring and q6 month follow up

# NAIL THE DIAGNOSIS. FIND THE CAUSE. TREAT EARLY.

| | |
|---|---|
| **1. Confirm the syndrome and phenotype** | Clinical assessment + natriuretic peptides + echocardiography. |
| **2. Look for a treatable etiology** | Ischemic, inflammatory, infiltrative, genetic, toxic, and reversible causes. |
| **3. Start foundational therapy promptly** | Four pillars for HFrEF; decongest and arrange rapid titration. |
| **4. Know when to escalate** | Refer early for high-risk features, complex etiologies, or advanced HF evaluation. |

# Case Study: Baroreflex Activation Therapy in Advanced Heart Failure

Case presentation | BEAT-HF trial | Emerging device therapies | Our patient

**Dodie Kirkendoll, NP**
**APRN, Cardiology**

**Navin Rajagopalan, MD**
**Medical Director, Gill Affiliate Network**

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# CASE PRESENTATION

- 63 year old female with chronic systolic heart failure complains of dyspnea on exertion
- Symptoms limit how much activity she can do at home
- No HF hospitalizations in over 12 months
- Diagnosed with heart failure several years ago several years following receiving chemotherapy for breast cancer
- Left heart catheterization showed no coronary artery disease
- Patient underwent CRT-D implantation in 2025

# CASE PRESENTATION

- Current HF medications:
  - Carvedilol 12.5 mg BID
  - Entresto 49/51 mg BID
  - Eplerenone 25 mg QD
  - Furosemide 40 mg QD
- Did not tolerate SGLT2 inhibitor in the past due to yeast infection X 2
- Labs: normal kidney function; NT-proBNP 860 pg/mL

# CASE PRESENTATION

- Physical Exam:
  - Pulse 64, BP 108/62
  - No jugular venous distension
  - Lungs: Clear
  - CV: Regular rate and rhythm; no murmur or gallop
  - Extremities: no edema
- Echocardiogram performed in 2026:
  - LV end-diastolic dimension: 6.6 cm
  - LVEF 15-20%
  - Mild tricuspid and mitral regurgitation

# CASE PRESENTATION – WHAT TO DO NEXT?

- Continue current GDMT
- Refer for cardiac transplantation / LVAD therapy
- Refer for baroreflex activation therapy (BAT)

# BAROREFLEX ACTIVATION THERAPY (BAT)

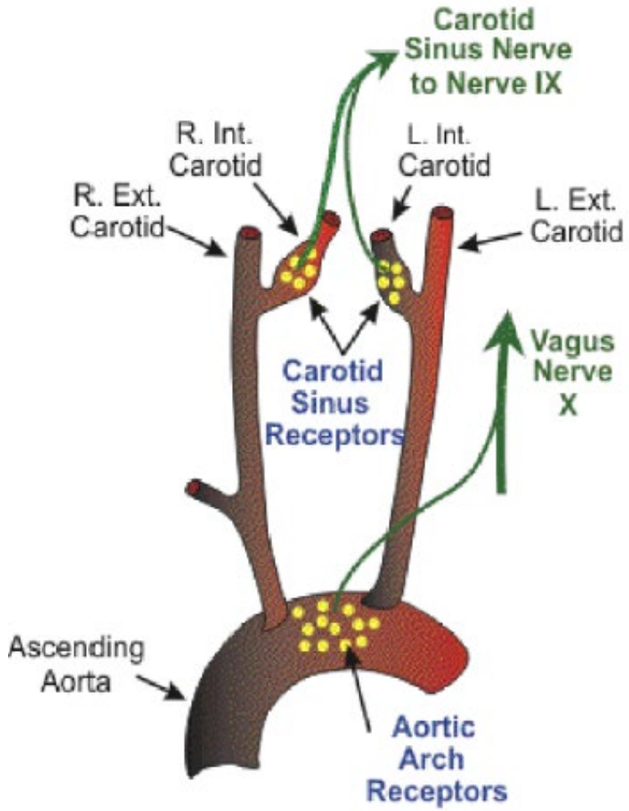



Figure 1. Location and innervation of arterial baroreceptors.

- Heart failure with reduced ejection fraction (HFrEF) is characterized by increased sympathetic activity and decreased parasympathetic activity
- Arterial baroceptors located in carotid sinus play a role in autonomic nervous system homeostasis
- After cardiac damage, the autonomic balance shifts towards a sympathetic predominance due to offset of the baroreflex control by increased afferent pathological signaling from other receptors in the body
- Baroreflex activation therapy (BAT) involves electrical stimulation of the carotid baroreceptors resulting in activation of the baroreflex system with subsequent increase in the parasympathetic outflow and inhibition of the sympathetic activity

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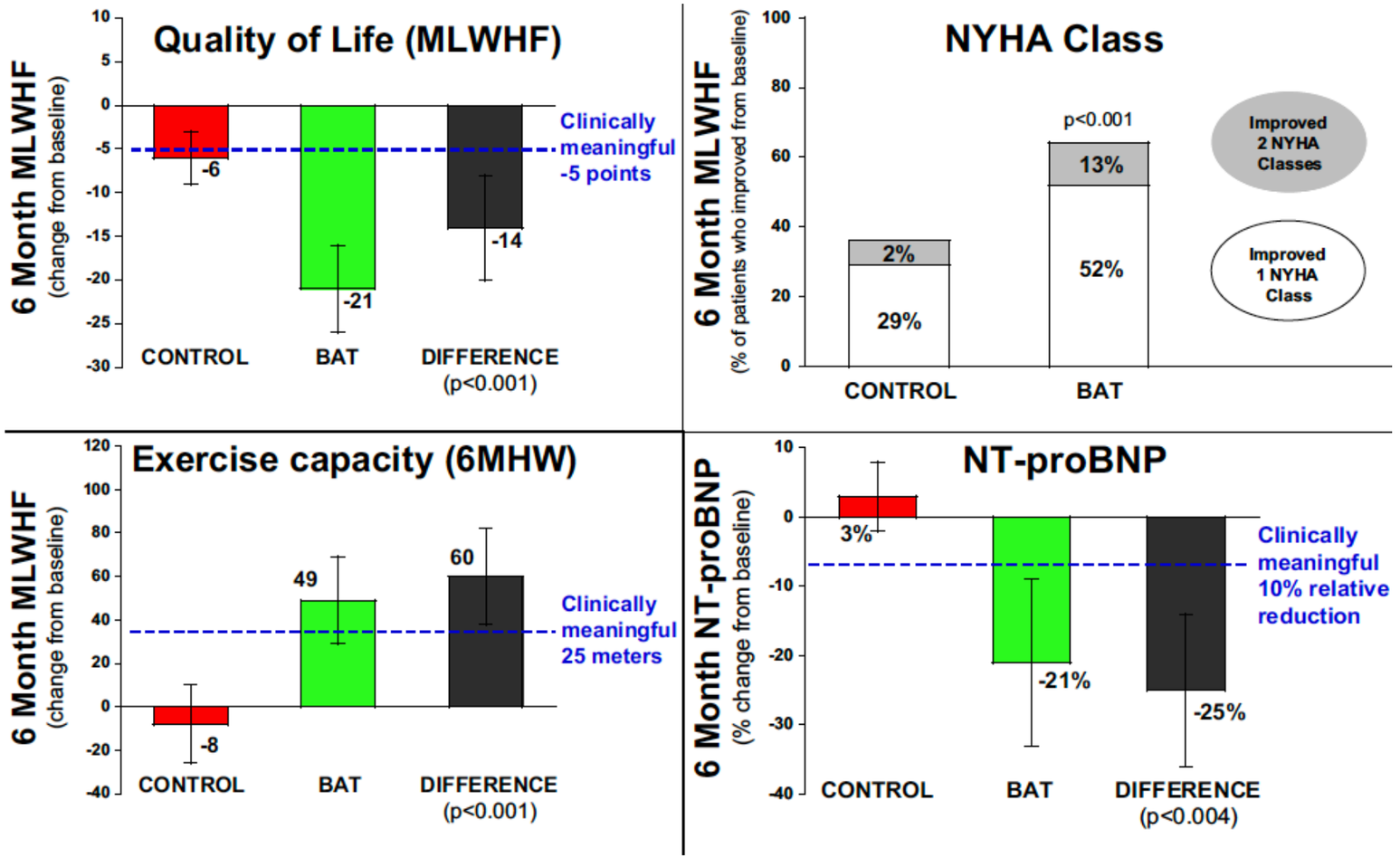
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Dusi V et al. Eur Heart Journal 2022

# BEAT-HF TRIAL

- Phase III, multi-center, prospective, randomized trial
  - LVEF < 35% on stable medical management X 4 weeks
  - NYHA class III
  - NT-proBNP < 1600 pg/ml
  - No indication for CRT
  - No significant carotid artery disease (stenosis < 50% on at least one side)
- Subjects randomized 1:1 to receive either BAT plus optimal medical therapy versus optimal medical therapy alone
- Primary endpoints at 6 months:
  - 6-min hall walk distance
  - Minnesota Living with HF Questionnaire QOL score
  - NT-proBNP
- Primary safety endpoint included the major adverse neurological or CV system or procedure-related event rate

# BEAT-HF: RESULTS




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Dusi V et al. Eur Heart Journal 2022 (Supplement E)

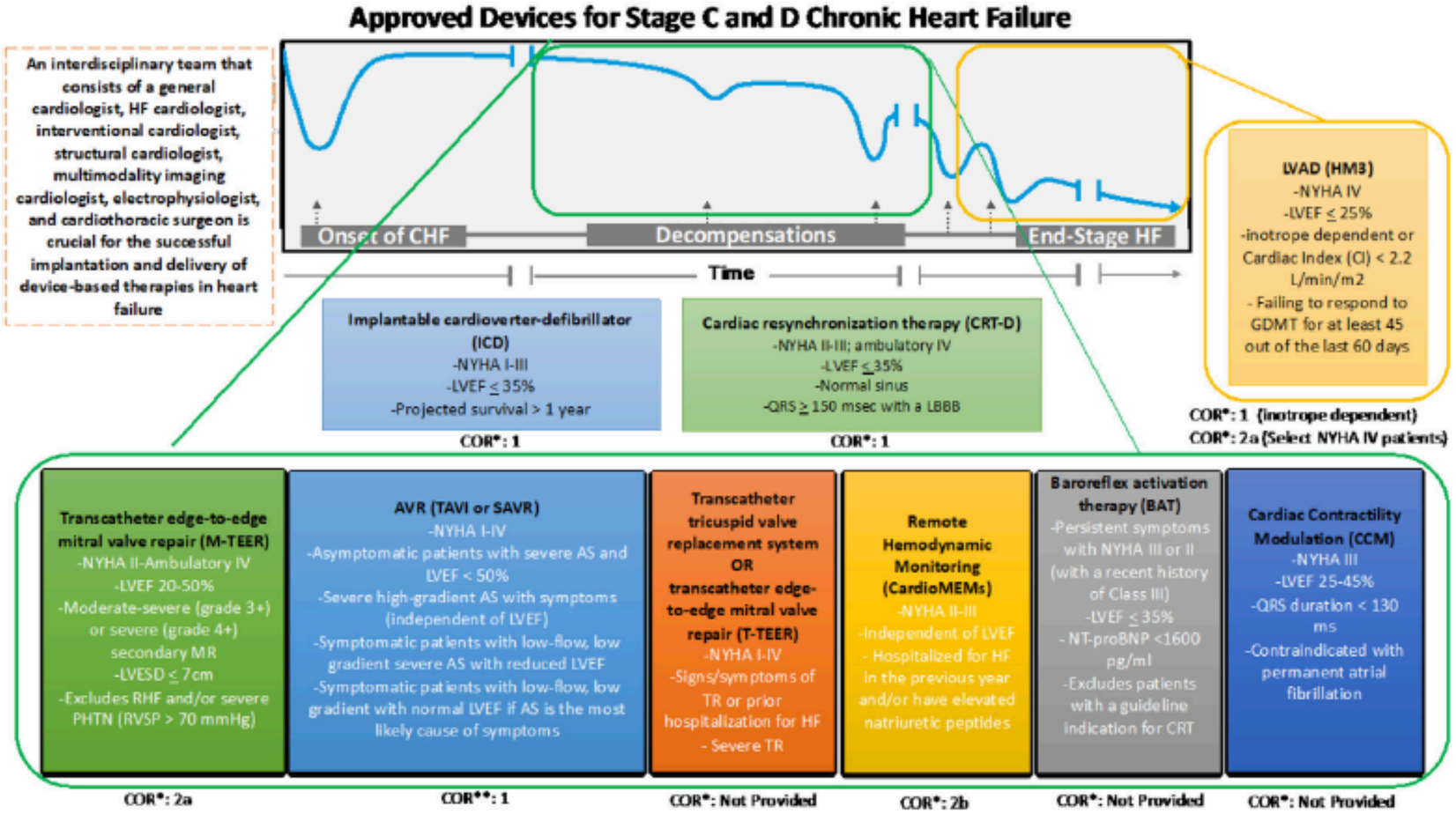
# BENEFITS OF BAT

Option for patients with significant symptoms despite GDMT, but who are not candidates for LVAD/transplant

Outpatient procedure with no intracardiac leads

Minimal long-term follow-up required at implanting center

# EMERGING DEVICE THERAPIES IN HF




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Estep JD et al. J Card Fail 2024

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# UNANSWERED QUESTIONS

- Are “supplemental” GDMT or HF devices such as Barostim contraindicated in patients with **advanced** HF?
- Does the identification of low cardiac index on RHC despite optimal GDMT indicate a patient who will not benefit?
- No trials of HF therapies have routinely included RHC results to identify hemodynamic profiles that are likely to signify a positive result.

# OUR PATIENT

- Obtained carotid artery Duplex which showed no evidence of disease in either carotid artery
- Evaluated by Dr Rothstein of UK Vascular Surgery on 9/24/2026 for consideration of Barostim
- Underwent Barostim implantation on 10/6/2026
- Seen in HF clinic on 11/2/2026 and feels subjectively better

# Cardiogenic Shock +\- Mechanical Circulatory Support → Transplant or Ventricular Assist Device.

**Chioma Obiokoye, MD, MPH, FACC**
**Heart Failure Cardiology**

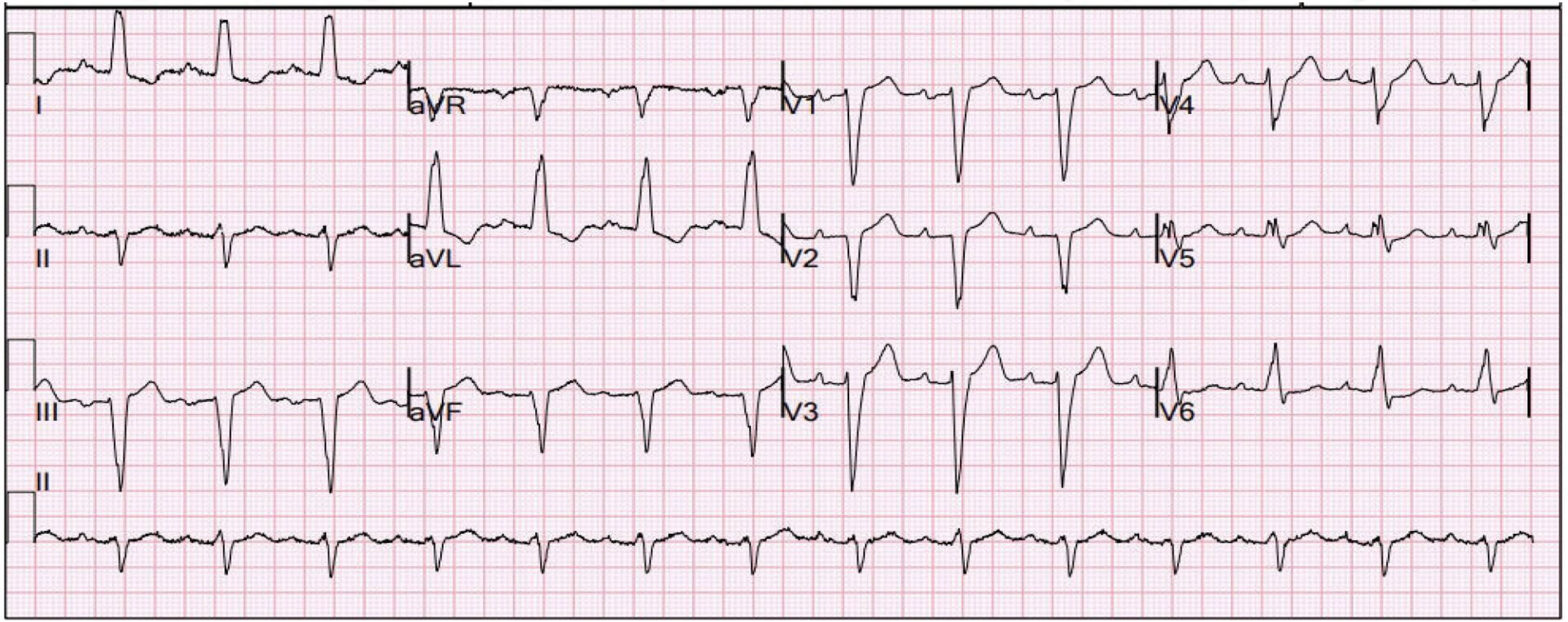
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# CASE PRESENTATION

- 42-year-old male with past medical history of chronic systolic heart failure (non-ischemic cardiomyopathy, diagnosed in 2019, s/p ICD), Non-Hodgkins's lymphoma s/p chemotherapy at age 11 (in remission), type 2 diabetes mellitus, methamphetamine, marijuana and tobacco use.
- Quit methamphetamine use in 2021, compliant with heart failure guideline medical therapy (GDMT).
- GDMT: empagliflozin 10mg po daily, metoprolol succinate 50mg po bid, digoxin 0.125mg po daily, sacubitril-valsartan 24-26mg po bid, spironolactone 25mg po daily.

# ELECTROCARDIOGRAM

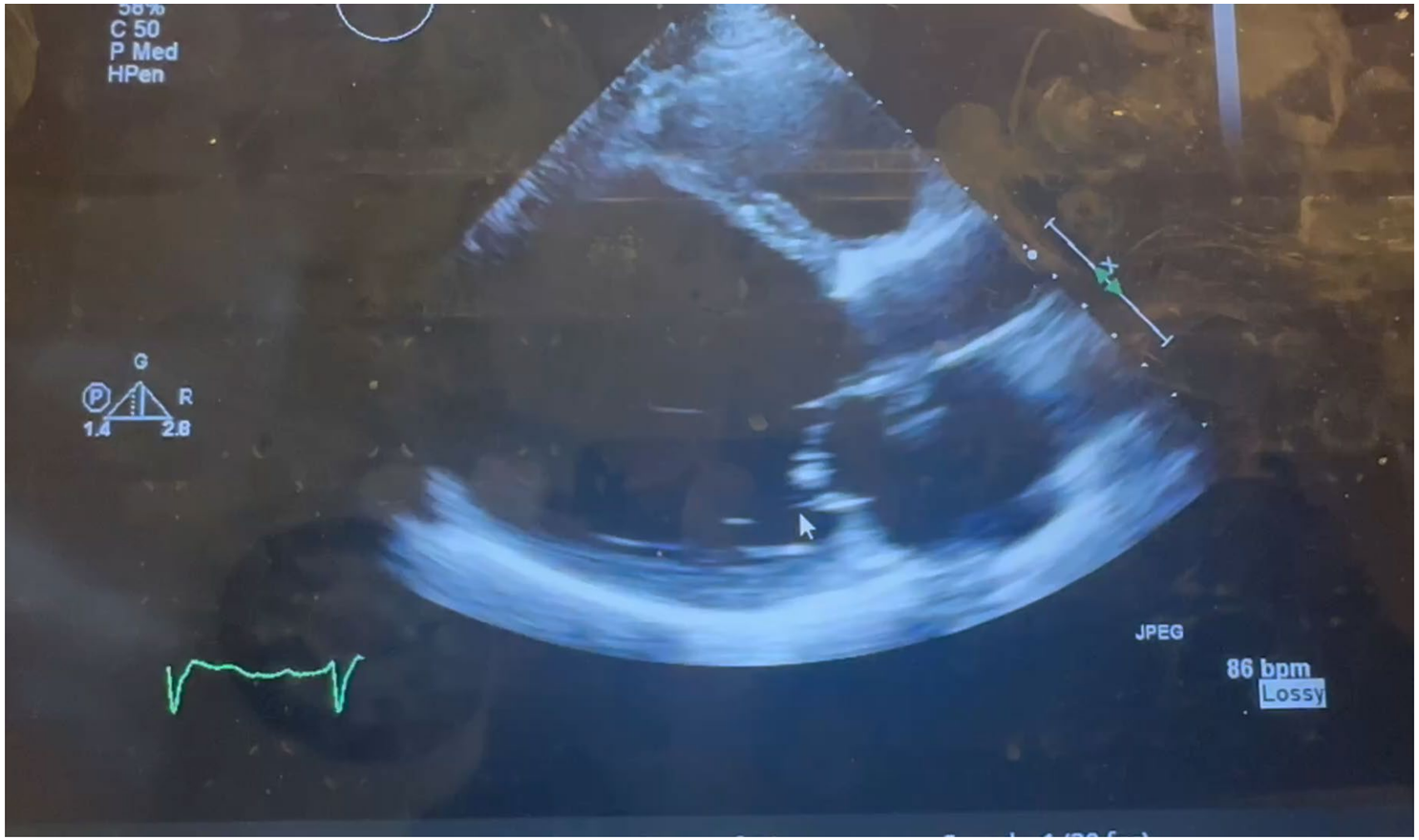



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# TRANSTHORACIC ECHOCARDIOGRAM

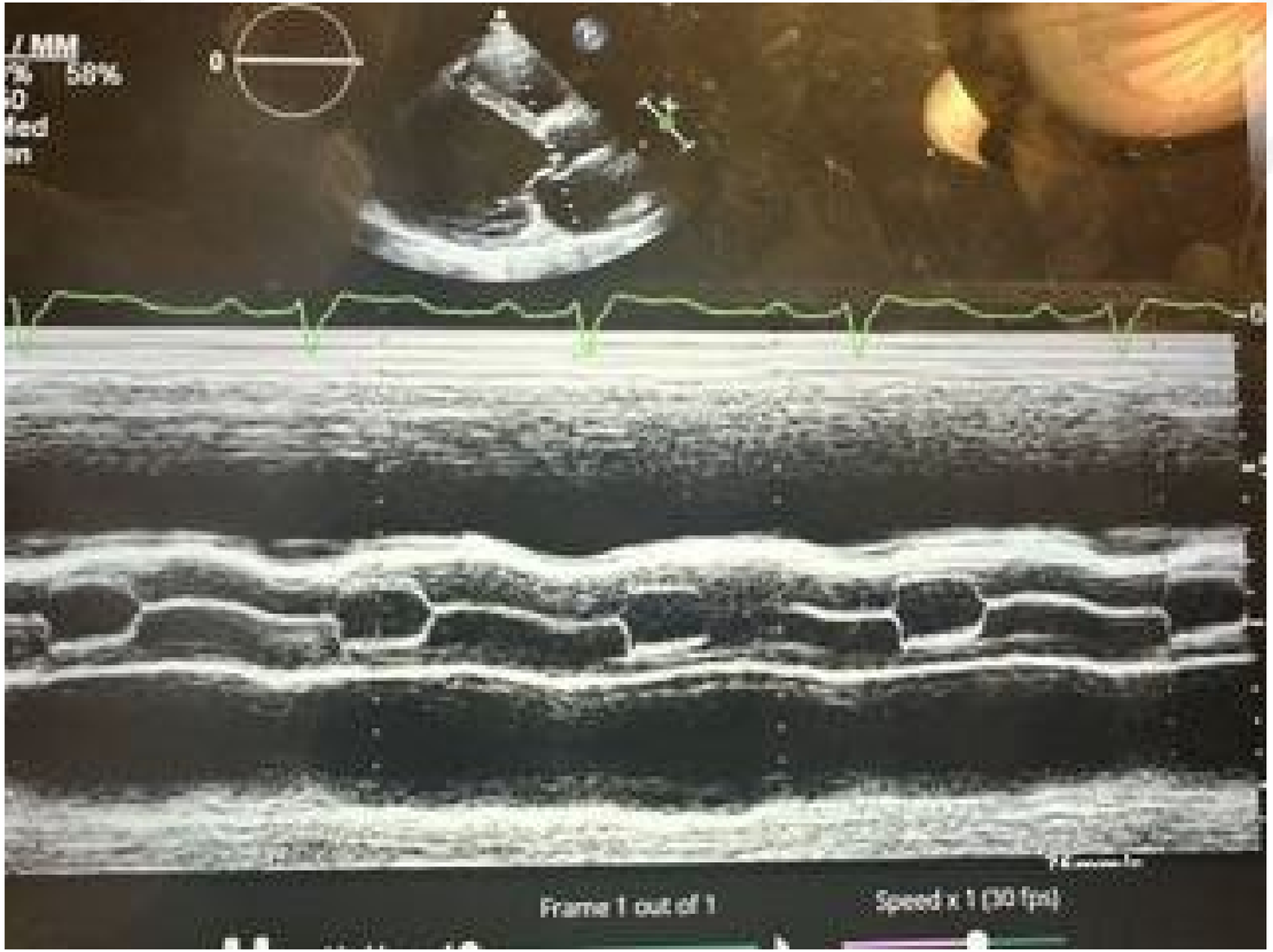



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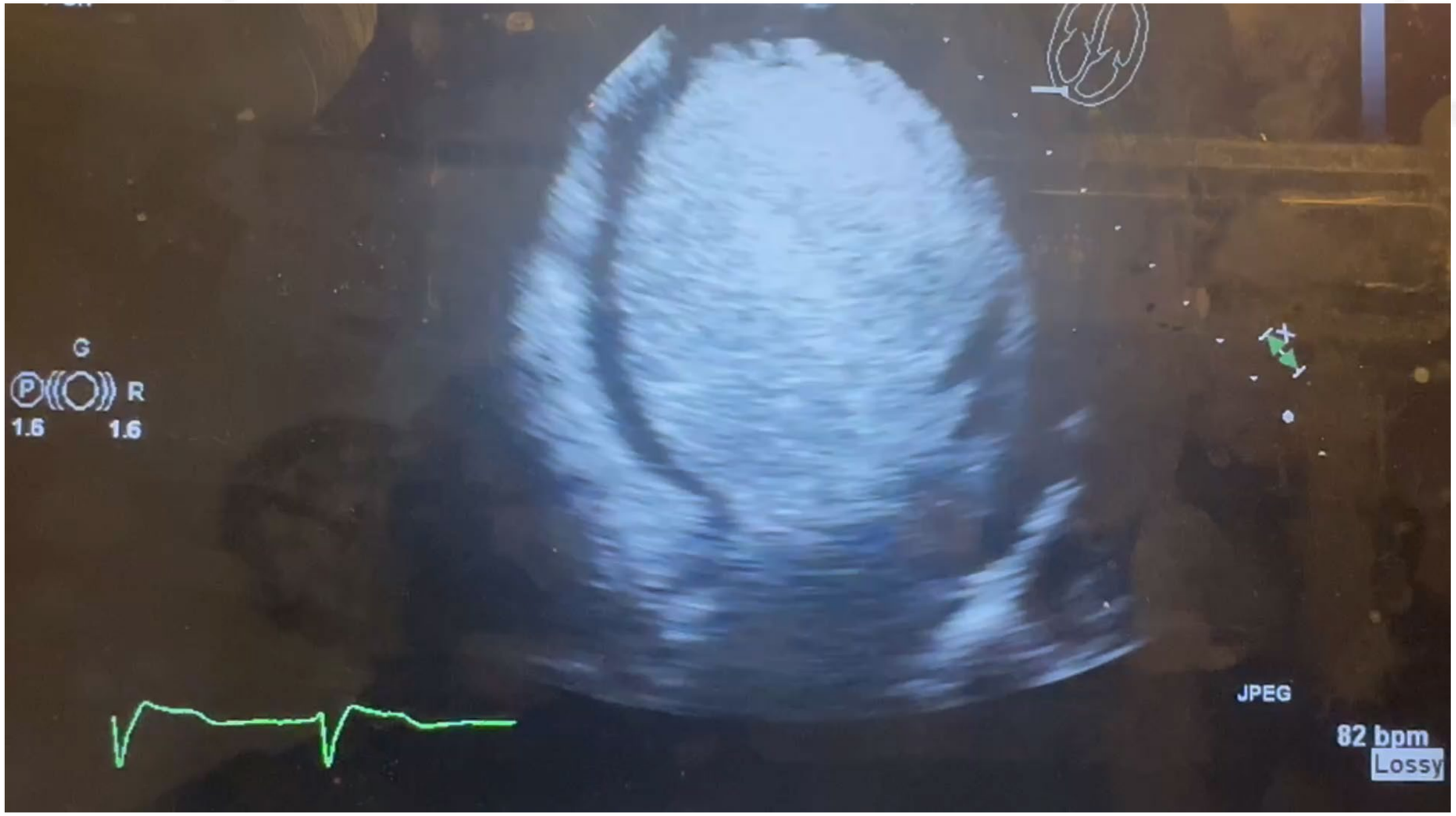
# TTE




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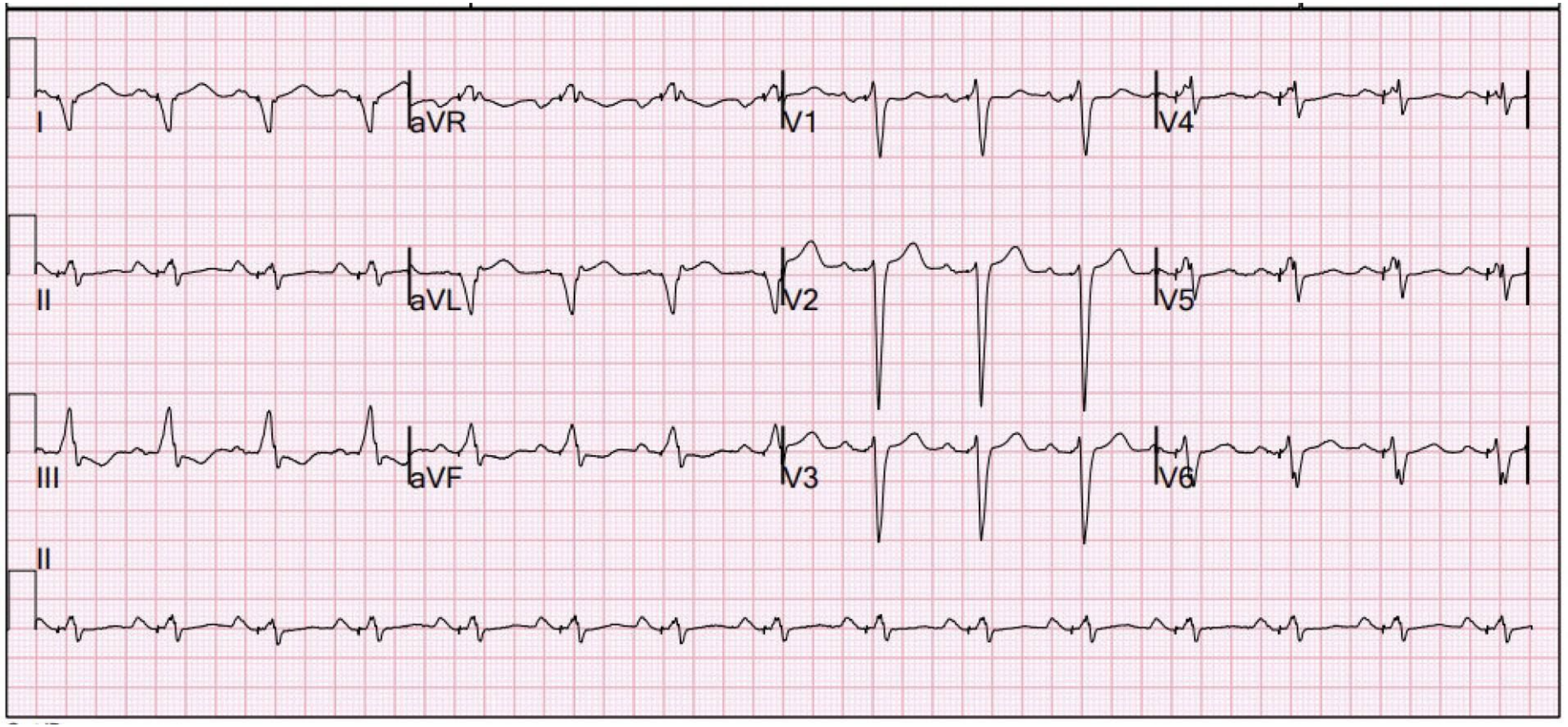
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# CONTD.

- Underwent Bi ventricular ICD upgrade in 06/2022.
- COVID-19 infection 8/22.
- Negative Utox x 3 in 2022.
- Compliant with medications and clinic visits.
- CPET 7/2022: RER 1.09, Peak VO2 21.9 (56% predicted), VO2/HR 14, VE/VCO2 35, METS 6.3.

# ELECTROCARDIOGRAM POST CRT-D




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# RIGHT HEART CATH 2022

- BP 128/88 (98)
- RA 21/16/15
- RV 72/16
- PA 72/40 (48)
- PCWP 26/25 (23)
- TD CO 3.9, CI 2.1
- Calculated Fick CO/CI 2.94/1.6
- PVR 8WU
- SVR 2231
- With Nitric challenge, PA 59/33/43, PCWP 18/23/19, FCO/CI 3.96/2.1, PVR 6.06WU

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# CLINICAL COURSE

- **Admitted 10/2023** with orthopnea, weight gain, leg and arm swelling despite adherence to his home diuretics dose.
- Significant findings on physical exam: JVD+, orthopnea, PND, 2+ bilateral lower extremity edema.
- Improved with IV diuresis and discharged home.
- **Readmitted 1/24 with acute decompensated heart failure.**

# RIGHT HEART CATH 1/24

- **BP 87/69**
- RA 28/30/25
- RV 52/23
- PA 56/30/25
- PCWP 25/22/26
- TD CO/CI: unable to obtain

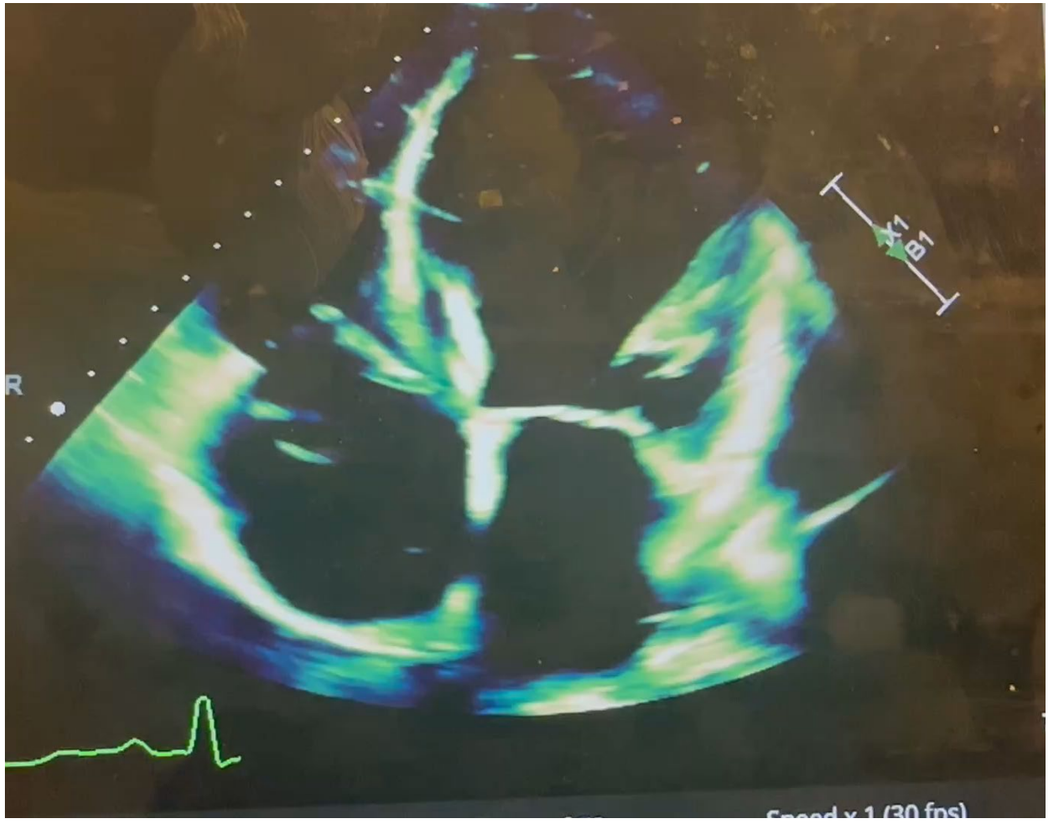
- Calculated Fick CO/CI 1.73/1
- PVR 1WU
- SVR 2219
- Metoprolol and Entresto were discontinued. Dobutamine drip was initiated at 5mcg/kg/min.
- Started on apixaban for ICD lead thrombus.
- Patient was discharged home on dobutamine 5mcg/kg/min. Advanced heart therapy work up initiated.

# CLINICAL COURSE CONTINUED

- Fatigue, orthopnea and weight gain. Milrinone drip initiated.
- Impella 5.5 placed 2/2024.
- Negative 35 liters fluid balance, however, had persistent right ventricular dysfunction.
- Unsuccessful placement of Protek-duo via right internal jugular vein 3/2024 due to significant scar tissue.

# IMPELLA



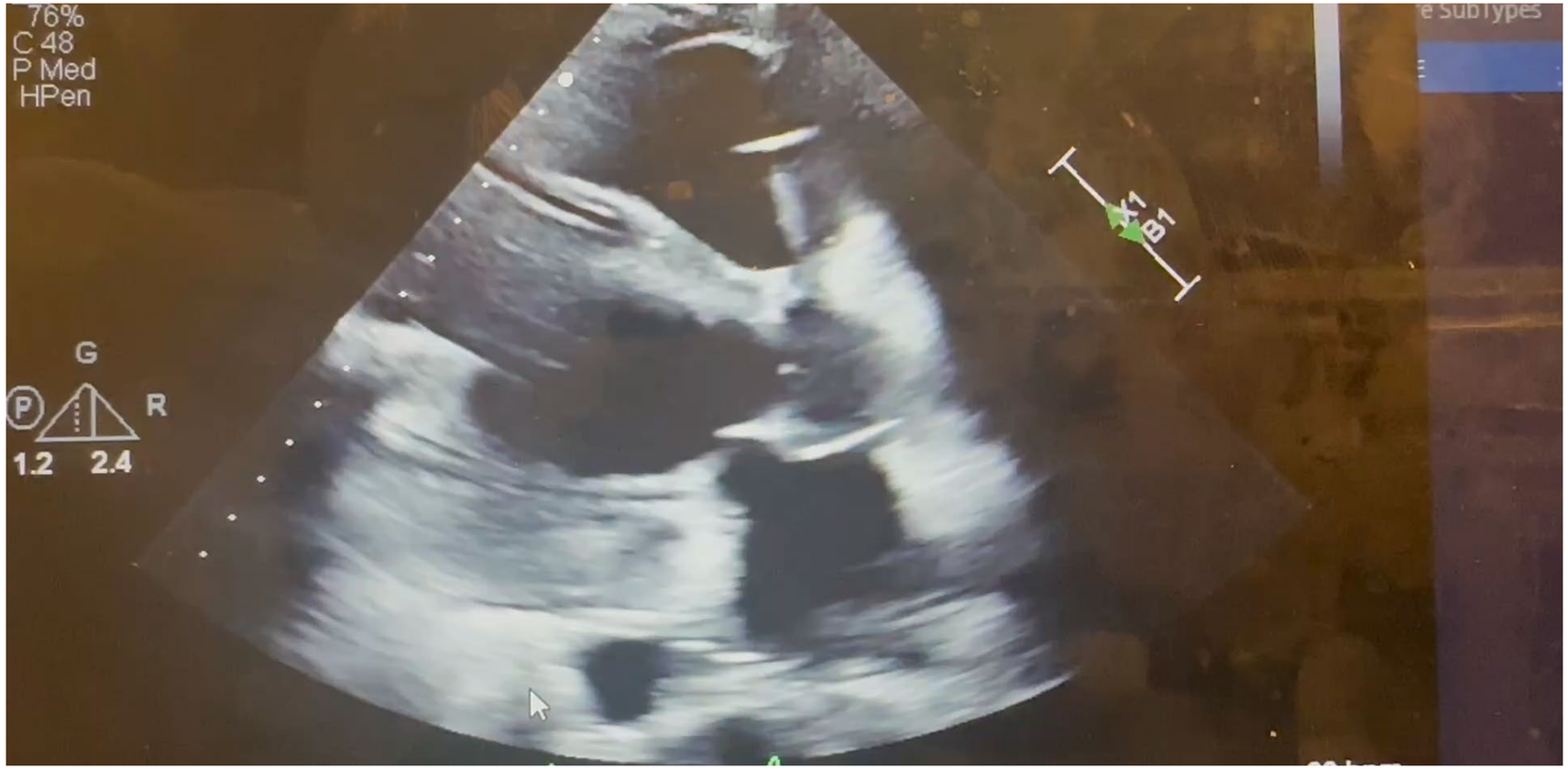



# COURSE CONTD.

- 1 week later, he underwent Impella 5.5 removal, HeartMate 3 left ventricular assist device (LVAD) and temporary right ventricular assist device (RVAD) placement.

- RVAD flow was slowly weaned.

# S/P LVAD

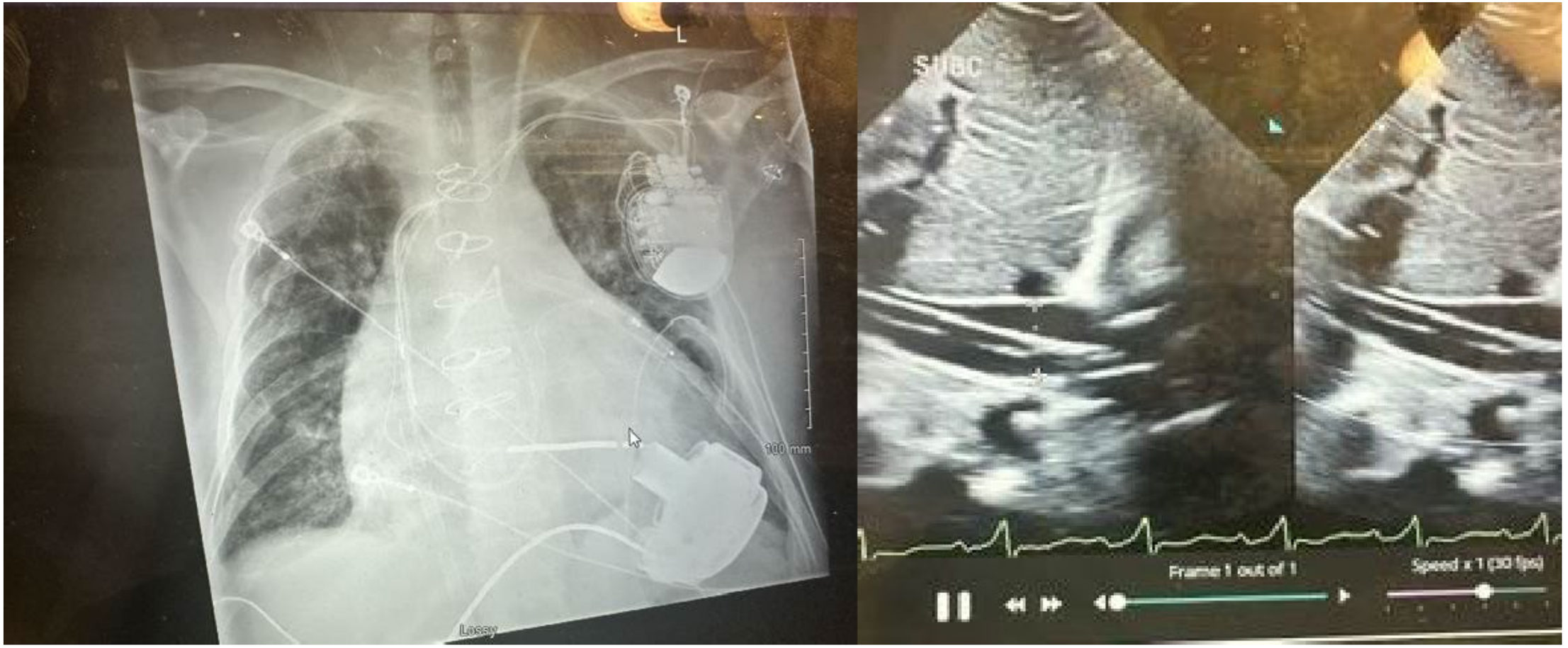



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# BIVAD




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# POST OP COURSE

- POD #13, patient was taken back to the OR for RVAD removal.
- Discharged to home POD# 22 with milrinone drip for 2 weeks for RV support.
- Milrinone has since been weaned off. Patient reports improvement in his exercise capacity, independent in all activities of daily living.
- Patient was referred to UK 12/2025 for heart transplant evaluation.

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# THANK YOU FOR ATTENDING THIS SESSION!

## Questions/Discussion

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