

SNS COLLEGE OF ALLIED HEALTH SCIENCE
Affiliated to The Tamil Nadu Dr MGR Medical University, Chennai



DEPARTMENT OF CARDIAC TECHNOLOGY

COURSE NAME : Echocardiography

UNIT:1-BASICS OF ECHOCARDIOGRAPHY AND DOPPLER STUDY

TOPIC : 2-D & M-Mode Echocardiography

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Enhancing Diagnostic Accuracy through M-Mode and 2D Transthoracic Echocardiography

Patient Profile

Patient: 56-year-old male

Symptoms: Progressive shortness of breath, mild chest pain, and ankle swelling

Clinical Findings: Elevated jugular venous pressure, displaced apex beat, S4 gallop

Primary Suspect: Left ventricular hypertrophy with possible diastolic dysfunction

EMPATHIZE – Understanding the Clinical Problem



Identify Patient Symptoms

Recognizing symptoms that suggest cardiac issues

Conduct M-mode Echocardiography

Performing M-mode echo to evaluate cardiac structures

Analyze Echo Results

Interpreting the results to diagnose cardiac conditions



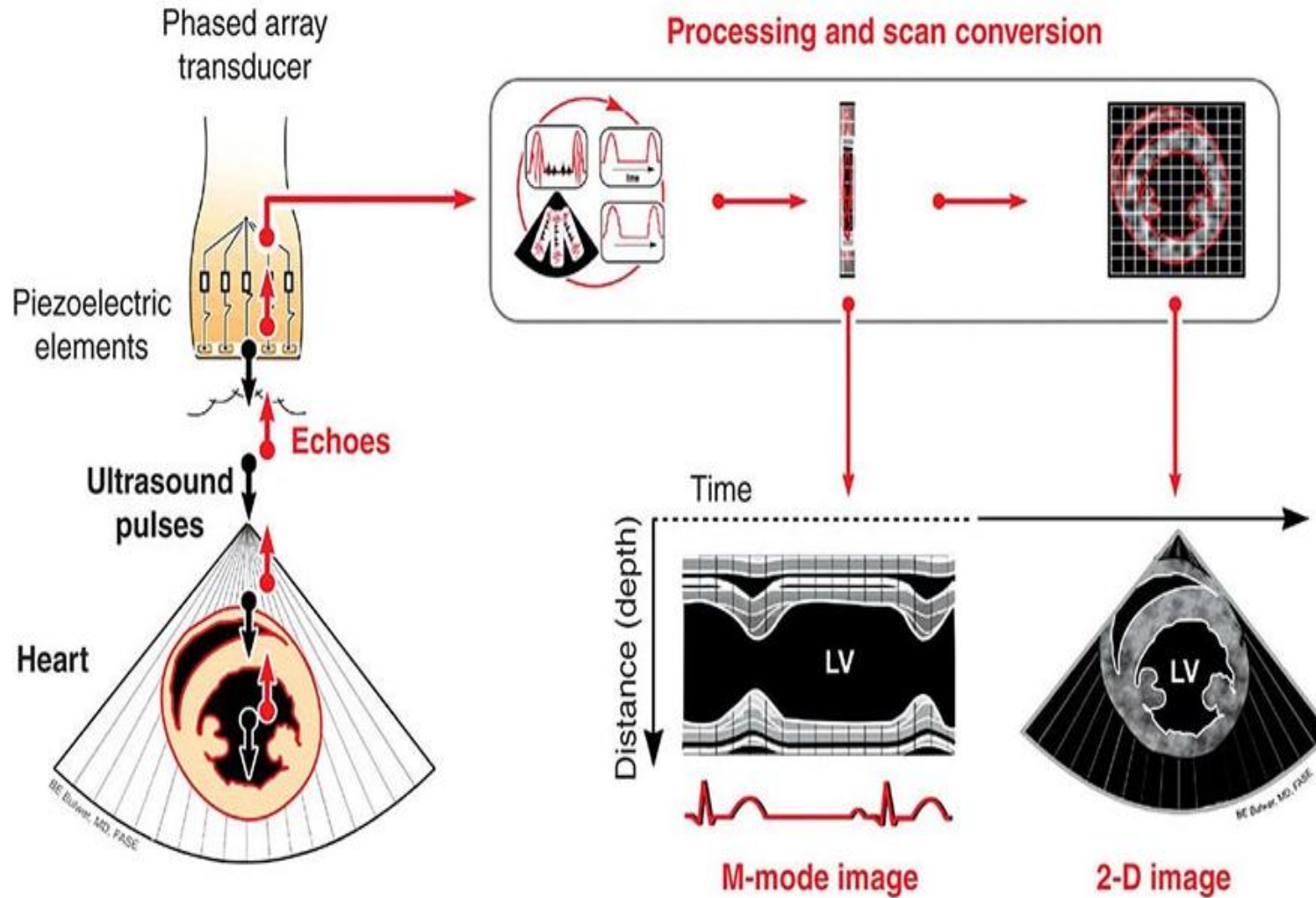
Determine Need for Echocardiography

Assessing the necessity of echocardiography for diagnosis

Conduct 2D Echocardiography

Performing 2D echo to visualize heart in real-time

Empathize



Insights:

- Symptoms indicate possible ventricular dysfunction.
- Non-invasive imaging (TTE) helps visualize structure and function.
- M-mode gives **precise measurements**, while 2D provides **anatomical visualization**.

DEFINE – Establishing the Diagnostic Challenge

Problem Statement :

How might we accurately evaluate left ventricular structure and function in this patient to guide effective treatment?

Measure Chamber Dimensions

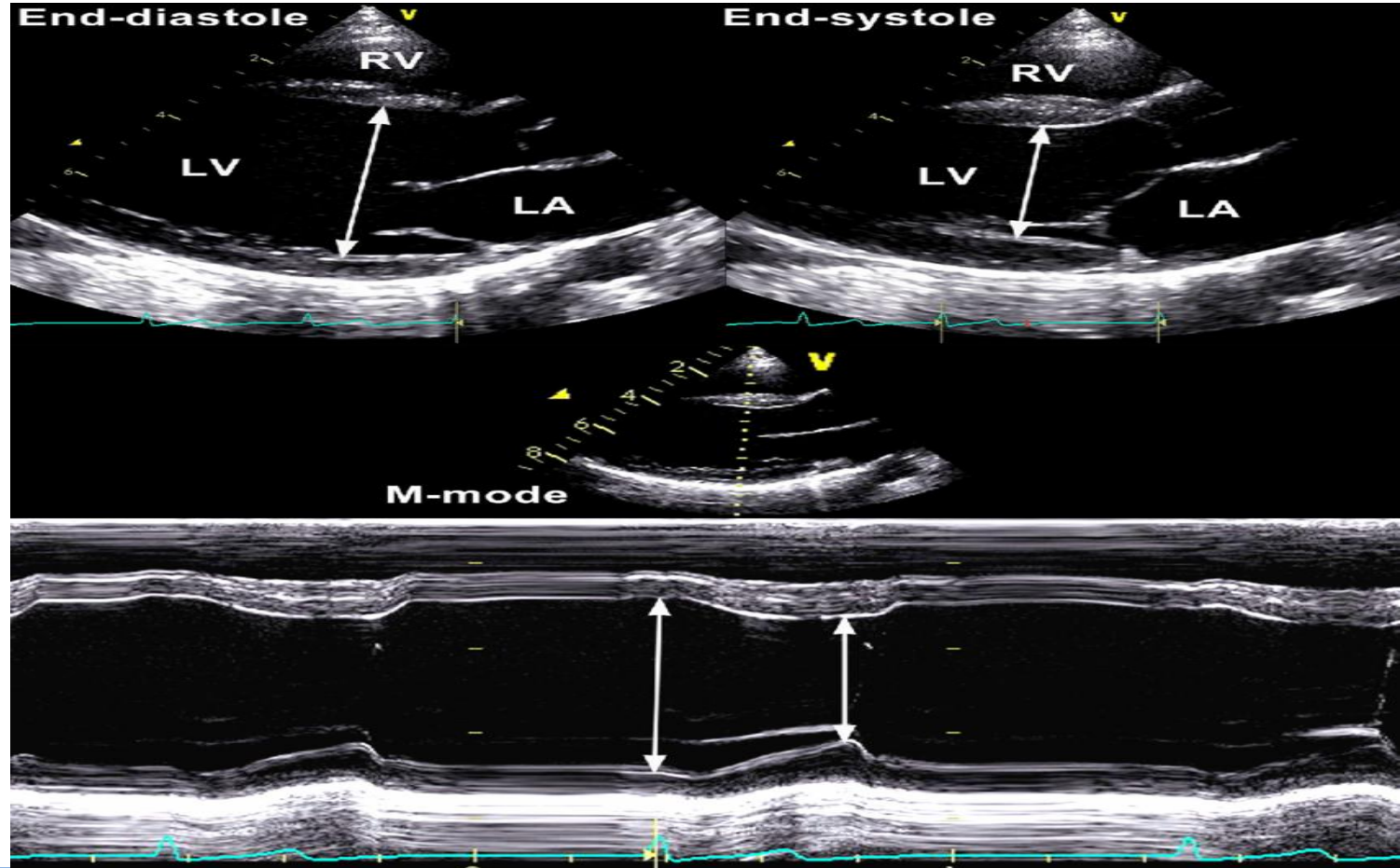
Determine the size of heart chambers

Identify Structural Abnormalities

Detect hypertrophy or valvular lesions

Assess Ventricular Function

Evaluate systolic and diastolic performance



IDEATE – Designing an Echocardiographic Approach

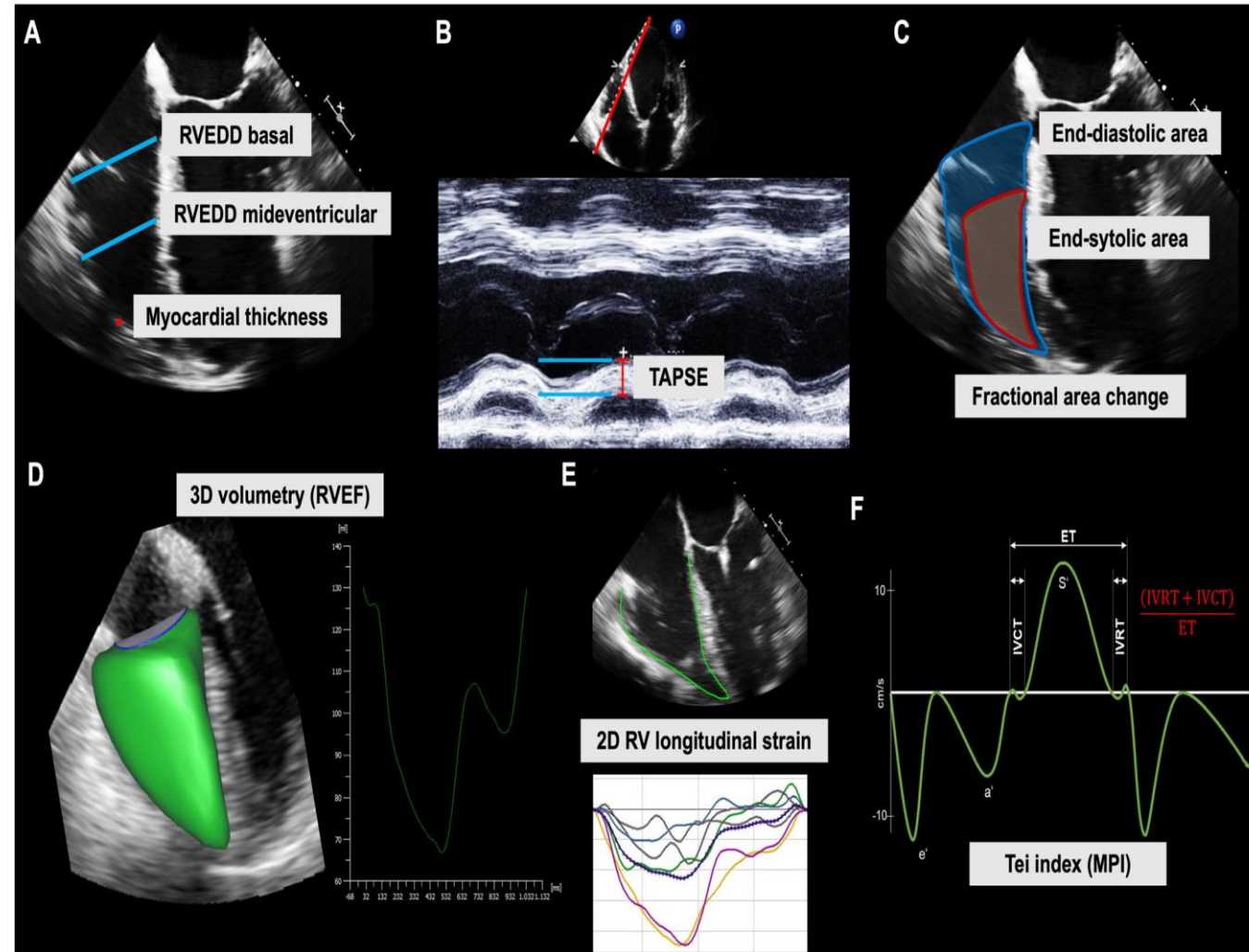
Brainstorm Diagnostic Tools:

M-mode Echocardiography:

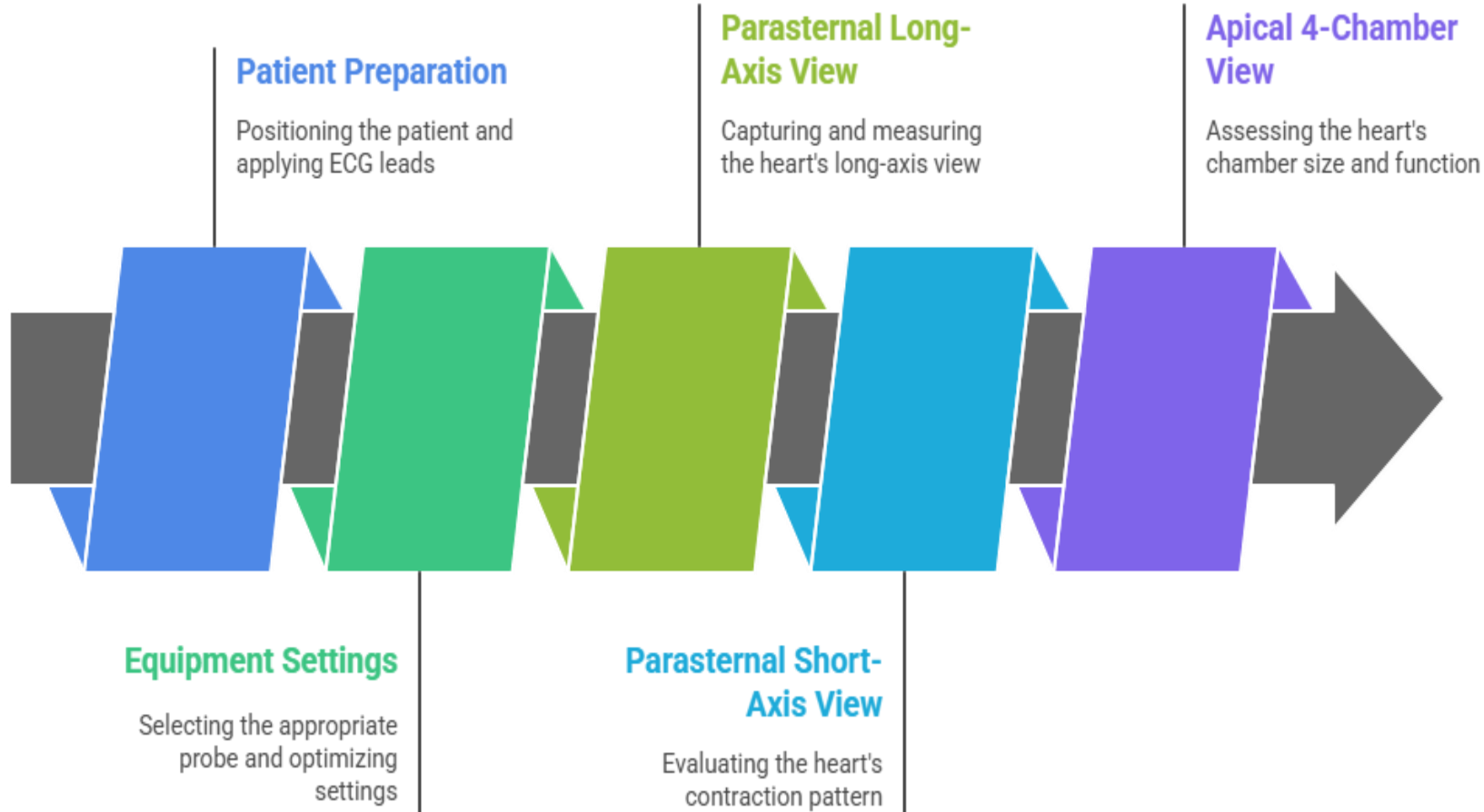
- High temporal resolution
- Precise motion and dimensional measurements
- Used for LV dimensions, EF calculation, wall thickness

2D Transthoracic Echocardiography (TTE):

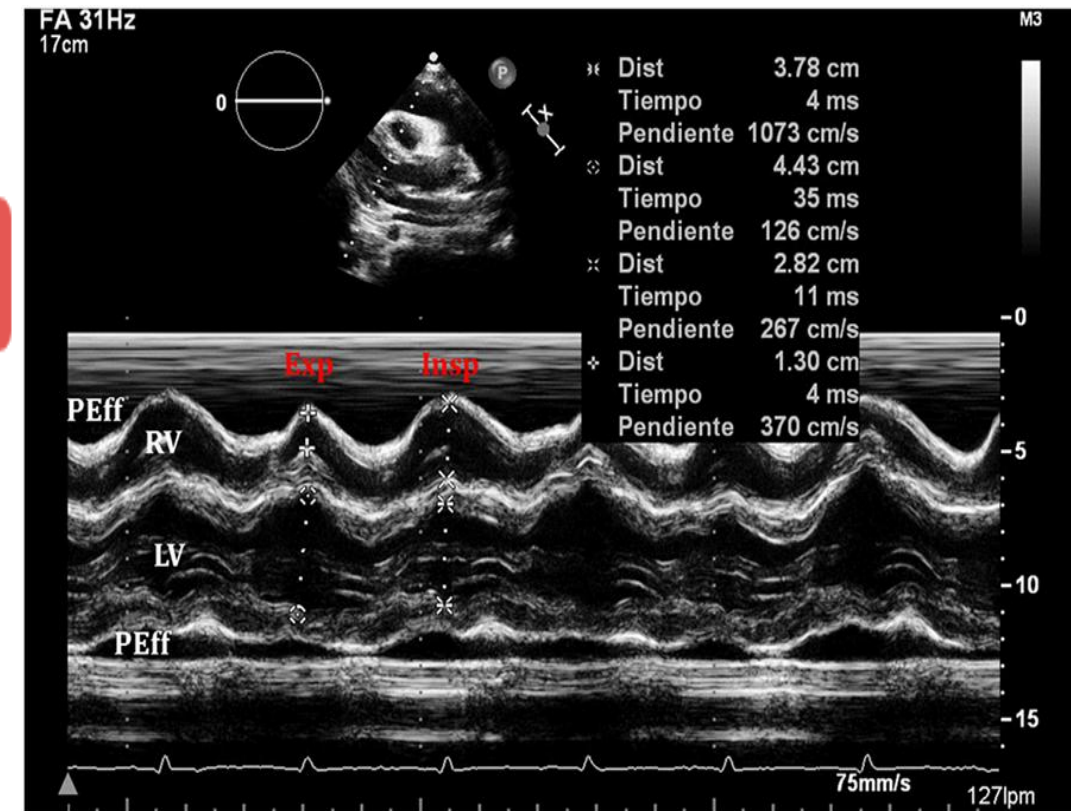
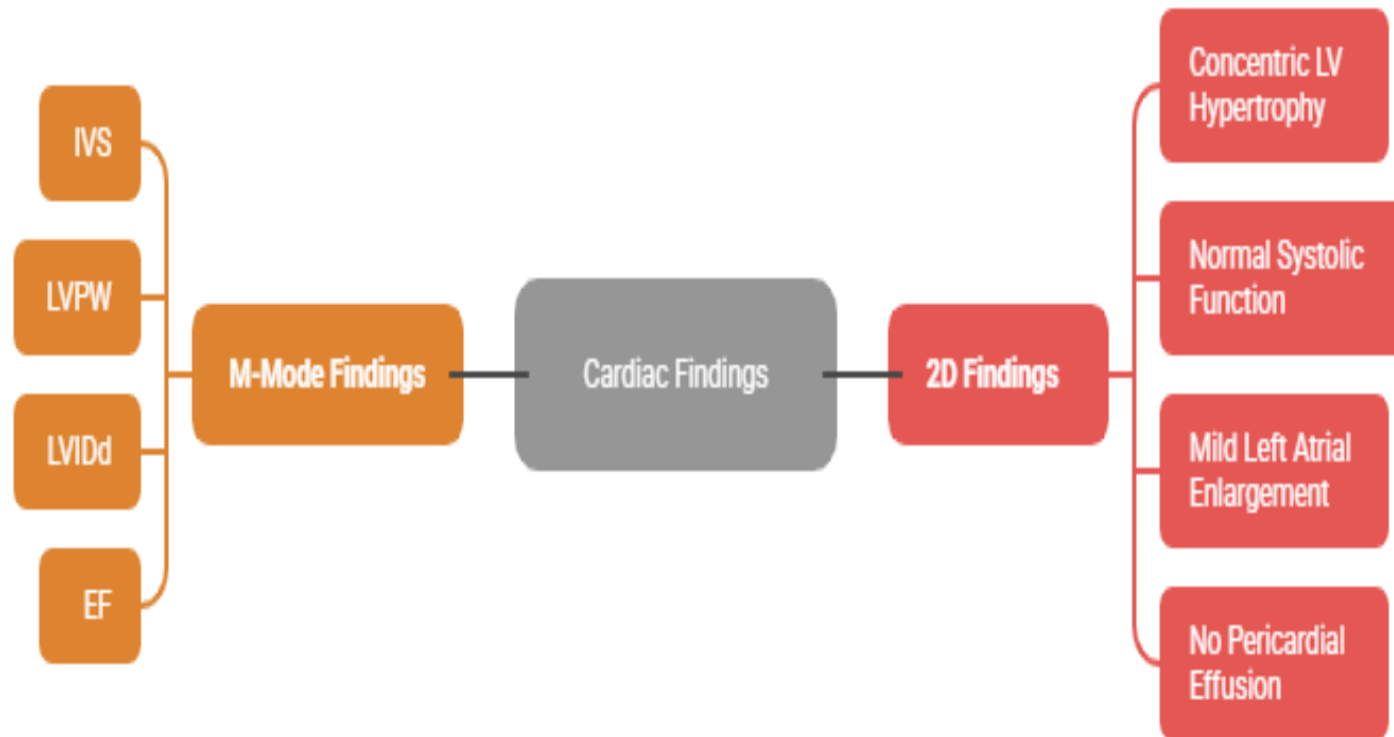
- Cross-sectional real-time imaging
- Evaluates cardiac morphology, valve motion, chamber size, and function
- Assesses pericardial effusion and congenital anomalies



PROTOTYPE – Performing the Echocardiographic Study



PROTOTYPE – Performing the Echocardiographic Study



TEST – Clinical Interpretation

M-mode Findings

M-mode confirms increased wall thickness → LV hypertrophy

2D Image Findings

2D images show preserved systolic function but reduced compliance (diastolic dysfunction)

Diagnosis

Diagnosis: Hypertensive heart disease with LV hypertrophy

Management

Management: Antihypertensive therapy and periodic echocardiographic follow-up



Summary Table: M-Mode vs 2D Echocardiography

Feature	M-Mode Echo	2D Transthoracic Echo
Principle	Motion-time display	Real-time 2D anatomy
Resolution	High temporal	High spatial
Application	Quantitative (dimensions)	Qualitative (structure)
Typical Views	PLAX, PSAX	All standard windows
Clinical Use	LV measurements, wall motion	Comprehensive cardiac evaluation

References



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- Otto CM, Textbook of *Clinical Echocardiography*, 6th Edition. Elsevier, 2022.
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- Oh JK et al. *The Echo Manual*, 4th Edition. Lippincott, 2018.
- Nagueh SF et al., “ASE Guidelines for Diastolic Function Assessment,” *JASE*, 2016.