

# Clinical Decision Making: The Use of Echocardiography

11<sup>th</sup> Annual RI-ACC Cardiology for the PCP

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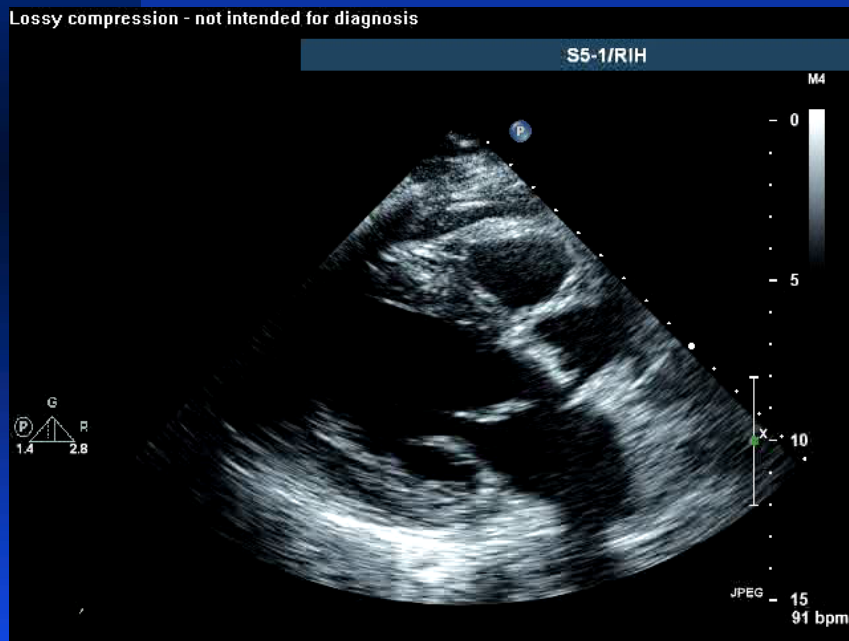
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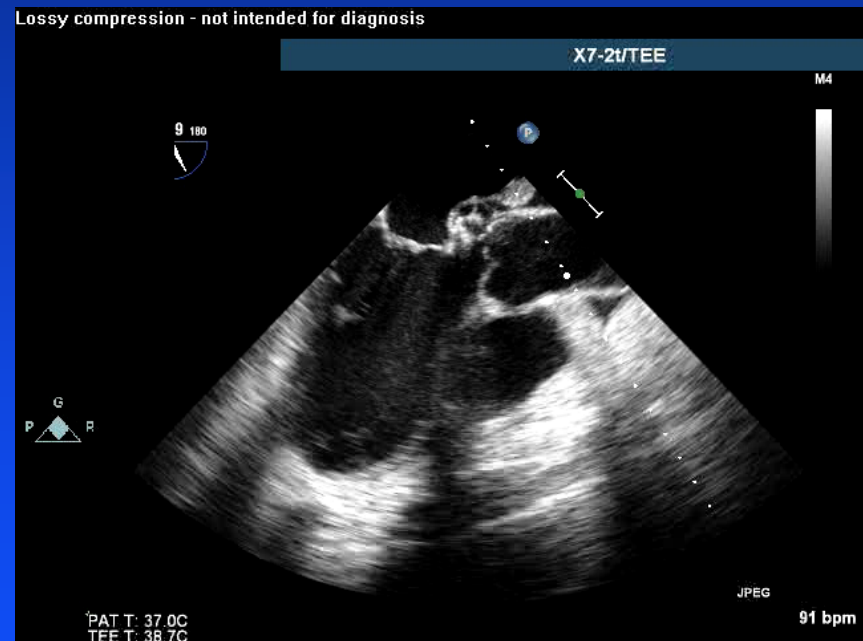
# Echocardiography: indications

## Transthoracic echo



Severe AS and DCM

## Transesophageal echo



Aortic root abscess

# Transthoracic Echocardiography

## Anatomic Details

- Ventricles: function and cardiomyopathies
- Valvular: etiology of stenosis/regurgitation
- Aorta: Aneurysm, dissection

## Hemodynamics

- Pericardial disease: constriction, tamponade
- Valvular stenosis and regurgitation
- Estimated Pressures: LAP, PAP

# Echo and Diagnosis

- Heart failure
  - ◆ LVEF versus other etiologies
- Syncope
  - ◆ Severe aortic stenosis
- Arrhythmias
  - ◆ Cardiomyopathy

# AUC for Echo

## ACC/AHA/ASE 2011

### TTE for General Evaluation of Cardiac Structure and Function Lightheadedness/Presyncope/Syncope

- Clinical symptoms or signs consistent with a cardiac diagnosis known to cause lightheadedness/presyncope/syncope (including but not limited to aortic stenosis, hypertrophic cardiomyopathy, or HF) A (9)
- Syncope when there are no other symptoms or signs of cardiovascular disease A (7)

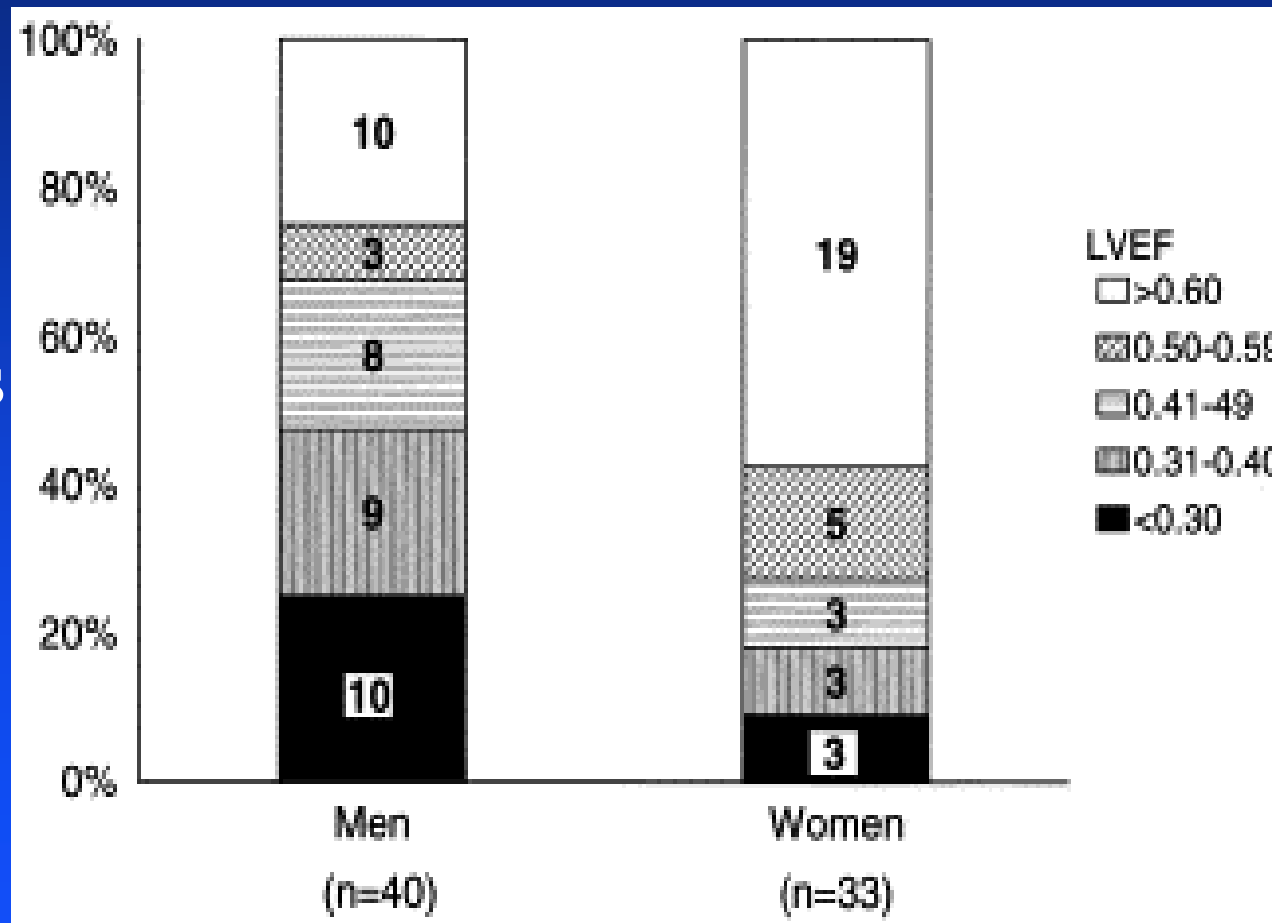
### TTE for Evaluation of Hypertension, HF, or Cardiomyopathy HF

- Initial evaluation of known or suspected HF (systolic or diastolic) based on symptoms, signs, or abnormal test results A (9)
- Re-evaluation of known HF (systolic or diastolic) with a change in clinical status or cardiac exam without a clear precipitating change in medication or diet A (8)
- Re-evaluation of known HF (systolic or diastolic) to guide therapy A (9)

# Half of CHF patients have normal LVEF

## Framingham Heart Study

% of patients



Vasan RS et al. J Am Coll Cardiol. 1999;33:1948-55

# Systolic Heart Failure

## Frequency of repeat studies

- Recent echo within past 5 years
- New and significant change in murmur
- If they have a cardiologist probably don't need a repeat study.

### TTE for Evaluation of Hypertension, HF, or Cardiomyopathy HF

- |   |       |
|---|-------|
| ● Initial evaluation of known or suspected HF (systolic or diastolic) based on symptoms, signs, or abnormal test results  | A (9) |
| ● Re-evaluation of known HF (systolic or diastolic) with a change in clinical status or cardiac exam without a clear precipitating change in medication or diet | A (8) |
| ● Re-evaluation of known HF (systolic or diastolic) to guide therapy  | A (9) |

# Echoes for Syncope

- History should drive testing
- If there is previous known heart disease *or* data suggestive of structural heart disease *or* syncope secondary to cardiovascular cause
- Cardiac?
  - ◆ Severe AS: murmur and previously known
  - ◆ Ventricular arrhythmias: 24 hours tele and
    - ☞ CAD by ECG and prior evaluation
    - ☞ NICM by CHF symptoms
    - ☞ HCM by ECG



## Risk stratification for syncope

### **Short-term high risk criteria which require prompt hospitalization or intensive evaluation**

**Severe structural or coronary artery disease** (heart failure, low LVEF, or previous myocardial infarction)

### **Clinical or ECG features suggesting arrhythmic syncope**

- Syncope during exertion or supine
- Palpitations at the time of syncope
- Family history of SCD
- Non-sustained VT
- Bifascicular-block (LBBB or RBBB combined with left anterior or left posterior fascicular block) or other intraventricular conduction abnormalities with QRS duration  $\geq 120$  ms
- Inadequate sinus bradycardia ( $< 50$  bpm) or sinoatrial block in absence of negative chronotropic medications or physical training
- Pre-excited QRS complex
- Prolonged or short QT interval
- RBBB pattern with ST-elevation in leads V1-V3 (Brugada pattern)
- Negative T waves in right precordial leads, epsilon waves, and ventricular late potentials suggestive of ARVC

### **Important co-morbidities**

- Severe anaemia
- Electrolyte disturbance

# Transesophageal Echocardiography

## Diagnosis of Cardiovascular Disease

- Cardiac sources of systemic embolism
- Diseases of the aorta
- Native and prosthetic valvular function
- Valvular infective endocarditis
- Congenital Heart Disease
- Cardiac and pericardial masses

Interval change in clinical status or cardiac exam

### TEE as Initial or Supplemental Test—General Uses

- Use of TEE when there is a high likelihood of a nondiagnostic TTE due to patient characteristics or inadequate visualization of relevant structures A (8)
- Re-evaluation of prior TEE finding for interval change (e.g., resolution of thrombus after anticoagulation, resolution of vegetation after antibiotic therapy) when a change in therapy is anticipated A (8)
- Guidance during percutaneous noncoronary cardiac interventions including but not limited to closure device placement, radiofrequency ablation, and percutaneous valve procedures A (9)
- Suspected acute aortic pathology including but not limited to dissection/transsection A (9)

### TEE as Initial or Supplemental Test—Valvular Disease

- Evaluation of valvular structure and function to assess suitability for, and assist in planning of, an intervention A (9)
- To diagnose infective endocarditis with a moderate or high pretest probability (e.g., staph bacteremia, fungemia, prosthetic heart valve, or intracardiac device) A (9)

### TEE as Initial or Supplemental Test—Embolic Event

- Evaluation for cardiovascular source of embolus with no identified noncardiac source A (7)

# Transesophageal Echocardiography

## Cardiac Sources of Systemic Emboli

### ■ High Risk

- ◆ Intracardiac thrombus or mass lesions
- ◆ Infective endocarditis with valvular vegetation

### ■ Intermediate Risk

- ◆ Atrial septal aneurysm, ASD, PFO
- ◆ Spontaneous echo contrast

### ■ Low Risk

- ◆ Myxomatous mitral valve prolapse
- ◆ Left ventricular regional wall motion abnormality

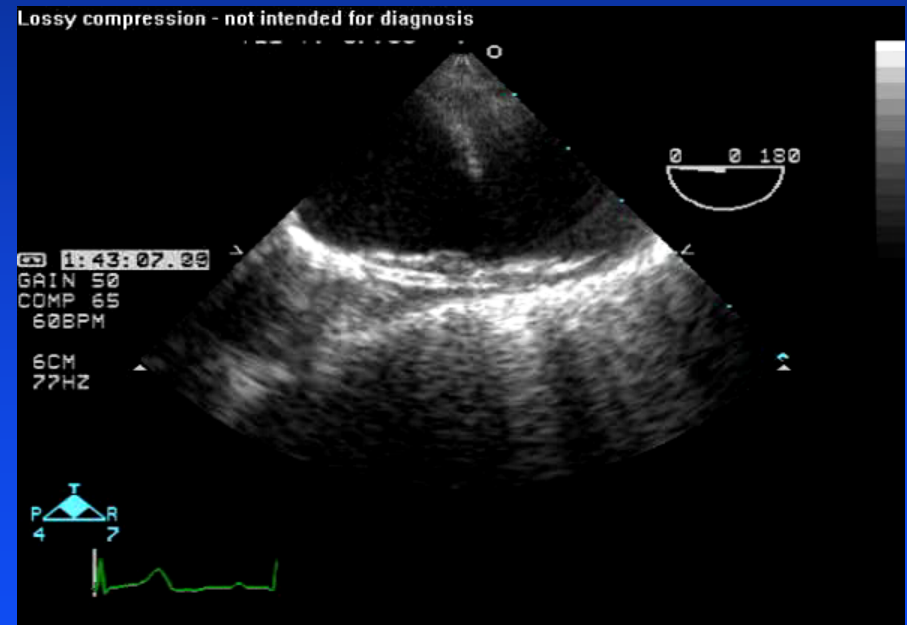
# TEE: Vascular source of emboli

## ■ High Risk

- ◆ Protruding aortic atheroma
- ◆ Mobile thrombi in proximal aorta and arch

## ■ Low Risk

- ◆ Aortic Dissection/aneurysm with thrombus



# Endocarditis: TTE vs TEE

	TTE	TEE
Sensitivity	44-60%	87-94%
Specificity	91-98%	98-100%
Sensitivity in:		
Prosthetic valve	27%	78-86%
Native valves	68%	94%
6-10mm Veg	69%	100%
<5mm Veg	25%	100%

Negative predictive value of TTE + TEE > 95%

# Clinical Decision Making: The Use of Echocardiography

## ■ Diagnosis

- ◆ Heart failure, cardiac syncope, murmurs

## ■ Followup

### ◆ Mild disease

- ☞ Change in symptoms

- ☞ Routine  $\geq 3$  years

### ◆ Moderate to Severe AS, AI, MS or MR

- ☞ routine  $\geq 1$  year

- ☞ Sooner if symptoms change for severe

CVS ORDER REQUISITION  
ORDERING LOCATION CVS

Adm Diagnosis:

Patient Ht: ft in  
m cm

Patient Wt: lb oz  
kg gm

Isolation: 2

-----Patient Allergy Information in System as of 03/21/11 13:32 -----  
No Known Allergies No Known Drug Allerg No Known Food Allerg

Nurse Sta:

Bed/Room:

Clinic Cd: EMERGENCY

Order #: 1

Ord Dept/Cd:

Order Desc:

**ECHOCARDIOGRAM LIMITED ROUTINE ONCE**

Priority: ROUTINE

Duration: 0 H

Daily Freq: ONCE

Weekly Freq: ONCE

Order Start Dt/Tm: 03/19/11 13:31

Order Stop Dt/Tm: 03/19/11 13:31

Ordering Dr:

Dr Beeper:

Ord Entered By: TKM007

Entered Dt/Tm: 03/21/11

LINK ID:

Total # Occur: 1

Occur #: 1

Occur Start Dt/Tm: 03/19/11 13:31

Reason: UNSURE IF DEAD, LVF

UNSURE IF DEAD, LVF

Performed By Nurse: Y

Comments:

Transport Method:

Pt Has a Pacemaker:

Precautions:

Perform in/at:

Approved by Pedi Cardiologist:

Current Meds: