



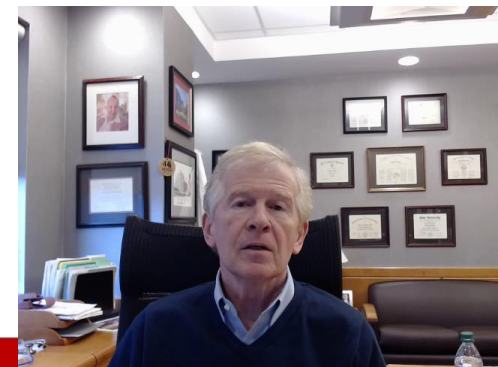
Improving People's Lives Through Innovations in Personalized Health Care

Update on Endocarditis

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(No disclosures)



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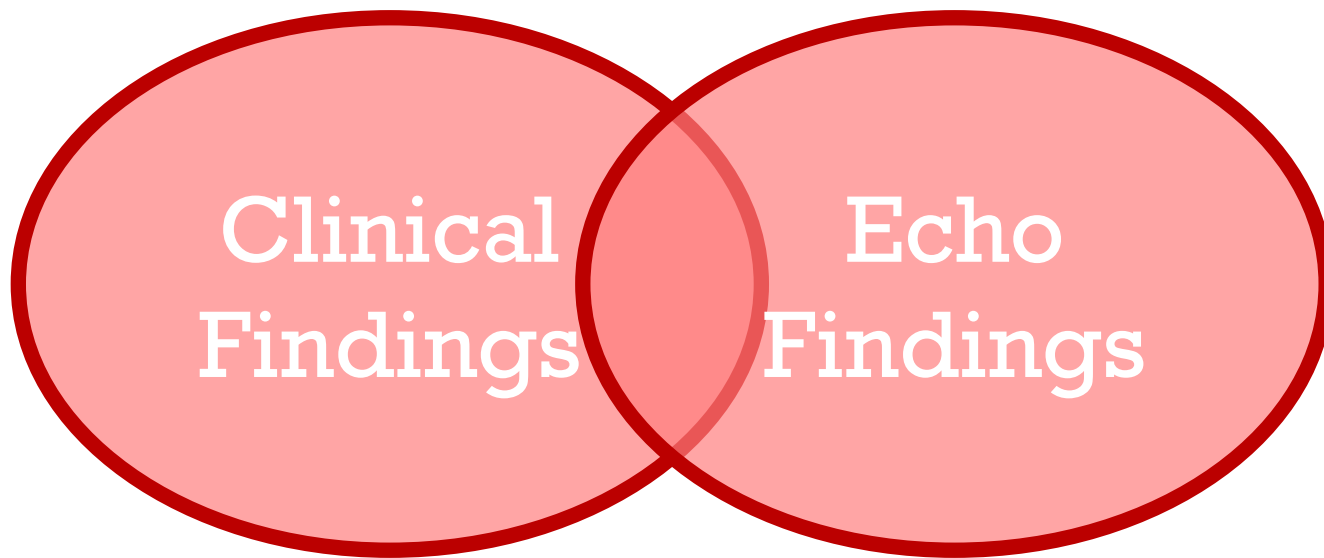


Issues to Consider

- Clinical data vs echo findings
- Who gets IE and why
- Role of echocardiography
 - Modified Duke criteria – making a Dx
 - Clinical decision making
 - Transthoracic vs TEE
 - Detection of complications



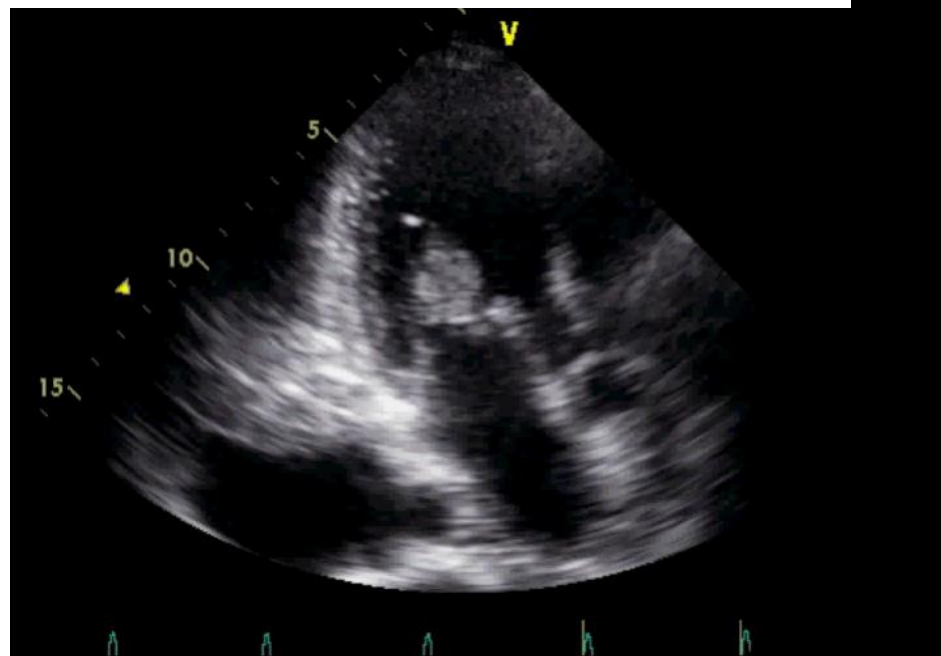
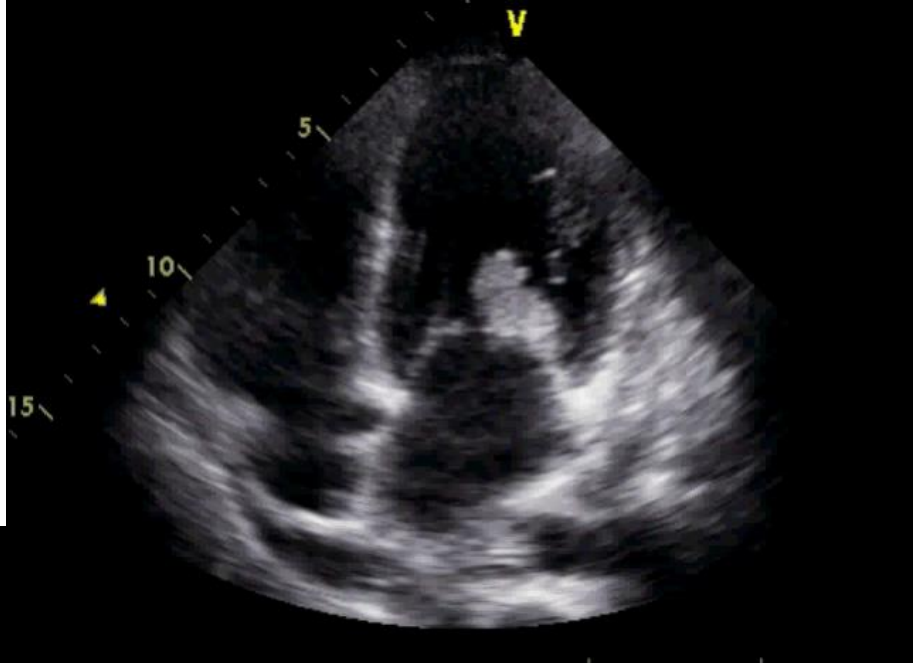
Establishing a Diagnosis of IE



41 yo man
transferred
from OSH
with fever
and positive
blood
cultures

- Generally good health,
no prior Hx
- 10 d of fever and cough
- 1-2/6 holosystolic apical
murmur; Temp 38.5
- WBC 11,000
- Blood cultures – GPC
- Day 2 of antibiotics, feels
well





Complications and Risk Factors

Detect Complications

- CHF
- Emboli
- Abscess/fistula
- Dehiscence
- Valve perforation
- Valvular regurgitation

Predict Complications

- Size/location of veg
- Persistently + BC
- Type of organism
- Presence of prosthetic material/ICD
- Multivalve involvement

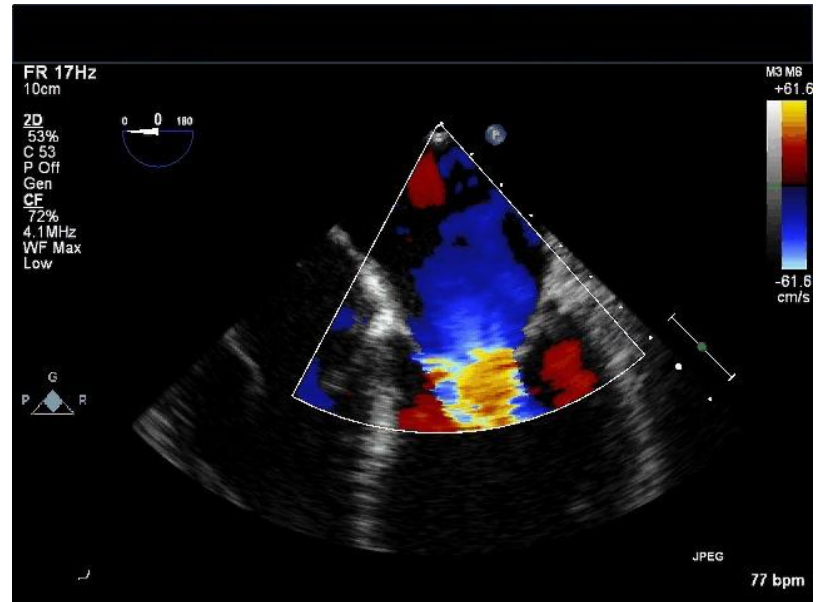
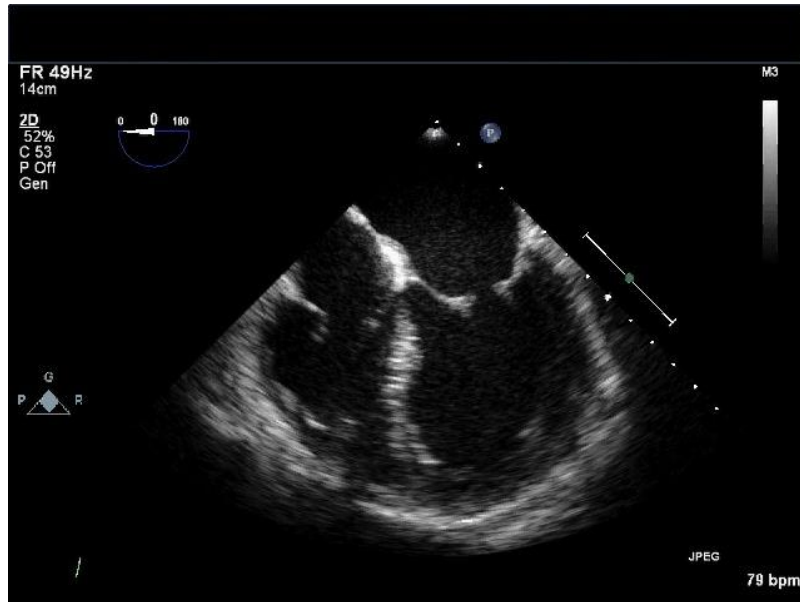


47 yo woman
with Hx of
SLE

- Worsening renal function
- Progressive SOB
- 3/6 holosystolic apical murmur; Afebrile
- WBC 11,000 (on prednisone)



47 yo Female with SLE and SOB



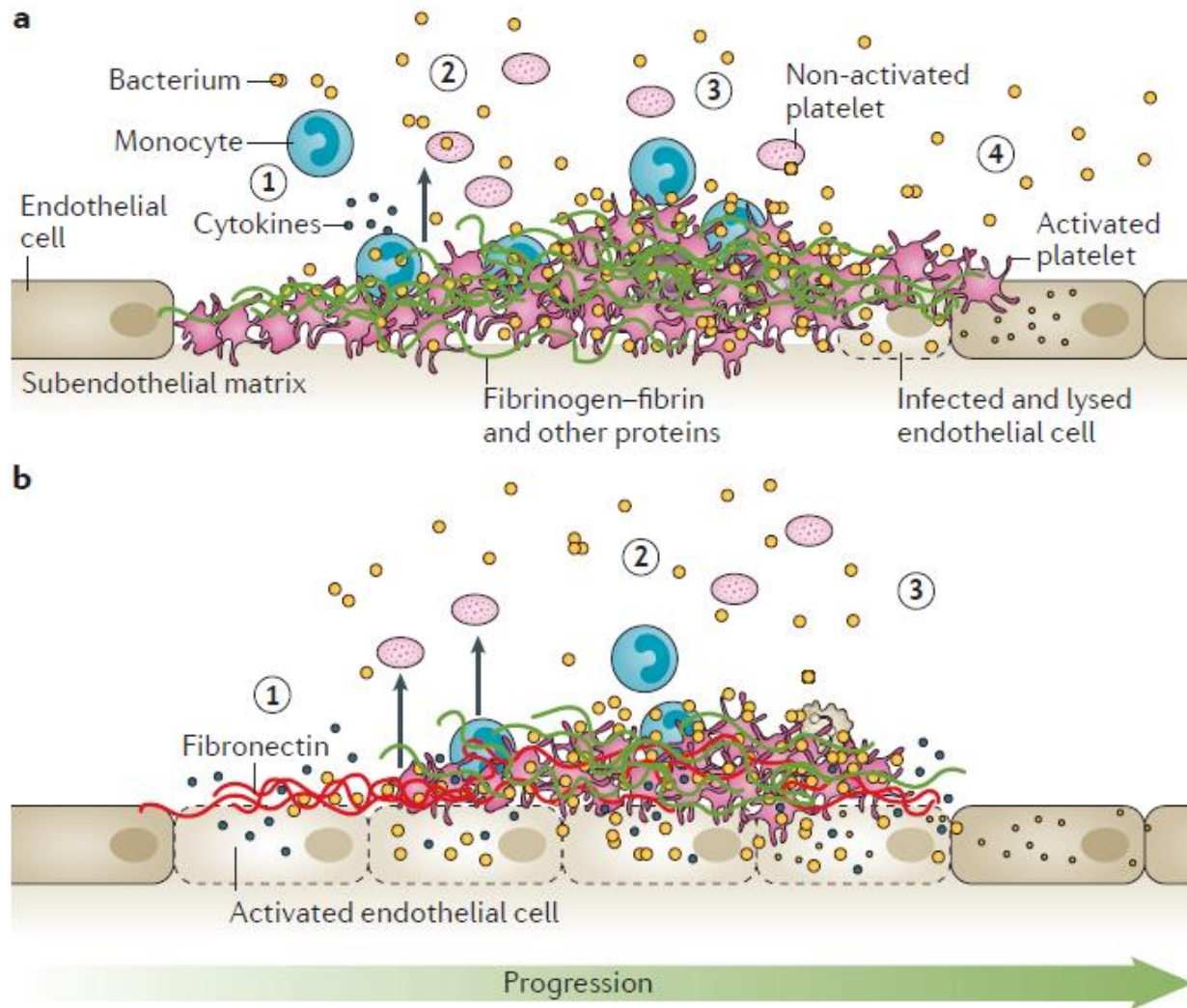
Things That Look Like a Vegetation

- Myxomatous valves (mitral)
 - Redundant chordae
- Non-specific degenerative thickening
 - Fused raphae of bicuspid aortic valve
- Mitral annular calcification
 - Reverberation artifact
- Isolated ruptured chordae
- Papillary fibroelastoma
- Lambl's excrescence
- Benign fibrinous strands
- Libman Sachs lesions
- Thrombotic lesions

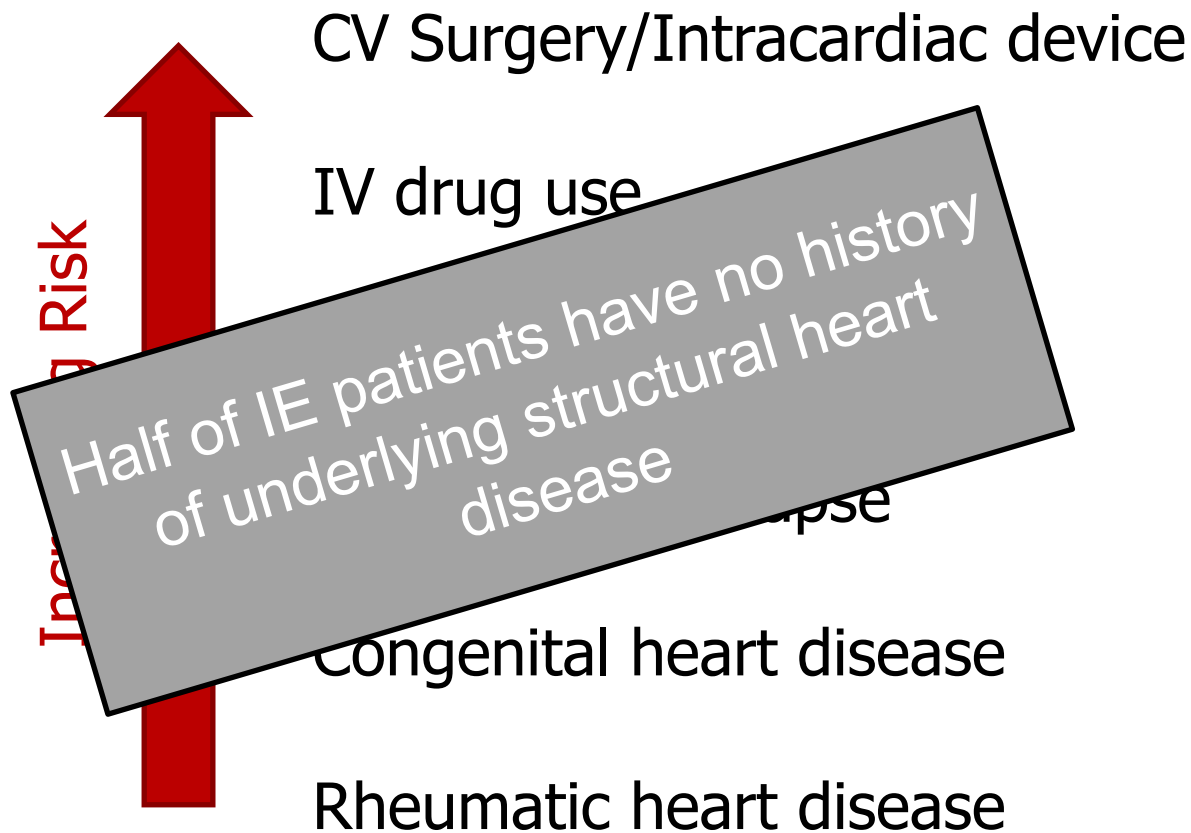


Who Gets Endocarditis and Why?





Predisposing Factors

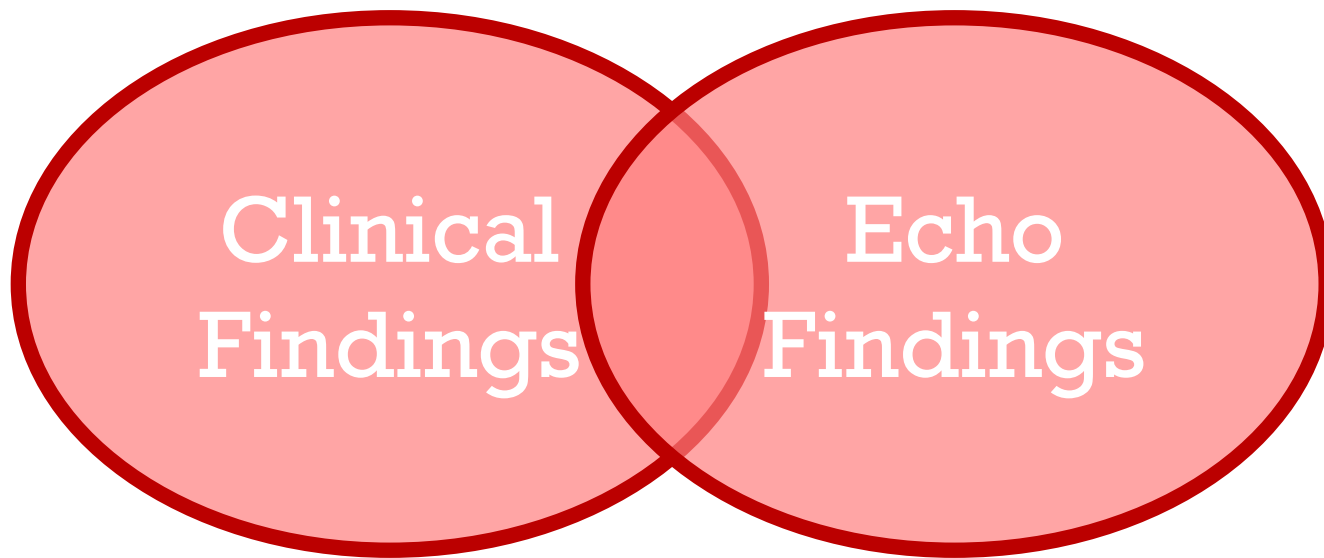


Summary of Predisposing Factors

- Host factors **explain about half** of pts who develop IE
- “Traditional” host factors are **less important** than in the past
- The exposure of pts to possible IE often occurs in the setting of **intracardiac devices**
- The **opioid epidemic** has increased the prevalence, complexity, and recurrence rate of IE



Establishing a Diagnosis of IE

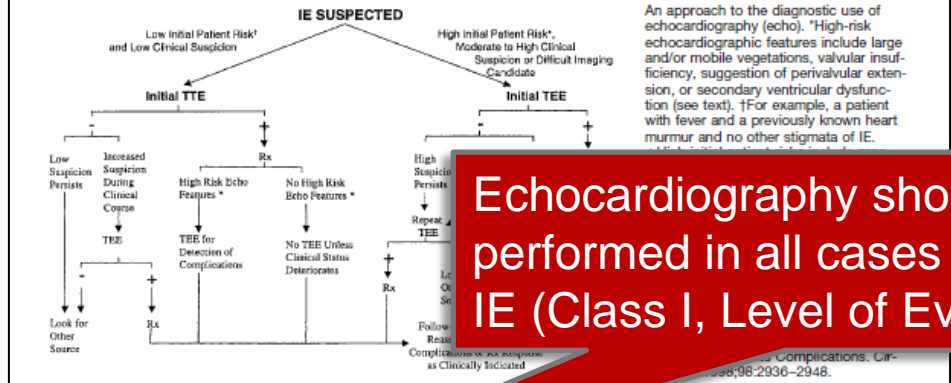


Modified Duke Criteria: Definite Endocarditis

Major Criteria – need 2

1. Positive blood cultures
2. Evidence of endocardial involvement
3. Serology





Echocardiography should be performed in all cases of suspected IE (Class I, Level of Evidence: A).

Echocardiography

Echocardiography is central to the diagnosis and management of patients with IE. As previously stated, the presence of an oscillating intracardiac vegetation, an annular abscess, prosthetic valve dehiscence, and new valvular regurgitation are major criteria in the diagnosis of IE.

Echocardiography should be performed in all cases of suspected IE (Class I, Level of Evidence: A). Whether TTE or TEE should be performed first depends on the clinical scenario (Figure). If the clinical suspicion is relatively low or imaging is likely to be of good quality (many children), then it is reasonable to perform TTE. When imaging is difficult or poor, TEE should be considered. If any circumstances preclude securing optimal echocardiographic windows, including chronic obstructive lung disease, previous thoracic surgery, morbid obesity, or other conditions, then TEE should be performed instead of TTE. If TTE is negative and clinical suspicion remains low, then other clinical entities should be considered. If TTE shows vegetations but the likelihood of complications is low, then subsequent TEE is unlikely to alter initial medical management. On the other hand, if clinical suspicion of IE or its complications is high (prosthetic valve, staphylococcal bacteremia, or new atrioventricular block), then negative TTE will not definitely rule out IE or its potential complications, and TEE should be performed first. Investigation in adults has shown TEE to be more sensitive than TTE for the detection of vegetations and abscesses.⁴³ In addition, in the setting of a prosthetic valve, transthoracic images are greatly hampered by the structural components of the prosthesis and are inadequate for assessment of the perivalvular area where those infections often start.⁴⁴ Although cost-effectiveness calculations suggest that TEE should be the first examination in adults with suspected IE (Table 2), particularly in the setting of staphylococcal bacteremia,^{45,46} many patients are not candidates for immediate TEE because of oral intake during the preceding 6 hours or because the patients are in institutions that cannot provide 24-hour TEE services. When TEE is not clinically possible or must be delayed, early TTE should be performed without delay.

TTE will not definitely exclude vegetations or abscesses, it will allow identification of very high-risk patients, establish the diagnosis in many, and guide early treatment decisions.

Many findings identified by TEE also can be detected on transthoracic views. Concurrent TTE images can serve as a baseline for rapid and noninvasive comparison of vegetation size, valvular insufficiency, or change in abscess cavities during the course of the patient's treatment should clinical deterioration occur. Some findings, such as tricuspid vegetations or abnormalities of the right ventricular outflow tract, may occasionally be better visualized with TTE than with TEE.⁴⁷

Both TEE and TTE may produce false-negative results if vegetations are small or have already embolized.⁴⁸ Even TEE may miss initial perivalvular abscesses, particularly when the study is performed early in the patient's illness.⁴⁹ In such cases, the incipient abscess may be seen only as nonspecific perivalvular thickening, which on repeat imaging across several days may become recognizable as it expands and cavitates. Similarly, perivalvular fistulae and pseudoaneurysms develop over time, and negative early TEE images do not exclude the potential for their development.

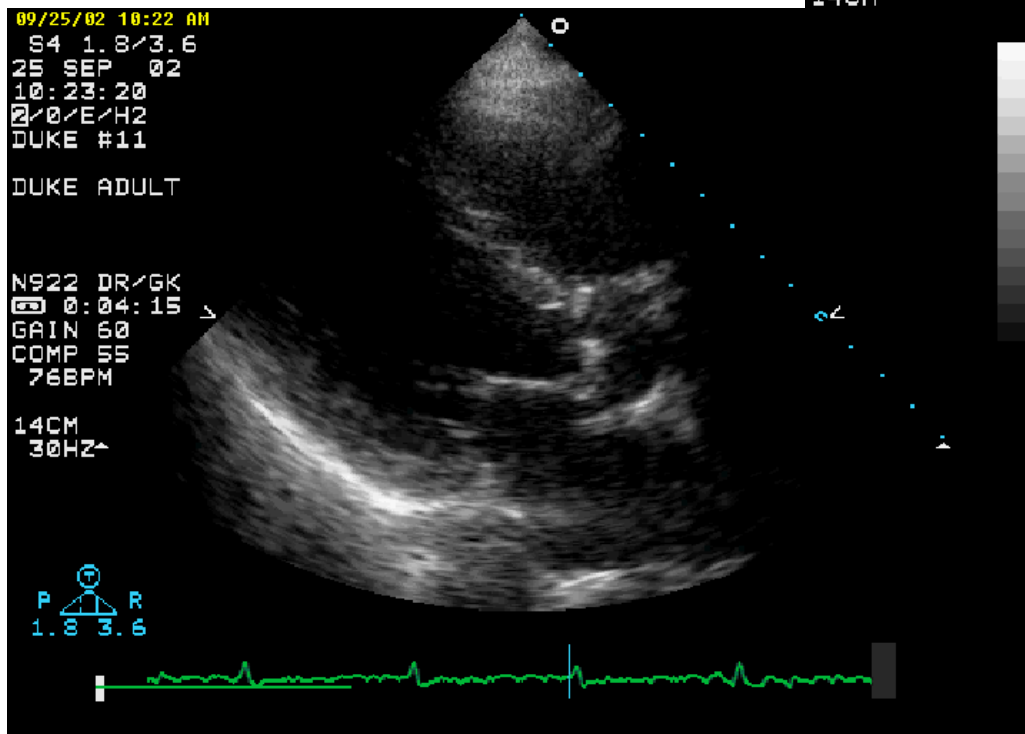
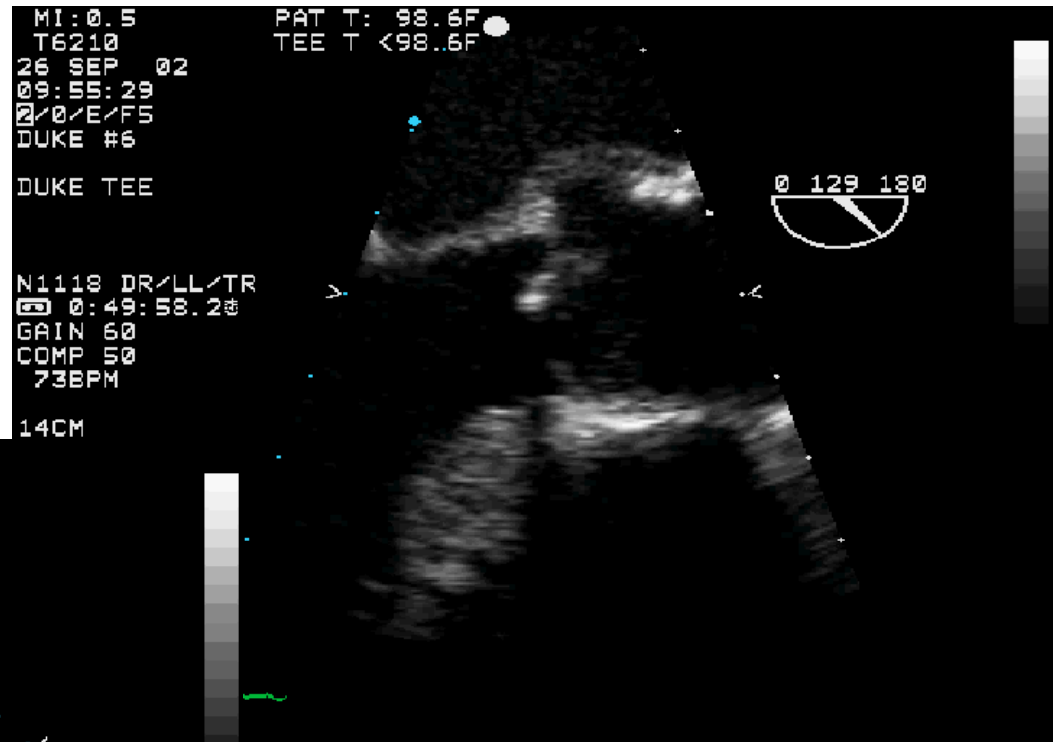
False-positive results from TEE or TTE studies may occur when valvular abnormalities are seen that may not be related to a current infection. Previous scarring, severe myxomatous change, and even normal structures such as Lambd's excrescences may be indistinguishable from active changes on the valves. As echocardiographic technology improves, with higher frequencies and refined beam-forming technology, more subtle findings continue to be recognized and may add to the category of indeterminate findings. One approach to minimizing confusion from these structures is to exploit the high frame rates that are often available with current equipment to improve temporal resolution and clearly visualize rapidly moving structures such as microcavitations from prosthetic valves or fibrillar components.

Several echocardiographic features identify patients at high risk for a complicated course or with a need for surgery

Role of Echo – When and What

- Early
 - ASAP (TEE preferred?)
- Repeat
 - TEE after +TTE if high risk of complications
 - TEE 7-10d later, if
 - No Dx and still suspicious
 - Worrisome clinical course during Rx
- Completion of Rx
 - To establish new baseline (TTE usually adequate)

Transthoracic vs Transesophageal



When is TEE Necessary?

- Not in everyone
- When transthoracic echo is suboptimal / non-diagnostic
- When index of suspicion is high and TTE is high quality
- Specific detection / localization of perforation
- Prosthetic valves / other devices
- Detection of abscess
- Precise sizing of vegetation needed

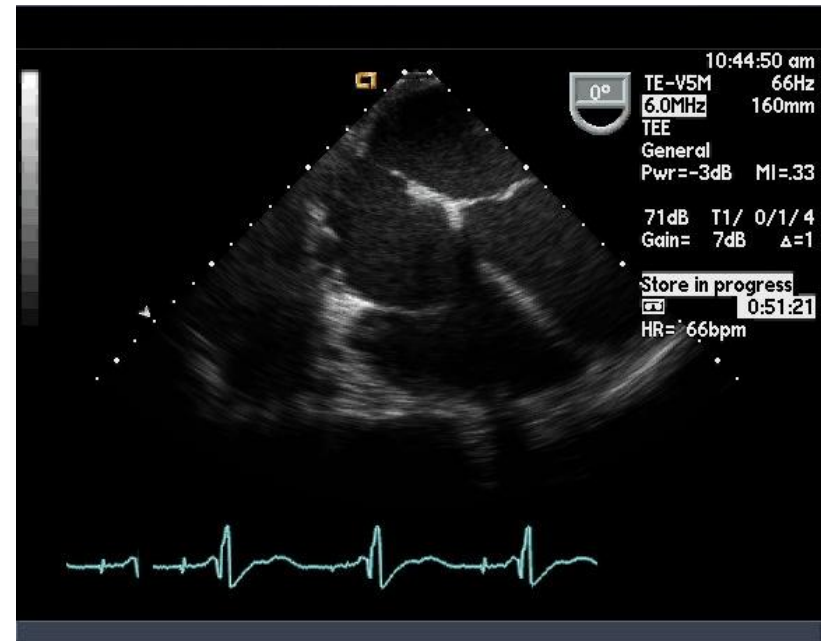


TEE for Complications

Multi-valve Involvement



PM Lead Infection



The Downside to TEE

- “Invasive”, sort of
- Sedation requirement
- Potential for complications
- Detects virtually every small anomaly / anatomical variant and unrelated bit of valvular thickening, ie may detect non-specific incidental benign “pathology”
- Most people who recommend “TEE first” have never had a TEE



