Endocarditis: The Role of Echocardiography

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Acknowledgments

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Temple Cardiac Sonographers
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Question 1

✓ Which of the following represents the specificity of transthoracic echo for IE?

A. 60-70%
B. 30-40%
C. 90-100%
D. <10%
Question 2

What is the following most suggestive of?

A. Bicuspid Aortic valve
B. Aortic root abscess
C. Coronary aneurysm
D. Mitral perforation
Question 3

What does this clip demonstrate?

A. Prosthetic valve stenosis
B. Prosthetic valve endocarditis
C. Mitral valve endocarditis
D. Aortic dissection
Question 4
Which is most likely endocarditis

A.
B.
C.
D.
Endocarditis

✓ > 50,000 cases/yr in US (47,000 Medicare hospitalizations/year)
✓ Left sided - Majority of cases
✓ Highest mortality and complication rate

✓ Review
  – Guidelines for prophylaxis
  – Diagnosis and indications for TEE
  – Identification of complications
  – Prognostic (echocardiographic) features
  – Indications for surgery
ICE-PCS

✓ 41,000+ hospitalized cases of IE
✓ 30% 1 month mortality
✓ 33% of patients had CHF
✓ In-hospital mortality (without CHF) 13%

Keifer T et al. JAMA 2011
Prevention

✔ Antibiotic prophylaxis recommended:
  – Prosthetic heart valves or prosthetic material valve repair
  – History of endocarditis
  – Heart transplant with abnormal valve function
  – Certain congenital heart defects
    • Cyanotic heart disease, not fully repaired
    • Within 6 months of repair of defect
    • Repairs with residual defects and/or leaks
Infective Endocarditis Prophylaxis

**NOT** recommended for:

– Transesophageal echocardiography
– EGD
– Colonoscopy
– Cystoscopy without ongoing infection

Regardless of valvular/endocarditis risk
Diagnosis

✓ At least 2 sets of blood cultures
✓ Modified Duke Criteria for suspected IE
✓ Transthoracic recommended in those with suspected IE
  – Assess for vegetations
  – Assess hemodynamic severity of valve lesions
  – Assess cardiac function
  – Re-evaluation for clinical change/symptoms

Nishimura et al. Valvular Heart Disease Guidelines, JACC 2014
Modified Duke Criteria

- Definite infective endocarditis
  - Clinical Criteria
    - 2 Major criteria, or
    - 1 Major criterion and 3 minor criteria, or
    - 5 Minor criteria
  - Major criteria
    - Blood culture positive
    - Typical microorganism for IE (multiple variations)
    - Endocarditis by imaging study

Circulation 2005;111:e394-434
Imaging Recommendations

Nishimura et al. Valvular Heart Disease Guidelines, JACC 2014
Echocardiography Criteria

✓ Evidence of endocarditis

– Oscillating intracardiac mass on valve or supporting structures, in the path of regurgitant jets, or on implanted material in the absence of an alternative anatomic explanation, or

– Abscess, or

– New partial dehiscence of prosthetic valve, or

– New valvular regurgitation

Circulation 2005;111:e394-434
Echocardiography

 Transthoracic
✓ Resolution ~ 3-4 mm
✓ Sensitivity: 62-82%
✓ Specificity: 91-100%
✓ Readily available, usual initial test of choice

 Transesophageal
✓ Resolution ~ 1-2 mm
✓ Sensitivity: 87-100%
✓ Specificity: 91-100%
✓ Greater (3-4x) sensitivity for prosthetic valves

Jacob S et al. Curr Opin Cardiol 2002;
Kini V et al. JASE 2010; Pederson WR et al. Chest 1991
Case

58 yo Female, chronic IV drug abuse presents with fever and malaise. +Blood cultures (MSSA). Acute HF
Underwent a robotic mitral valve repair with resection of the posterior leaflet scallop.
Leaflet Aspect

✔ Infective endocarditis
  – More commonly seen on the **upstream aspect**
    • Ventricular surface of AV with AI
    • Atrial surface of MV with MR
  – Usually at a site of endothelial damage

✔ Downstream Aspect
  – Usually a degenerative finding
  – Papillary fibroelastoma
  – Chordal structure (MV)
  – Less likely associated with significant regurgitation
Downstream Aspect

Lambl’s Excrescence

Papillary Fibroelastoma
47 Male presenting with DVT and PE
Case

49 yo Male with a progressive mandibular infection and + blood cultures (Strep pneumo)
Underwent a Ross procedure (pulmonary autograft) with aortic root reconstruction

3 Days Later
Complications of IE

- Leaflet perforation
- **Aortic root abscess**
- Annular perforation
- **Fistula formation**
- Embolism
- **Purulent pericarditis**
- Hardware infection
- Erosion
Early Surgery

- Valve dysfunction/ADHF
- Resistant organisms: Staph Aureus, Fungus
- Heart block or abscess formation
- Large mobile vegetation
- Persistent positive blood cultures
- Prosthetic valve endocarditis
- Fungal endocarditis
- Recurrent embolization
Case

18 yo Female present with an acute L MCA stroke and lower extremity thromboembolism. Negative blood cultures. New dx SLE
Treated with SC Lovenox. Returned for followup TEE. Moderate aortic insufficiency (improved).

Dx: Libman-Sacks Endocarditis
Differential Diagnosis

- Vegetation
  - Infective vs. non-infective/marantic
- Lambl’s excrescence
- Papillary fibroelastoma (PFE)
- Thrombus
- Ruptured chord
- Valvular strands
- Myxomatous
Case

74 yo Male with prior Sapien THV aortic valve presents with a cold left arm.

Urgent embolectomy.

+Blood cultures (Strep)
Unable to perform TEE due to scleroderma esophagitis. Cardiac CT and Intracardiac echocardiogram performed to better characterize valve.
Intracardiac Echocardiography

Ongoing treatment with IV antibiotics and oral anticoagulation
Size, Mobility and Embolic Events

DiSalvo et al. JACC 2001
Location, Location, Location

Villacosta et al. JACC 2002
Prosthetic Valve Endocarditis

- Perivalvular regurgitation
- Dehiscence/rocking motion
- Bulging of the annulus
- Necessitates TEE
Negative TTE

✓ TEE if clinical suspicion high
✓ If TEE negative and clinical suspicion persists
  – REPEAT studies at 5-12 days
  – Vegetations or abscess may now be present
  – If still negative, look for another source
    • Pacemaker, vascular grafts, catheters, PDA
ASCeXAM Focus

- Appropriate indications for TEE in IE
- Echocardiographic features of vegetations as described in modified Duke criteria
- Complications of IE
- Indications for surgery
- Follow-up study if high suspicion and initial study negative
Question 1

Which of the following represents the specificity of transthoracic echo for IE?

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D. <10%
## Question 1 - Followup

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**Answer:** 90-100%

Question 2

What is the following most suggestive of?

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B. Aortic root abscess
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Question 2 - Followup

**Answer:** B. Aortic Root Abscess
Question 3

What does this clip demonstrate?

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B. Prosthetic valve endocarditis
C. Mitral valve endocarditis
D. Aortic dissection
Question 3 - Followup

Answer: B

- New prosthetic valve dehiscence or rocking motion is endocarditis until proven otherwise

- Attention to surrounding structures for evidence of extension of infection
Question 4
Which is most likely endocarditis

A.
B.
C.
D.
Question 4 - Followup

Answer: C
Thank You!