Infective Endocarditis

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Introduction

• Inflammation and infection of the endocardium or valves of the heart

• Serious illness associated with significant morbidity and mortality

• Incidence:
  • **Childhood** 3 to 4 per million
    • Recent increase in frequency
      • Improved survival among children who are at risk
  • **Adults** 12 to 62 per million

INFECTIVE ENDOCARDITIS

Predisposing Cardiac Lesion

Positive Blood Culture

Endocardial Involvement

• Echocardiography
• Absent in 1/3 to 1/4

• 2-7% with negative blood cultures

• Echocardiography
• Negative in 15%
• False positive!!
Introduction

• With no CHD, it is associated with central venous catheters
  • In 8% to 10% of pediatric cases

• Neonatal endocarditis:
  • Right heart
  • Catheter-induced trauma and infection
Classification of IE

A. According to location and presence of intracardiac material
   A. Left sided
      A. Native valve
      B. Prosthetic valve
         A. Early <1 yr after Sx
         B. Late > 1 yr after Sx
   B. Right sided
   C. Device related (PPM)

B. According to mode of acquisition
   A. Healthcare associated
      A. Nosocomial ≤ 48hr from admission
      B. Non nosocomial > 48 hr from admission
   B. Community-acquired< 48 hr from admission
   C. IV Drug abuse-associate IE

C. Active IE
D. Recurrent IE
   A. Relapse
   B. Reinfection

European Heart Journal (2009)
Clinical presentation

Suspected in:

- New regurgitant murmur
- Embolic events
- Sepsis of unknown origin
- **Fever associated with:**
  - Intracardiac prosthesis
  - Previous H/O IE
  - CHD, valvular HD
  - Immunocompromised
  - Recent intervention
  - New conduction disturbance
  - Typical IE organism or +ve serology for Q fever
  - Vascular or immunologic phenomina
  - Evidence of pulmonary embolism/ infiltration
  - Peripheral abscess (renal, splenic, cerebral,..)
Clinical presentation
Diagnosis

Modified Duke Criteria

Definite IE  Possible IE  Rejected IE
• Pathological specimen
• Clinical:
  • 2 major OR
  • 1 major and 3 minor OR
  • 5 minor criteria

Definite

• 1 major & 1 minor OR
• 3 minor criteria

Possible

• Firm alternate diagnosis
• Resolution after 4 or less days of antibiotics
• No pathologic evidence after 4 or less days of antibiotics
• Does not meet criteria for possible IE

Rejected
Major Criteria

- **Positive blood cultures:**
  - Typical microorganisms from 2 separate cultures
  - Persistently positive blood culture
  - Single positive blood culture for Coxiella

- **Evidence of endocardial involvement:**
  - Positive echo
  - New valvular regurgitation
Minor Criteria

1. Predisposition
2. Fever $\geq 38$
3. Vascular phenomena
   (arterial emboli, pulmonary infarcts, mycotic aneurysm, ICH, conjunctival hage., janeway lesions)
4. Immunologic phenomena
   (GN, Osler's nodes, Roth's spots, rh facotor)
5. Microbiologic evidence
   (+ve bl culture but doesn’t met criteria, serologic evidence of infection with consistent organism)
Role of Echo in IE

• In 1994 Echo was included as a major criterion in the diagnosis of IE.

• Echo should be done when there is clinical suspicion of IE.
Role of Echo in IE

- Diagnosis of IE
  - First-line imaging
- Prediction of embolic risk
- Prognostic assessment
- Follow up during therapy
- Intra-operative evaluation
- Following completion of therapy
Indications for Echo in suspected IE

Clinical suspicion of IE

- Prosthetic valve or IC device
- Positive
- Poor quality TTE

If initial TEE is negative but suspicion for IE remains, repeat TEE within 7 – 10 days

European Heart Journal (2009)
Indications for Echo in suspected IE

Clinical suspicion of IE

TTE

Negative

Clinical suspicion of IE

High

TEE

Low

Stop

If initial TEE is negative but suspicion for IE remains, repeat TEE within 7 – 10 days

European Heart Journal (2009)
Role of Echo in IE

• The major Echo findings in IE are
  • Vegetations
  • Abscess formation
  • Dehiscence of prosthetic valve or patch
<table>
<thead>
<tr>
<th>Echocardiographic definitions</th>
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<tbody>
<tr>
<td><strong>Vegetation</strong></td>
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<tr>
<td><strong>Abscess</strong></td>
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<tr>
<td><strong>Pseudoaneurysm</strong></td>
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<tr>
<td><strong>Perforation</strong></td>
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<td><strong>Fistula</strong></td>
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<tr>
<td><strong>Valve aneurysm</strong></td>
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<tr>
<td><strong>Dehiscence of prosthetic valve</strong></td>
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</table>
Role of Echo in IE

- Evaluation of consequences of IE
  - LV size and function
  - Quantification of valve function (obstruction/insufficiency)
  - RV size and estimation of PA pressure
  - Presence and quantification of pericardial effusion
Case 1
Case 2
Case 2
Case 2
Case 2
Case 3 & 4
Role of Echo in IE
Limitations and Pitfalls

• The sensitivity and specificity of echo is not 100%
  • A negative echo may be observed in 15%
  • Repeat echo
• The sensitivity is 75% for TTE & 85-95% for TEE
• Specificity = 90% for TTE and TEE
Role of Echo in IE
Limitations and Pitfalls

• **False diagnosis may occur**
  - Difficult to differentiate vegetation from e.g. thrombi, tumors, myxematous changes, strands, embryonic remnants, etc

• **Interpret in account with the clinical presentation**
Vegetation DD Case 1
Vegetation DD Case 1
Vegetation DD Cases 2 & 3
Vegetation DD Case 4 & 5
Culture-Negative IE

- Inadequate microbiological techniques
- Previous administration of antimicrobial agents
- Infection with highly fastidious bacteria or non-bacterial pathogens e.g. fungi
Investigation of rare causes of culture-negative IE

Blood culture; serology; immunology & PCR of surgical specimen

Brucella spp
Coxiella burnetii
Bartonella spp
Mycoplasma
Tropheryma w
Legionella spp
Risk Factors for Mortality

1- Vegetation size 20mm or more
2- Age less than 1 year
3- Presence of heart failure
4- S. aureus as a causative organism
Prevention

• AHA issued the first guidelines for prevention of IE in 1955
• Was based on expert opinion and case reports
• The rarity and severity of IE complicates the execution of RCT
2007 Major changes in IE prophylaxis recommendations

- **Prophylaxis is reasonable**
  - For cardiac conditions associated with the highest risk of adverse outcome
  - For all dental procedures that involve manipulation of either gingival tissue or the periapical region of teeth or perforation of oral mucosa

- **Prophylaxis is not recommended**
  - For patients who undergo a GU or GI tract procedures
Prevention

• In the absence of active infection
  • Prophylaxis is not necessary for non-dental procedures that do not penetrate the mucosa, such as
    • TEE
    • Diagnostic bronchoscopcy
    • Esophagogastrosopy, or colonoscopy
High-risk group includes

- Prosthetic heart valve or prosthetic material used for repair
- Past history of IE
- Cardiac valvulopathy after cardiac transplantation
- Congenital Heart Disease (CHD), limited to:
  - Unrepaired cyanotic CHD
  - Completely repaired CHD within the first 6 months after corrective surgery
  - Repaired CHD with residual defects
Risks of Antibiotics

Risks of Infective Endocarditis

Guidelines Should Never Replace Clinical Judgment
Thank You