

INFECTIVE ENDOCARDITIS

Dr. Sachin Agrawal

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DEFINITION

- Infective Endocarditis (IE) is a microbial infection of the endocardial (endothelial) surface of the heart.
- The vegetation is a variably sized amorphous mass of platelets and fibrin in which abundant micro-organisms and scant inflammatory cells are enmeshed.

Braunwald – Heart Disease

ENDOCARDITIS



Characteristic pathological lesion: vegetation,
composed of platelets, fibrin, microorganisms
and inflammatory cells.

Epidemiology

- Incidence difficult to ascertain and varies according to location
- Much more common in males than in females
- May occur in persons of any age and increasingly common in elderly
- Mortality ranges from 20-30%

Classification

■ Acute

- Affects normal heart valves
- Rapidly destructive
- Metastatic foci
- Commonly Staph.
- If not treated, usually fatal within 6 weeks

■ Subacute

- Often affects damaged heart valves
- Indolent nature
- If not treated, usually fatal by one year

Pathogenesis

■ **ALTERED VALVE SURFACE**

- Animal experiments suggest that IE is almost impossible to establish unless the valve surface is damaged

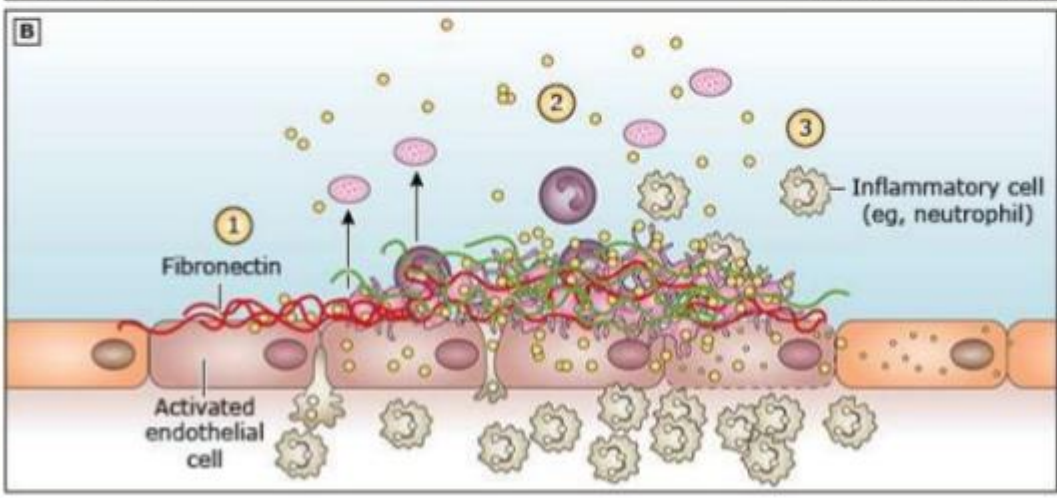
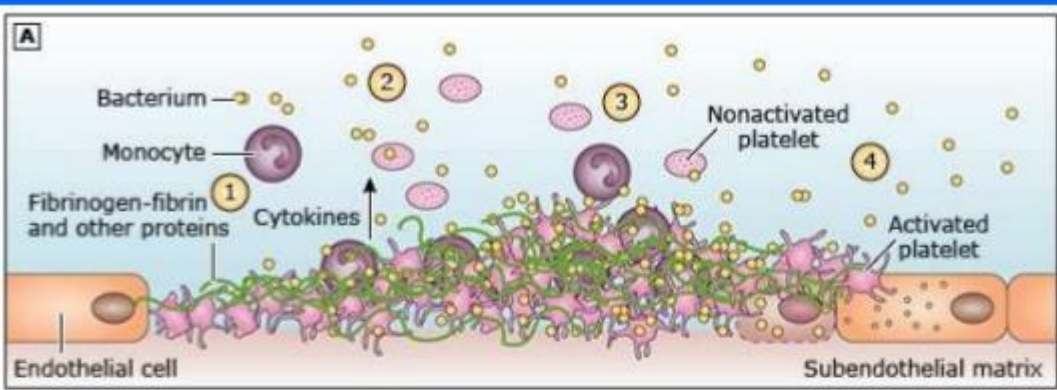
■ **DEPOSITION OF PLATELETS AND FIBRIN** – nonbacterial thrombotic vegetation (NBTE)

- ## ■ **BACTERAEMIA** – attaches to platelet-fibrin deposits
- Covered by more fibrin
 - Protected from neutrophils
 - Division of bacteria
 - Mature vegetation

Pathogenesis

■ Haemodynamic Factors

- Bacterial colonisation more likely to occur around lesions with high degrees of turbulence
 - » eg. small VSD, valvular stenosis
- Large surface areas, low flow and low turbulence are less likely to cause IE
 - » eg large VSD,



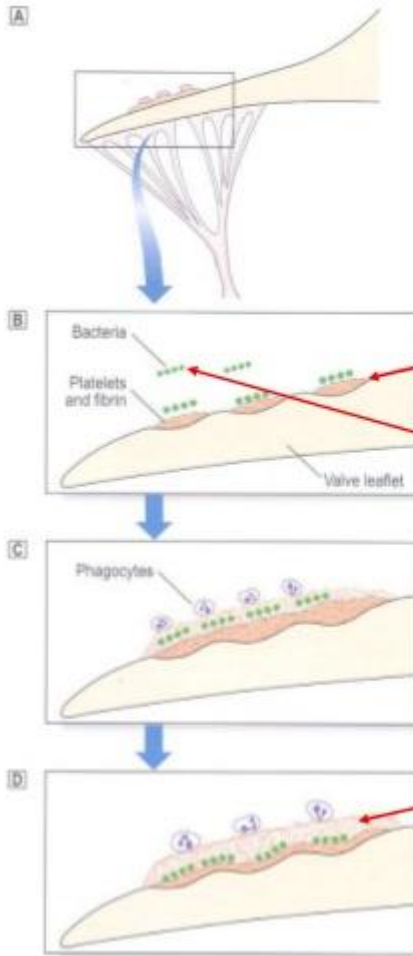
Pathogenesis

■ Bacteraemia

- Transient bacteraemia occurs when a heavily colonised mucosal surface is traumatised
 - » Dental extraction
 - » Periodontal surgery
 - » Tooth brushing
 - » Tonsillectomy
 - » Operations involving the respiratory, GI or GU tract mucosa
 - » Oesophageal dilatation
 - » Biliary tract surgery

Site of Infection

- Aortic valve more common than mitral
- Aortic:
 - Vegetation usually on ventricular aspect, all 3 cusps usually affected
 - Perforation or dysfunction of valve
 - Root abscess
- Mitral:
 - Dysfunction by rupture of chordae tendinae



Turbulent blood flow
traumatises endothelium

Nonbacterial thrombotic
endocarditis

Bacteraemia

Further deposition of
fibrin and platelets

Clinical Manifestations

- Fever, most common symptom, sign
- Anorexia, weight-loss, malaise, night sweats
- Heart murmur
- Petechiae on the skin, conjunctivae, oral mucosa
- Splenomegaly
- Right-sided endocarditis is not associated with peripheral emboli/phenomena but pulmonary findings predominate

Petechiae—Nonspecific



Splinter Hemorrhages
Nonspecific



Osler's Nodes--More specific
Painful and erythematous nodules



Janeway Lesions
More specific, Nonpainful



Symptoms

■ Acute

- High grade fever and chills
- SOB
- Arthralgias/ myalgias
- Abdominal pain
- Pleuritic chest pain
- Back pain

■ Sub acute

- Low grade fever
- Anorexia
- Weight loss
- Fatigue
- Arthralgia's/ myalgia's
- Abdominal pain
- N/V

The onset of symptoms is usually ~2 weeks or less from the initiating bacteremia

Signs

- Fever
- Heart murmur
- Nonspecific signs – petechiae, subungal or “splinter” hemorrhages, clubbing, splenomegaly, neurologic changes
- More specific signs - Osler’s Nodes, Janeway lesions, and Roth Spots

Osler's Nodes



1. More specific
2. Painful and erythematous nodules
3. Located on pulp of fingers and toes
4. More common in subacute IE

Bacterial Endocarditis

Laboratory Features

1. Anemia
2. Most commonly elevated WBC
3. ESR elevated, ↓ C' in patients with glomerulonephritis
4. Microscopic hematuria
5. Bacteremia. Persistent. ≥ 3 , ≤ 5 blood cultures. Aerobic and anaerobic. Different sites.

Blood cultures

- Recommendation: Blood cultures remain a cornerstone of the diagnosis of IE cases and should be taken prior to starting treatment in all case
- Meticulous **aseptic technique** is required when taking blood cultures, to reduce the risk of contamination with skin commensals, which can lead to misdiagnosis. Guidelines for best practice should be consulted

Blood Cultures

■ Blood Cultures

- Minimum of three blood cultures (ideally spread over 24 hrs)
- Three separate venipuncture sites ideally
- Obtain correct volume of blood for culture bottles

■ Positive Result

- 1 set gives 90% sensitivity, remaining 2 sets add 8%
- Multiple same cultures are important in confirming significance, especially for less typical organisms

■ Negative Result

- Prior antibiotic therapy
- ‘Culture negative endocarditis’ – fastidious orgs / non-culturable
- May support a non-endocarditis patient diagnosis

Additional Tests

- CBC
- ESR and CRP
- Complement levels (C3, C4, CH50)
- RF
- Urinalysis
- Baseline chemistries



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Imaging

■ Chest x-ray

- Look for multiple focal infiltrates and calcification of heart valves

■ ECG

- Rarely diagnostic
- Look for evidence of ischemia, conduction delay, and arrhythmias

■ Echocardiography



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Complications

■ Four etiologies

- Embolic
- Local spread of infection
- Metastatic spread of infection
- Formation of immune complexes –
glomerulonephritis and arthritis

Emboic Complications

- Occur in up to 40% of patients with IE
- Predictors of embolization
 - Size of vegetation
 - Left-sided vegetation's
 - Fungal pathogens, *S. aureus*, and *Strep. Bovis*
- Incidence decreases significantly after initiation of effective antibiotics

Embotic Complications

- Stroke
- Myocardial Infarction
 - Fragments of valvular vegetation or vegetation-induced stenosis of coronary ostia
- Ischemic limbs
- Hypoxia from pulmonary emboli
- Abdominal pain (splenic or renal infarction)

Metastatic Spread of Infection

- Meningitis and/or encephalitis
- Vertebral osteomyelitis
- Metastatic abscess
 - Kidneys, spleen, brain, soft tissues
- Septic arthritis

Antibiotic Therapy

- Effective antimicrobial treatment should lead to defervescence within 7 – 10 days
 - Persistent fever in:
 - IE due to staph, pseudomonas, culture negative
 - IE with micro vascular complications/major emboli
 - Intracardiac/extra cardiac septic complications
 - Drug reaction

Prevention

- Prophylactic regimen targeted against likely organism
 - Strep. viridans – oral, respiratory, esophageal
 - Enterococcus – genitourinary, gastrointestinal
 - S. aureus – infected skin, mucosal surfaces