

INFECTIVE ENDOCARDITIS

BY PROF. MARK D. JOSHI MMED, MPH, FACC

CONSULTANT CARDIOLOGIST

CLINICAL EPIDEMIOLOGIST

DEPARTMENT OF MEDICINE

DEFINITION

- **Microbial infection of the endothelial surface of the heart.** Commonly bacterial.
- A **Vegetation** is the characteristic lesion: **amorphous mass of platelets, fibrin, micro-organisms & scant inflammatory cells.**

SITE OF INVOLVEMENT

- Heart valves – most common
 - Septal defects
 - Chordae tendinae
 - Mural endocardium
-
- **NB:** Infection of the arterio-venous shunts, arterio-arterial shunts (PDA), Coarctation of the aorta.

WHO IS AT RISK OF DEVELOPING IE?

- Structural heart disease (SHD)
 - VHD-RHD/DHD, CHD, Prosthesis
 - Turbulent flow & endothelial denudation
 - Sterile vegetation nidus for microbe settlement
 - Mostly, the mitral and aortic valves are involved
- Transient bacteremia – instrumentation e.g. dental procedures or urogenital instrumentation
- No prior SHD – IV drug users (IVDU IE)
 - Mostly involves the **tricuspid valves**.

CLASSIFICATION – CLINICAL COURSE

- **Acute**

- Marked toxicity
- Progress over days to several weeks with Valvular destruction
- Metastatic infection
- *Staphylococcus aureus*

- **Sub-acute**

- ~~Moderate~~ toxicity
- Evolves over weeks to months
- *Staphylococcus viridans* and coagulase negative staphylococcus

OTHER

- Native valve IE
- Prosthetic valve IE
- IVDU IE
- Nosocomial IE

PATHOGENESIS

- Underlying Heart Disease
- Endothelial trauma
 - Turbulence
 - Immune complexes
 - Foreign particles
- Non-Bacterial Thrombotic Vegetation (NBTV)
- Transient Bacteremia
 - Local invasion (Murmur, valve/chordal rupture, Valve ring abscess, aortic root abscess)
 - Septic emboli (cerebral, coronary, renal, mesenteric)
 - Constant bacteremia due to poor blood supply to the endocardium and physical coverage of the infected vegetations:
 - Systemic infection – Fever, splenomegaly, malaise
 - Immune complexes – Arthritis Glomerulonephritis, Vasculitis DIC

CONT.

- Adherence to damaged valves
- Mechanical lesions
 - Excoriation of the endothelium
 - Formation of a blood coagulum
 - Bacterial colonization
 - Monocyte activation
- In-situ bacterial persistence
 - Maturation of vegetation – within which the micro-organisms become enveloped
 - Monocytes
 - Platelet aggregation
 - Intracellular invasion

MICROBIOLOGY

- Streptococcus – Common in children and middle aged population (2-60 years)
- Staph aureus
- Enterococcus – common in in old (> 60 years)
- Gram negative – common in neonates
- HACEK (Haemophilus, Actinobacillus, Cardiobacterium, Eikenella & Kingella) – common in neonates and in the old.
- Polymicrobial – common in neonates

CLINICAL FEATURES

- 80% within 14 days
- Fever
 - Absent in elderly, CHF, Severe disability, CRF (Chronic renal failure)
- Heart murmur
 - 80-85% (absent with Tricuspid Valve)
- Splenomegaly – 25-50%
- Peripheral manifestations
 - Less frequent/absent TV IE

CLINICAL FEATURES: PERIPHERAL MANIFESTATIONS

- Petechiae
- Splinter hemorrhages
- Janeway lesions – Non-tender lesions on the soles and the palms
- Osler's nodes – at the pulp of the fingers; are tender
- Roth spots in the fundus
- Finger clubbing
- Musculo-skeletal
 - Arthralgia, myalgias, true arthritis (due to immune complexes), back pain
- Systemic embolization – common (40%)
 - Spleen, kidneys, CNS, coronaries, mesenteries
- Neurologic
- *Staphylococcus aureus* is more common.

DIAGNOSIS: MODIFIED DUKES CRITERIA

- **Major criteria**
 - Microbiological
 - Typical organisms 2 cultures/+ cultures consistent bugs/single *C. burnetti*
 - Endocardial involvement evidence
 - Changing murmurs
 - Positive echo: vegetation, abscess/Prosthetic Valve dehiscence
- **Minor criteria**
 - Predisposition to IE
 - Fever of $>38^{\circ}\text{C}$
 - Vascular phenomenon
 - Immunological phenomenon: RF, Glomerulonephritis, Roth's & Osler's nodes.
- **Clinical criteria**
 - 2 major / 1 major and 3 minor / 5 minor

MANAGEMENT

- Multidisciplinary approach
 - Specialists in cardiology, infectious disease and cardiac surgeons
- Bactericidal antibiotics are the cornerstone of therapy
- Regimen choice should be based on susceptibility testing
- Give high dose, IV antibiotics for a prolonged period of time

PROPHYLAXIS

- Establish a person at risk
- Procedure that might provoke bacteremia
- Most effective prophylactic regimen

PROSTHETIC VALVE IE

- 1-5% of individuals with IE
- Early PVIE
 - Within 60 days
 - Infectious agents
 - *S. epidermidis*
 - *S. aureus*
- Late PVIE
 - After 60 days
 - Microbes: gram negative organisms and Strep.

IVDU IE

- Young people
- Valves commonly affects Tricuspid (50%), Aortic (25%), Mitral
- HIV co-infection increases the risk and mortality from IVDU IE; Organisms are unusual, *Bartonella*, *Salmonella* etc.

NOSOCOMIAL ENDOCARDITIS

- Common organisms are staph aureus and enterococcus.

• TYPED BY DR. E.
NAILAH