Lecture 2

Infective Endocarditis

- Additional Notes
- Important
- Explanation
- Examples

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There are some slides which aren't mentioned in this work

Infective Endocarditis (IE)

- It is an infection or colonization of endocardium, heart valves, congenital defects by bacteria, rickettsiae, fungi.
- It is a serious disease, that causes heart damage or other organs.
- Predisposing Factors and Sources of infection:
  - ✓ Dental procedures
  - ✓ Rheumatic Heart Disease
  - ✓ Congenital Heart Disease
  - ✓ IV Drug Abuse
  - ✓ Atherosclerosis
  - ✓ Prosthetic Valves
  - ✓ Immunosuppressive treatment
  - ✓ Alcoholism
- It is classified into four groups:
  - ✓ Native valve IE
  - ✓ Prosthetic valve IE
  - ✓ Intravenous Drug Abuse (IVDA) IE
  - ✓ Nosocomial IE

Types of clinical presentation

Acute Infective Endocarditis

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

Subacute Infective Endocarditis

- Affects damaged heart valves
- Indolent nature
- If not treated usually fatal by one year.

Factors affecting severity and outcome

- Bacterial factors: Virulence, No bacteria in the blood
- Host factors:
  - ✓ Factors increasing susceptibility
    - Local
      - Congenital or Rheumatic Heart Disease
      - Prosthetic heart valves
      - Other cardiovascular diseases
      - Heart surgery
    - General
      - Underlying disease (Diabetes M.)
    - Drugs
      - Iatrogenic: Immunosuppressant treatment, Cytotoxic agent
      - Self-inflicted: Alcoholism, Injected drugs
  - ✓ Protective factors: Antimicrobial chemotherapy

- Causative organisms:
  - ✓ Viridians Streptococci:[1] common in sub-acute IE
  - ✓ Staphylococcus Areus: common in acute IE, **it can affect normal heart**
  - ✓ Staphylococcus Epidermidis: common in prosthetic heart valves.
  - ✓ Streptococcus faecium is hard to treat and **very rare.**
  - ✓ Streptococcus faecalis: can cause IE after genitourinary or gut procedures.
  - ✓ Coxiella burneti: it may be found in sheep
- Portal of entry:
  - ✓ Dental extraction
  - ✓ Oral irrigation devices
  - ✓ Scaling, tooth brushing, endodontic therapy "which may lead to bacteremia"
- Severity of Bacteremia depend on[2]:
  - ✓ Number of bacteria
  - ✓ Bacterial virulence

[1]It is the commonest cause of IE, colonized in the mouth. It has a very special nature which will help to produce polysaccharide structure that will make them adhere to the endocardium and cause disease.

[2]Low number and low virulence will lead to lack of clinical features and rapidly cleared by normal body defense "leukocytes"

Pathogenesis

- Formation of vegetations (thrombi)
  - ✓Fibrin + platelets (thrombus) +bacteria colonies
  - → infected emboli attached to heart valves
  - → Valves infection → destruction → heart failure
- Notes:
  - ✓The break off of infected emboli may cause infections in distant organs (kidney, brain)
  - ✓Extracardiac manifestations of IE are due Immune complex formation. If it was in the kidneys, it will cause glomerular damage → haematuria
  - ✓In drug addicts most common infected valves are tricuspid and pulmonary valves (right side of the heart).
  - ✓As a complication it may lead to lung emboli → pneumonia

*Copied from 432 team work

Clinical Features

- Prolonged fever without an obvious source or reason **"most important clinical feature 99% of cases"**
- Malaise, weight loss, weakness
- Changing murmurs
- Anemia, leukocytosis
- Microscopic hematuria
- Petechiae:
  - Non-specific, located extremities or mucus membrane
- Splenomegaly
- Splinter hemorrhage
- Hypergammaglubulinaemia
- Osler's node:
  - Painful and erythematous nodules, located on pulp of fingers and toes, common in Sub-acute IE

- High mortality:
  - ✓Virulence of organism or severe infection
  - ✓Presence of underlying disease
  - ✓Elderly
  - ✓Inadequate treatment
- Poor prognosis:
  - ✓Candida
  - ✓Staphylococcus
  - ✓Gram negative Bacteria
- Laboratory diagnosis:
  - ✓**2-3 sets of serial blood culture** specially for Aerobic bacteria
  - ✓CBC, ESR and CRP
  - ✓Serological test
  - ✓Sensitivity test
- Imaging:
  - ✓**Echocardiography**
  - ✓Chest X-ray
  - ✓ECG

- Local spread of infection leads to:
  - ✓Heart failure
  - ✓Paravalvular abscess
  - ✓Pericarditis
  - ✓Fistulous intracardiac connections
- Embolic complications leads to:
  - ✓Stroke
  - ✓Myocardial Infarction
  - ✓Ischemic limbs
  - ✓Hypoxia from pulmonary emboli
  - ✓Abdominal pain "splenic or renal infarction"
- Metastatic spread of infection leads to:
  - ✓Metastatic abscess
  - ✓Meningitis, encephalitis
  - ✓Vertebral osteomyelitis
  - ✓Septic arthritis

Go back for the original lecture for more information

Treatment

- Criteria of antibiotic:
  - ✓Bactericidal, parenteral, high dose and prolonged
- Measurement of:
  - ✓MIC "minimum inhibitory concentration"
  - ✓MBC "minimum bactericidal concentration"
- Treatment:
  - ✓Viridians streptococcus
    - Gentamicin and Penicillin(1)
  - ✓Streptococcus Faecalis
    - Ampicillin and Gentamicin

(1)It is the drug of choice for IE in general as well.

- Even though most streptococcus are resistant to Gentamicin, that's why we use it with penicillin. Penicillin will destroy the cell wall and make a pathway for Gentamicin to entre the cell into the ribosomes.

Quiz

ANSWERS: 1.A 2.B 3.B

1.Alcoholic-addicted-male came to ER with fever. Investigation shows he has leukocytosis and murmur. From the history he had tooth extraction before 3 weeks. What do you think the causative organism?

a) Viridans Strept. b) Staph. Epidermidis c) Staph. Aureus d) Diphtheriods

2.55-old-farmer came to the hospital with fever, weight loss, petechiae. From the history he had some activity as a shepherd "taking care of sheep". The gram stain shows –ve. What is the causative agent?

a) Brucella b) Coxiella Burneti c) Candida Albicans d) Staph. Aureus

3.40-old patient has artificial-heart valve. He had endocarditis. What is the most likley organism?

a) Viridans Strept. b) Staph. Epidermidis c) Staph. Aureus d) Diphtheriods

Quiz

4.In treatment course of valve inflammation due to endocarditis we should:

a) Use antibiotic for long time b) Prescribe high dose

c) Use bactericidal antibiotic d) all of the above

5.In management of endocarditis we should measure MIC & MBC. What does MBC mean?

a) Lowest concentration of antimicrobial that will inhibit the growth

b) Lowest concentration of antimicrobial agent required to kill a particular bacteria

6.What is the best method to confirm diagnose of endocarditis?

a) Serological test b) Sensitivity test

c) CBC, ESR and CRP d) 2-3 sets of serial Blood Culture

ANSWERS: 4.D 5.B 6.D