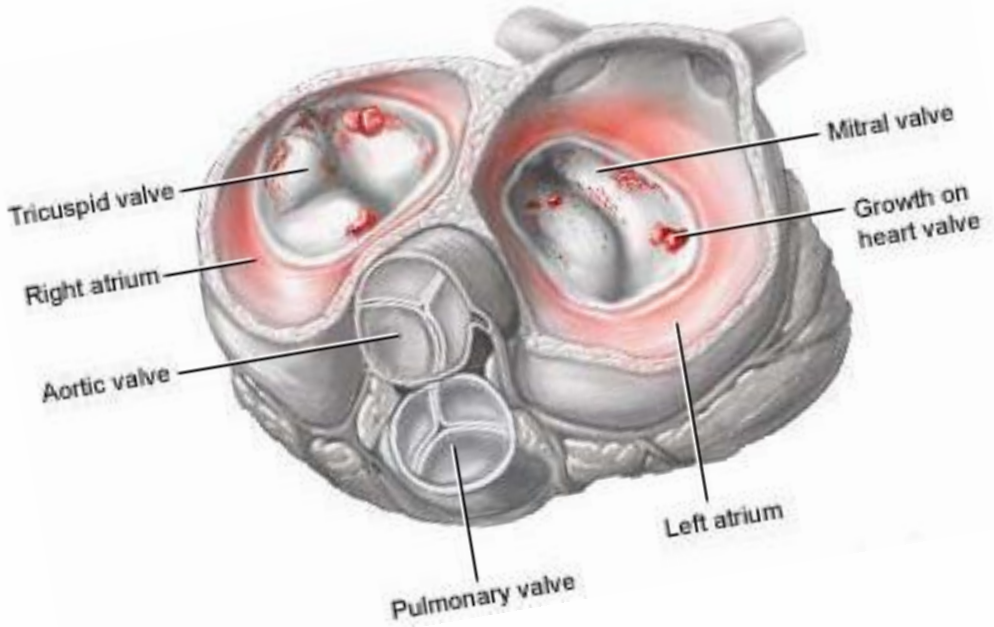
Microbiology TEAM 432

Lecture (2)

Infective Endocarditic

Objectives

Were not given in the student guide.



Color guide

- Very important
- Additional information
- Female doctor's notes
- Male doctor's notes

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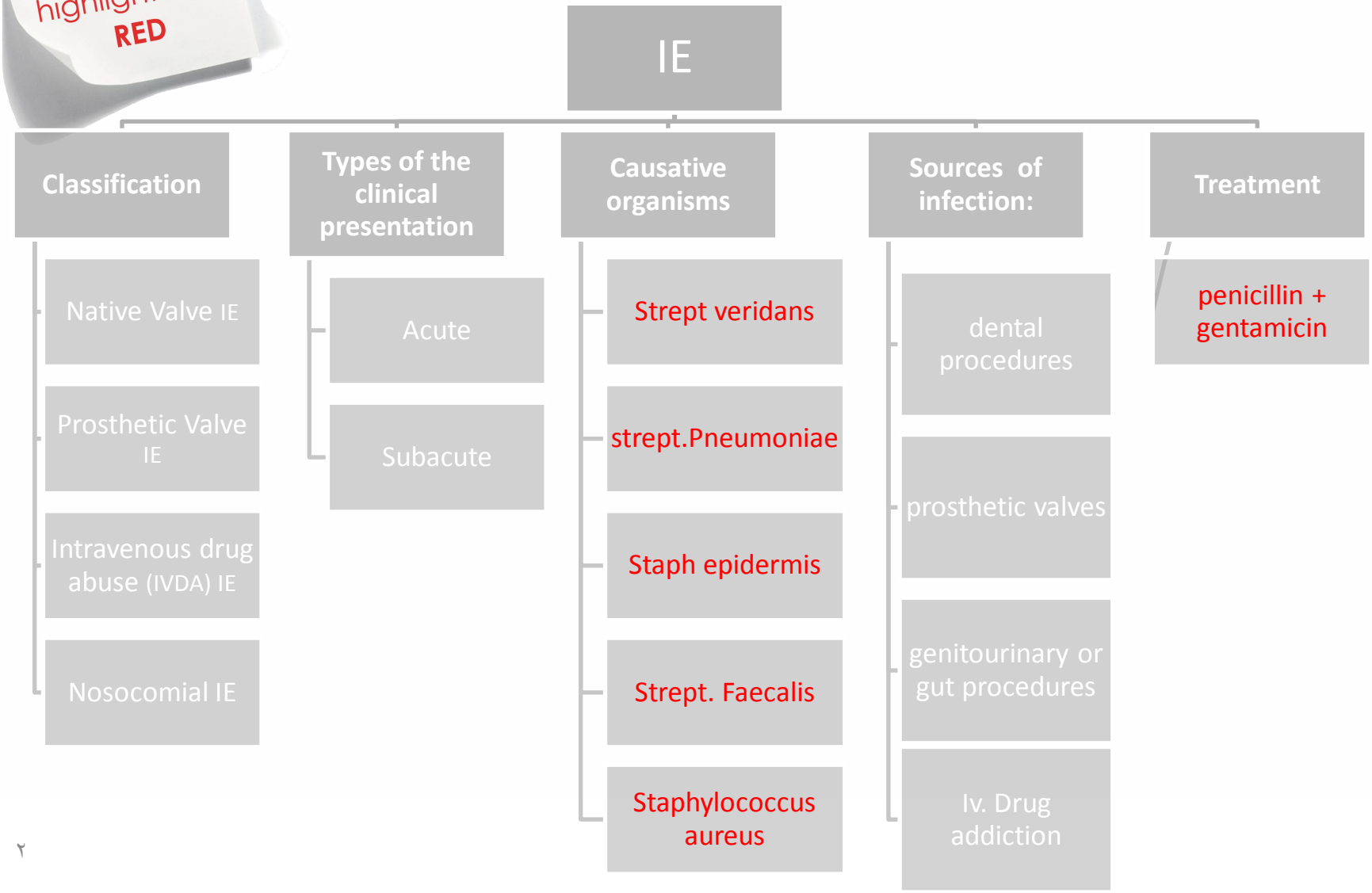
important things are highlighted in **RED**

Mind map
(Infective Endocarditis)



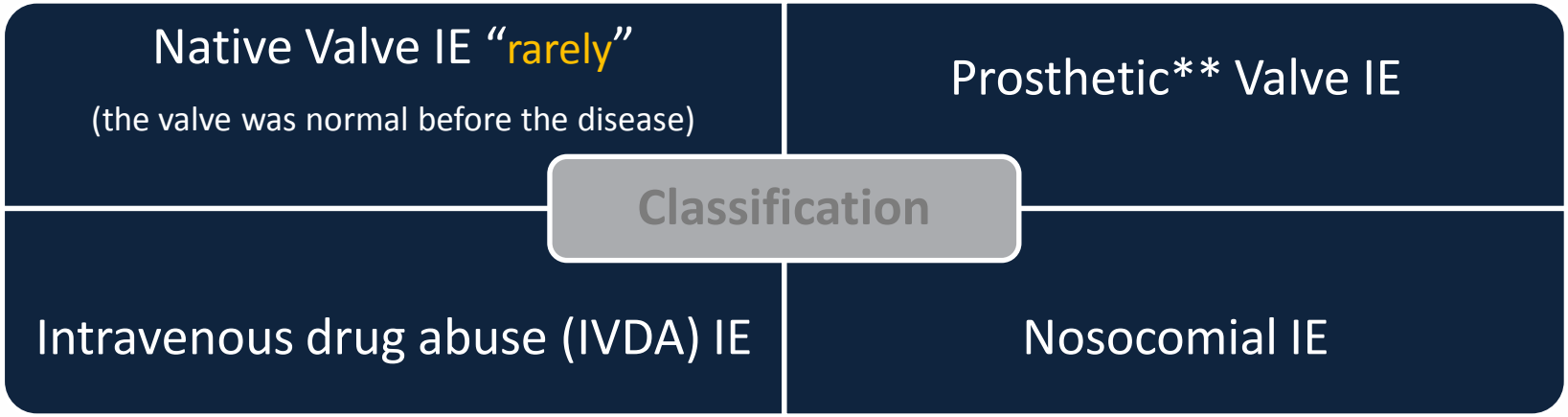
Definition:

- Infection or colonization of endocardium.
- It may include heart valves, or site of congenital defects.
- caused by bacteria, rickettsiae* or fungi.
- It has a Low grade persistent bacteraemia

Importance:

- Serious disease mortality : 30 %
- Cause Serious damage of heart or other organs
- Follow dental procedures (tooth extraction) if the patient has:

Rheumatic heart disease or Congenital heart disease



* rickettsiae: gram –ve bacteria

** Prosthetic: an artificial valve

Types of the clinical presentation:

	Acute	Sub-acute
site	• Affects normal heart valves	• Often affects damaged heart valves
severity	• Rapidly destructive & metastatic foci	• Causes little or no pain
Most common cause	• Commonly caused by S. aureus.	• Caused by low virulence organism. e.g.: strep. Viridans
	• If not treated, usually fatal within 6 weeks	• If not treated, usually fatal by one year

Etiology: depends on bacterial and host factors "next slide"

Factors affecting severity and outcome "Predisposing factors ":

bacterial factors

- Virulence of the organism
- no bacteria in the blood

host factors:

- **factors increasing susceptibility:**

  A- Local: e.g cardiac lesion. Could be caused by:

  - congenital rheumatic heart disease
  - cardiovascular disease
  - heart surgery
  - Atherosclerosis
  - prosthetic heart valves (immediate – delayed)

  B- General: underlying disease (diabetes.m)

  C- drugs: has systemic factors

  1- iatrogenic*: immunosuppressive treatment – cytotoxic agents

  2- self- inflicted**: Alcoholism – addiction (injected drugs)

- **Protective factors:** antimicrobial chemotherapy

- **Distorted heart shape → stasis of blood flow → increase adherence of bacteria in the endocardium**
- **Normal heart can be infected by virulent bacteria (staph.aureus or strept.Pneumoniae)**

* inadvertent adverse effect s

**related to the behavior

important

Sources of infection	Causative organisms
 Dental extraction and other dental procedures	**strep. Viridans** (sub-acute IE) by: Produce glucagon → adhere to endocardium E.g: **Strept. mutans** **Strept. sanguis**
 Cardiac surgery (prosthetic valves)	Staph epidermis
 Intravenous medication or Iv. Drug addiction or Intracardiac/intravenous catheters	**S. aureus** (Acute IE)
 genitourinary or gut procedures	Strept. Faecalis

But if the question was general, the most common cause of IE is **s.aureus**

Portal of entry:

1. Oral irrigation device 2. dental extraction
3. scaling , tooth brushing, endodontic therapy (usually lead to bacteraemia).

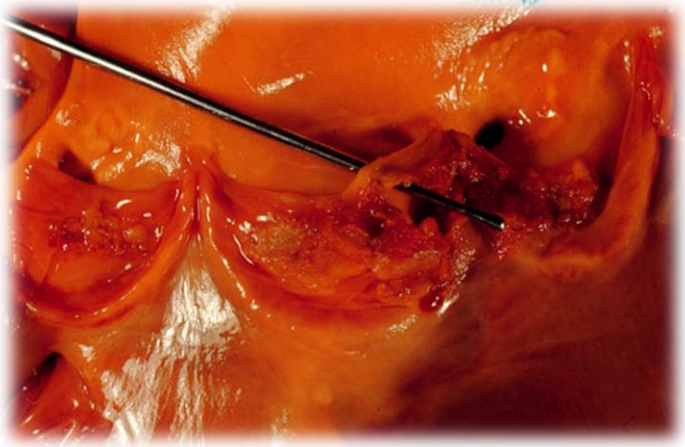
bacteria from gingival pockets inter blood stream → bacteraemia

The severity of bacteraemia depends on :

1. Number of bacteria 2. Bacterial virulence

Low number and low virulence → low clinical effect → rapidly cleared by normal body defence.

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

Clinical presentations

- Fever of unknown origin FUO (pyroxia of unknow origin PUO) for **3 months or more.**
- Malaise , weight loss , weakness.
- Changing murmurs (patient is having murmur due to stenosis but now it's changing due to IE).
- Dyspnea.
- Anaemia , leucocytosis.
- Microscopic haematuria.
- Petechiae.
- Spleenomegaly.
- Splinter haemorrhage.
- Hypergammaglobulinemia .
- Osler's Nodes

Onset is insidious for Subacute Bacterial Endocarditis.

Petechiae:

- spots of blood.
- Often located on extremities or mucous membranes.
- Non-specific.

Osler's Nodes:

- More specific.
- Painful and erythematous nodules.
- Located on pulp of fingers and toes.
- More common in subacute IE.

Mortality	**High mortality:** Depends on bacterial & host factors (slide 5) **poor prognosis in case of: "**depends on organisms**"** • Candida • Staphylococcus (e.g. S.aureus) • Gram-negative bacteria (rickettsiae)
LABORATORY DIAGNOSIS	• **serial blood culture (2-3 sets before antibiotic therapy)** mainly for aerobic bacteria • CBC, ESR and CRP • Complement levels (C3, C4, CH50) RF • Urinalysis • serological tests → CFT (coxiella burniti) • sensitivity test Those are not very important Note: if the patient is alcoholic + has fever of unknown origin → keep in mind IE as differential diagnose
Imaging	**Echocardiography**

اقرأ بتركيز..!

Local Spread of Infection	Leads to: • Heart failure. • Paravalvular abscess. • Pericarditis. • Fistulous intracardiac connections.
Embolic Complications	• Stroke. • Myocardial Infarction. • Ischemic limbs. • Hypoxia from pulmonary emboli. • Abdominal pain (splenic or renal infarction).
Metastatic Spread of Infection	• Metastatic abscess "Kidneys, spleen, brain, soft tissues". • Meningitis and/or encephalitis. • Vertebral osteomyelitis. • Septic arthritis.

Treatment

Criteria of antibiotic:

- Bactericidal.
- Parenteral.
- High dose.
- Treatment should take at least 4 weeks.

we have to give a combination of antibiotics, one should be beta-lactam (e.g. penicillin) to destroy the cell wall allowing gentamicin to enter, and another to stop protein synthesis.

Treatment: penicillin + gentamicin.

- if no response → ampicillin + gentamicin
- **For viridans streptococci** → Benzyl penicillin (I.V) or penicillin + gentamicin
- **For streptococcus faecalis** → ampicillin + gentamicin (I.V)

- for prophylaxis → Amoxicillin or Penicillin

important

Lecture's notes

- IE is infection of endocardium, mainly the valves.
- Sub-Acute endocarditic is caused by streptococcus viridine.
- Acute endocarditis is caused by staph. aureus (mainly in drug users).
- Patients with diabetes, rheumatic fever, prosthetic valve or were immunosupressed are more likely to develop IE .
- Pyrixia of unknown origin is the most common differential diagnose for IE.
- Bacteria come from oral cavity (teeth extractions of teeth brushing, gut, urinary system &/or blood stream.
- Best way to diagnose is blood culture.
- Treatment:Penicillin & gentamicin .
- Prophylaxis → penicillin or amoxicillin.

Questions

Reward yourself with a simple puzzle!

1- The must common cause of sub acute IE

A. group A streptococci. B. viridans streptococci.
C. Staphylococcus epidermitis.

2- A 55-year-old woman who had her rheumatic heart valve replaced with a prosthetic valve. Three blood cultures became positive after 3 days of incubation. An Obtochin-resistence, catalase-negative gram-positive coccus that was alpha-hemolytic was isolated. What was the most likely causal agent?

A. streptococcus viridans B. staphylococcus aureus
C. streptococcus pneumonia

3- IE is an infection of :

A. Pericardium B. Myocardium C. Endocardium and heart valve

4- An atherosclerotic 80-year-old man presented with fever for 3 months and weight loss. Clinical investigations revealed elevated ESR levels and leucocytosis. What is the treatment ?

A- penicillin B. amoxicillin C. combination of beta-lactam & Gentamicin

Questions

Answers

1-B

2-A
(we know from last block that, catalase-negative bacteria means streptococci. And if it was alpha hemolytic it means either viridans or pneumoniae. The answer is “streptococcus viridans ” because it is obtochin-resistence, this organism was mentioned in the mind map “slide 2”. Revise the practical lecture of respiratory block for more information)

3- C

4- C
(the right answer is combinations, because atherosclerosis is a predisposing factor for IE, if you think it’s not enough, the long term fever “which obviously was of unkwon origin” is very diagnostic for IE. If you still not convinced it’s an infection, elevated ESR and lycosytosis should change your mind. So, if it really was IE, the proper treatment is the combination.)