

Infective Endocarditis (IE)

- 35 year , male
- Presented with fever
- He has End stage renal disease on hemodialysis 3 times /week
- Physical examination : fever 38.5 , systolic murmur heard on the right second intercostal space .

What is the most likely diagnosis ?

Definition, Etiology, Pathogenesis

Infective endocarditis (IE) is an infection of the endocardium, most frequently involving the heart valves

Most frequently IE affects the mitral and aortic-valves

.IE is preceded by bacteremia-

- Bacteria (>90% of cases). Most frequent pathogens:
 - a) Staphylococci (**Staphylococcus aureus, the most common cause of IE**).
 - b) Streptococci (viridans-group streptococci; **until recently the most frequent cause of native valve infections**).
 - c) Enterococci.
 - d) The HACEK group of fastidious Gram-negative organisms (Haemophilus spp, Aggregatibacter [formerly Actinobacillus] spp, Cardiobacterium hominis, Eikenella corrodens, and Kingella spp).
 - e) Non-HACEK Gram-negative bacteria.
- Fungi (<1%).
- Very rare: Chlamydia, rickettsia, or mycoplasma.

Etiologic agents in patients with :negative blood cultures

- Culture-negative IE may be seen in the context of antimicrobial use prior to blood cultures being drawn or infections caused by fastidious organisms like :
 - *Coxiella burnetii*.
 - *Bartonella* spp.
 - *Mycoplasma pneumoniae*.

Diseases and conditions predisposing :to native valve endocarditis (NVE)

- history of rheumatic disease
- hypertrophic cardiomyopathy
- valvular or congenital heart disease
- prolonged maintenance of indwelling central venous catheters, foreign bodies in the heart (eg, intracardiac electrodes, vascular patches),
- chronic hemodialysis and IV drug use (IVDU)

Prosthetic valve endocarditis (PVE)

- accounts for 10% to 30% of all cases of IE.
- In the first 2 months after surgery, PVE is most frequently caused by *S aureus* followed by coagulase-negative staphylococci (mainly methicillin-resistant strains) and *Candida* spp.
- In PVE developing >1 year after surgery, etiologic agents are similar to those seen in NVE.
- Cardiac device–related infective endocarditis (CDRIE) is most frequently caused by coagulase-negative staphylococci and *S aureus*.



Source: Foster V, Stahly RA, Harrington RA: *Anatomy: The Heart*,
13th Edition, www.accessmedicine.com
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Clinical Features

- 1) Regurgitation murmur over the affected valve.
- 2) Features of heart failure
- 3) Conduction abnormalities.
- 4) Rarely functional mitral stenosis.
- 5) Embolic phenomena (most frequently associated with *S aureus*), including: (CNS) symptoms , retinal art embolism ..etc.
- 6) Right sided endocarditis : pulmonary embolism (septic emboli) >More in IVDU , affecting Tricuspid or pulmonary valves

Roth spots



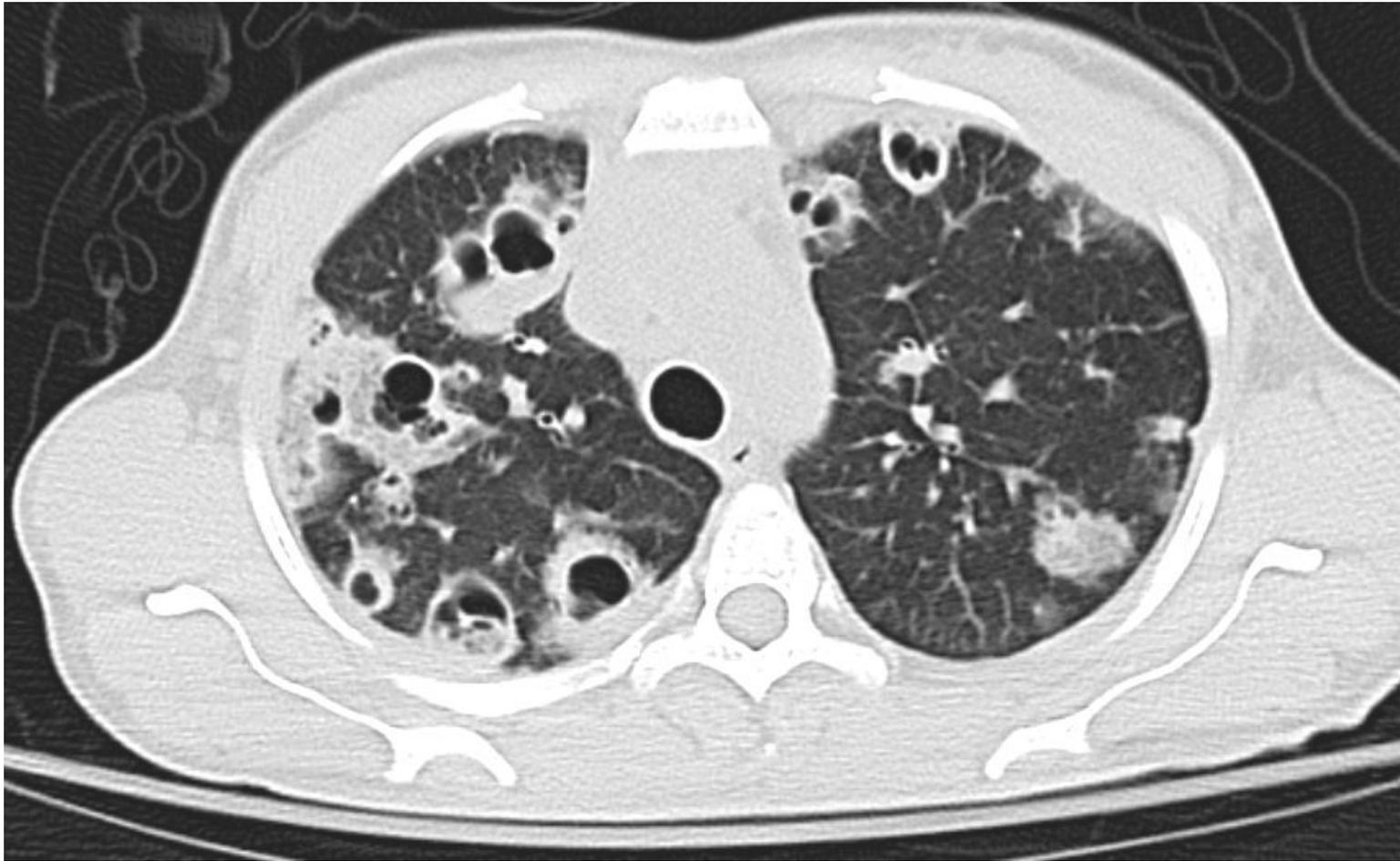
Osler nodes



Janeway lesions



Septic pulmonary emboli



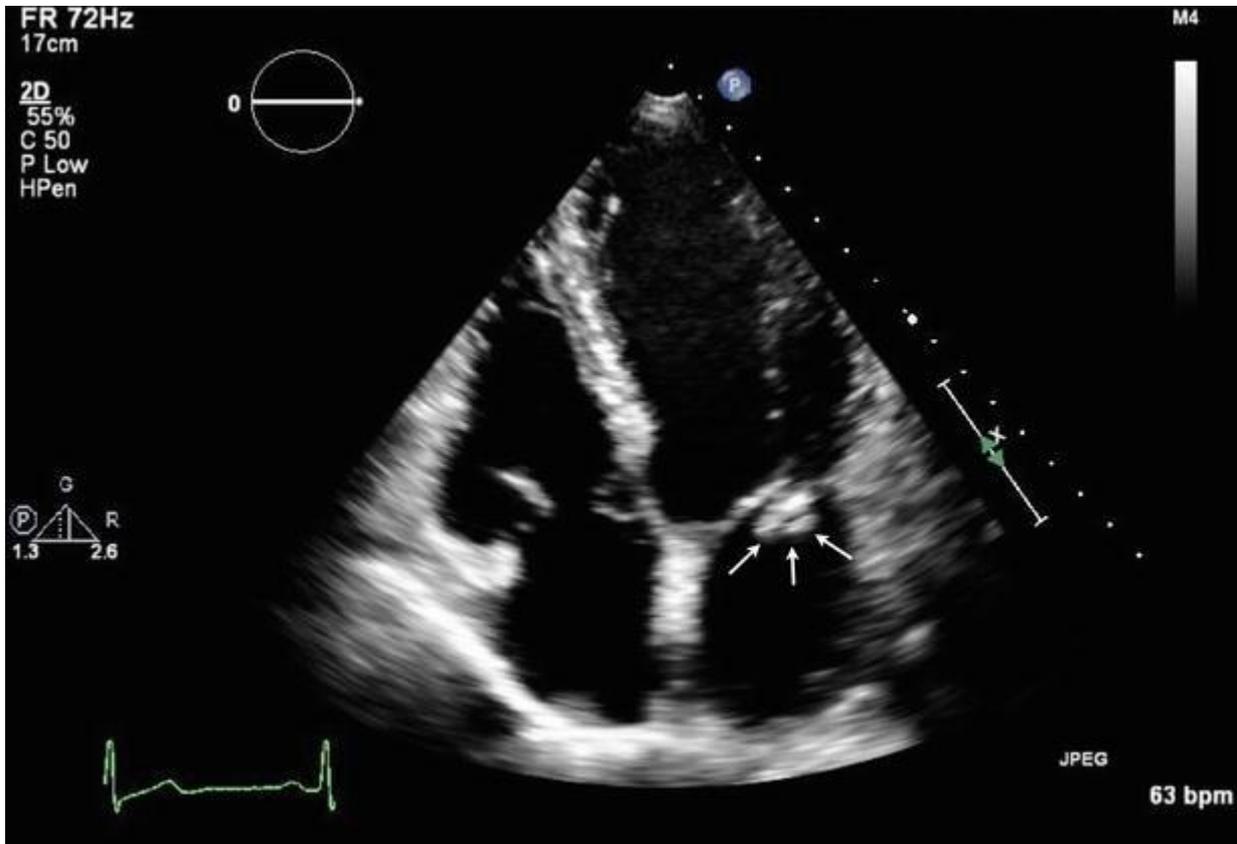
Diagnostic Workup

- 1. Blood cultures are critical for the diagnosis of IE:
:Obtain ≥ 3 blood culture sets from separate venipuncture sites before starting antimicrobial treatment, with the first and last samples being drawn ≥ 1 hour apart, regardless of body temperature.
- 2. **Serologic studies:** Perform these in the case of suspected infection with *C burnetii*, *Bartonella* spp, *Brucella* spp, *Histoplasma capsulatum*, *Legionella* spp, or *Chlamydia* spp.

Diagnostic Workup

3. Echocardiography:

- Evaluate for vegetations (mobile echogenic structures attached to the endocardium or intracardiac prosthetic material), valvular damage (regurgitation of the infected valve due to vegetations, leaflet perforation, or rupture of chordae tendineae), and perivalvular complications (abscess, pseudoaneurysm, intracardiac fistula).
- transthoracic echocardiography (TTE)
>transesophageal echocardiography (TEE) should be performed.



Duke's Criteria

Definite IE

Pathologic Criteria

- Pathologic lesions - vegetation or intracardiac abscess demonstrating active endocarditis on histology **OR**
- Microorganism - demonstrated by culture or histology of a vegetation or intracardiac abscess

Clinical Criteria

- 2 major clinical criteria **OR**
- 1 major and 3 minor clinical criteria **OR**
- 5 minor criteria

Possible IE

- Presence of 1 major and 1 minor clinical criteria **OR**
- Presence of 3 minor clinical criteria

Rejected IE

- A firm alternate diagnosis is made **OR**
- Resolution of clinical manifestations after ≤ 4 days of antibiotic therapy **OR**
- No pathologic evidence of infective endocarditis is found at surgery or autopsy after antibiotic therapy for 4 days or less
- Clinical criteria for possible or definite IE not met

Major Criteria

Positive blood cultures for IE

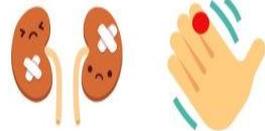
- Typical microorganisms consistent with IE from 2 separate blood cultures
- Persistently positive blood culture
- Single positive blood culture for *Coxiella burnetii* or phase I IgG antibody titer $>1:800$

Evidence of endocardial involvement

- Echocardiogram positive for IE
- New valvular regurgitation

Minor Criteria

- Predisposition
- Fever $\geq 38.0^{\circ}\text{C}$
- Vascular phenomena
- Immunologic phenomena
- Micro: + bcxs that do not meet major criteria **OR** serologic evidence of active infection with organism consistent with IE



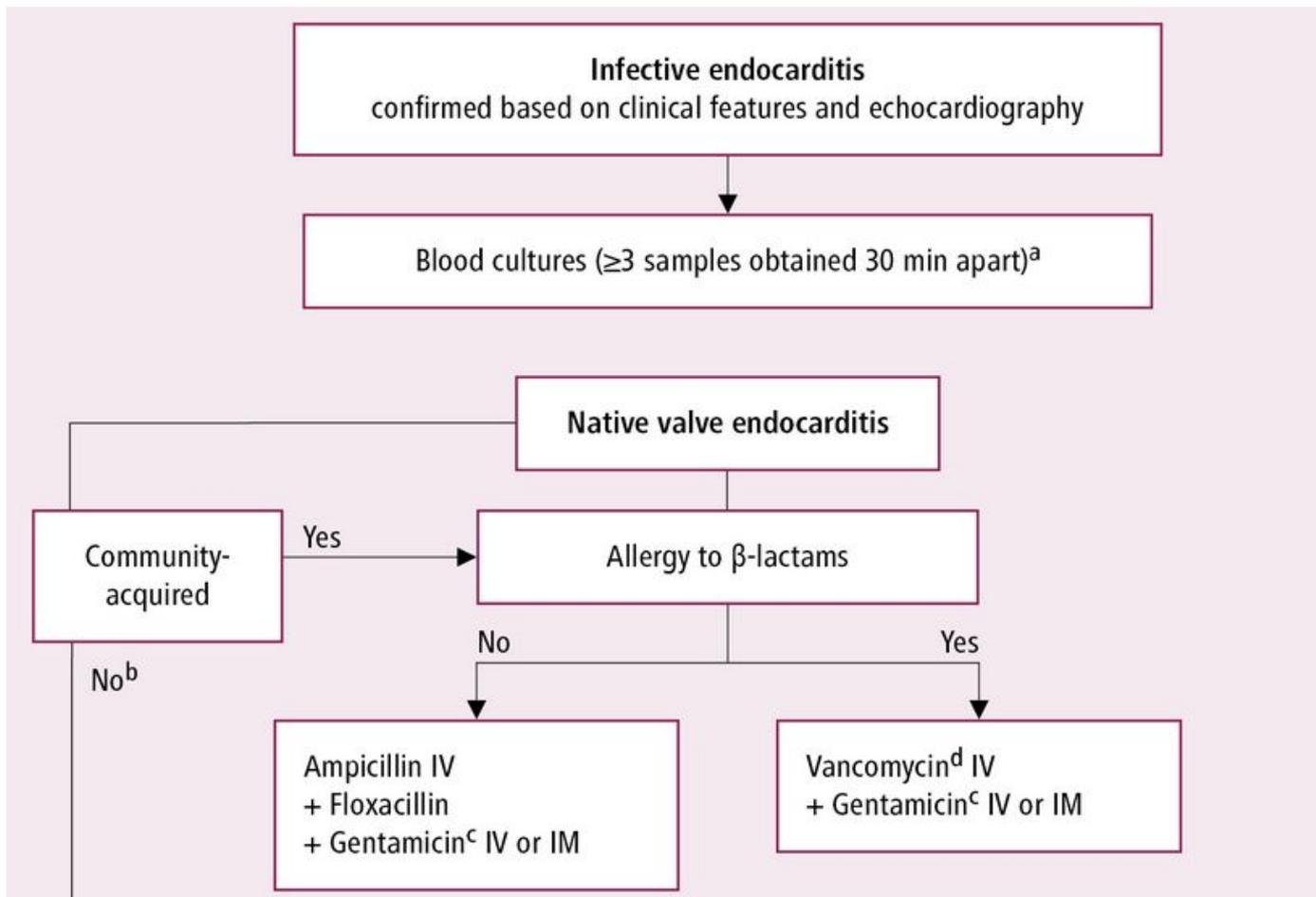
Treatment

- Treatment of IE requires eradication of infection and prolonged parenteral and bactericidal therapy. IV treatment is currently.
- IV treatment may vary in duration from 2 weeks (in a highly selective population meeting predefined criteria) up to 4 to 6 weeks (most commonly) or longer.
- Treatment of PVE lasts ≥ 6 weeks.

Pharmacologic Treatment

IV antibiotics:

- In acutely ill patients with suspected IE, start empiric treatment immediately after obtaining blood cultures .The choice of empiric treatment should take into consideration the most likely pathogens.



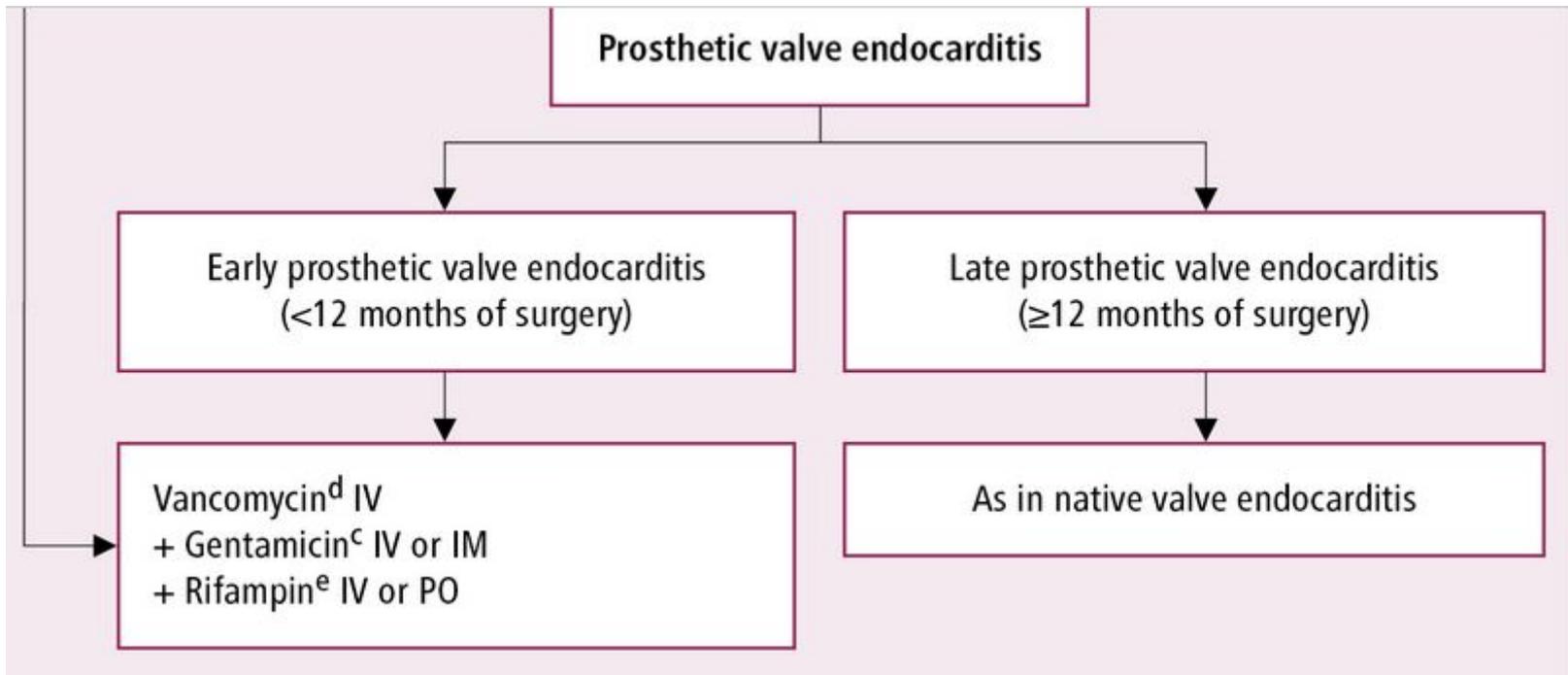
Prosthetic valve endocarditis

Early prosthetic valve endocarditis
(<12 months of surgery)

Late prosthetic valve endocarditis
(≥ 12 months of surgery)

Vancomycin^d IV
+ Gentamicin^c IV or IM
+ Rifampin^e IV or PO

As in native valve endocarditis



Need for urgent surgery

- 1) Symptoms of heart failure
- 2) Locally uncontrolled infection with involvement of perivalvular structures .
- 3) Persistent infection despite appropriate antibiotic treatment
- 4) Infection with difficult-to-treat organisms (fungi or multidrug-resistant organisms).

Prevention

- Indications for antimicrobial prophylaxis:
 - only before dental procedures involving gingival or periapical instrumentation or perforation of the oral mucosa :
 - 1) Prosthetic valve or history of valve repair using prosthetic materials.
 - 2) History of IE.
 - 3) Congenital heart disease (cyanotic and up to 6 months after complete surgical or percutaneous repair of congenital heart disease using prosthetic materials; residual regurgitation or leak in the area of surgical or transcatheter implantation of prosthetic material).
 - 4) Cardiac transplant patients with a structurally abnormal valve .

- Recommended antimicrobial agents (a single dose 30-60 minutes before the procedure):
- 1) Patients with no allergy to penicillin: Oral or IV amoxicillin or ampicillin 2 g in adults or 50 mg/kg in children
- 2) Patients with allergy to penicillin: Oral or IV clindamycin 600 mg in adults or 20 mg/kg in children.