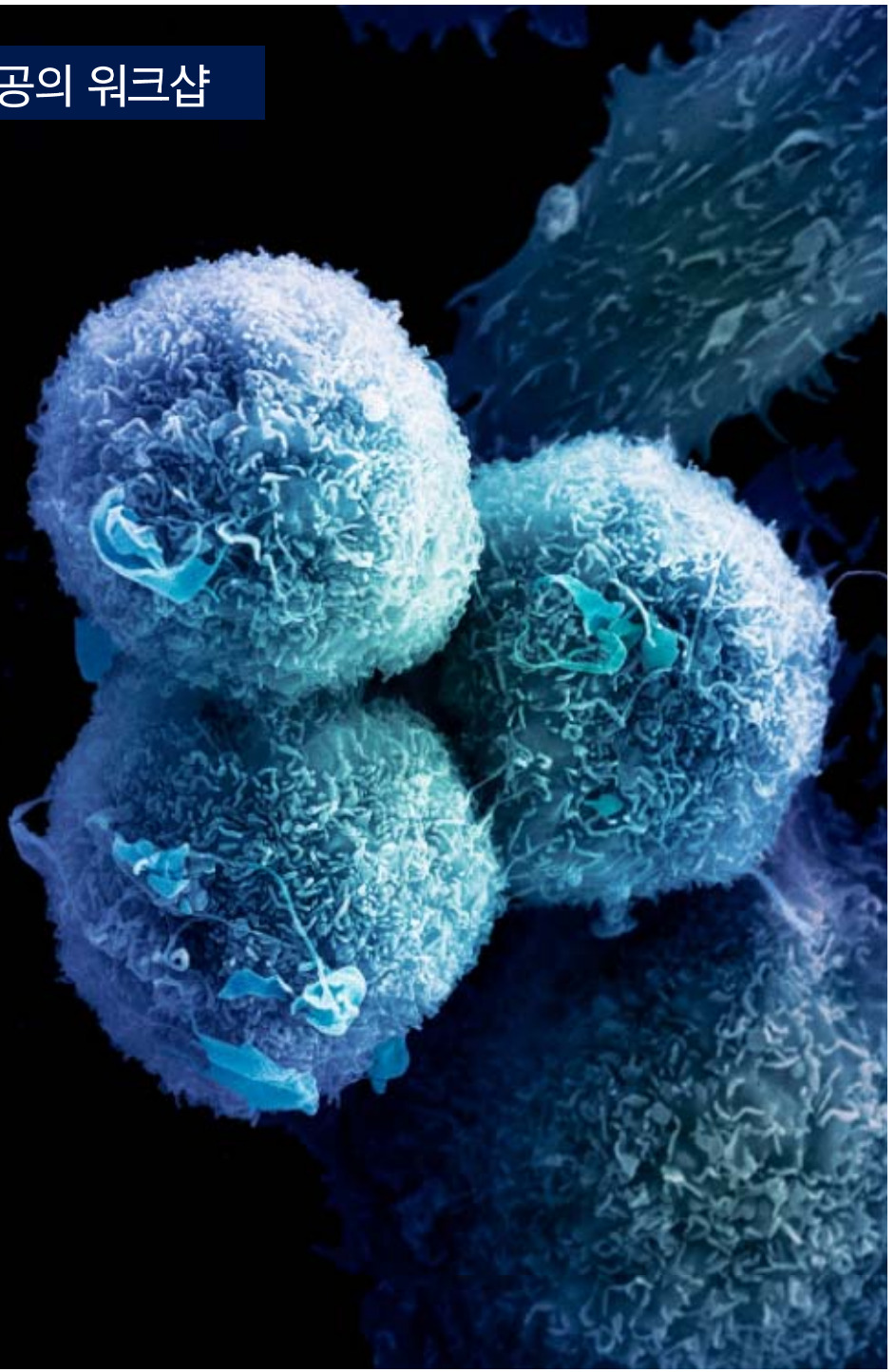
2022년 제 15차 전공의 연수교육 및 신입 전공의 워크샵

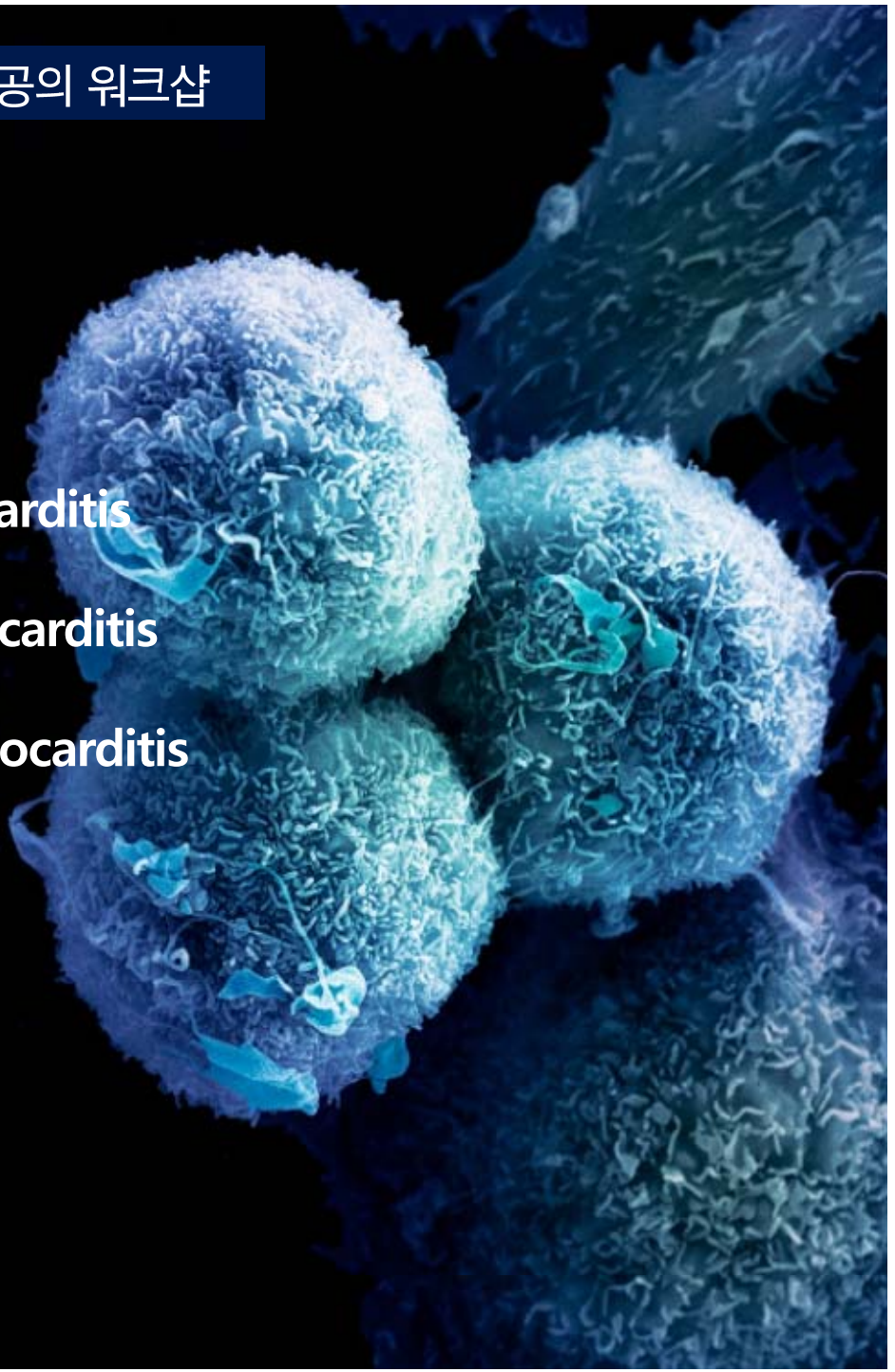
Infective endocarditis



성균관 대학교 의과대학
삼성서울병원 심장외과

정수련

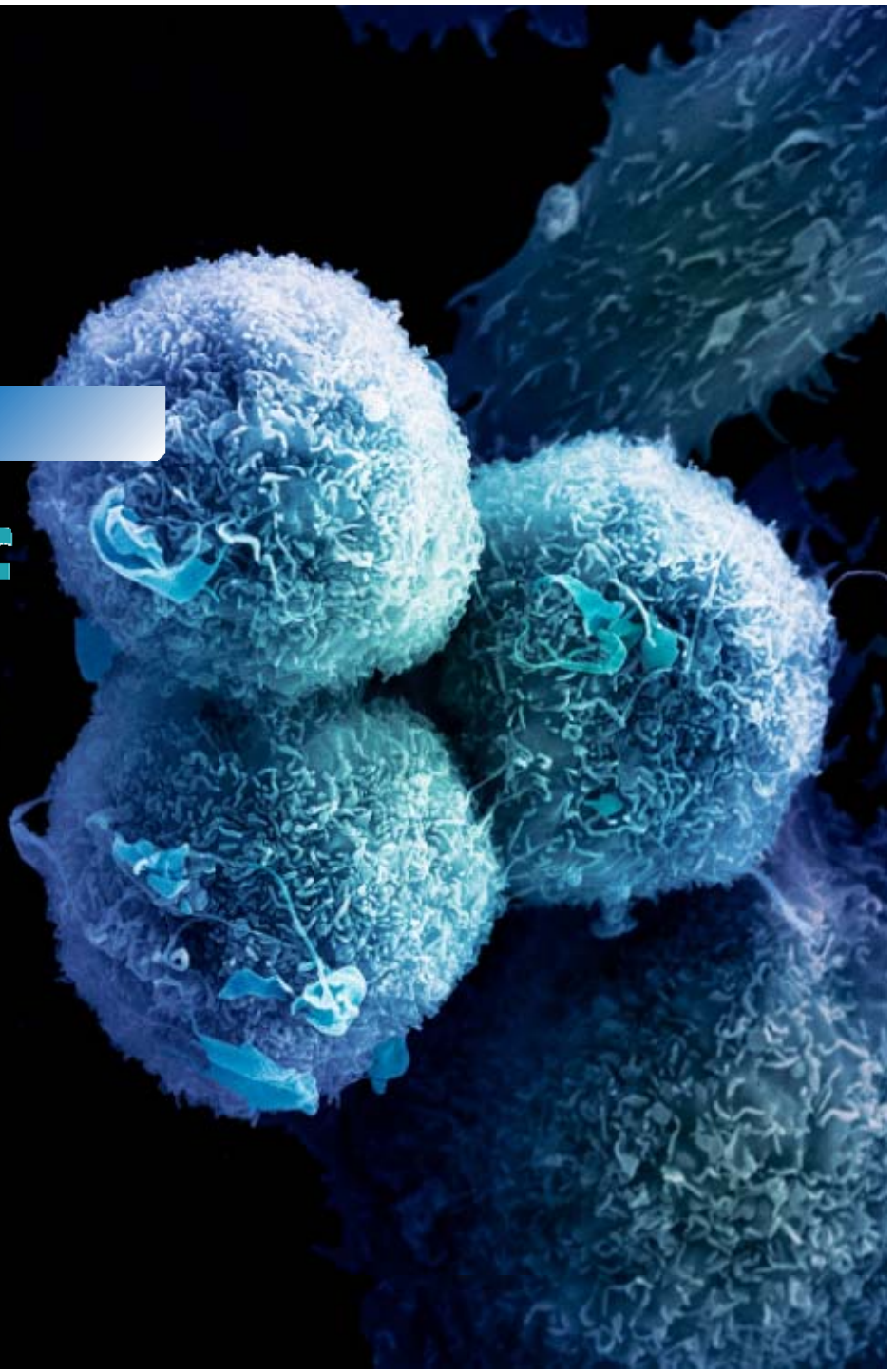
2022년 제 15차 전공의 연수교육 및 신입 전공의 워크샵



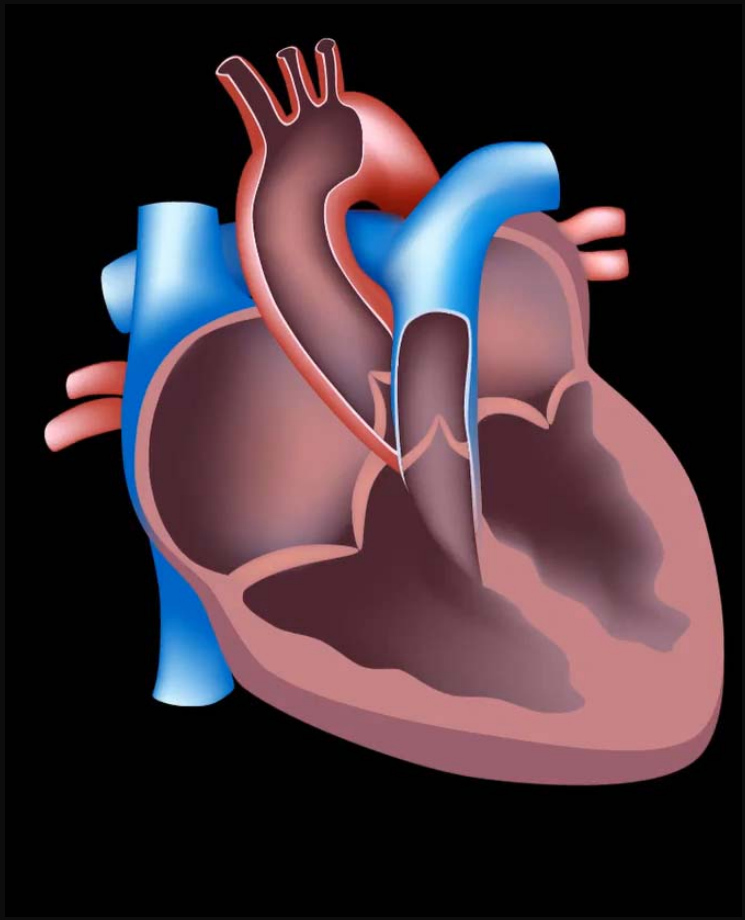
CONTENTS

SMC 삼성서울병원

Diagnosis of IE



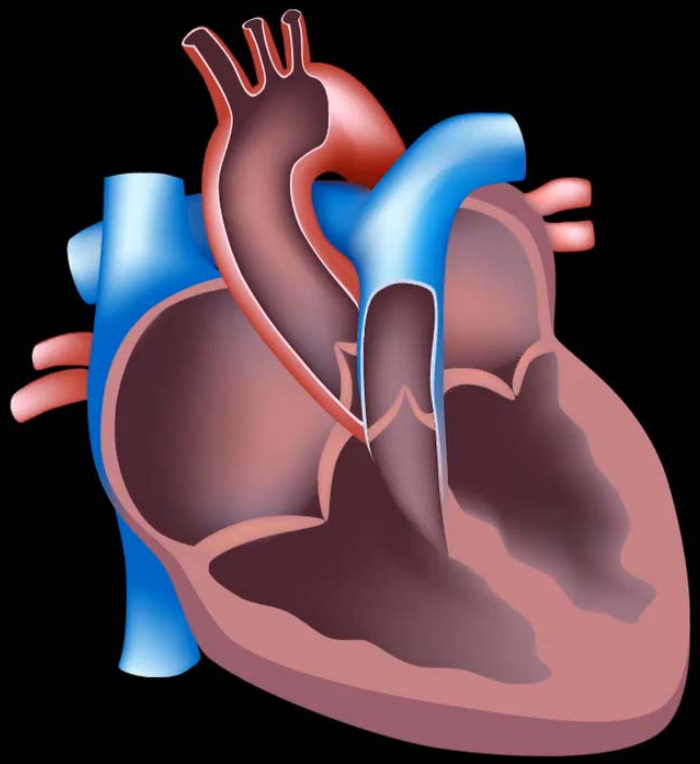
Infective Endocarditis



Infection of the endocardium

- Caused by bacteria/fungi in blood stream

Infective Endocarditis



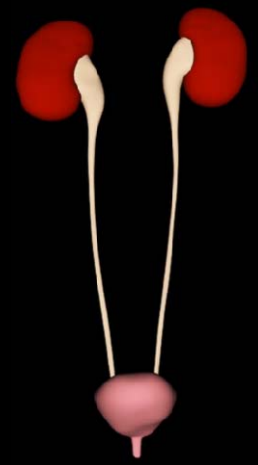
Infection of the endocardium

- Caused by bacteria/fungi in blood stream

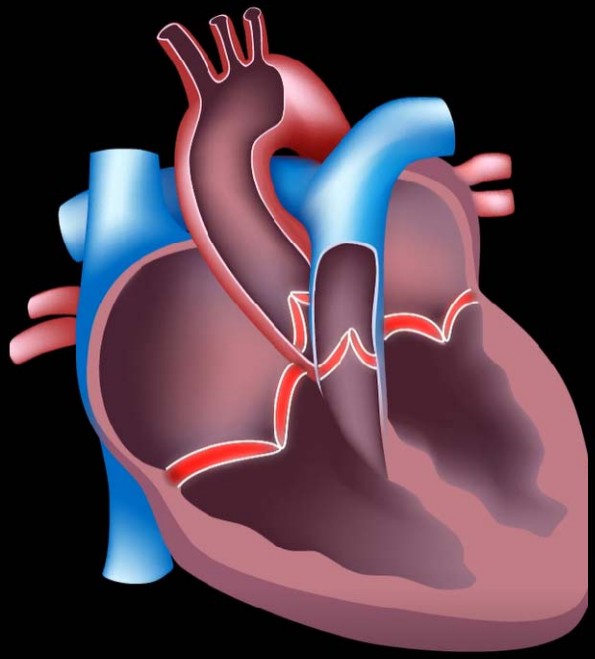
- Abnormality of endocardium is required

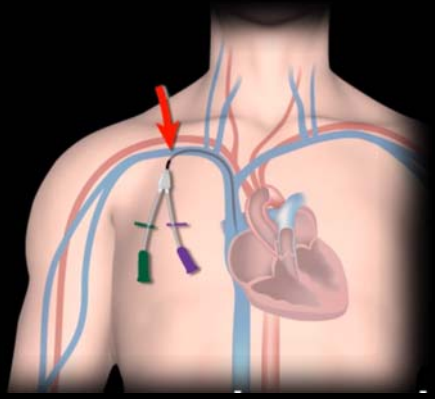
Source of Infective Endocarditis

Skin abscess

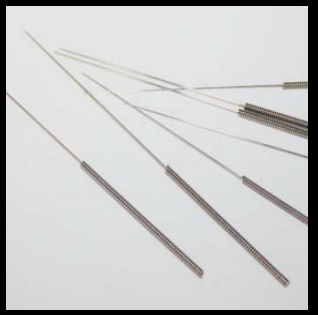


UTI





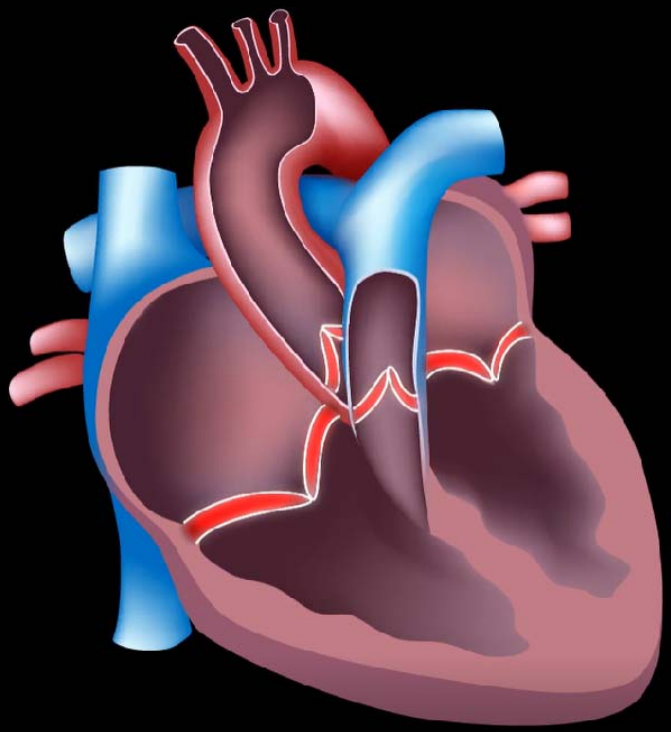
Contaminated central line



Drug injection or acupuncture

Dental procedures
Or brushing

Source of Infective Endocarditis



Causative organisms :

Viridians streptococci (20%)

Streptococcus gallolyticus

Staphylococcus aureus(38%)

Coagulase-negative staphylococci

HACEK*

Enterococci

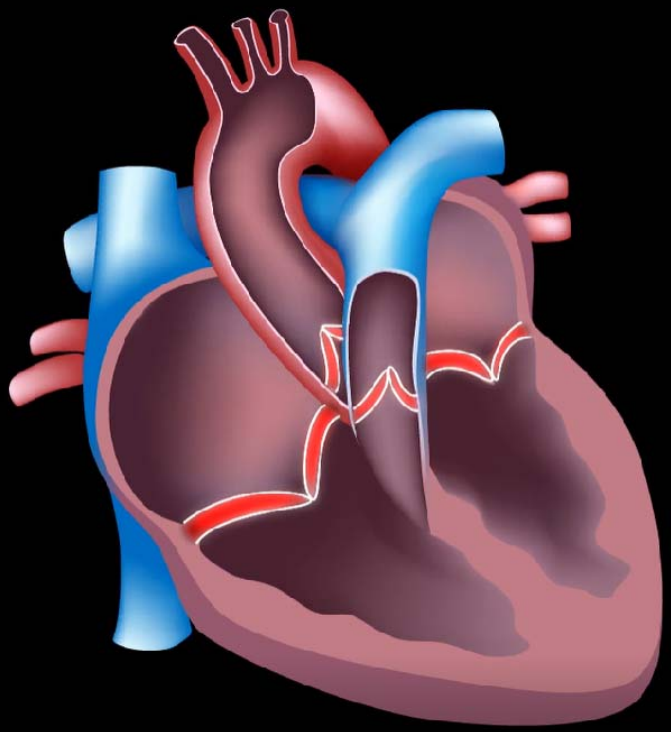
Pneumococci

Gram-negative bacillic

Fungus (Candida, Aspergillus etc)

*HACEK (Haemophilus, Aggregatibacter,Cardiobacterium,Eikenella,Kingella)

Source of Infective Endocarditis



Causative organisms :

Viridians streptococci

Streptococcus gallolyticus

Staphylococcus aureus (MRSA)

Coagulase-negative staphylococci

HACEK*

Enterococci

Pneumococci

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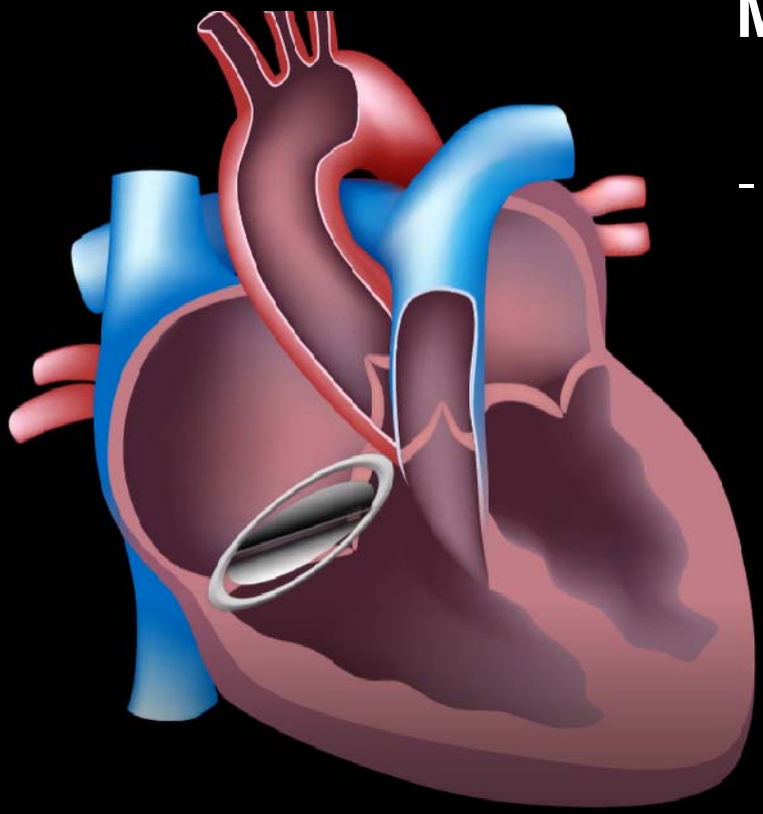
Fungus (Candida, Aspergillus etc)

*HACEK (Haemophilus, Aggregatibacter,Cardiobacterium,Eikenella,Kingella)

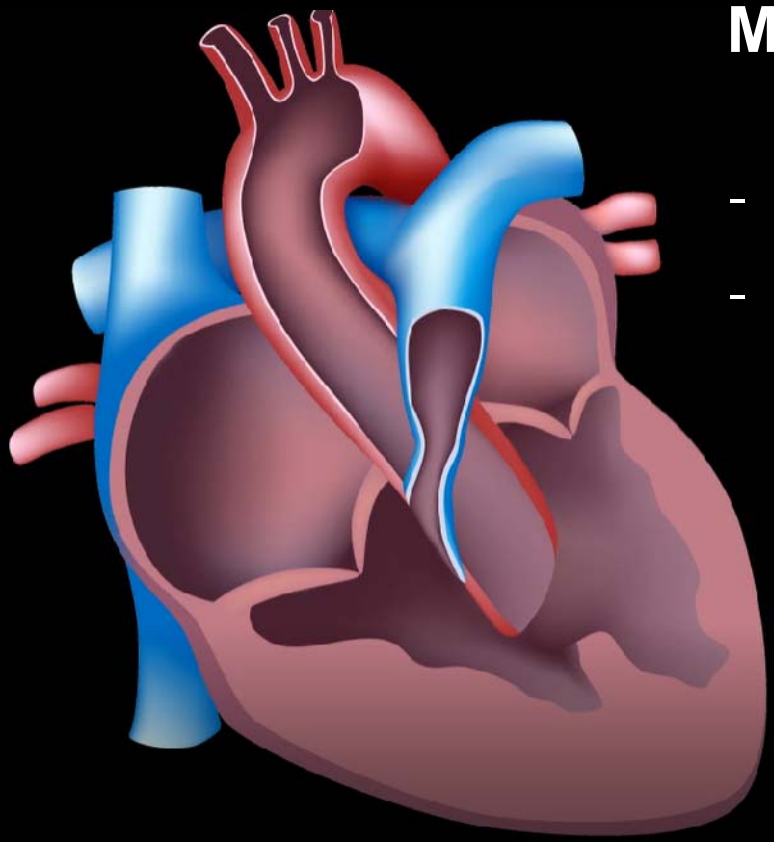
Infective Endocarditis



Major risk factors :

- **Prosthetic valve/devices (highest risk)**

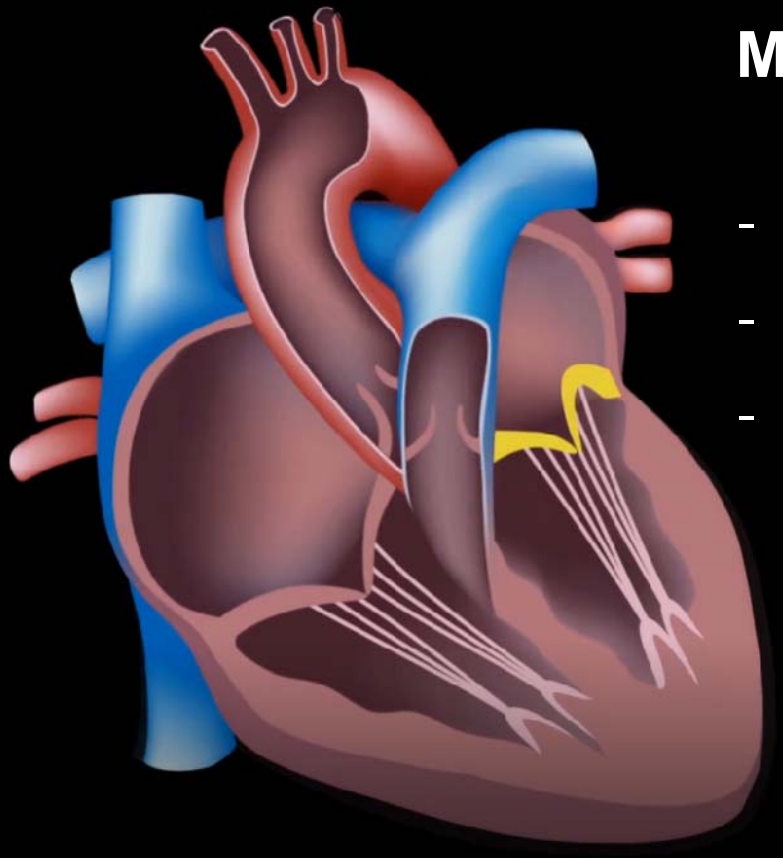
Infective Endocarditis



Major risk factors :

- **Prosthetic valve/devices (highest risk)**
- **Congenital heart defect (VSD etc)**

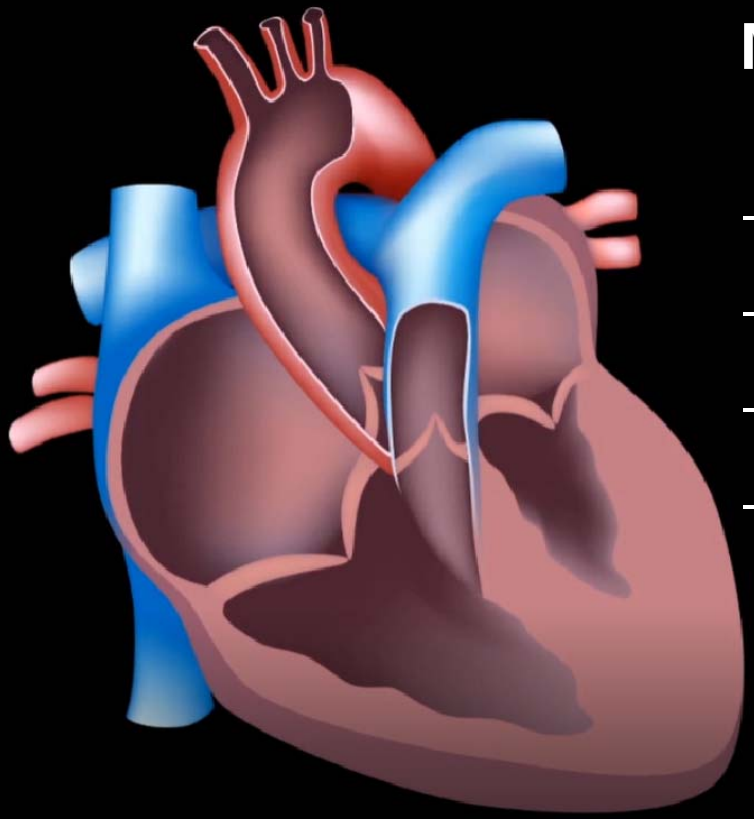
Infective Endocarditis



Major risk factors :

- **Prosthetic valve/devices (highest risk)**
- **Congenital heart defect (VSD etc)**
- **Heart valve disorder**

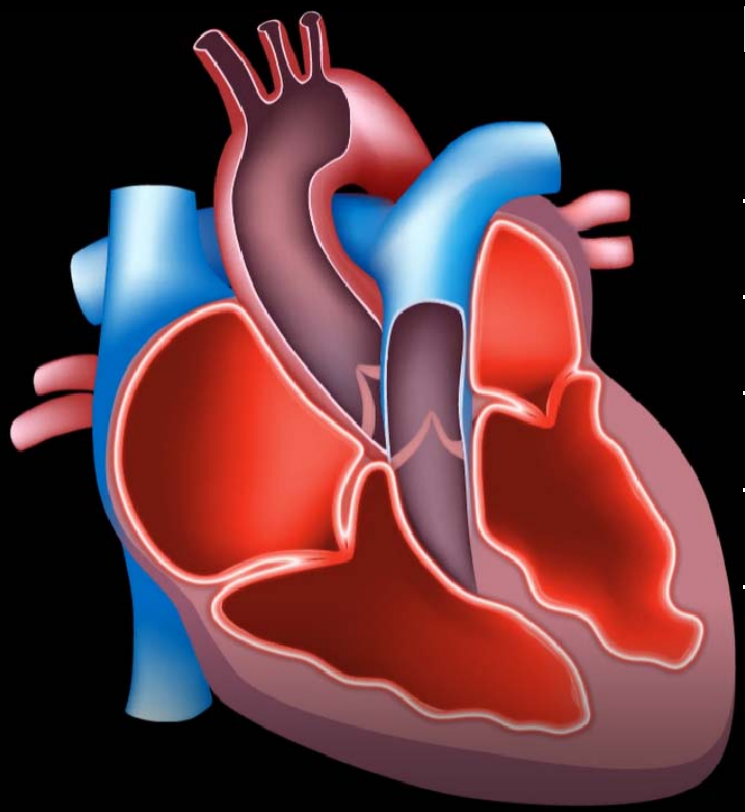
Infective Endocarditis



Major risk factors :

- **Prosthetic valve/devices (highest risk)**
- **Congenital heart defect (VSD etc)**
- **Heart valve disorder**
- **Hypertrophic cardiomyopathy**

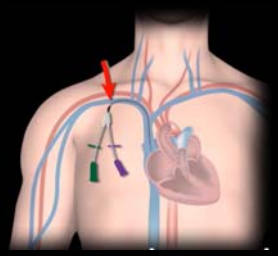
Infective Endocarditis

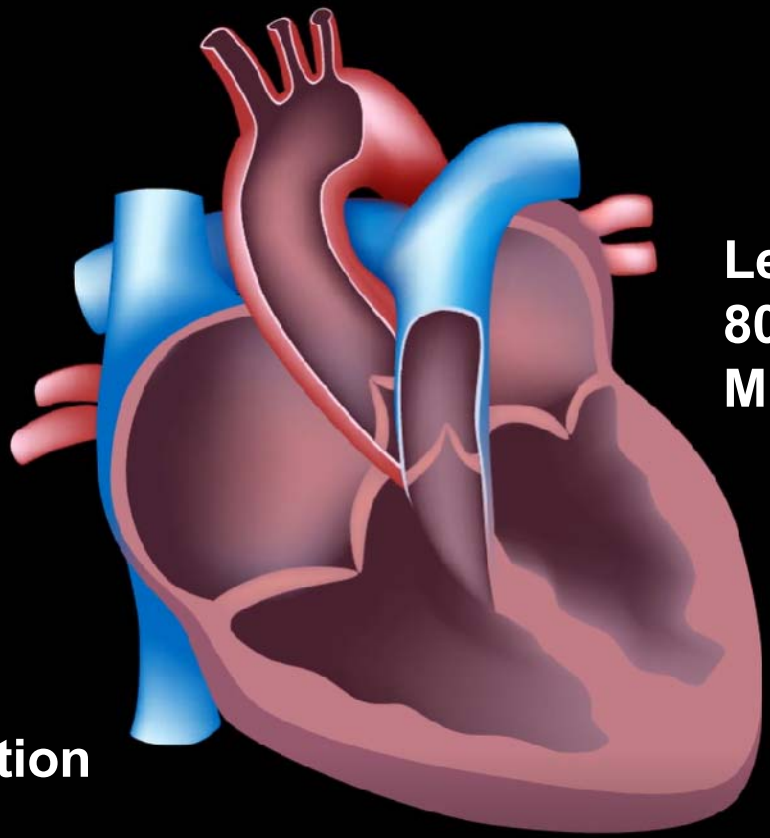


Major risk factors :

- **Prosthetic valve/devices (highest risk)**
- **Congenital heart defect (VSD etc)**
- **Heart valve disorder**
- **Hypertrophic cardiomyopathy**
- **Previous endocarditis**

Prevalence of Infective Endocarditis

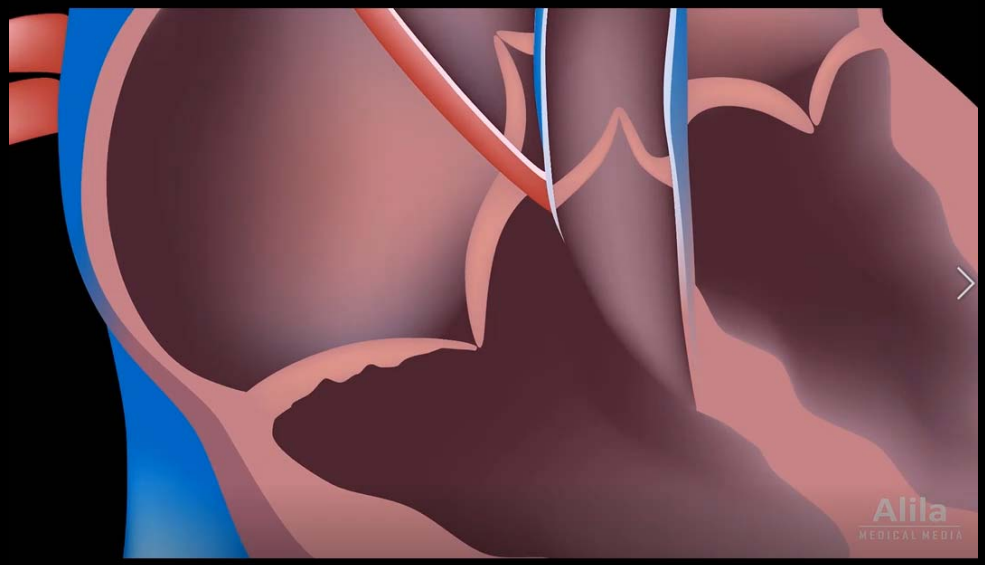


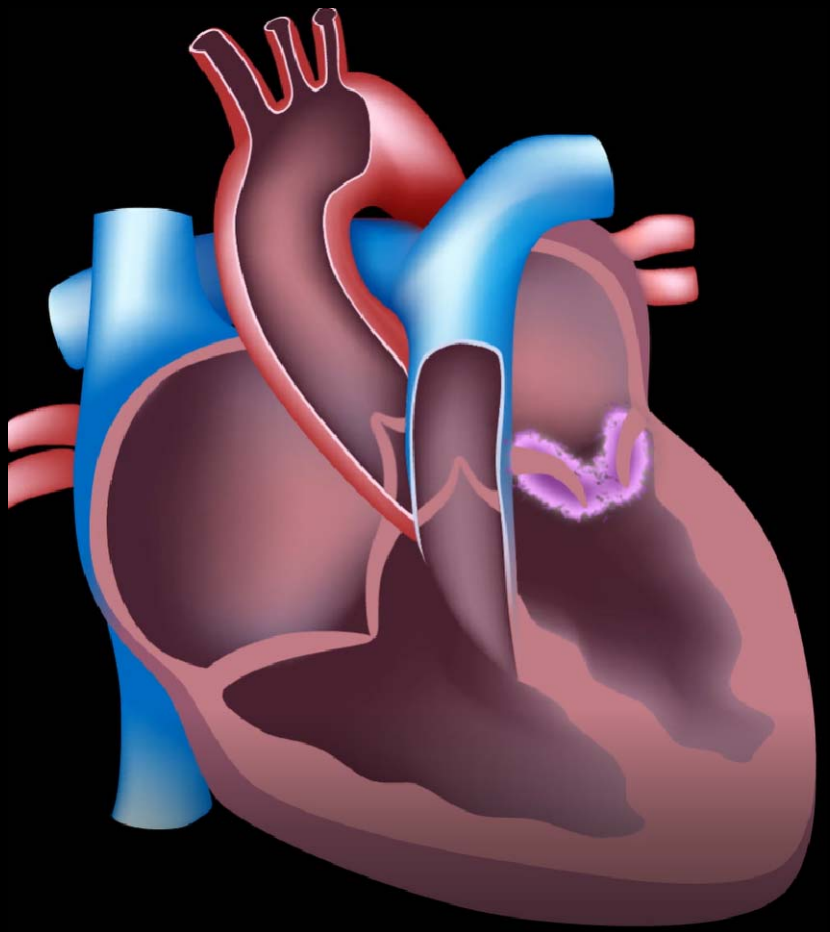


Left-sided infection
80-90%
Mitral valve (m/c)

Right-sided infection
10-20%
(Mostly intravenous drug users)

Pathophysiology of Infective endocarditis

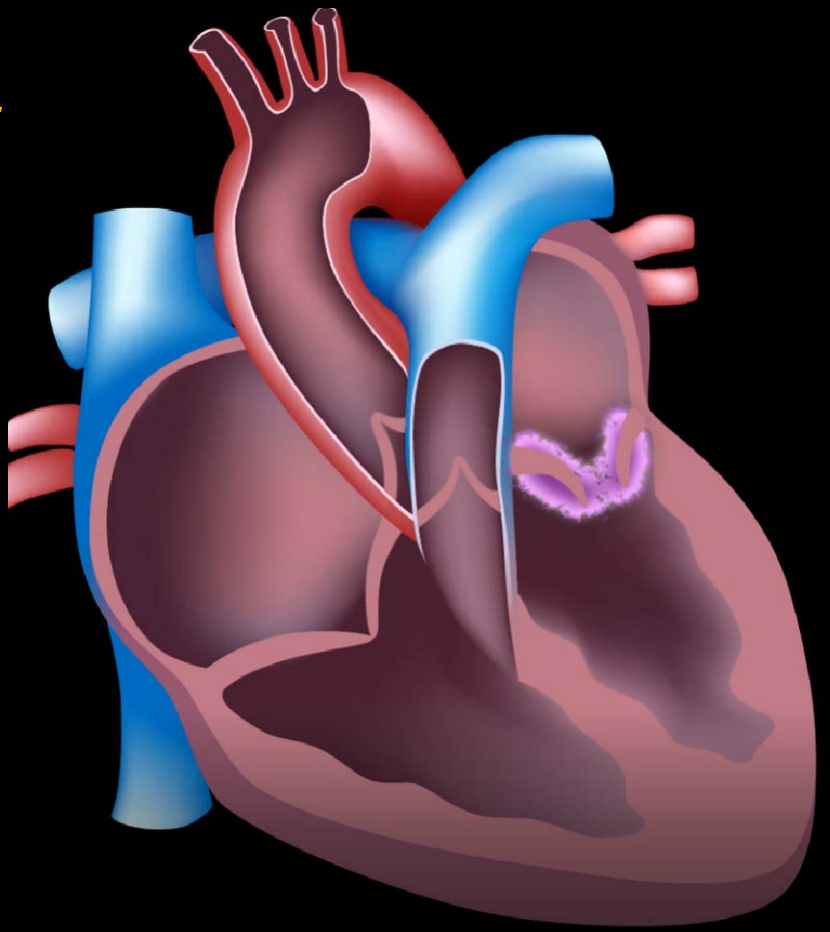




endocarditis

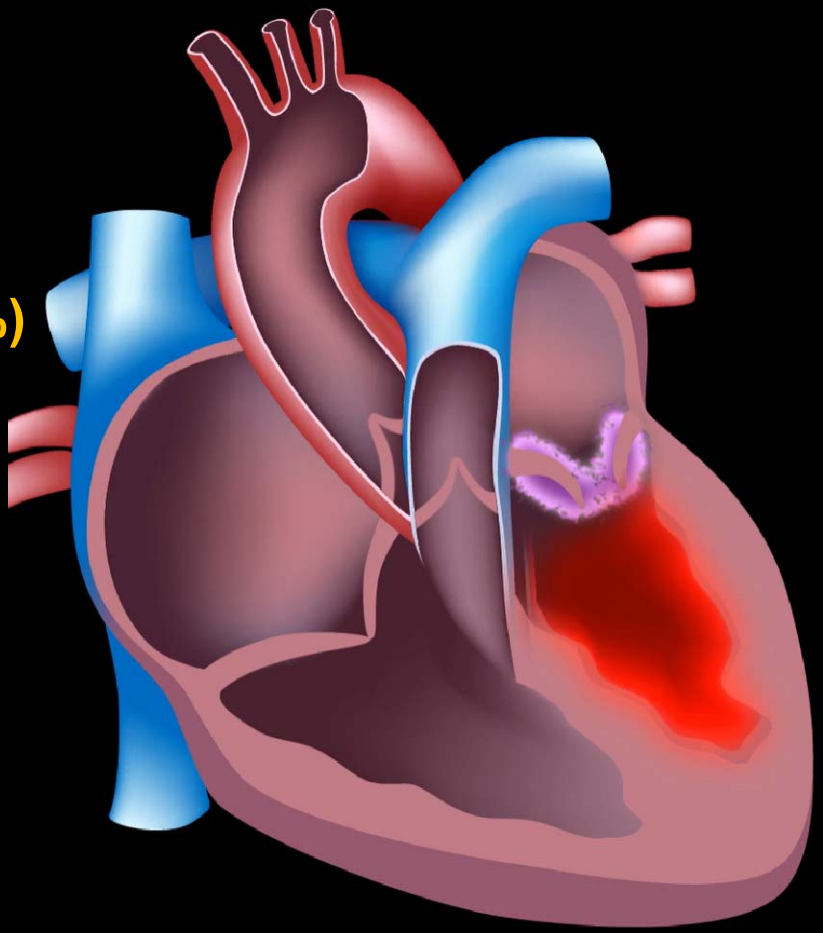
Pathophysiology of Infective endocarditis

- Heart valve dysfunction (in 85% of patients)



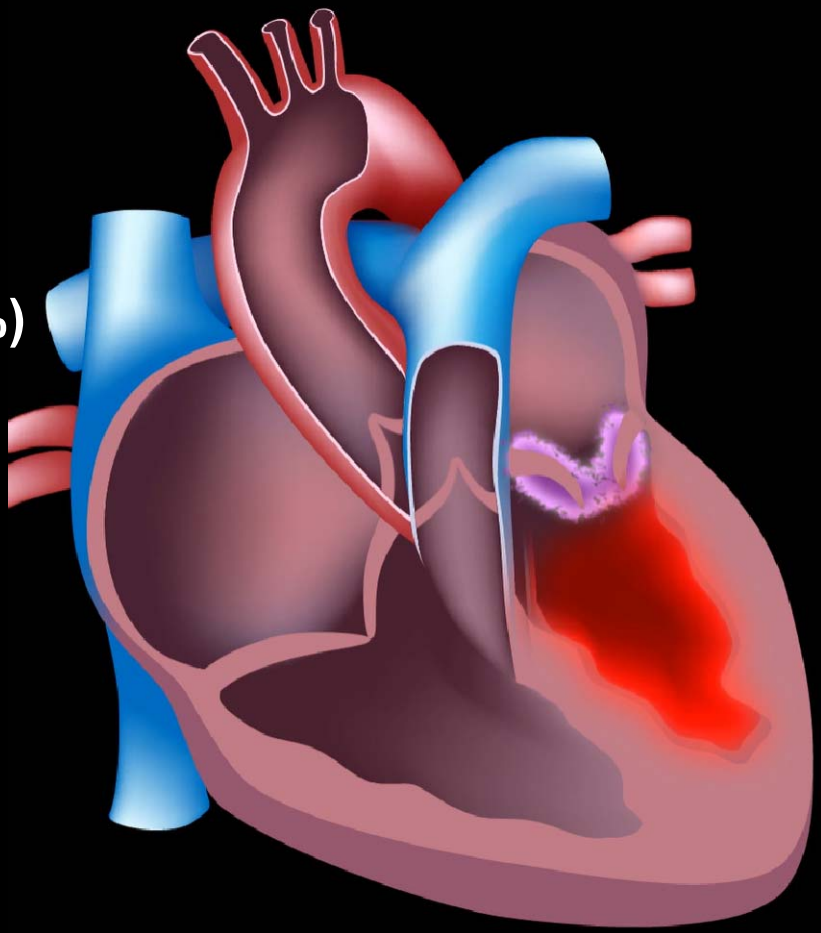
Pathophysiology of Infective endocarditis

- Heart valve dysfunction (in 85% of patients)
- Congestive heart failure (in 30-40%)



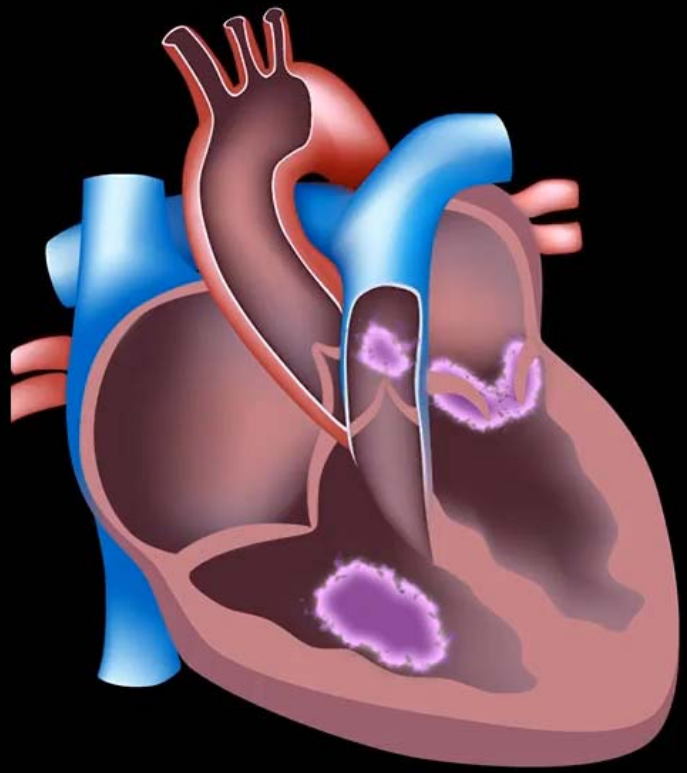
Pathophysiology of Infective endocarditis

- Heart valve dysfunction (in 85% of patients)
- Congestive heart failure (in 30-40%)
- Conduction problems
  - complete heart block



Pathophysiology of Infective endocarditis

- Heart valve dysfunction (in 85% of patients)
- Congestive heart failure (in 30-40%)
- Conduction problems
- Embolism (blocked arteries)
  - Stoke
  - Pulmonary embolism
  - Acute myocardial infarct



Symptom of Infective endocarditis

Fever

Chills

Fatigues

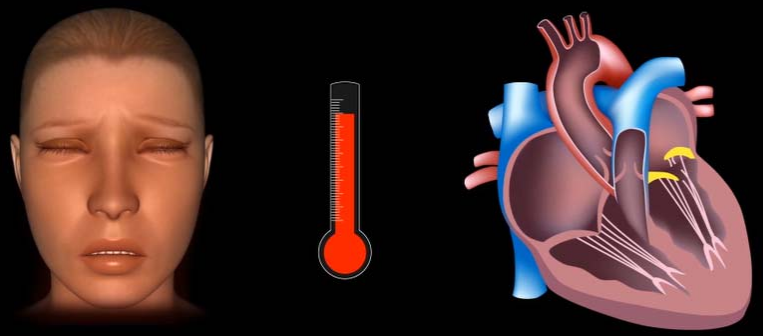
Characteristic spot

Dyspnea or DOE

Pitting edema

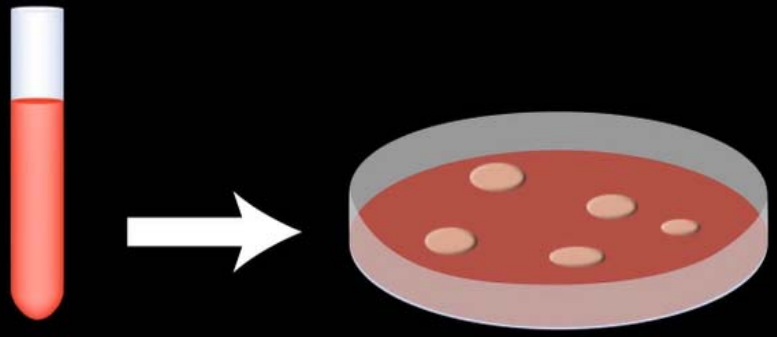
Diagnosis of Infective endocarditis

1. Fever + Heart valve disorder

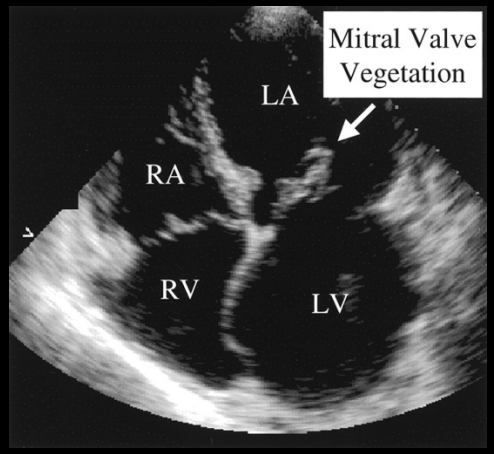


2. Characteristic symptoms

3. Blood culture for evidence of blood infection



4. Imaging to show vegetation



Modified Duke Criteria

MAJOR CRITERIA	minor criteria
1. **Blood culture positive**	
1. Typical microorganisms consistent with IE form 2 separate blood culture: Viridans streptococci, Streptococcus bovis,HACEK groups, S.aureus or community-acquired enterococci 2. Persistently positive blood culture result ; At least 2 positive culture result of blood sample drawn 12hr All of 3 or most of >4 separate culture samples of blood Single positive blood culture result for Coxiella burnetii or	

Modified Duke Criteria

MAJOR CRITERIA	minor criteria
1. **Blood culture positive** 1. **Evidence of endocardial involvement**	
1. Echocardiogram detects vegetation, abscess, or new partial dehiscence of prosthetic valve. 1. New valvular regurgitation or stenosis . 1. Oscillating intracardiac mass on valve or supporting structures	

Modified Duke Criteria

MAJOR CRITERIA	minor criteria
1. **Blood culture positive** 1. **Evidence of endocardial involvement**	1. Predisposing factor 2. Temperature >38 degree 3. Vascular phenomena 4. Immunologic phenomena 5. Microbiologic evidence
1. Intravenous drug use or a predisposing heart condition 3. Major arterial emboli, septic emboli, pulmonary infarcts, mycotic Aneurysm, intracranial	

Janeway lesion

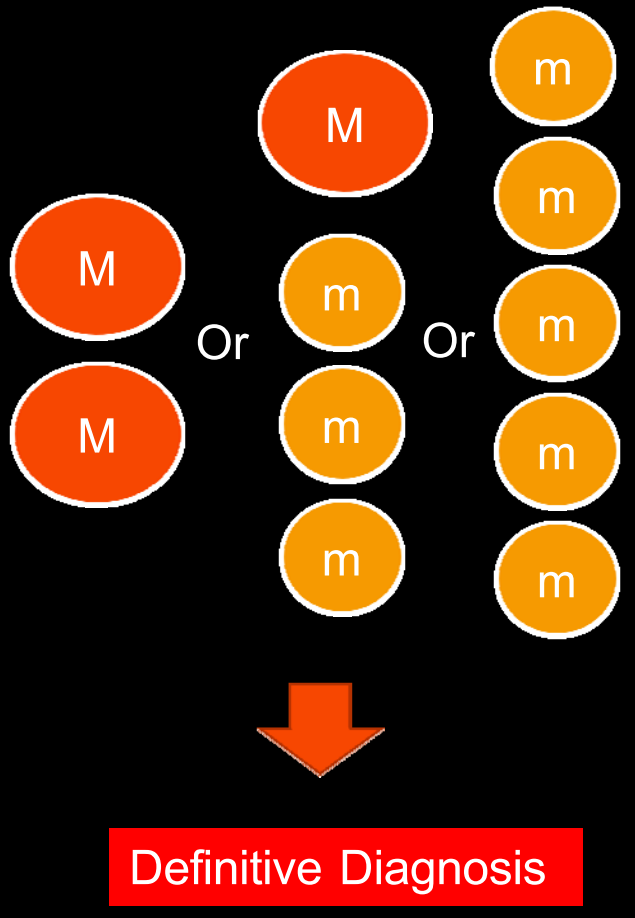
Osler`s node (painful)

Roth`s spot (retinal)

Modified Duke Criteria

MAJOR CRITERIA	minor criteria
1. **Blood culture positive** 1. **Evidence of endocardial involvement**	1. Predisposing factor 2. Temperature >38 degree 3. Vascular phenomena 4. Immunologic phenomena 5. Microbiologic evidence

1. Intravenous drug use or a predisposing heart condition
3. Major arterial emboli, septic emboli, pulmonary infarcts, mycotic Aneurysm, intracranial



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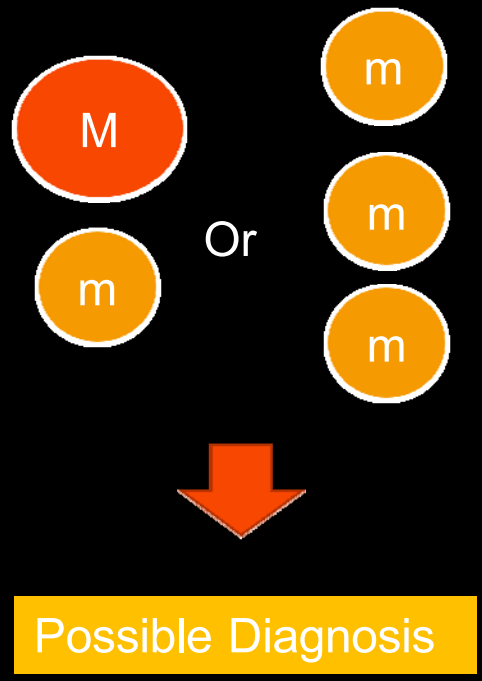
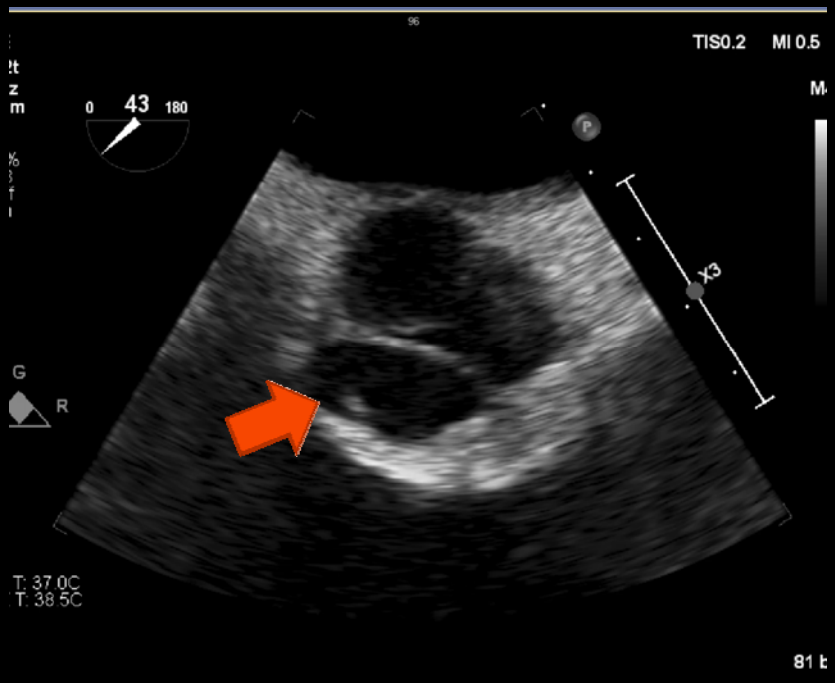


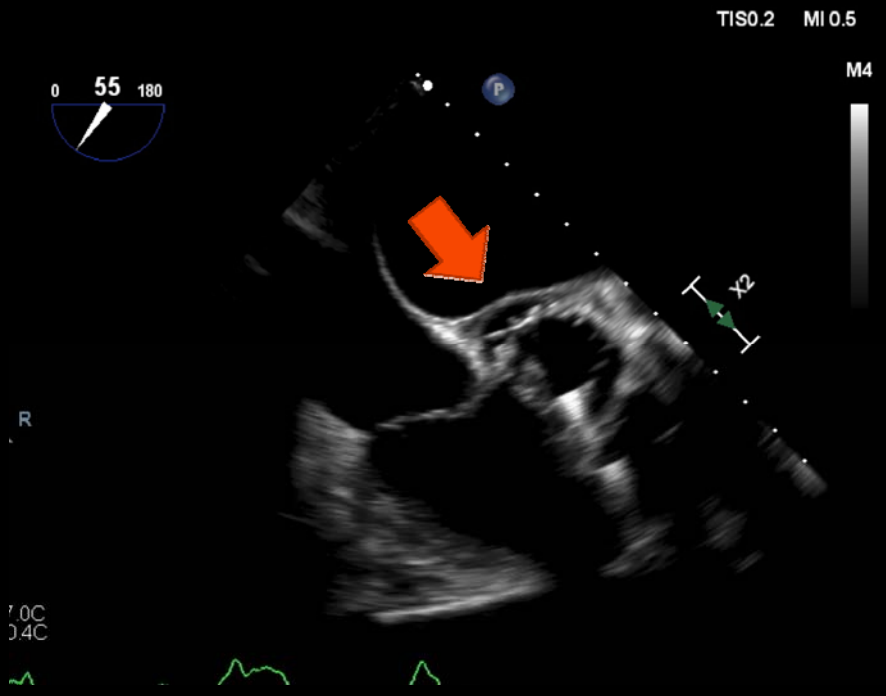
Echocardiography (TTE or TEE)

Clinical and Echocardiographic Features That Suggest Potential Need for Surgical intervention
Vegetation
Persistent vegetation after systemic embolization
Anterior mitral leaflet vegetation, particularly with size > 10mm*
≥1 Embolic events during first 2 weeks of antimicrobial therapy *
Increase vegetation size despite appropriate antimicrobial therapy *
Valvular dysfunction
Acute Aortic or mitral insufficiency with signs of ventricular failure
Heart failure unresponsive to medical therapy
Valve perforation or rupture
Perivalvular extension
Valvular dehiscence, rupture or fistula
New heart block
Large abscess or extension of abscess despite appropriate antimicrobial therpy

Echocardiography (TTE or TEE)

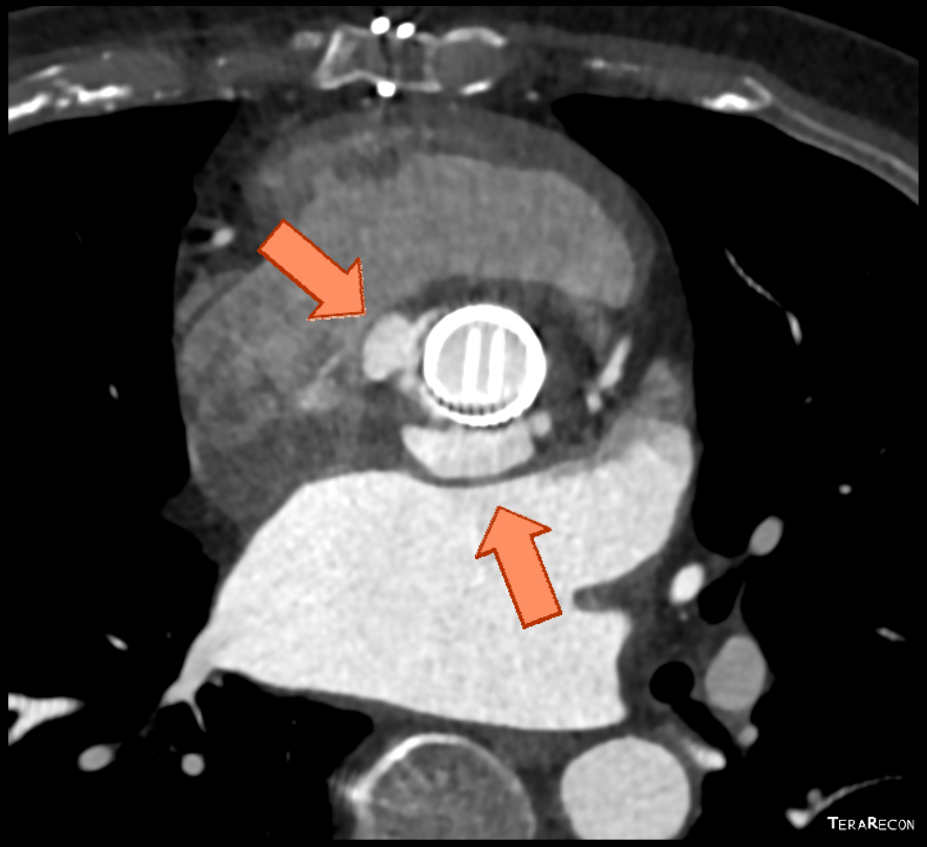


Native valve endocarditis(AV)
Vegetation at leaflet

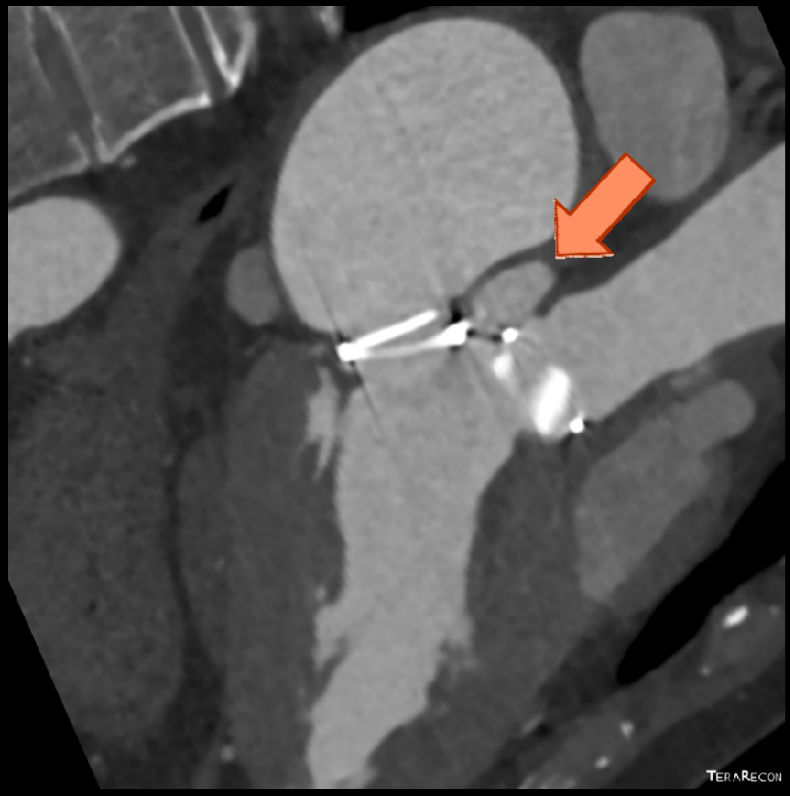


Prosthetic valve endocarditis(AV)
Dehiscence

Cardiac CT for IE

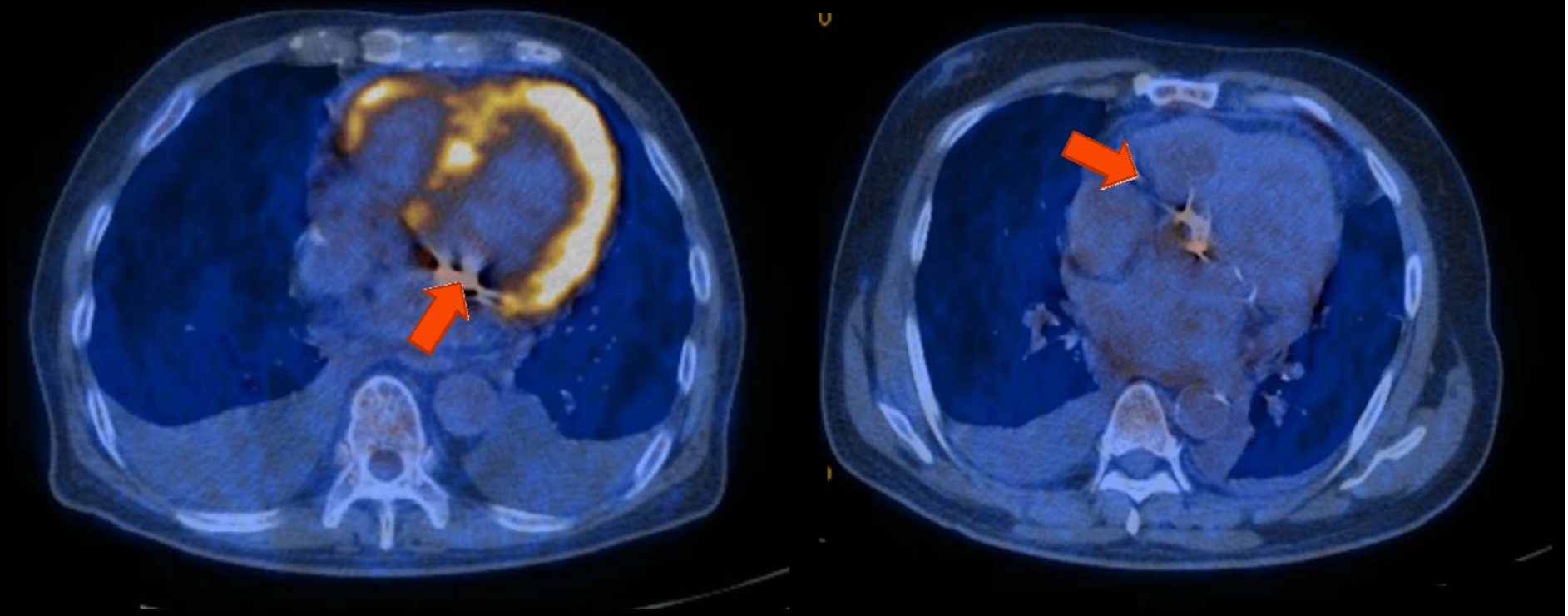


Pseudoaneurysm around prosthetic valve (AV)

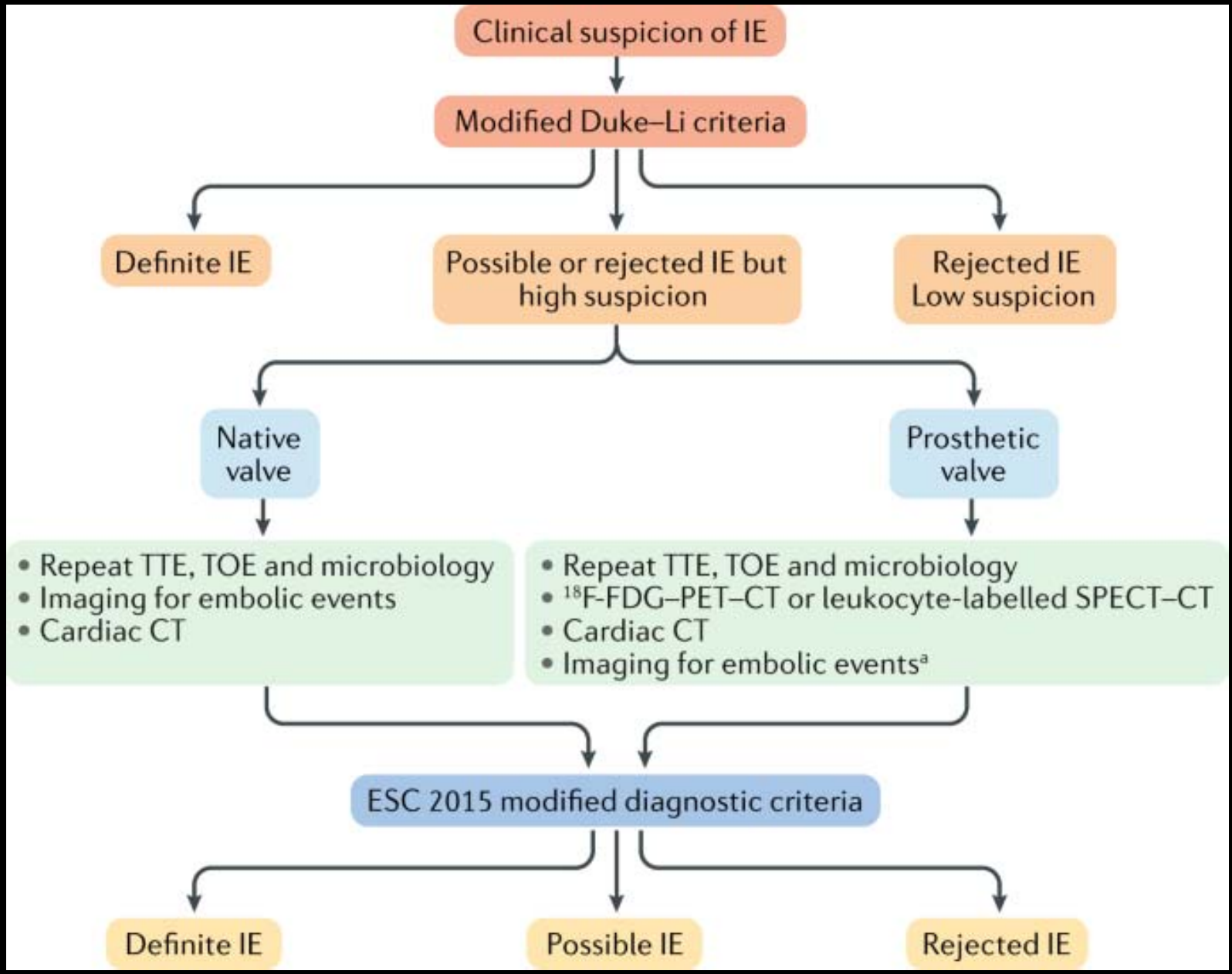


Abscess formation at aortomitral continuity

^{18}F-fluorodeoxyglucose PET/CT

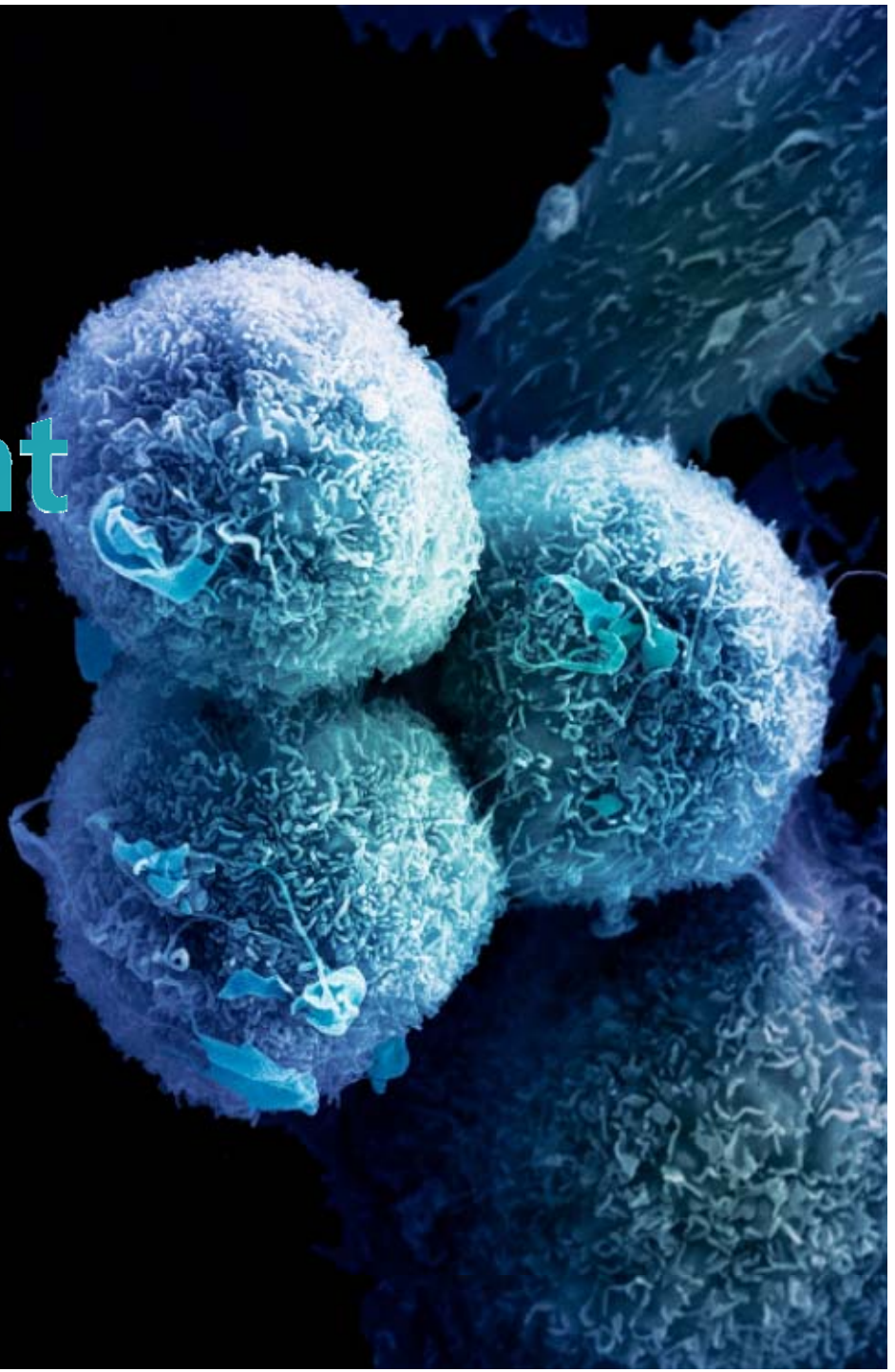


High uptake of FDG at sawing cuff of prosthetic valve

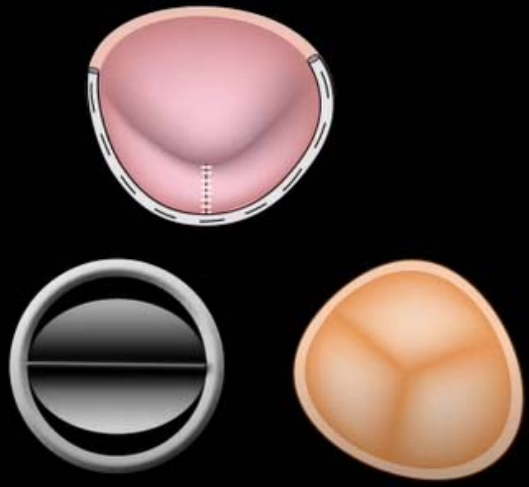

Clinical suspicion of IE
Modified Duke–Li criteria
Definite IE
Possible or rejected IE but high suspicion
Rejected IE Low suspicion
Native valve
Prosthetic valve
• Repeat TTE, TOE and microbiology
• Imaging for embolic events
• Cardiac CT
• Repeat TTE, TOE and microbiology
• 18F-FDG–PET–CT or leukocyte-labelled SPECT–CT
• Cardiac CT
• Imaging for embolic events[a]
ESC 2015 modified diagnostic criteria
Definite IE
Possible IE
Rejected IE

SMC 삼성서울병원

Management of Infective Endocarditis



Treatment of Infection endocarditis



- Empiric antibiotics therapy
- 2 to 8 weeks of IV antibiotic therapy (after identified organism)

- Removal of potential source of infection
- Repair or replace to heart valve

Antibiotic therapy (Empirical)

Antibiotic	Dosage and route	Class[b]	Level[c]	Comments
Community-acquired native valves or late prosthetic valves (≥12 months post surgery) endocarditis				
Ampicillin with (Flu)cloxacillin *or* oxacillin with Gentamicin[d]	12 g/day i.v. in 4–6 doses 12 g/day i.v. in 4–6 doses 3 mg/kg/day i.v. or i.m. in 1 dose	IIa	C	Patients with BCNIE should be treated in consultation with an ID specialist.
Vancomycin[d] with Gentamicin[d]	30–60 mg/kg/day i.v. in 2–3 doses 3 mg/kg/day i.v. or i.m. in 1 dose	IIb	C	For penicillin-allergic patients
Early PVE (<12 months post surgery) or nosocomial and non-nosocomial healthcare associated endocarditis				
Vancomycin[d] with Gentamicin[d] with Rifampin	30 mg/kg/day i.v. in 2 doses 3 mg/kg/day i.v. or i.m. in 1 dose 900–1200 mg i.v. or orally in 2 or 3 divided doses	IIb	C	Rifampin is only recommended for PVE and it should be started 3–5 days later than vancomycin and gentamicin has been suggested by some experts. In healthcare associated native valve endocarditis, some experts recommend in settings with a prevalence of MRSA infections >5% the combination of cloxacillin plus vancomycin until they have the final S. aureus identification

Antibiotic therapy (Empiric therapy)

Table 1

Treatment of IE Caused by Viridans Group Streptococci and *Streptococcus bovis

Native-Valve IE	Drug Regimen	Duration of Therapy (weeks)
Penicillin-susceptible (MIC ≤0.12 mcg/mL)	Penicillin G sodium 12 to 18 million U continuous infusion over 24 hours or divided into four or six equal IV doses per 24 hours **OR**	4
	Ceftriaxone 2 g in one dose every 24 hours IV/IM **OR**	4
	Penicillin G sodium 12 to 18 million U continuous infusion over 24 hours or in six equal doses IV per 24 hours **OR**	2
	Ceftriaxone 2 g in one dose every 24 hours IV/IM **PLUS** gentamicin 3 mg/kg in one dose every 24 hours IV/IM **OR**	2 2
	Vancomycin 15 mg/kg every 12 hours IV	4
Penicillin, relatively resistant (MIC >0.12 to ≤0.5 mcg/mL)	Penicillin G sodium 24 million U continuous infusion over 24 hours or divided into four or six equal IV doses per 24 hours **OR**	4
	Ceftriaxone 2 g in one dose every 24 hours IV/IM **PLUS** gentamicin 3 mg/kg in one dose every 24 hours IV/IM **OR**	4 2
	Vancomycin 15 mg/kg every 12 hours IV	4
Prosthetic-Valve IE		
Penicillin-susceptible (MIC ≤0.12 mcg/mL)	Penicillin G sodium 24 million U continuous infusion over 24 hours or divided into four or six equal IV doses per 24 hours **OR**	6
	Ceftriaxone 2 g in one dose every 24 hours IV/IM with or without gentamicin 3 mg/kg in one dose every 24 hours IV/IM **OR**	6 2
	Vancomycin 15 mg/kg every 12 hours IV	6
Penicillin, relatively or fully resistant (MIC >0.12 mcg/mL)	Penicillin G sodium 24 million U continuous infusion over 24 hours or divided into four or six equal IV doses per 24 hours **OR**	6
	Ceftriaxone 2 g in one dose every 24 hours IV/IM **PLUS** gentamicin 3 mg/kg in one dose every 24 hours IV/IM **OR**	6 6
	Vancomycin 15 mg/kg every 12 hours IV	6

** Dosage for normal renal function. Source: Adapted from reference 7.*

Table 2

Treatment of IE Caused by the *Staphylococcus* Species*

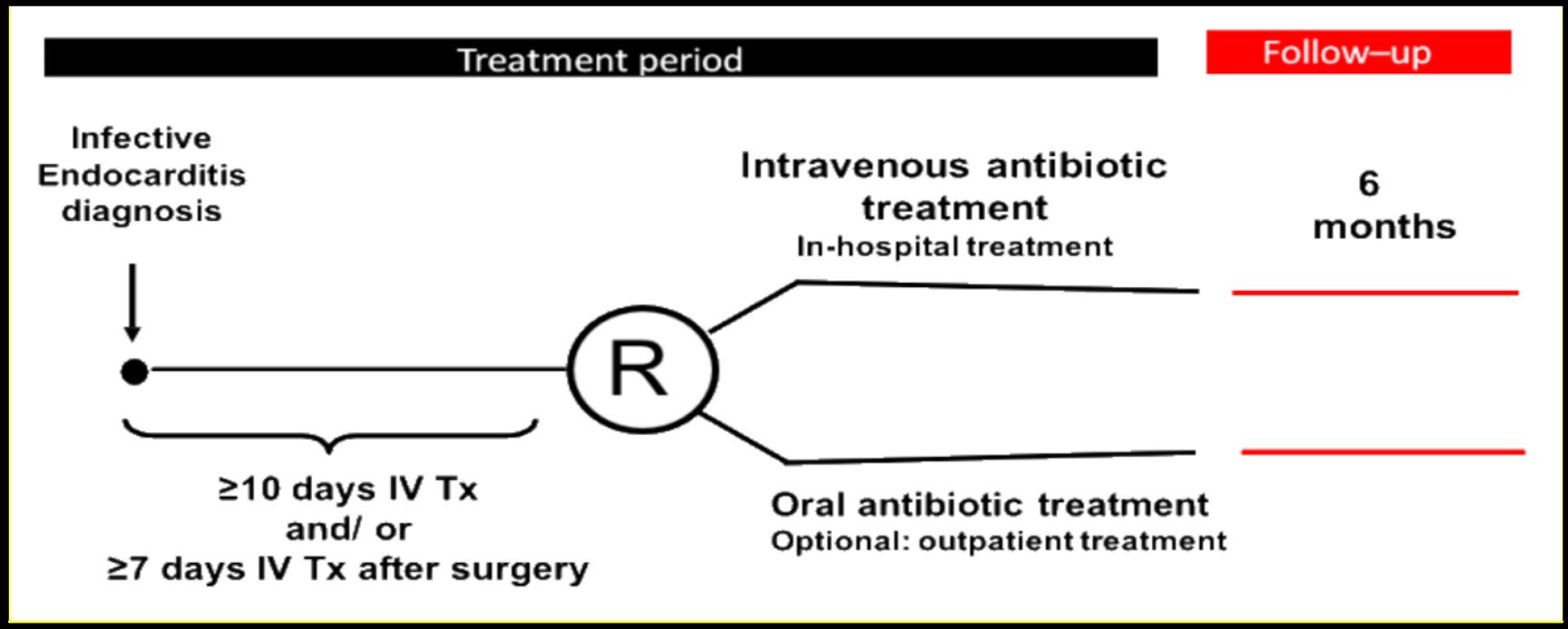
Native-Valve IE	Drug Regimen	Duration of Therapy (weeks)
Oxacillin-susceptible	Nafcillin or oxacillin 12 g divided in four to six equal doses per 24 hours IV **PLUS** optional gentamicin 3 mg/kg in two to three equal doses per 24 hours IV/IM	6 3 to 5 days
	If allergic (nonanaphylactoid) to penicillins, consider: Cefazolin 2 g every eight hours IV **PLUS** optional gentamicin 3 mg/kg in two to three equal doses per 24 hours IV/IM	6 3 to 5 days
Oxacillin-resistant	Vancomycin 15 mg/kg every 12 hours IV	6
Prosthetic-Valve IE		
Oxacillin-susceptible	Nafcillin or oxacillin 2 g every four hours IV **PLUS** rifampin 300 mg every eight hours IV/PO **PLUS** gentamicin 3 mg/kg in two to three equal doses per 24 hours IV/IM	≥6 ≥6 2
Oxacillin-resistant	Vancomycin 15 mg/kg every 12 hours IV **PLUS** rifampin 300 mg every eight hours IV/PO **PLUS** gentamicin 3 mg/kg in two to three equal doses per 24 hours IV/IM	≥6 ≥6 2

** Dosage for normal renal function. Source: Adapted from reference 7.*

Empirical IV antibiotics therapy during 4-6 weeks
(maintained over 8weeks for Enterococci species)

Partial Oral Treatment of Endocarditis (POET) trial

- Stable, native,, left-side of heart endocarditis
- Streptococci, E.faecalis, S. aureus or coagulase-negative staphylococci
- Death, unplanned cardiac surgery, embolic event, relapse of positive blood culture after 6months



Partial Oral Treatment of Endocarditis (POET) trial

- Stable, native,, left-side of heart endocarditis
- Streptococci, E.faecalis, S. aureus or coagulase-negative staphylococci
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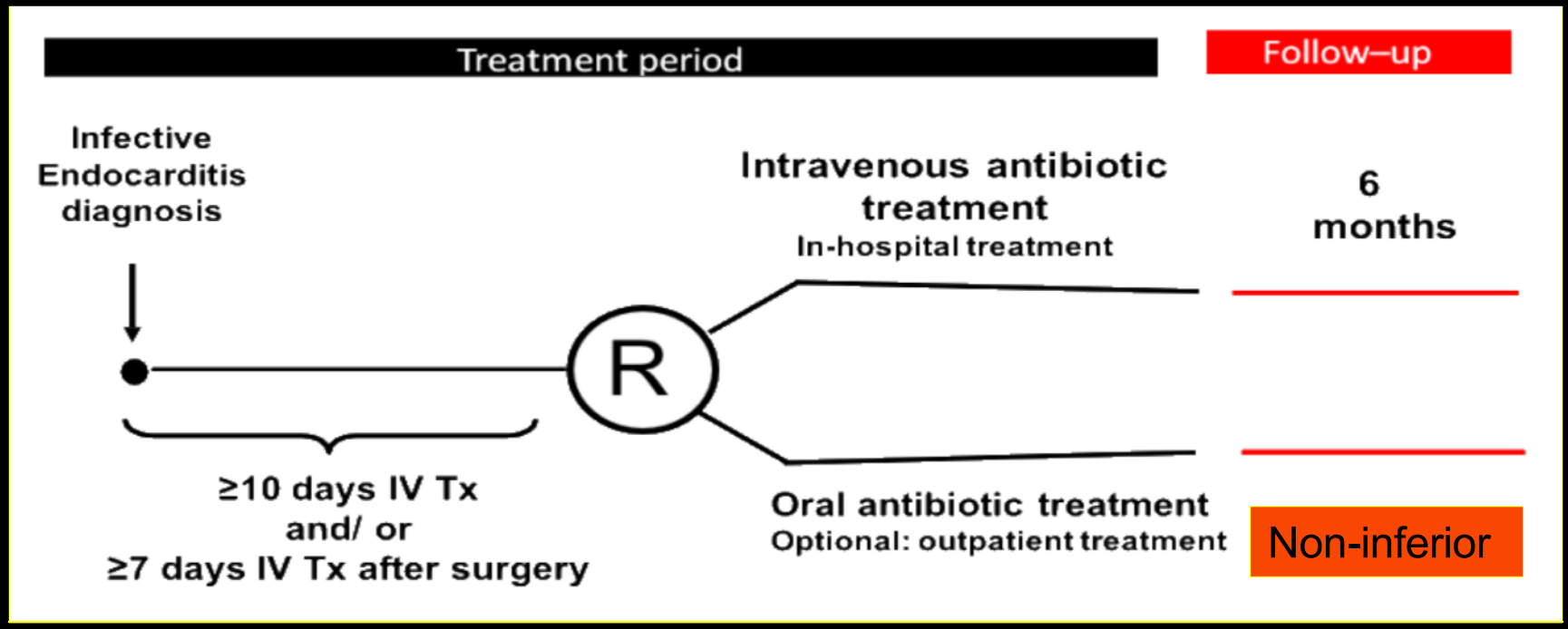
Table. Oral Antibiotic Regimens Recommended in the POET Trial

PENICILLIN- AND METHICILLIN-SUSCEPTIBLE *STAPHYLOCOCCUS AUREUS* AND COAGULASE-NEGATIVE STAPHYLOCOCCI	METHICILLIN-RESISTANT COAGULASE-NEGATIVE STAPHYLOCOCCI	*ENTEROCOCCUS FAECALIS*	STREPTOCOCCI WITH PENICILLIN MIC <1 MG/L	STREPTOCOCCI WITH PENICILLIN MIC >1 MG/L
Amoxicillin 1 g 4 times a day and fusidic acid 0.75 g 2 times a day	Linezolid 600 mg 2 times a day and fusidic acid 0.75 g 2 times a day	Amoxicillin 1 g 4 times a day and rifampin 600 mg 2 times a day	Amoxicillin 1 g 4 times a day and rifampin 600 mg 2 times a day	Linezolid 600 mg 2 times a day and rifampin 600 mg 2 times a day
Amoxicillin 1 g 4 times a day and rifampin 600 mg 2 times a day	Linezolid 600 mg 2 times a day and rifampin 600 mg 2 times a day	Amoxicillin 1 g 4 times a day and moxifloxacin 400 mg 1 time a day	Linezolid 600 mg 2 times a day and rifampin 600 mg 2 times a day	Moxifloxacin 400 mg 1 time a day and rifampin 600 mg 2 times a day
Linezolid 600 mg 2 times a day and fusidic acid 0.75 g 2 times a day		Linezolid 600 mg 2 times a day and rifampin 600 mg 2 times a day	Linezolid 600 mg 2 times a day and moxifloxacin 400 mg 1 time a day	Moxifloxacin 400 mg 1 time a day and clindamycin 600 mg 3 times a day
Linezolid 600 mg 2 times a day and rifampin 600 mg 2 times a day		Linezolid 600 mg 2 times a day and moxifloxacin 400 mg 1 time a day		

MIC indicates minimum inhibitory concentration.

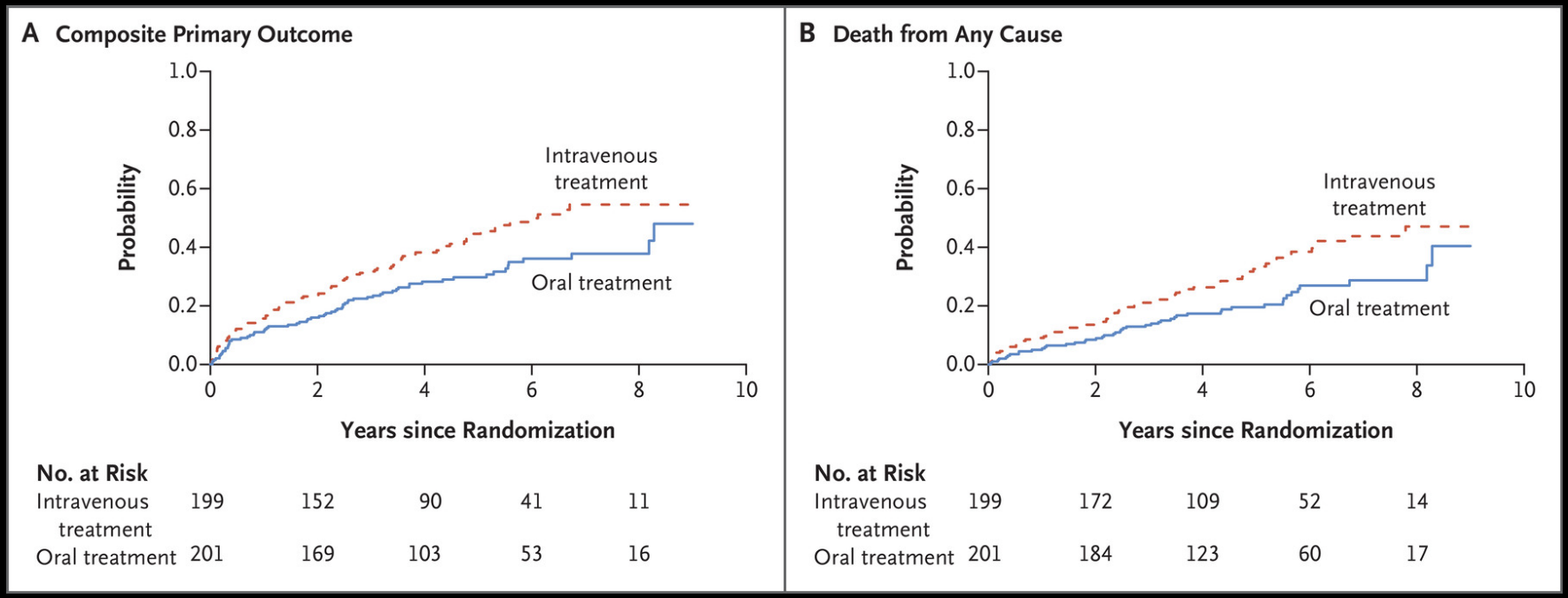
Partial Oral Treatment of Endocarditis (POET) trial

- Stable, native,, left-side of heart endocarditis
- Streptococci, E.faecalis, S. aureus or coagulase-negative staphylococci
- Death, unplanned cardiac surgery, embolic event, relapse of positive blood culture after 6months

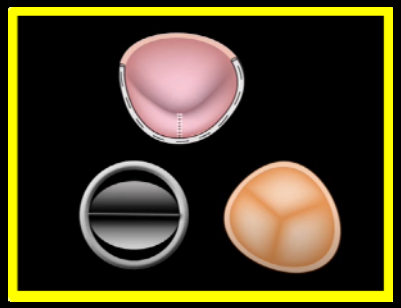


Partial Oral Treatment of Endocarditis (POET) trial

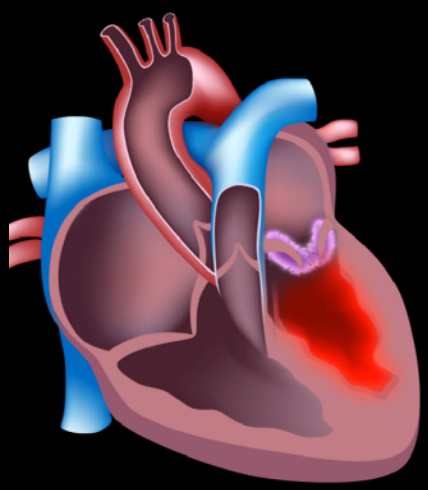
- Stable, native,, left-side of heart endocarditis
- Streptococci, E.faecalis, S. aureus or coagulase-negative staphylococci
- Randomized trial (IV antibiotics vs oral medication)



Indication for surgery



1. Heart failure

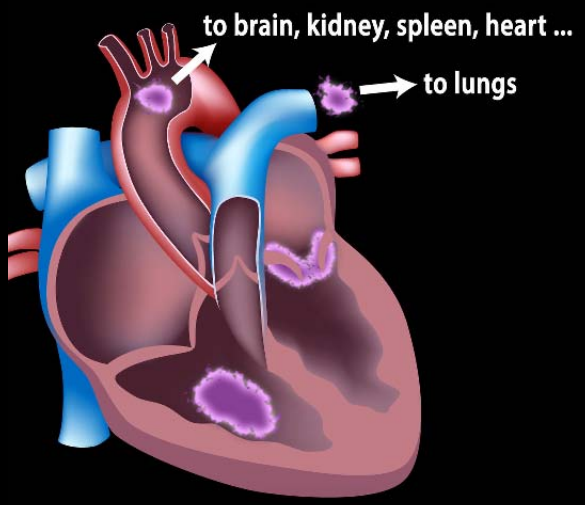


Valvular dysfunction
Dehiscence of prosthetic valve
Fistula

2. Uncontrolled infection

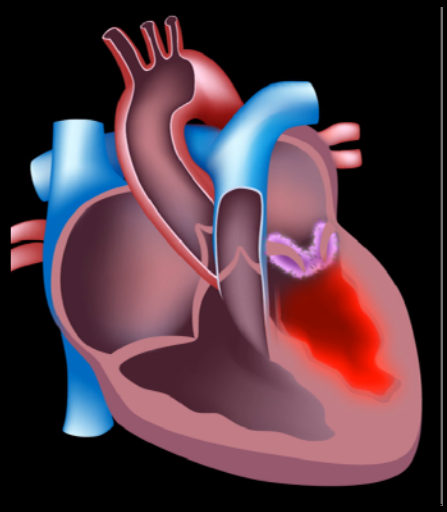
Failed antibiotics

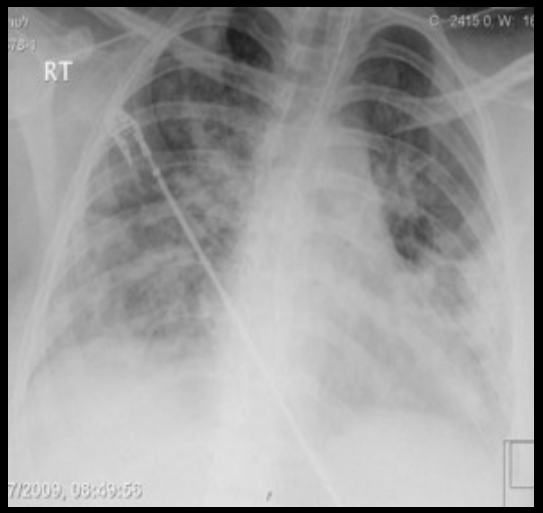
3. Prevention of embolism

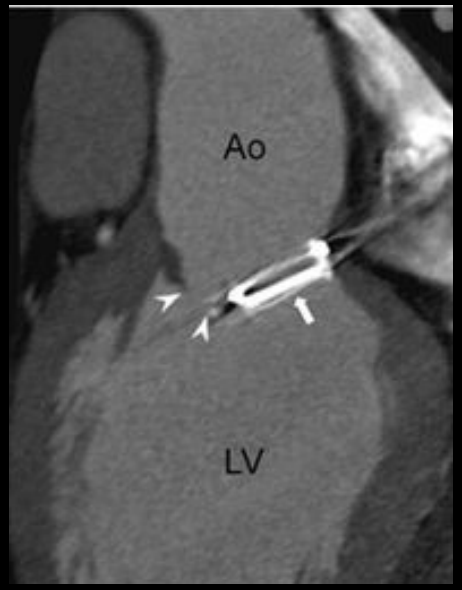


Recurrent embolism
With large vegetation

Indication for surgery



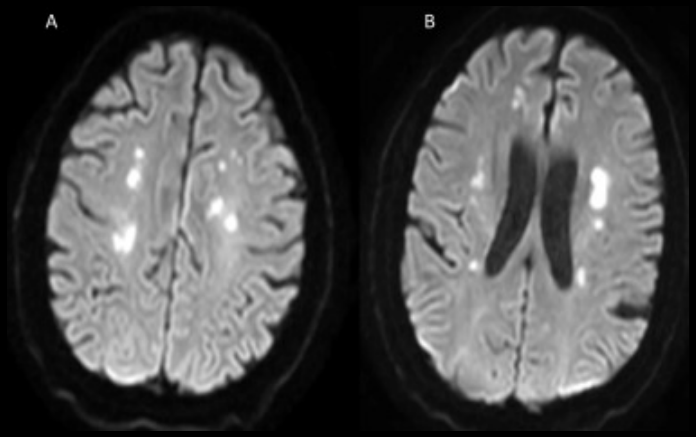


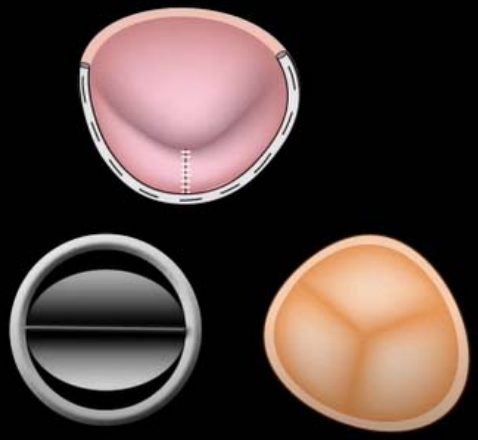


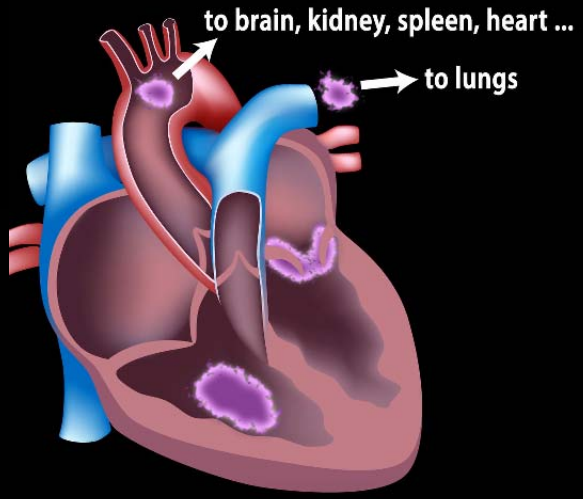
Valvular dysfunction with heart failure

Dehiscence of prosthetic valve

Indication for surgery

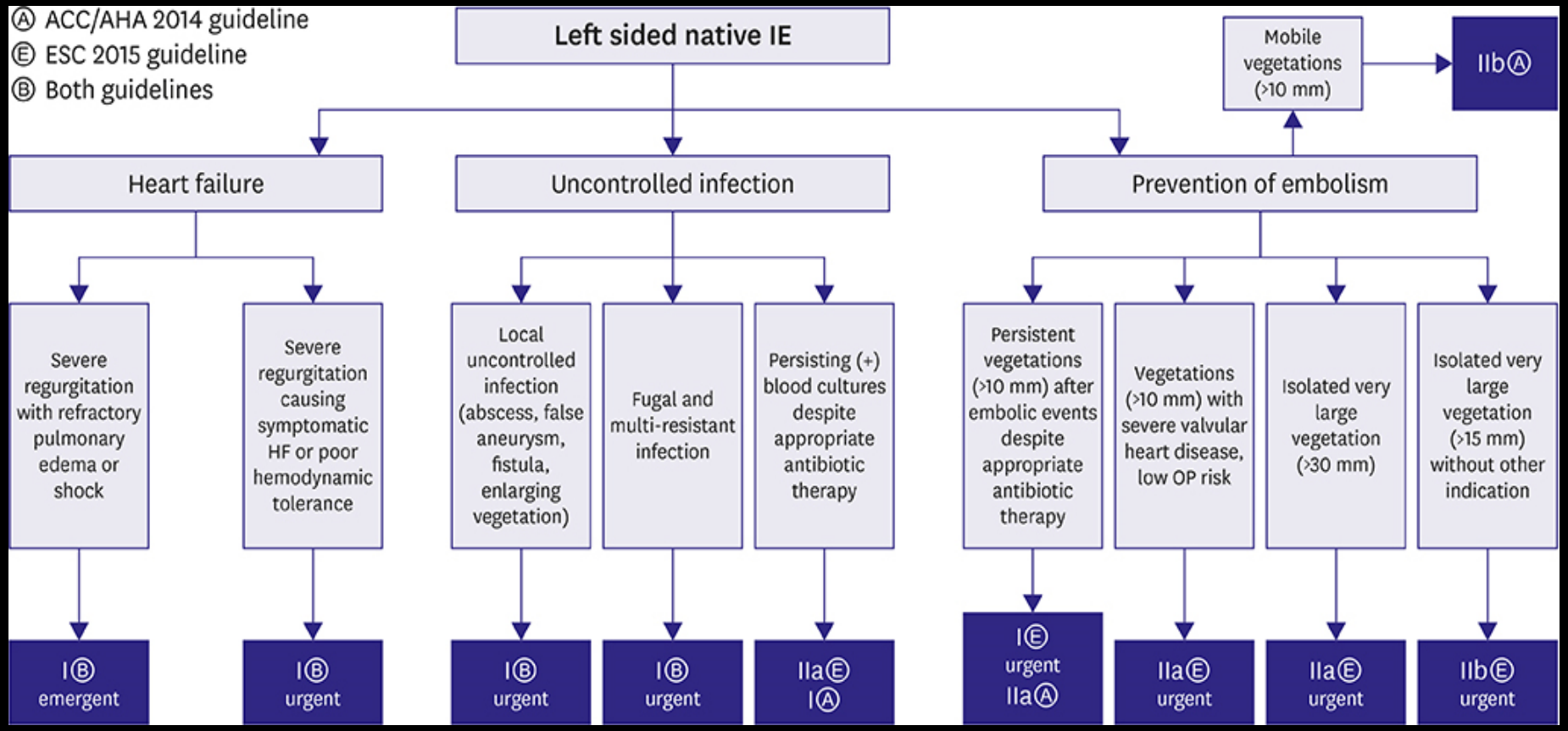






Recurrent embolism With large vegetation at intracardiac structure

Indication for early surgery

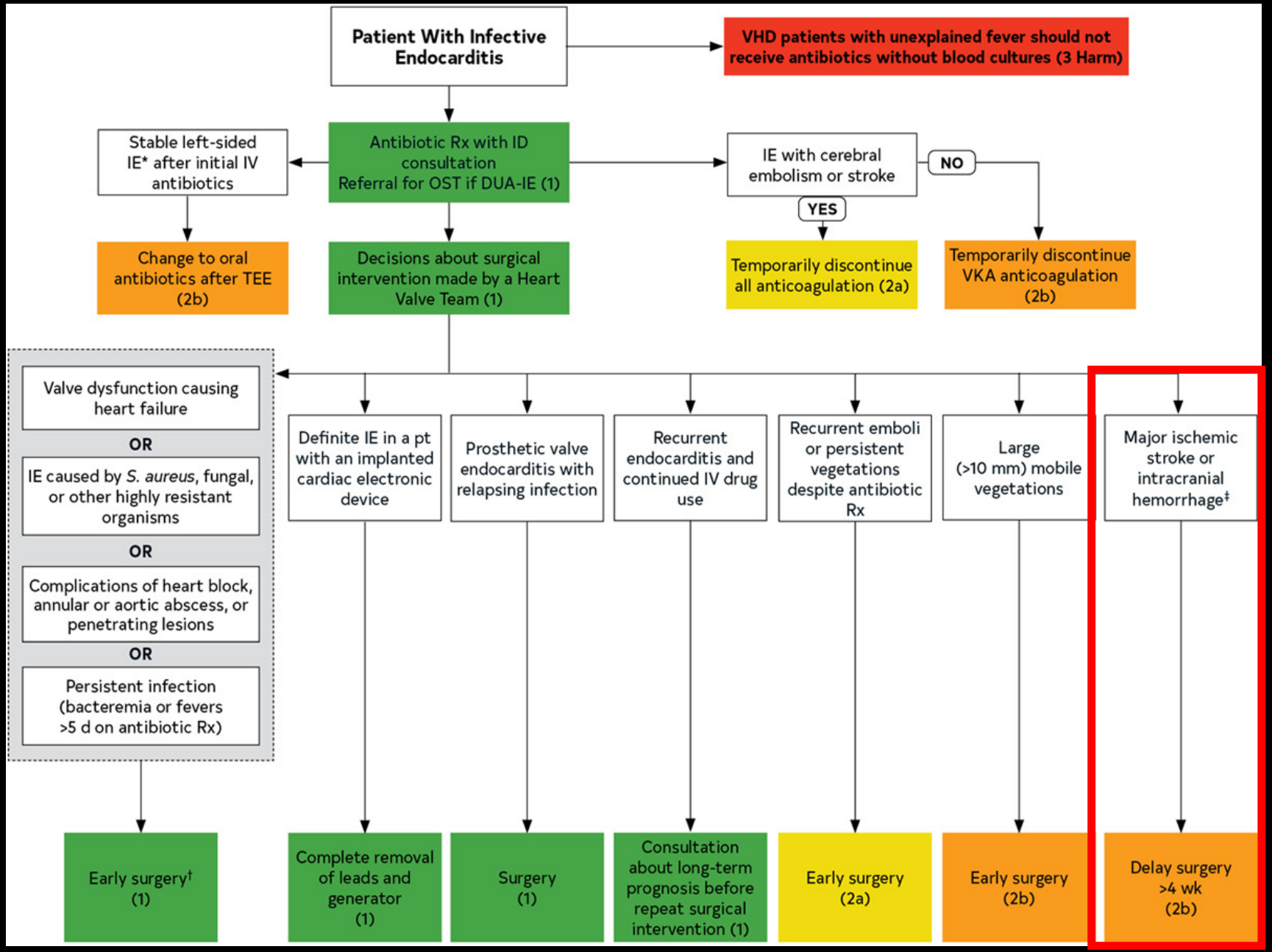


Early surgery in valvular heart disease KAMJE v48.(11)

Indication for early surgery

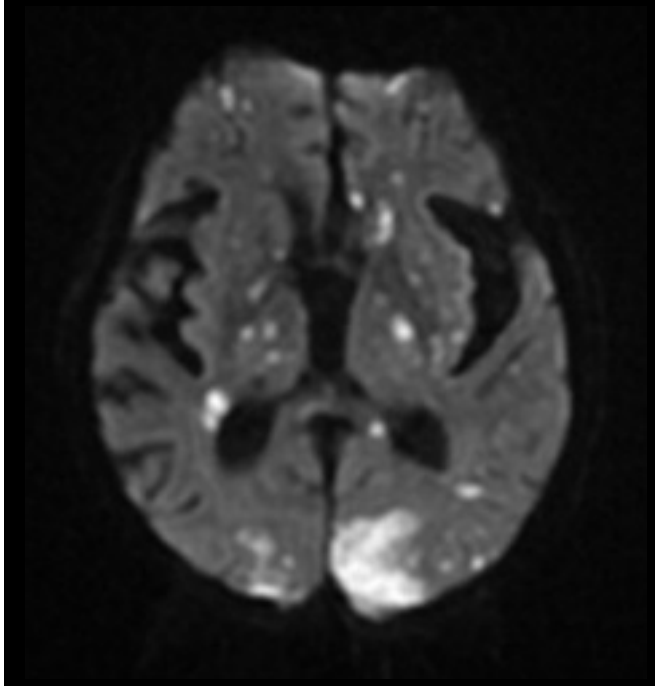
L-Sided NATIVE Valve IE	R-Sided NATIVE Valve IE	Prosthetic Valve IE
IE-associated valve dysfunction -> symptomatic left-sided heart failure. • Often MR or AR	Very large vegetations (>/= 20 mm diameter)	IE-associated symptomatic heart failure 2/2 valve dehiscence, intracardiac fistula, or severe prosthetic valve dysfunction.
Paravalvular extension of infection. • Annular or Aortic Abscess • Fistula • Heart Block • Destructive Penetrating Lesions	Recurrent septic pulmonary emboli	Paravalvular extension of infection. • Annular or Aortic Abscess • Fistula • Heart Block • Destructive Penetrating Lesions
Difficult-to-Treat Pathogens: • Fungi: *Candida, Aspergillus* • MDRO: *Pseudomonas aeruginosa*, Vancomycin-Resistant *Enterococcus*.	Presence of highly-resistant organism	Difficult-to-Treat Pathogens: • Fungi: *Candida, Aspergillus* • MDRO: *Pseudomonas aeruginosa*, Vancomycin-Resistant *Enterococcus*.
Persistent Infection: • *Persistent bacteremia or fever >/= 7 days after initiation of appropriate abx therapy, and no other etiology of infection identified.*	Persistent bacteremia	Persistent Infection: • *Persistent bacteremia or fever >/= 7 days after initiation of appropriate abx therapy, and no other etiology of infection identified.*
Recurrent emboli and persistent/enlarging vegetations despite appropriate abx.		Recurrent emboli despite appropriate abx / Relapsing PVE
Severe valve regurgitation and mobile vegetation >10 mm (esp. if anterior leaflet of mitral valve).		Mobile vegetations > 10 mm.

Surgical management of Infective endocarditis
Circulation v132, issue 15, 1435-1486



2020 AHA guideline for valvular heart disease

Management of neurologic complication



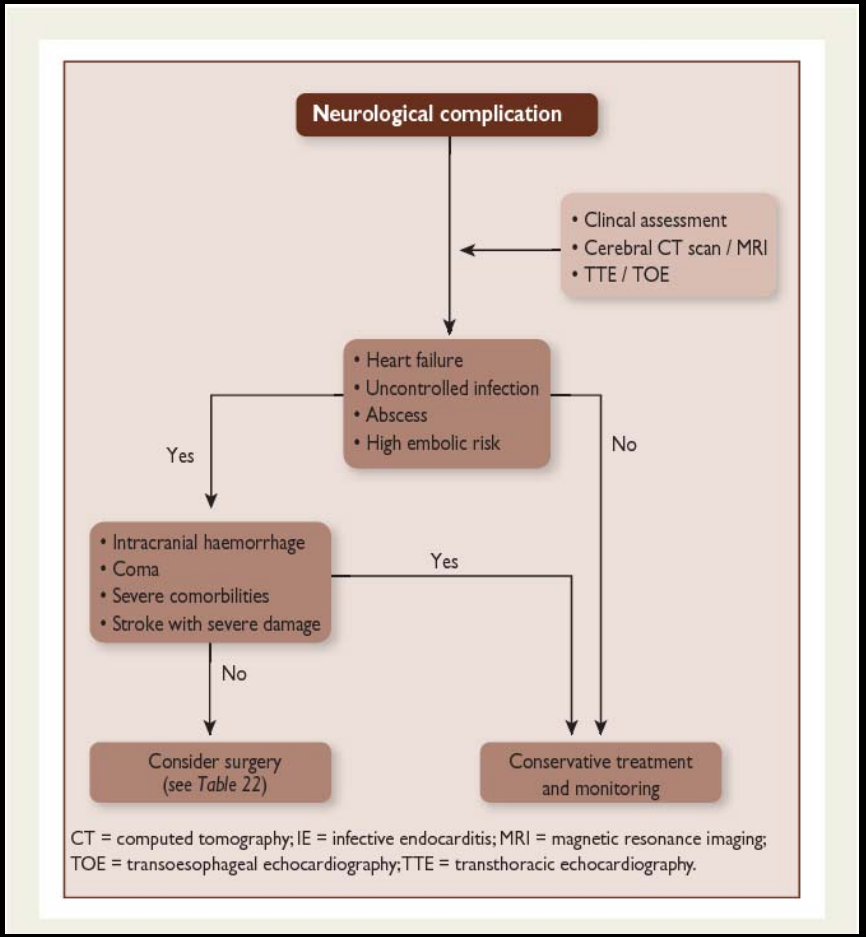
Cerebral infarct
(stoke)

Cerebral hemorrhage
(mycotic Aneurysm)

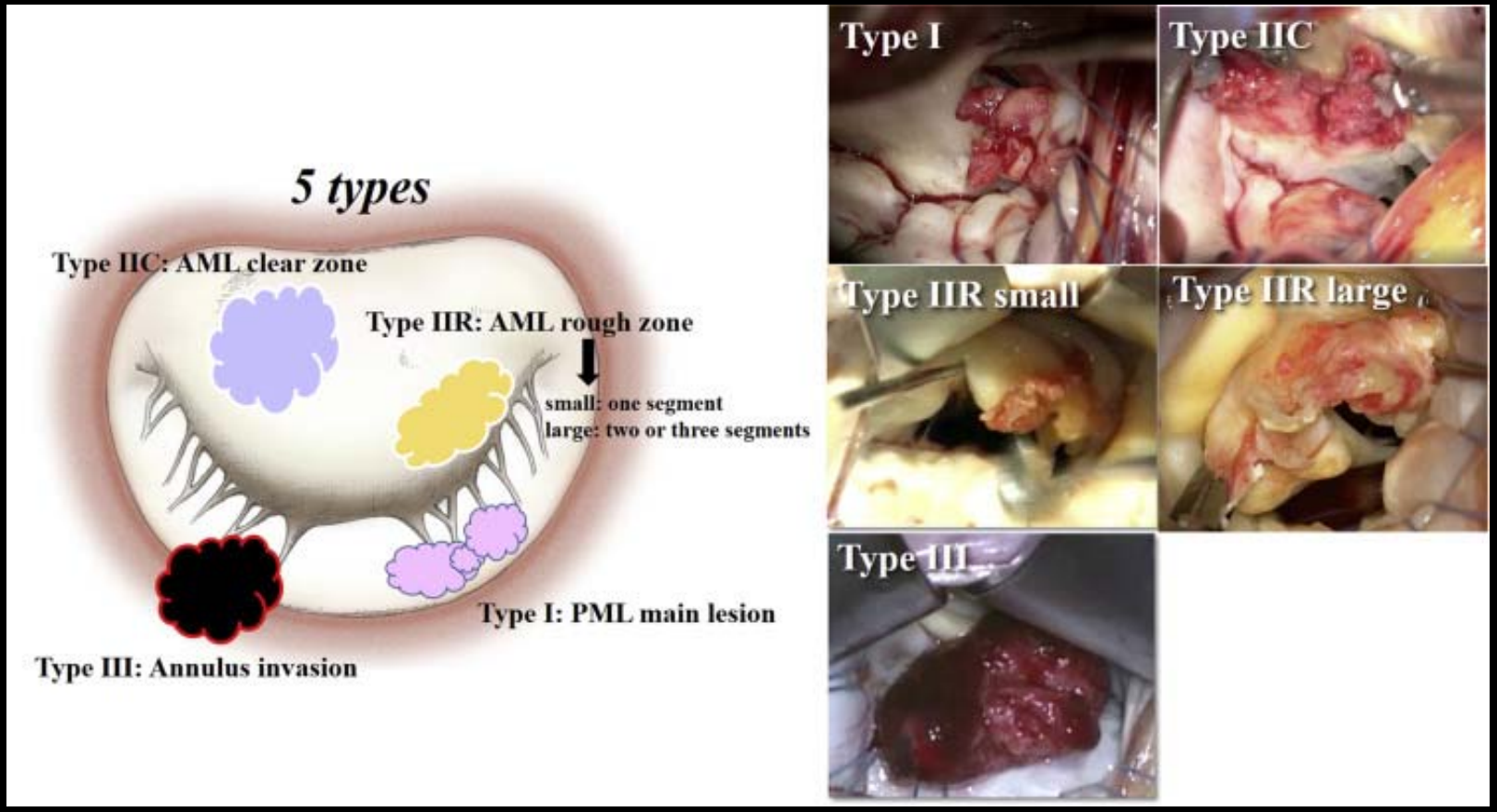
Brain abscess
Meningitis

Management of neurologic complication

Recommendations	Class[a]	Level[b]	Ref.[c]
After a silent embolism or transient ischaemic attack, cardiac surgery, if indicated, is recommended without delay	I	B	105, 263
Neurosurgery or endovascular therapy is recommended for very large, enlarging or ruptured intracranial infectious aneurysms	I	C	
Following intracranial haemorrhage, surgery should generally be postponed for ≥1 month	IIa	B	264–266
After a stroke, surgery indicated for HF, uncontrolled infection, abscess, or persistent high embolic risk should be considered without any delay as long as coma is absent and the presence of cerebral haemorrhage has been excluded by cranial CT or MRI	IIa	B	9,263
Intracranial infectious aneurysms should be looked for in patients with IE and neurological symptoms. CT or MR angiography should be considered for diagnosis. If non-invasive techniques are negative and the suspicion of intracranial aneurysm remains, conventional angiography should be considered	IIa	B	267, 268

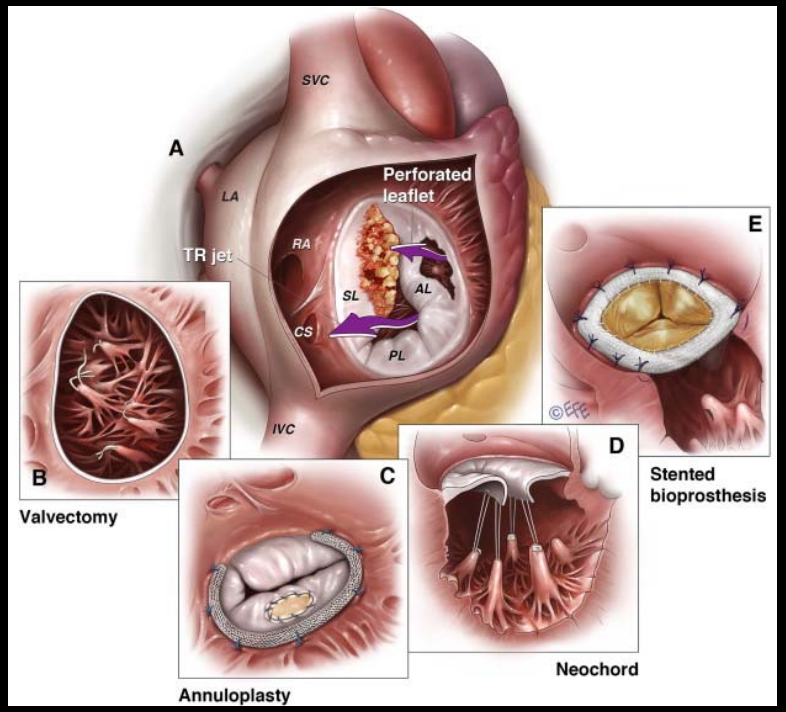


Various condition of infective endocarditis



Impact of lesion localization on durability of mitral valve in infective endocarditis, Ann of Thorac Surg 2020;109:1335-42

Goal of surgery



- **Valve replacement**
  - Mechanical valve
  - Tissue valve
  - Homograft
- **Valve repair**
- **Patch closure etc…..**

1. **Infected source or material and Vegetation removal**

2. **Reconstruction of destroyed structure (ex. aortomitral continuity)**

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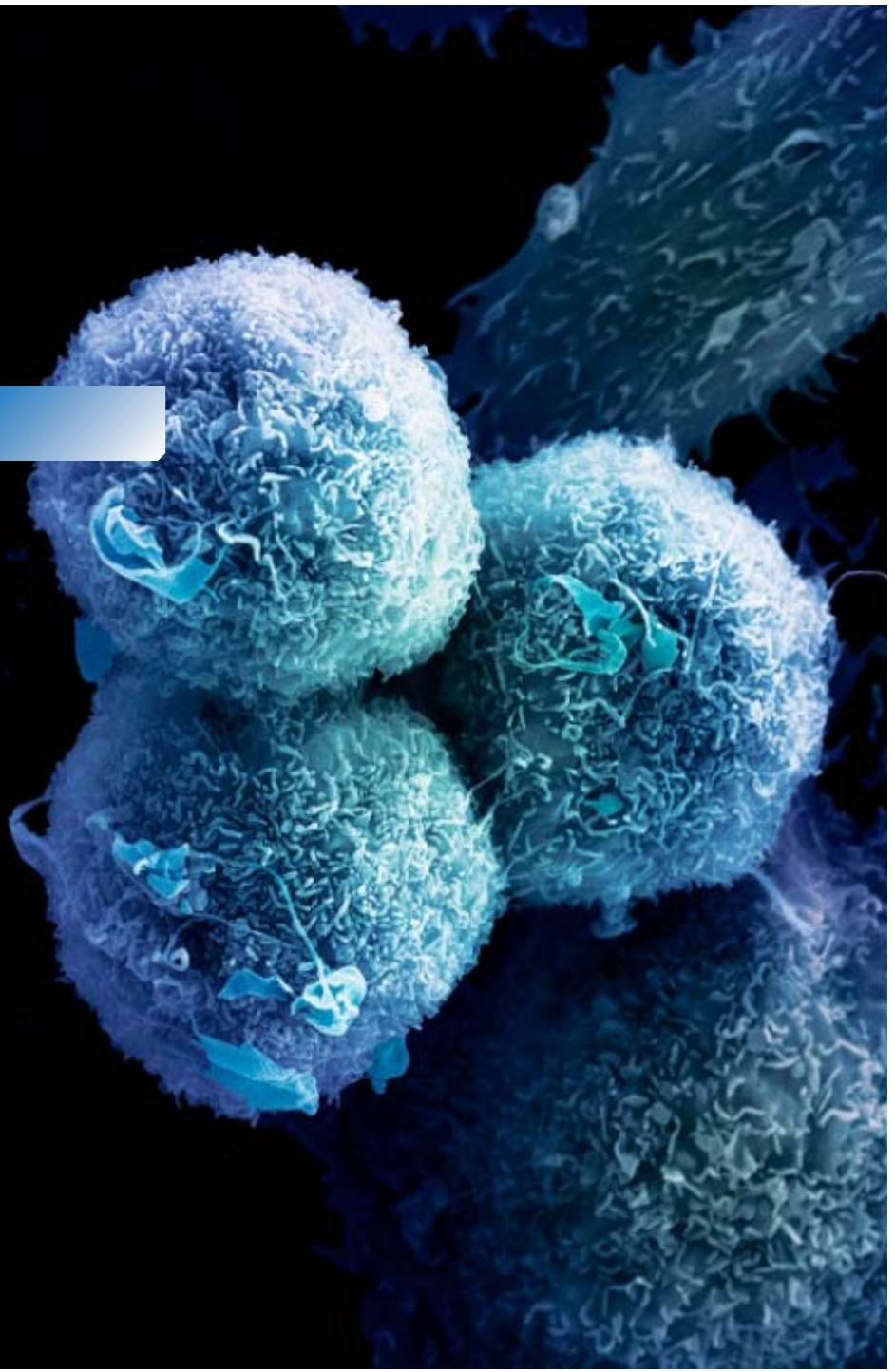
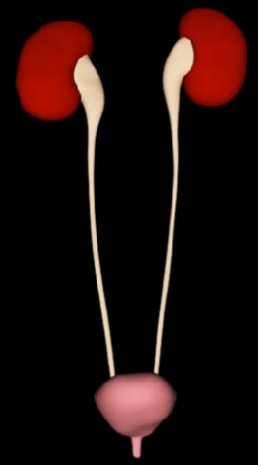
Prophylactic for IE

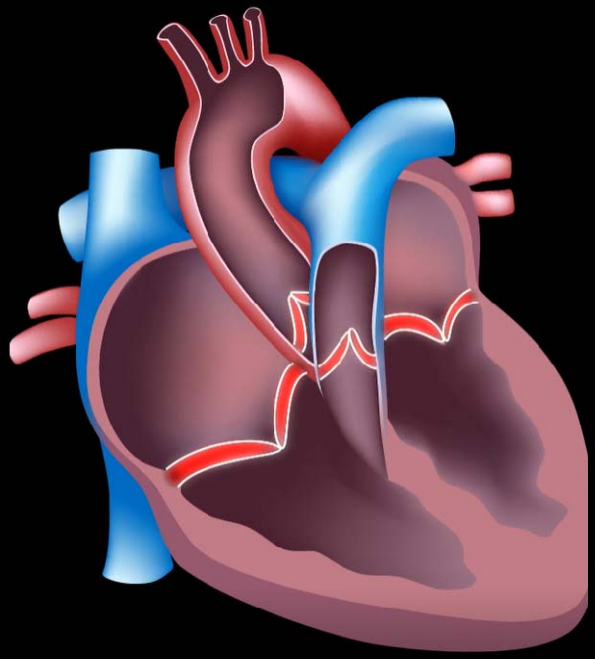


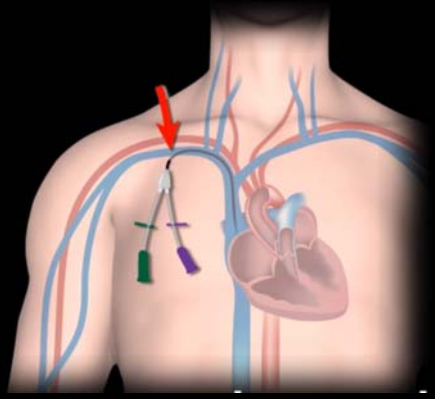
Source of Infective Endocarditis

Skin abscess

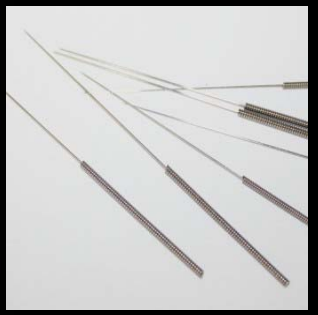


UTI





Contaminated central line

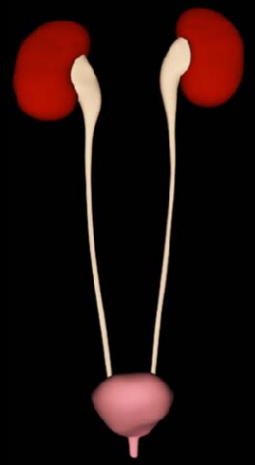


Drug injection or acupuncture

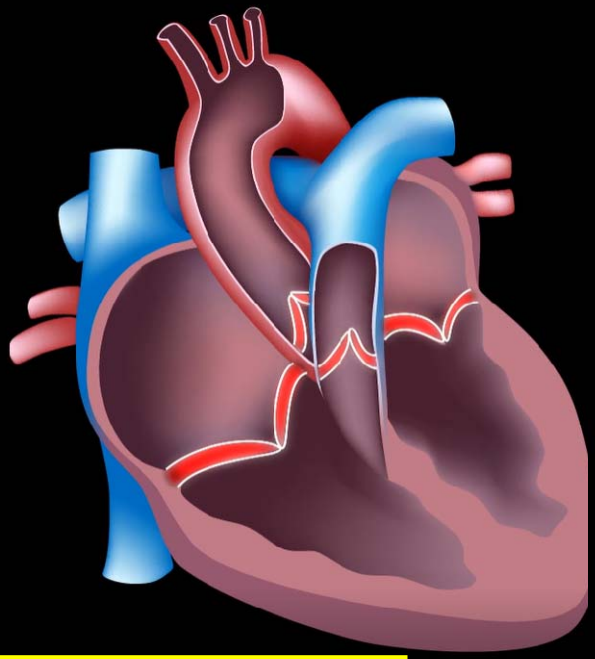
Dental procedures
Or brushing

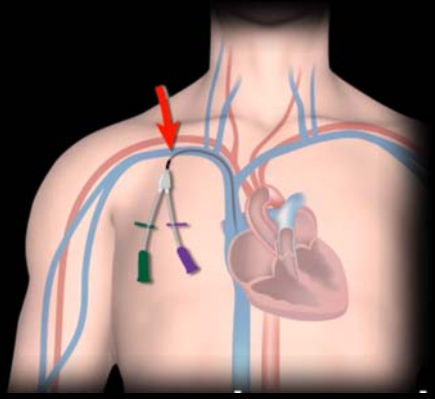
Source of Infective Endocarditis

Skin abscess

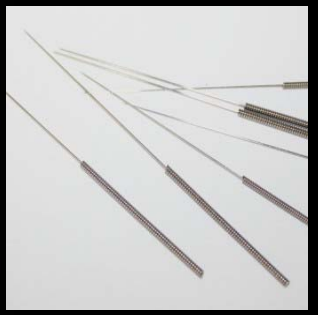


UTI





Contaminated central line



Drug injection or acupuncture

Dental procedures
Or brushing
(S. viridians)

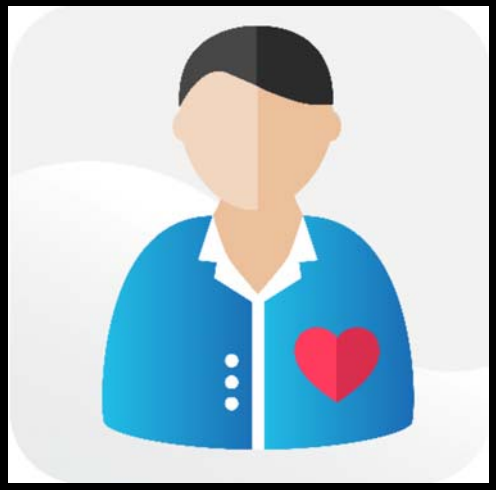
Prophylactic antibiotic before Dental procedure

Who?

When?

How?

Prophylactic antibiotic before Dental procedure



1. **Prosthetic cardiac valve or prosthetic material used for cardiac valve repair or other implantable cardiac devices**

1. **Recurrent or relapse IE**

1. **Congenital heart disease**

1. **Cardiac transplantation**

2021 AHA statement on prevention of infective endocarditis

High risk population (Indication)

Table 3. AP for a Dental Procedure: Underlying Conditions for Which AP Is Suggested

Prosthetic cardiac valve or material
Presence of cardiac prosthetic valve
Transcatheter implantation of prosthetic valves
Cardiac valve repair with devices, including annuloplasty, rings, or clips
Left ventricular assist devices or implantable heart
Previous, relapse, or recurrent IE
CHD
Unrepaired cyanotic congenital CHD, including palliative shunts and conduits.
Completely repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by transcatheter during the first 6 mo after the procedure
Repaired CHD with residual defects at the site of or adjacent to the site of a prosthetic patch or prosthetic device
Surgical or transcatheter pulmonary artery valve or conduit placement such as Melody valve and Contegra conduit
Cardiac transplant recipients who develop cardiac valvulopathy

AP for a dental procedure not suggested
Implantable electronic devices such as a pacemaker or similar devices
Septal defect closure devices when complete closure is achieved
Peripheral vascular grafts and patches, including those used for hemodialysis
Coronary artery stents or other vascular stents
CNS ventriculoatrial shunts
Vena cava filters
Pledgets

2021 AHA statement on prevention of infective endocarditis

Prophylactic antibiotic before Dental procedure

Table 4. Dental Procedures and AP

AP suggested
All dental procedures that involve manipulation of gingival tissue or the periapical region of teeth or perforation of the oral mucosa
AP not suggested
Anesthetic injections through noninfected tissue, taking dental radiographs, placement of removable prosthodontic or orthodontic appliances, adjustment of orthodontic appliances, placement of orthodontic brackets, shedding of primary teeth, and bleeding from trauma to the lips or oral mucosa

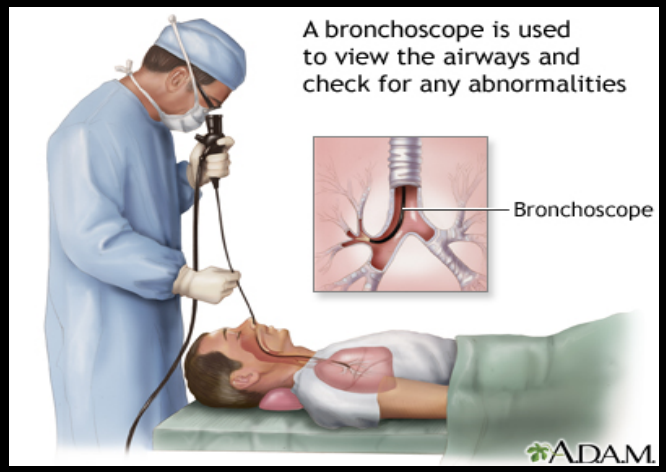
AHA 2021 statement on prevention of infective endocarditis

Prophylactic antibiotic before Dental procedure

Situation	Agent	Adults	Children
Oral	Amoxicillin	2 g	50 mg/kg
Unable to take oral medication	Ampicillin OR	2 g IM or IV	50 mg/kg IM or IV
	Cefazolin or ceftriaxone	1 g IM or IV	50 mg/kg IM or IV
Allergic to penicillin or ampicillin—oral	Cephalexin*† OR	2 g	50 mg/kg
	Azithromycin or clarithromycin OR	500 mg	15 mg/kg
	Doxycycline	100 mg	<45 kg, 2.2 mg/kg >45 kg, 100 mg
Allergic to penicillin or ampicillin and unable to take oral medication	Cefazolin or ceftriaxone†	1 g IM or IV	50 mg/kg IM or IV

AHA 2021 statement on prevention of infective endocarditis

Prophylactic antibiotic is not recommended situation



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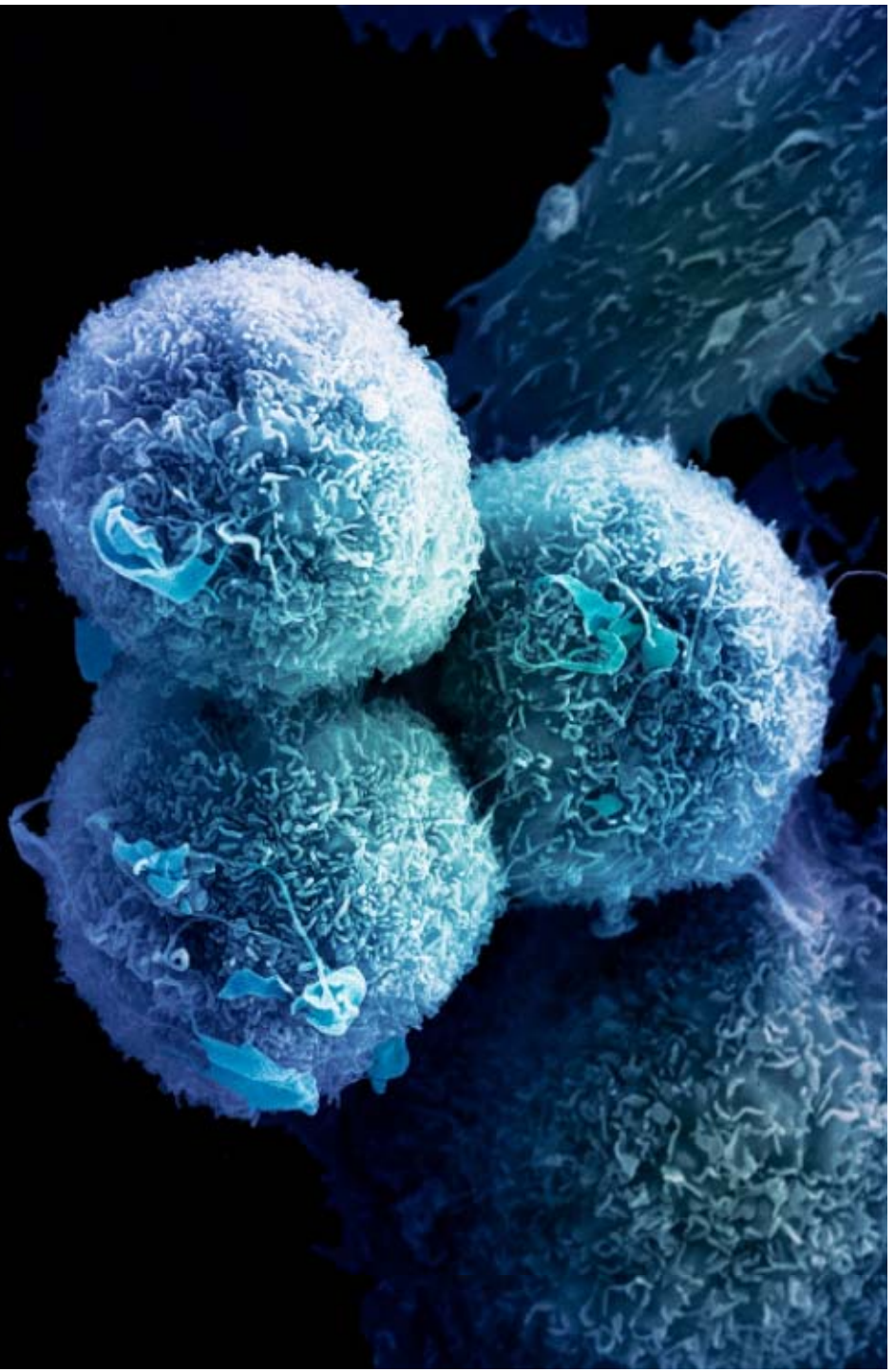
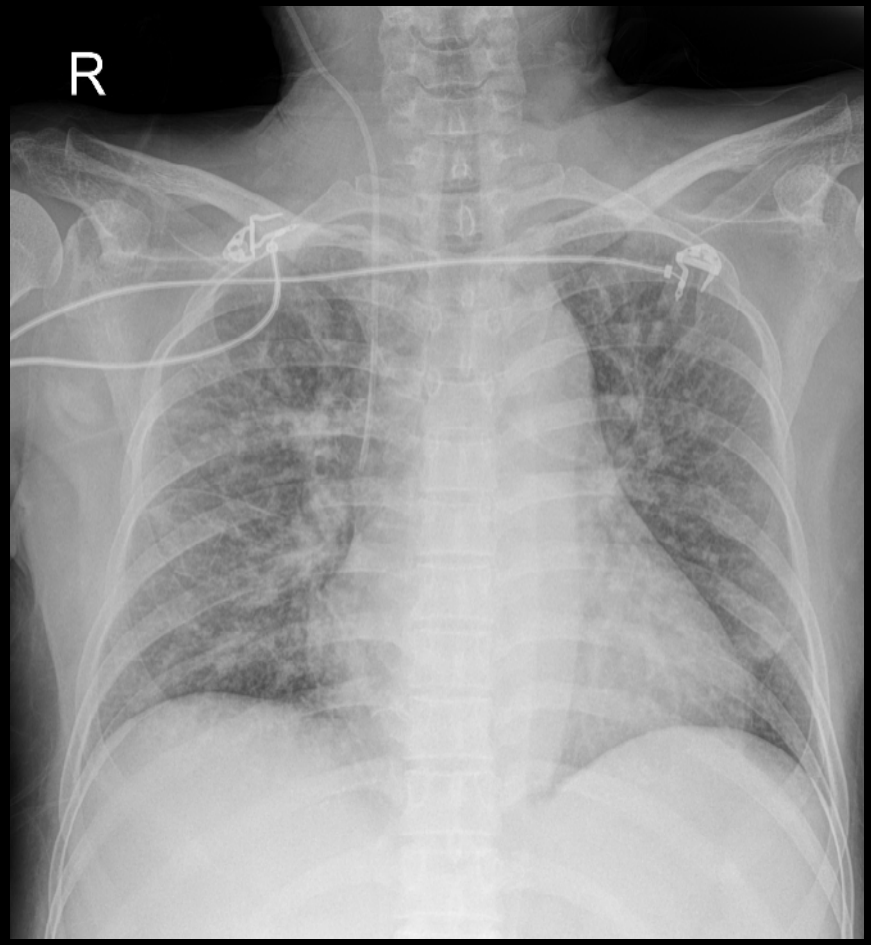
Case review



Case I

- F/60y
- Previous medial history (-)
- Fever, DOE, pitting edema
- COVID-19 (-)
- Blood culture :

  - Gram positive cocci(+)



Case I

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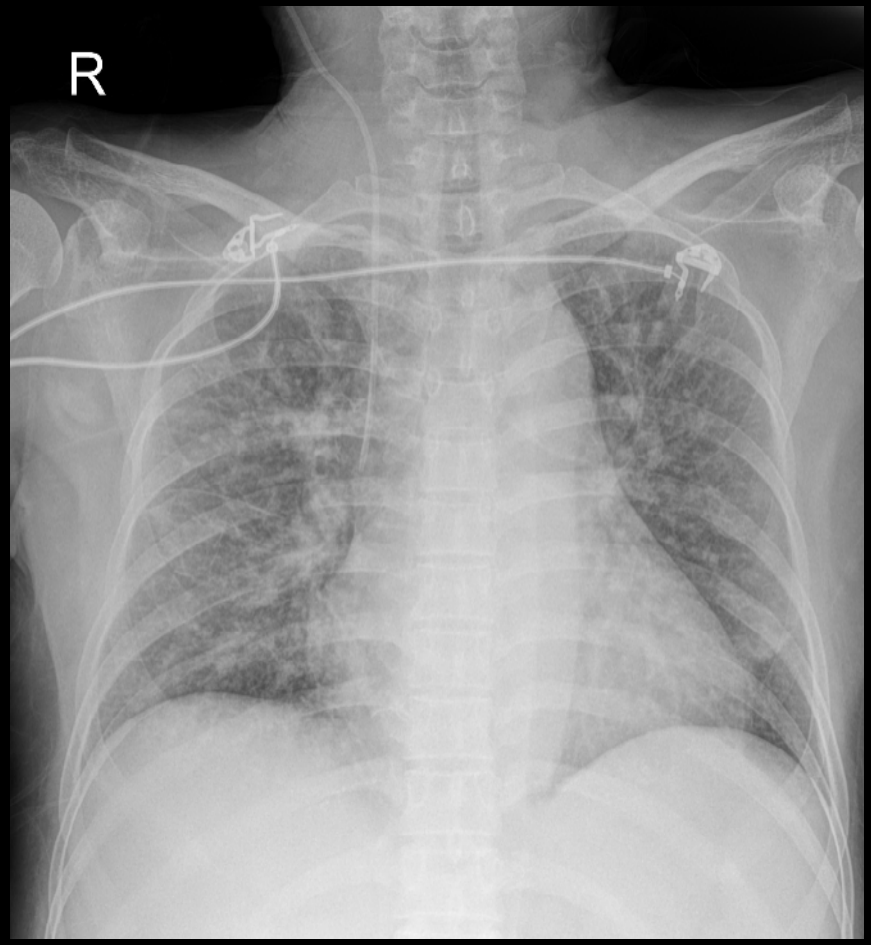
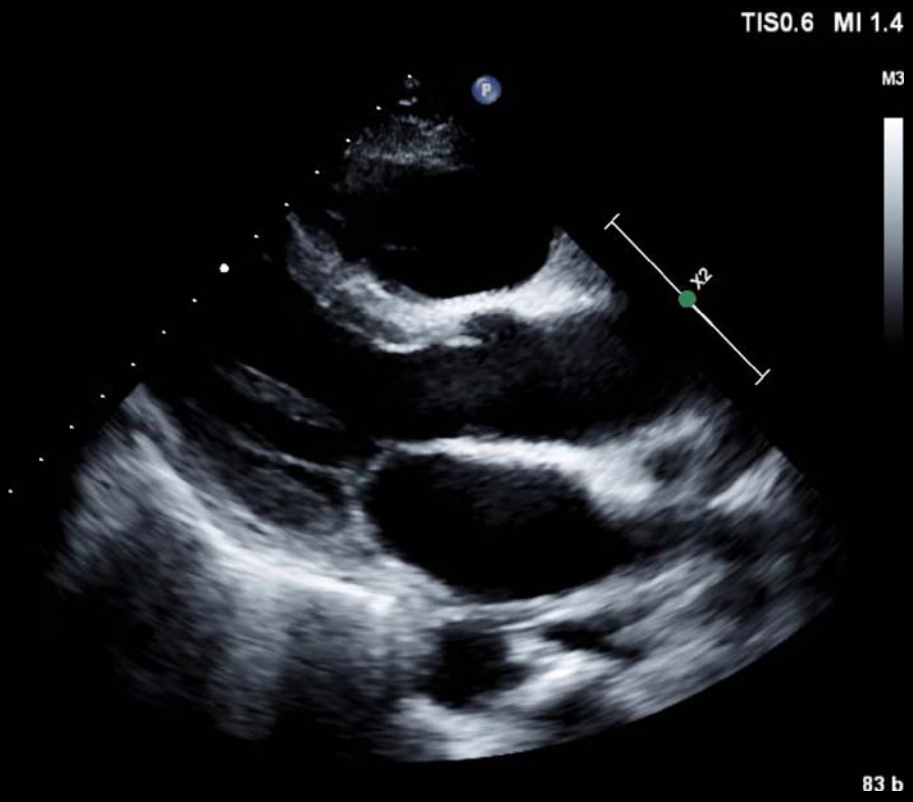


Heart failure 동반한 fever + blood infection (+)
Infective endocarditis 의심

Case I

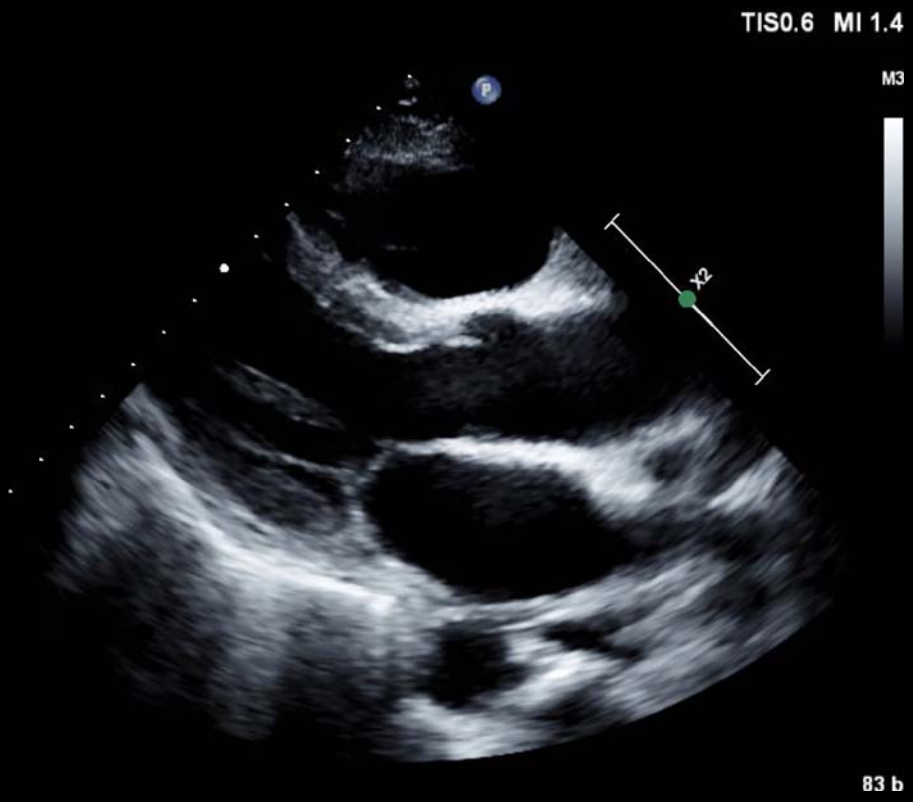


Vegetation at native MV (2.0*1.8cm, hypermobile)

MAJOR CRITERIA	minor criteria
1. **Blood culture positive**	1. Predisposing factor
1. **Evidence of endocardial involvement**	2. Temperature >38 degree
	3. Vascular phenomena
	4. Immunologic phenomena
	5. Microbiologic evidence

Infective endocarditis

Case I



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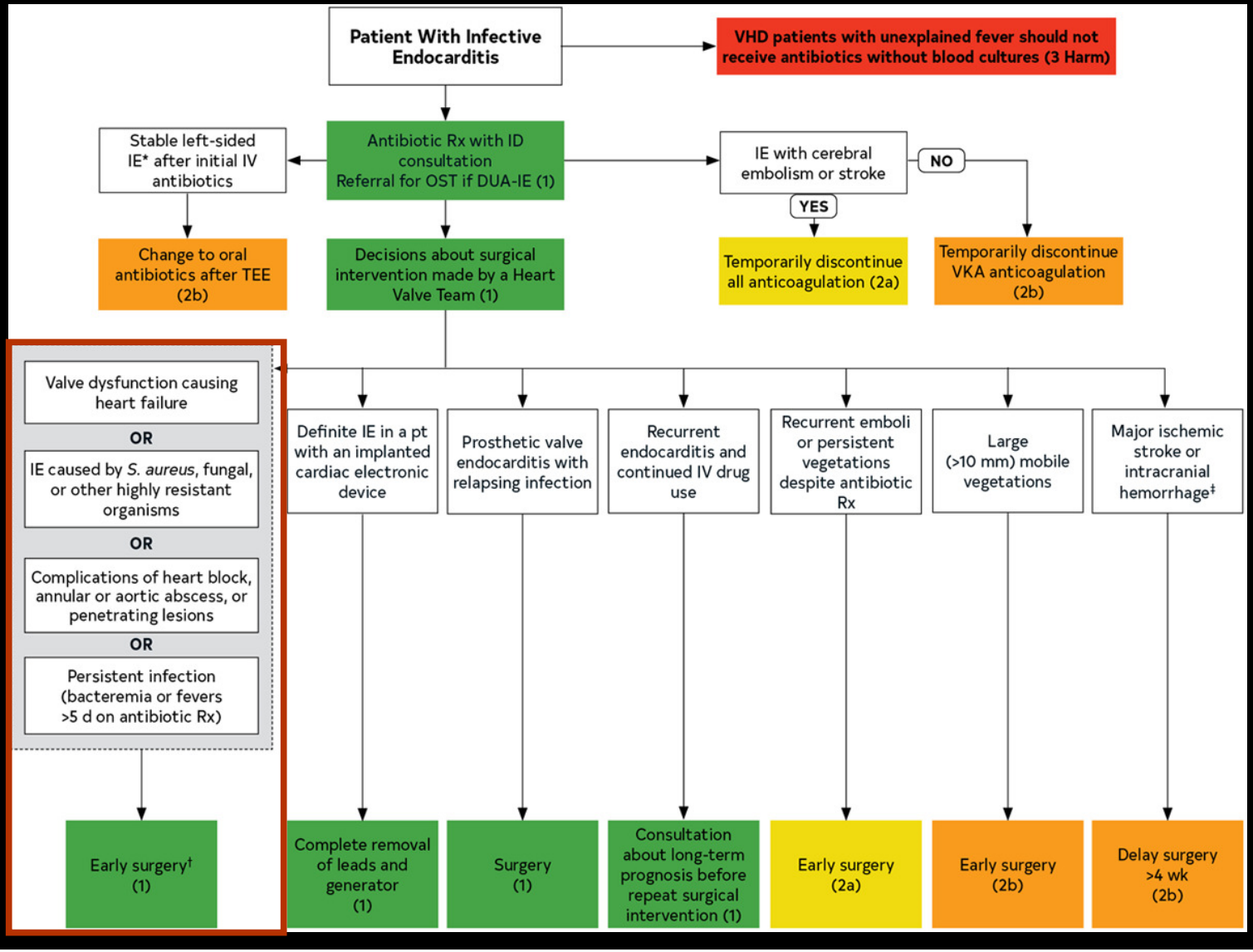
	4. Immunologic phenomena
	5. Microbiologic evidence

Infective endocarditis

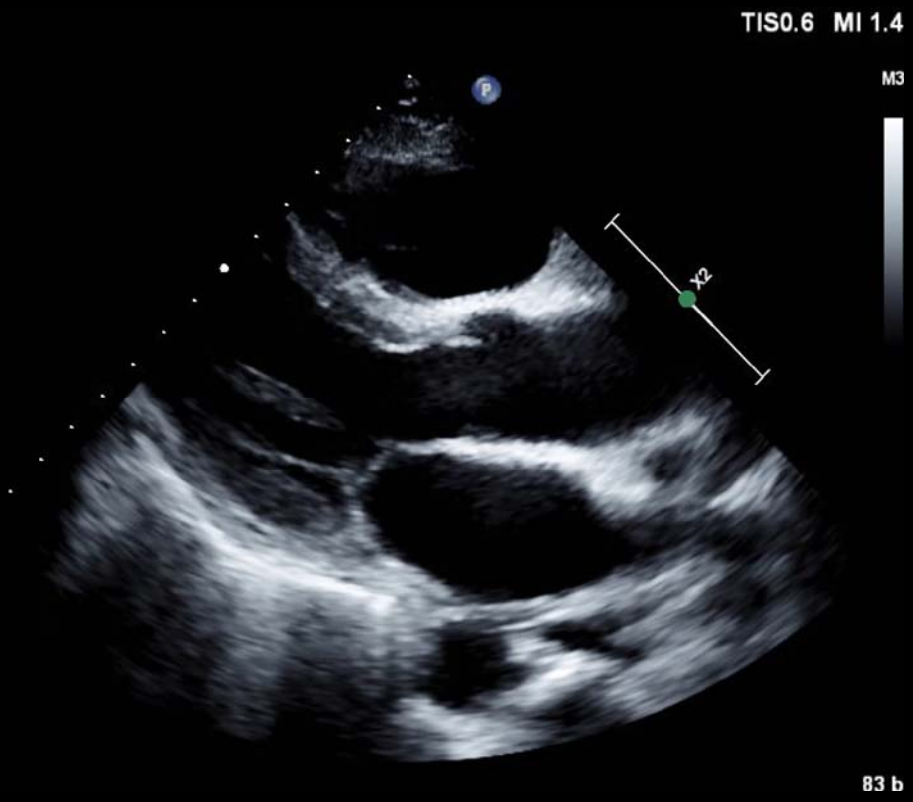
Heart failure
Embolic risk

Early surgery (MVR)

Case I I


Patient With Infective Endocarditis
VHD patients with unexplained fever should not receive antibiotics without blood cultures (3 Harm)
Stable left-sided IE* after initial IV antibiotics
Antibiotic Rx with ID consultation
Referral for OST if DUA-IE (1)
IE with cerebral embolism or stroke
NO
YES
Change to oral antibiotics after TEE (2b)
Decisions about surgical intervention made by a Heart Valve Team (1)
Temporarily discontinue all anticoagulation (2a)
Temporarily discontinue VKA anticoagulation (2b)
Valve dysfunction causing heart failure
OR
IE caused by S. aureus, fungal, or other highly resistant organisms
OR
Complications of heart block, annular or aortic abscess, or penetrating lesions
OR
Persistent infection (bacteremia or fevers >5 d on antibiotic Rx)
Definite IE in a pt with an implanted cardiac electronic device
Prosthetic valve endocarditis with relapsing infection
Recurrent endocarditis and continued IV drug use
Recurrent emboli or persistent vegetations despite antibiotic Rx
Large (>10 mm) mobile vegetations
Major ischemic stroke or intracranial hemorrhage‡
Early surgery† (1)
Complete removal of leads and generator (1)
Surgery (1)
Consultation about long-term prognosis before repeat surgical intervention (1)
Early surgery (2a)
Early surgery (2b)
Delay surgery >4 wk (2b)

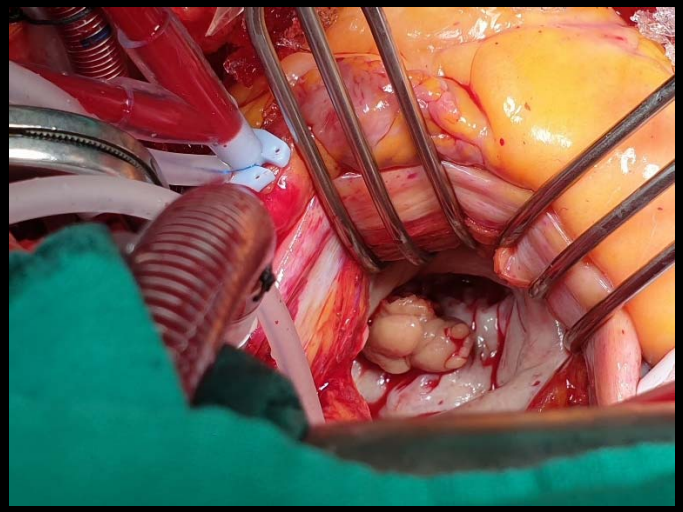
Case I



Vegetation at native MV (2.0*1.8cm, hypermobile)

MAJOR CRITERIA	minor criteria
1. **Blood culture positive**	1. Predisposing factor
1. **Evidence of endocardial involvement**	2. Temperature >38 degree
	3. Vascular phenomena
	4. Immunologic phenomena
	5. Microbiologic evidence

Infective endocarditis



Case I I

- M/60y
- s/p AVR (2009)
- Bacterial meningitis
- DOE, Pitting edema
- Blood culture :

  - E. faeicum (+)

High risk of predisposing factor

Meningitis

Heart failure 증상

Blood infection (+)

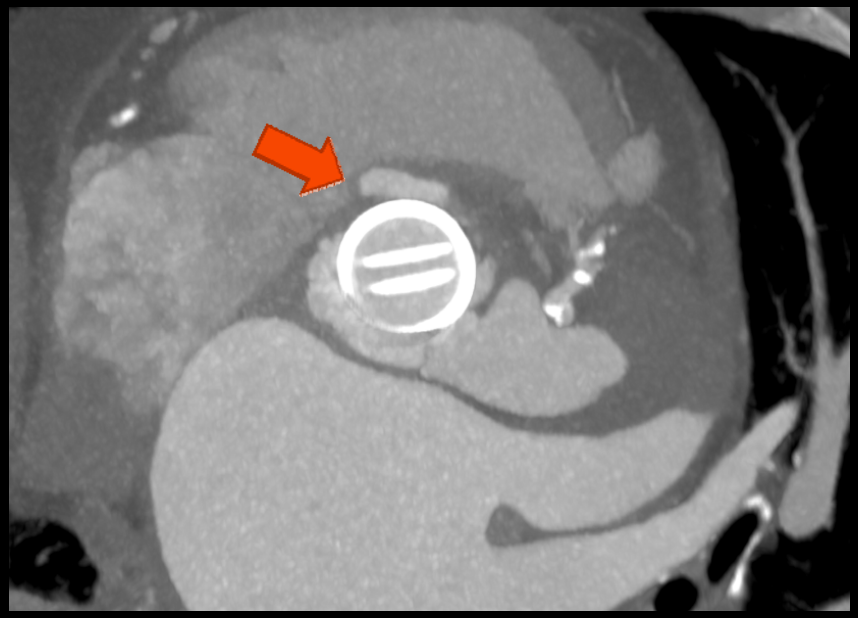
Prosthetic infective endocarditis 의심

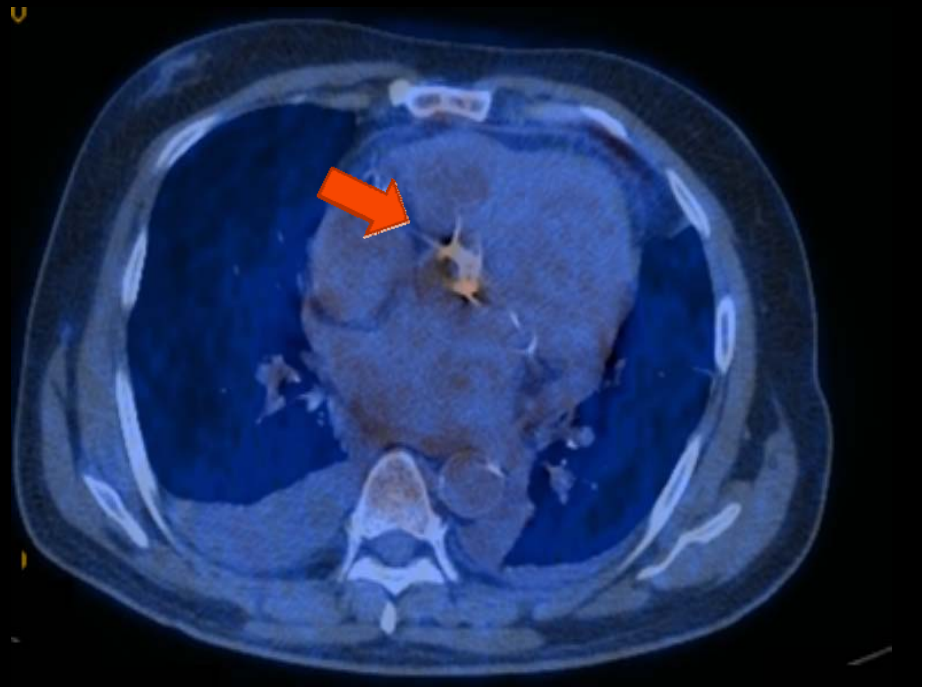
Case I I

- M/60y
- s/p AVR (2009)
- Bacterial meningitis
- DOE, Pitting edema
- Blood culture :

  - E. faeicum (+)

Case I I

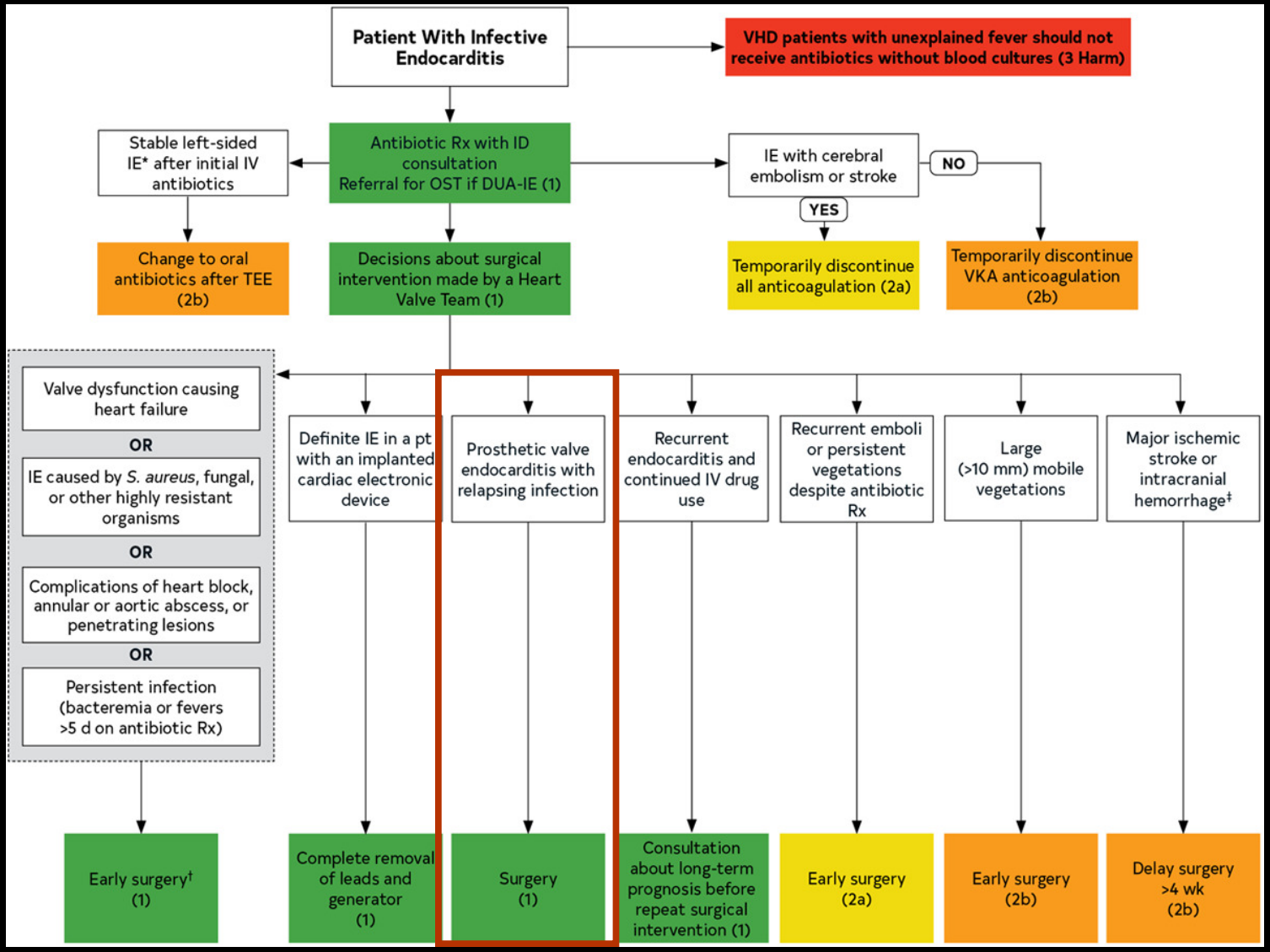




Cardia CT : Pseudoaneurysm r/o dehiscence
PET-CT : FDG uptake around prosthetic valve (SUV:3.7)

Prosthetic valve endocarditis with dehiscence

Case I I

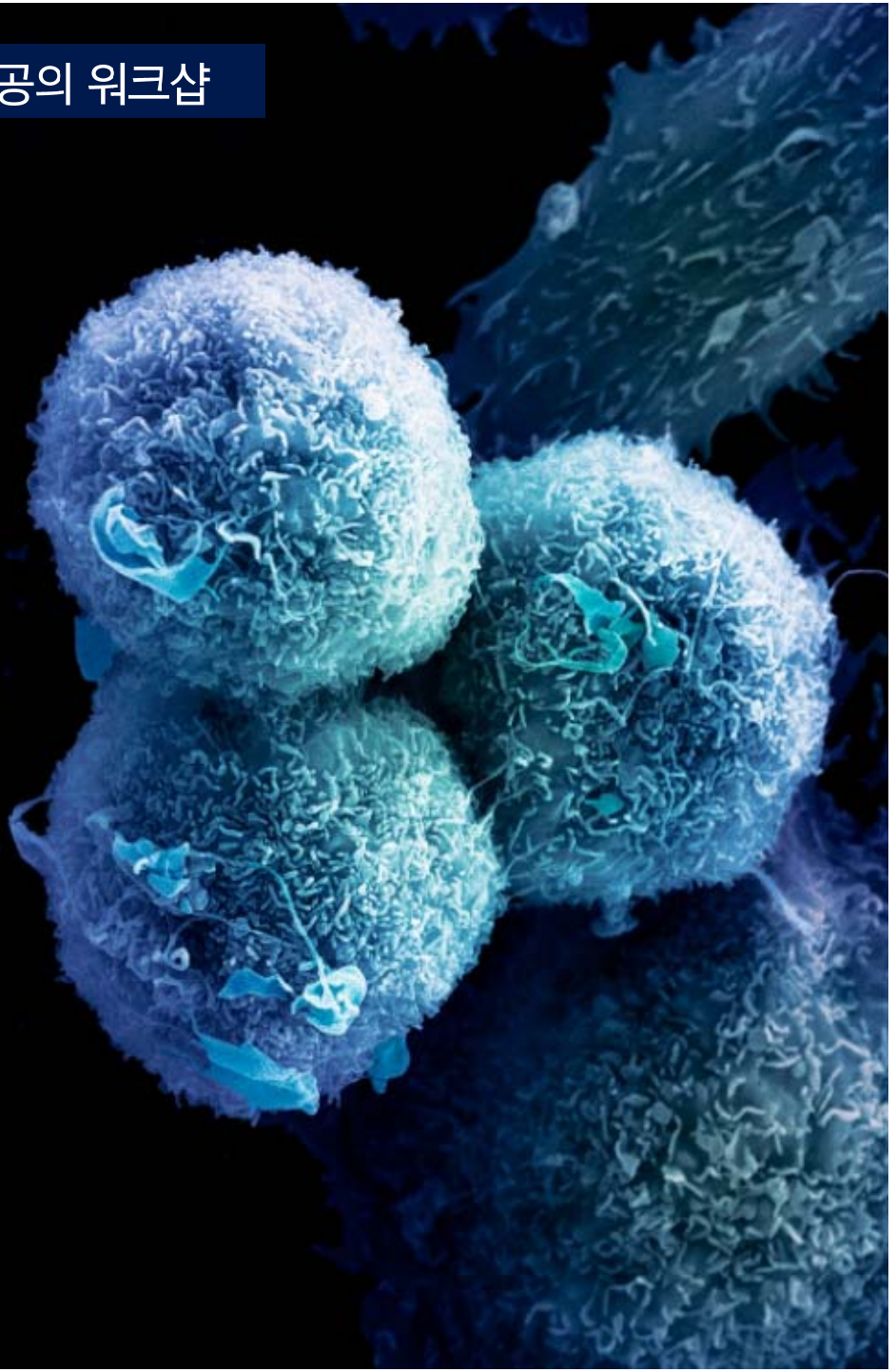

Patient With Infective Endocarditis
VHD patients with unexplained fever should not receive antibiotics without blood cultures (3 Harm)
Stable left-sided IE* after initial IV antibiotics
Antibiotic Rx with ID consultation
Referral for OST if DUA-IE (1)
IE with cerebral embolism or stroke
NO
YES
Change to oral antibiotics after TEE (2b)
Decisions about surgical intervention made by a Heart Valve Team (1)
Temporarily discontinue all anticoagulation (2a)
Temporarily discontinue VKA anticoagulation (2b)
Valve dysfunction causing heart failure
OR
IE caused by S. aureus, fungal, or other highly resistant organisms
OR
Complications of heart block, annular or aortic abscess, or penetrating lesions
OR
Persistent infection (bacteremia or fevers >5 d on antibiotic Rx)
Definite IE in a pt with an implanted cardiac electronic device
Prosthetic valve endocarditis with relapsing infection
Recurrent endocarditis and continued IV drug use
Recurrent emboli or persistent vegetations despite antibiotic Rx
Large (>10 mm) mobile vegetations
Major ischemic stroke or intracranial hemorrhage‡
Early surgery† (1)
Complete removal of leads and generator (1)
Surgery (1)
Consultation about long-term prognosis before repeat surgical intervention (1)
Early surgery (2a)
Early surgery (2b)
Delay surgery >4 wk (2b)

Summary

Suspicious	Fever with heart failure symptom Embolic event (stroke, peripheral spot) Predisposing risk factor (+)
Diagnosis	Blood culture Echocardiography (TTE, TEE), Cardiac CT, PET-CT
Management	Antibiotics therapy (4-6weeks) Surgery (Heart failure, Uncontrolled infection, Prevent of emboli) Neurologic evaluation (huge hemorrhage, large stroke)
Prophylaxis	High risk patients (prosthetic material, CHD, HT) Dental procedure Amoxicillin or IV cepha before 1-2hrs

2022년 제 15차 전공의 연수교육 및 신입 전공의 워크샵

경청해 주셔서 감사합니다.



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