

2026 Resident Training Course

Infective Endocarditis

A surgeon's guide
from diagnosis to treatment

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Learning Objectives

- ✓ **Diagnosis** - Criteria and Work-up
- ✓ **Management** - Indications and timing of surgery
- ✓ **Prophylaxis** - Who, when and how
- ✓ **Case review** - Applying the guidelines to real patients



What's new since 2022

2023 ESC Guidelines

Surgical timing redefined (emergency <24 h · urgent 3–5 days); Endocarditis Team upgraded to Class I

2023 Duke-ISCVID criteria

Cardiac CT, FDG PET/CT, surgical findings and PCR added as major criteria

Oral step-down

POET 5-year data; guidelines now accept oral switch in stable patients

Broader prophylaxis

High-risk dental procedures Class I; TAVI and VAD included; clindamycin removed

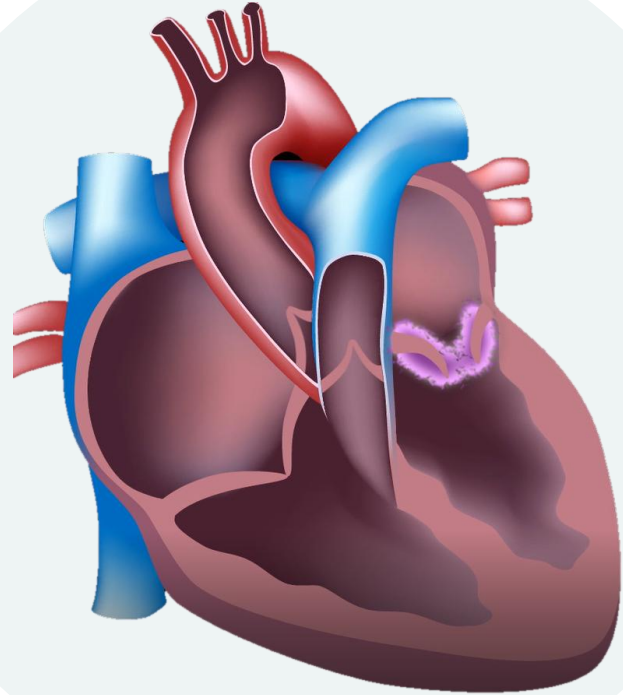
2026 AHA Statement

First revision since 2015: adopts Duke-ISCVID, oral and long-acting agents

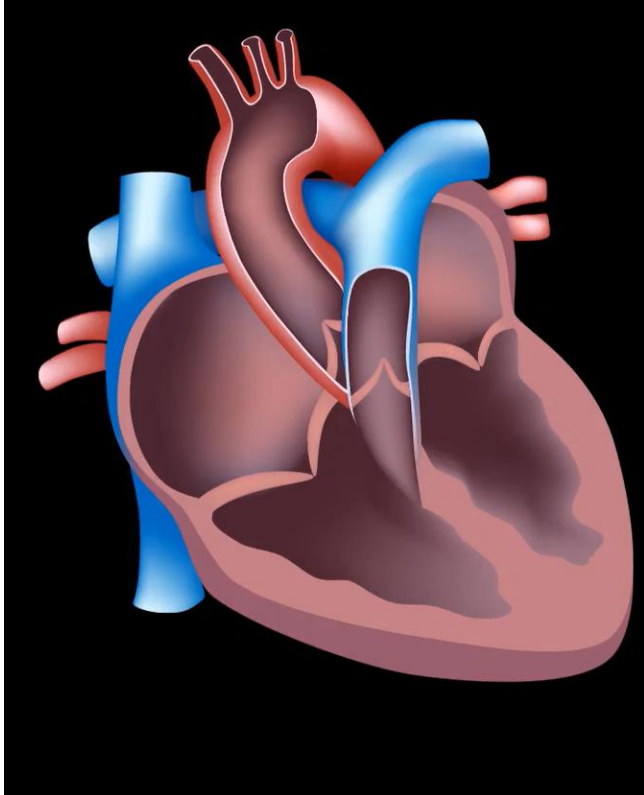
Neurological timing

Ischaemic stroke: do not delay surgery; haemorrhage: consider ≥ 4 -week delay

Pathophysiology of IE



Infective endocarditis: two conditions must meet



1

Bacteraemia / fungaemia

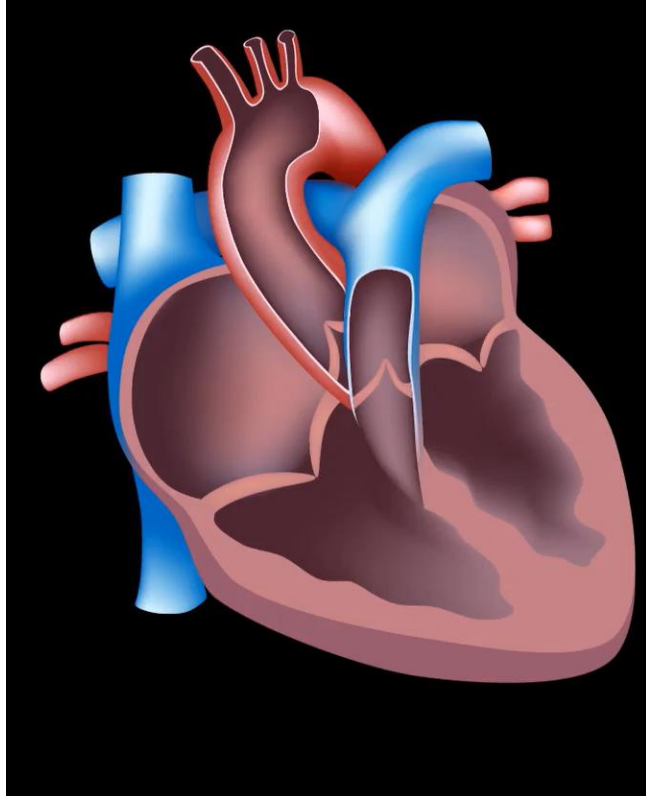
Bacteria or fungi reach the heart through the bloodstream

2

Abnormal endocardium

Rapid flow protects normal endothelium — damaged endocardium, valves or prosthetic material are required

Infective endocarditis: two conditions must meet



1

Bacteraemia / fungaemia

Bacteria or fungi reach the heart through the bloodstream

2

Abnormal endocardium

Rapid flow protects normal endothelium — damaged endocardium, valves or prosthetic material are required

Sources of bacteraemia



Skin abscess



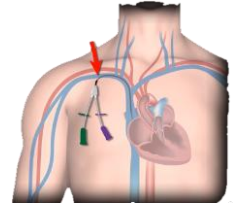
Urinary tract infection



Dental procedure / brushing



Contaminated central line



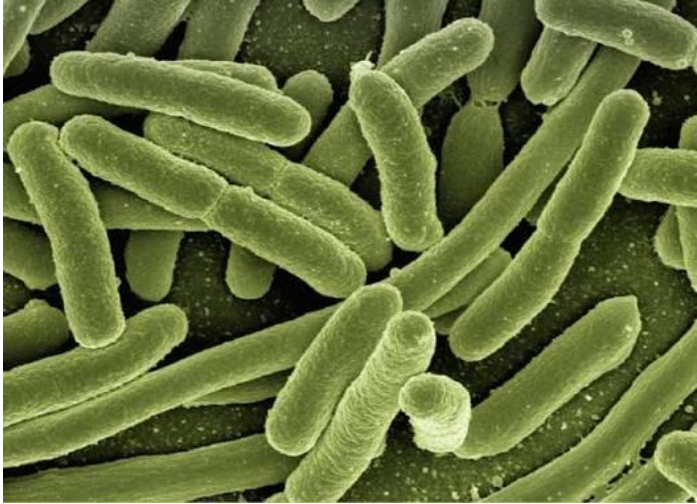
Injection drug use



Acupuncture



Causative organisms



Staphylococcus aureus (MSSA / MRSA) — now the most common cause

Viridans streptococci — oral flora, linked to dental procedures

Enterococci (mostly *E. faecalis*)

Coagulase-negative staphylococci — prosthetic valves and devices

Streptococcus gallolyticus (bovis) — look for colonic lesions

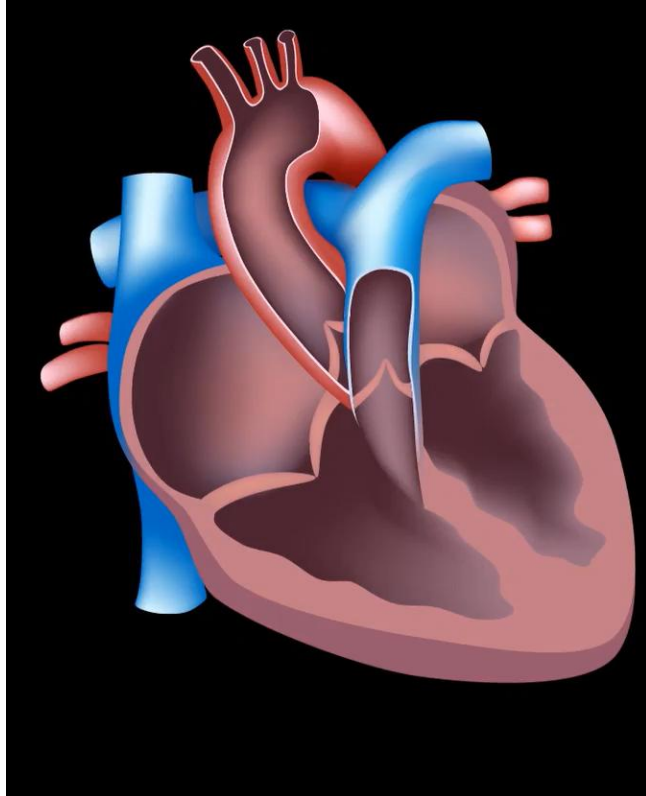
HACEK*, Gram-negative bacilli

**HACEK: Haemophilus, Aggregatibacter, Cardiobacterium, Eikenella, Kingella*

Fungi (Candida, Aspergillus)

Poor prognosis : MRSA and fungi cause extensive intracardiac destruction and frequent relapse

Infective endocarditis: two conditions must meet



1

Bacteraemia / fungaemia

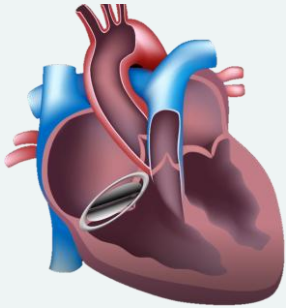
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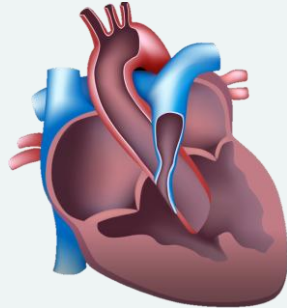
Rapid flow protects normal endothelium — damaged endocardium, valves or prosthetic material are required

Predisposing cardiac conditions



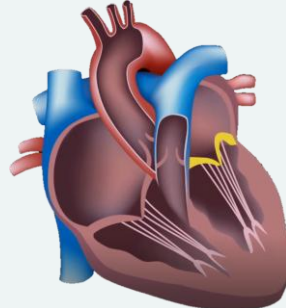
**Prosthetic
valve / device**

Highest risk



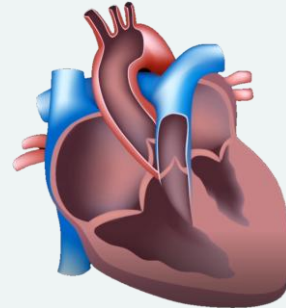
**Congenital
heart disease**

e.g. VSD



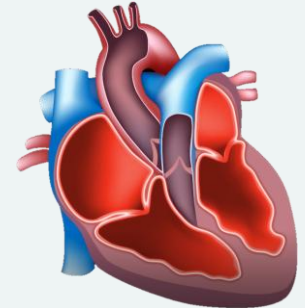
**Valvular heart
disease**

Regurgitation ·
stenosis



**Hypertrophic
cardiomyopat
hy**

HOCM



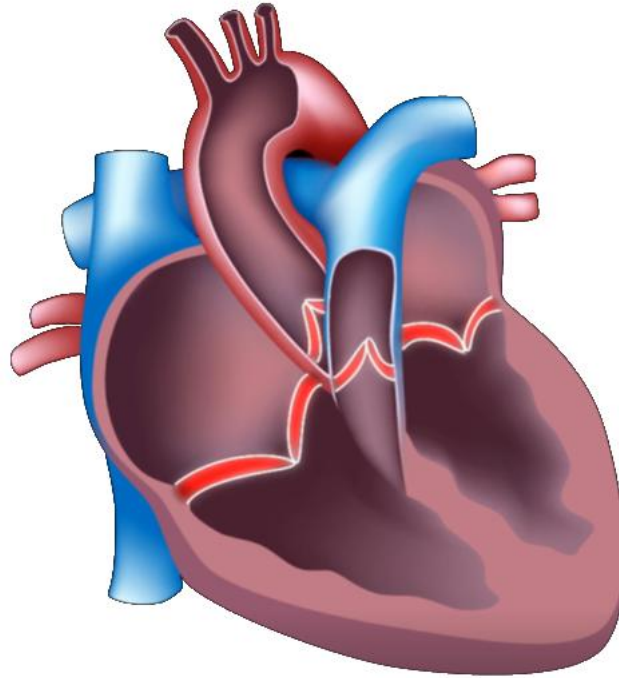
Previous IE

**High risk of
recurrence**

Left-sided vs right-sided IE

5–10%

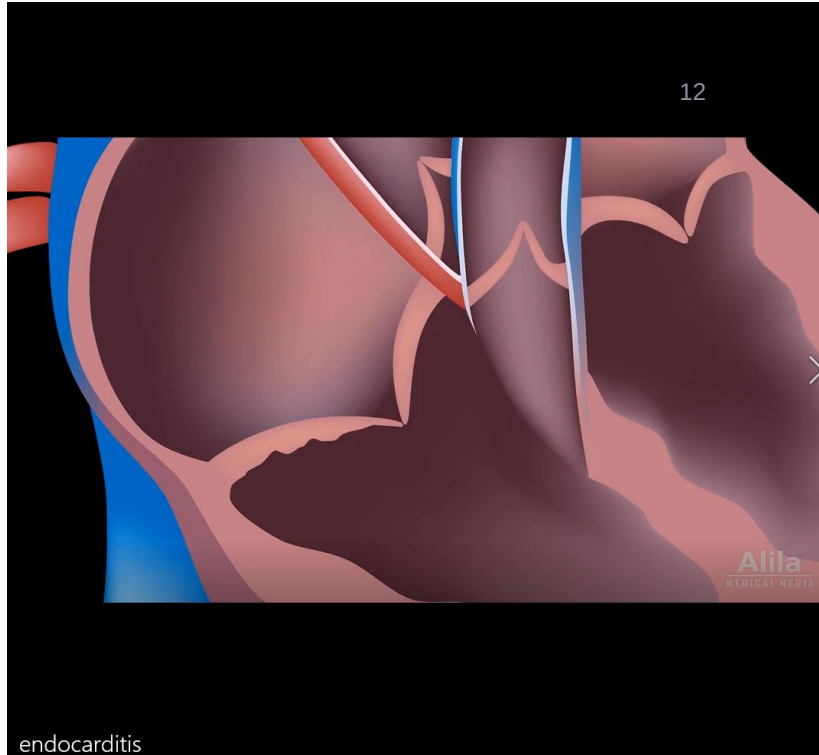
Right-sided (tricuspid)
IDU · central line · CIED



85–90%

Left-sided
(aortic · mitral)

Pathophysiology: vegetation formation



1

Endothelial damage → platelet–fibrin deposition (NBTE)

2

Organisms adhere and **colonise** during bacteraemia

3

Secondary colonisation of thrombus → vegetation grows

4

Valve destruction · perivalvular extension

Complications drive surgical decisions

Valve dysfunction

Regurgitation · perforation · obstruction

~85%

Heart failure

The most common indication for surgery

30–40%

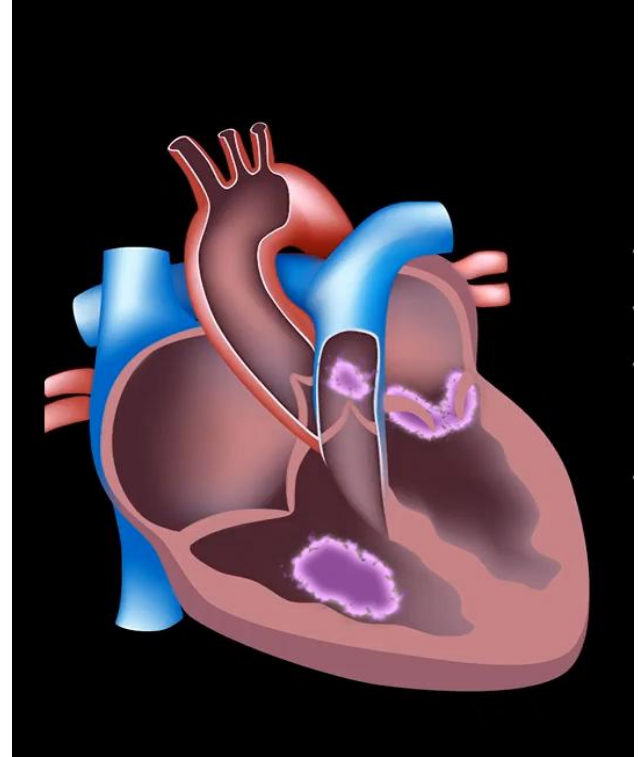
Perivalvular extension

Abscess · fistula · conduction block (CHB)

Embolism

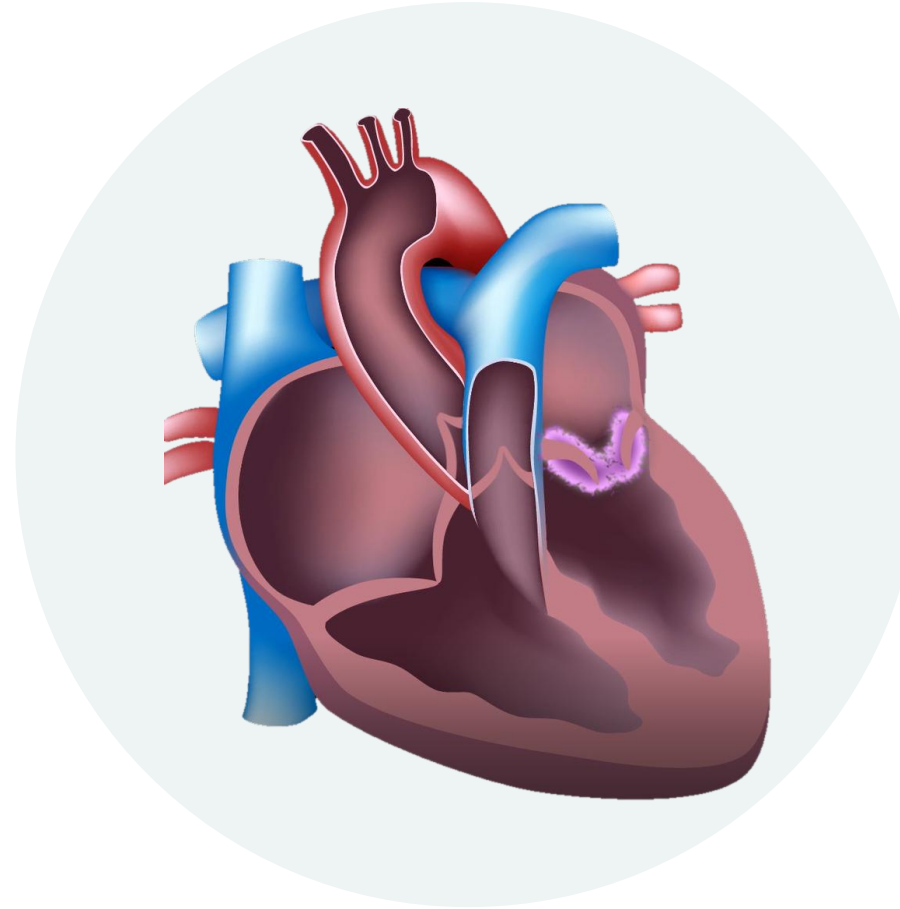
Stroke · splenic/renal infarct · MI · PE

20–50%

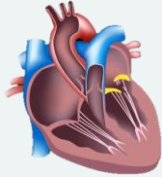


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Diagnosis of IE



Clinical suspicion: four clues



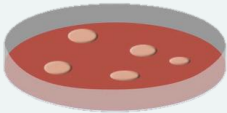
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**Fever + valve
disease or prosthetic
valve**



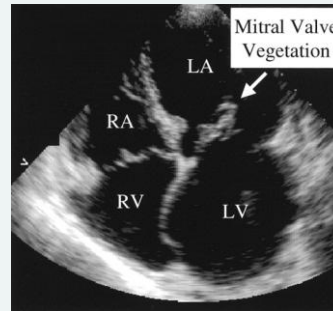
2

**Embolic and
immunological
phenomena**



3

**Positive blood
cultures (≥ 3 sets,
before antibiotics)**



4

**Vegetation on
imaging**

2023 Duke-ISCVID criteria: Major

NEW

Microbiological	Imaging	Surgical (new)
Typical organism in ≥ 2 sets <i>S. aureus</i>, <i>S. lugdunensis</i>, <i>E. faecalis</i>, viridans/most streptococci, HACEK, Granulicatella, Abiotrophia, Gemella Non-typical organism in ≥ 3 sets PCR / sequencing (new) <i>Coxiella</i>, <i>Bartonella</i>, <i>T. whipplei</i>; <i>Coxiella</i> phase I IgG $>1:800$, <i>Bartonella</i> IgG $\geq 1:800$	Echo and/or cardiac CT Vegetation, perforation, aneurysm, abscess, pseudoaneurysm, fistula, new significant regurgitation, new partial dehiscence [^{18}F]FDG PET/CT (new) Abnormal uptake on native/prosthetic valve, graft or lead (prosthesis ≥ 3 months after implantation)	Direct inspection at surgery Evidence of IE seen at operation counts as a major criterion even without imaging or histological/microbiological confirmation

Fowler VG Jr, et al. The 2023 Duke-ISCVID criteria for infective endocarditis. *Clin Infect Dis* 2023;77:518–26

2023 Duke-ISCVID criteria: Minor

Predisposition Previous IE, prosthetic valve or repair, congenital heart disease, more than mild regurgitation or stenosis, CIED, HOCM, injection drug use

Fever > 38.0 °C

Vascular Emboli, septic pulmonary infarcts, cerebral or splenic abscess, mycotic aneurysm, intracranial or conjunctival haemorrhage, Janeway lesions

Immunological Positive rheumatoid factor, Osler nodes, Roth spots, immune-complex glomerulonephritis

Microbiological Positive cultures not meeting the major threshold; culture or PCR from a non-cardiac sterile site

Imaging PET/CT uptake within 3 months of prosthetic implantation



Janeway lesion



Osler node (painful)



Roth spot (retina)

Diagnostic classification

Definite IE



or pathological confirmation (organisms or active IE in vegetation, tissue or embolus)

Possible IE



Rejected

Firm alternative diagnosis · no recurrence after <4 days of antibiotics · no evidence at surgery/autopsy · criteria for possible not met

Modified Duke (2000) → Duke-ISCVID (2023)

	Modified Duke 2000	Duke-ISCVID 2023
Typical organisms	Community-acquired enterococci	All <i>E. faecalis</i> , <i>S. lugdunensis</i> , etc. · separate list for prosthetic material
Blood cultures	Timing interval specified	Timing requirement removed (separate venepuncture still advised)
Molecular	—	PCR · 16S / metagenomic sequencing accepted
Imaging major	Echocardiography	Echo + cardiac CT + FDG PET/CT
Surgical	—	Findings at operation count as major
Predisposition	IDU, valve disease	+ CIED, TAVI, previous IE

The 2023 ESC Guidelines propose their own 'Duke-ESC 2023' criteria, in which prosthetic PET/CT uptake is major regardless of time since surgery

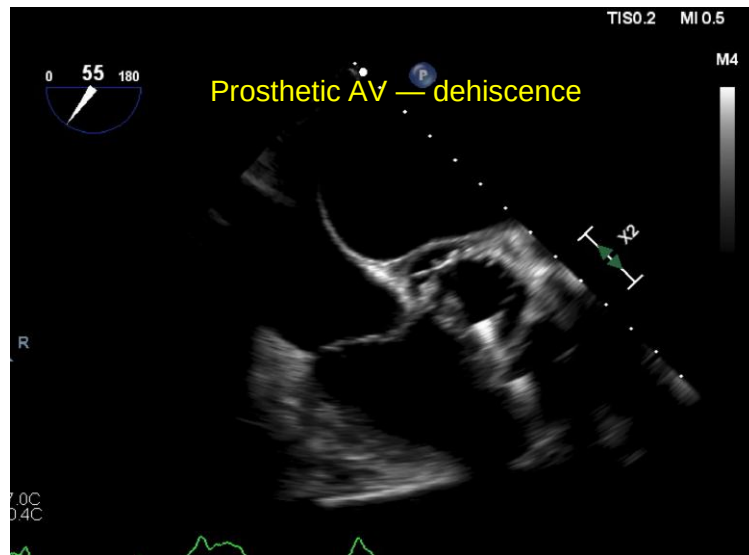
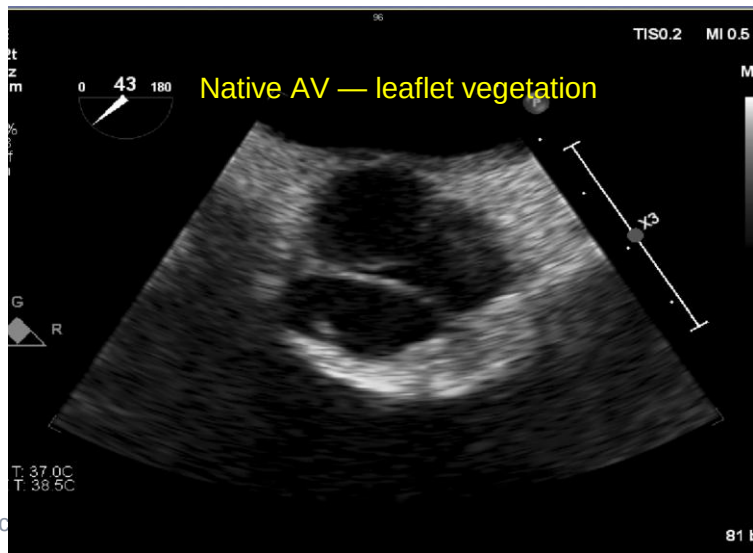
Echocardiography: first-line imaging

TTE first-line in every suspected case

TEE even when TTE is positive (Class I) — assesses perivalvular complications

Repeat within 5–7 days if initially negative but suspicion persists

Before oral switch TEE must exclude complications



Echo findings that suggest the need for surgery

Vegetation

- Persistent vegetation after systemic embolisation
- Size and mobility of vegetation especially >10 mm (high risk of embolization)
- ≥ 1 embolic event within 2 weeks of antibiotics
- Increasing size despite appropriate antibiotics

Valve dysfunction

- Acute AR or MR with ventricular failure
- Heart failure unresponsive to medical therapy
- Valve perforation or rupture

Perivalvular extension

- Valve dehiscence, rupture or fistula
- New heart block
- Large or enlarging abscess despite antibiotics

Cardiac CT: perivalvular anatomy



Pseudoaneurysm around a prosthetic AV



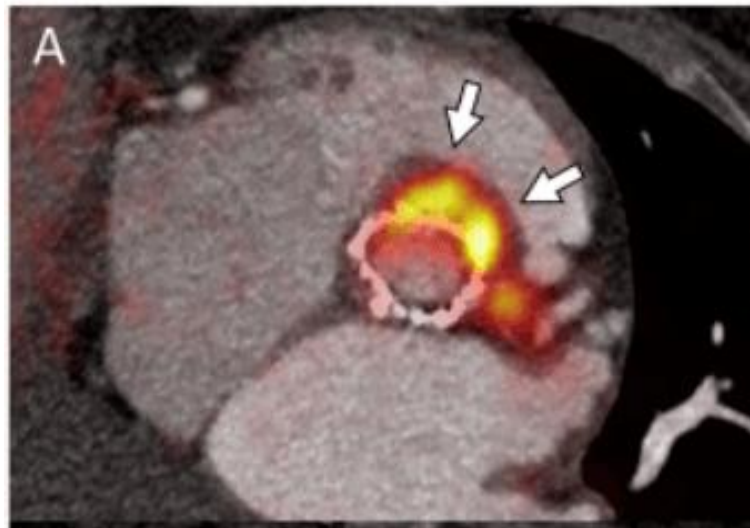
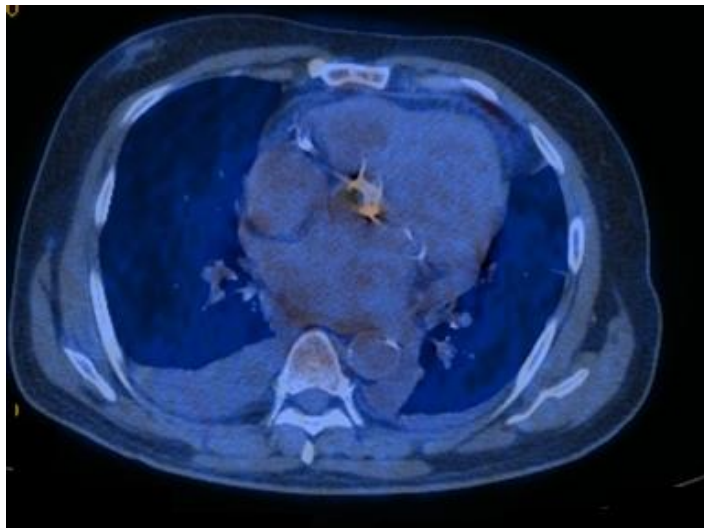
Abscess at the aortomitral continuity

[18F]FDG PET/CT: prosthetic valve endocarditis

Suspected PVE with inconclusive echo

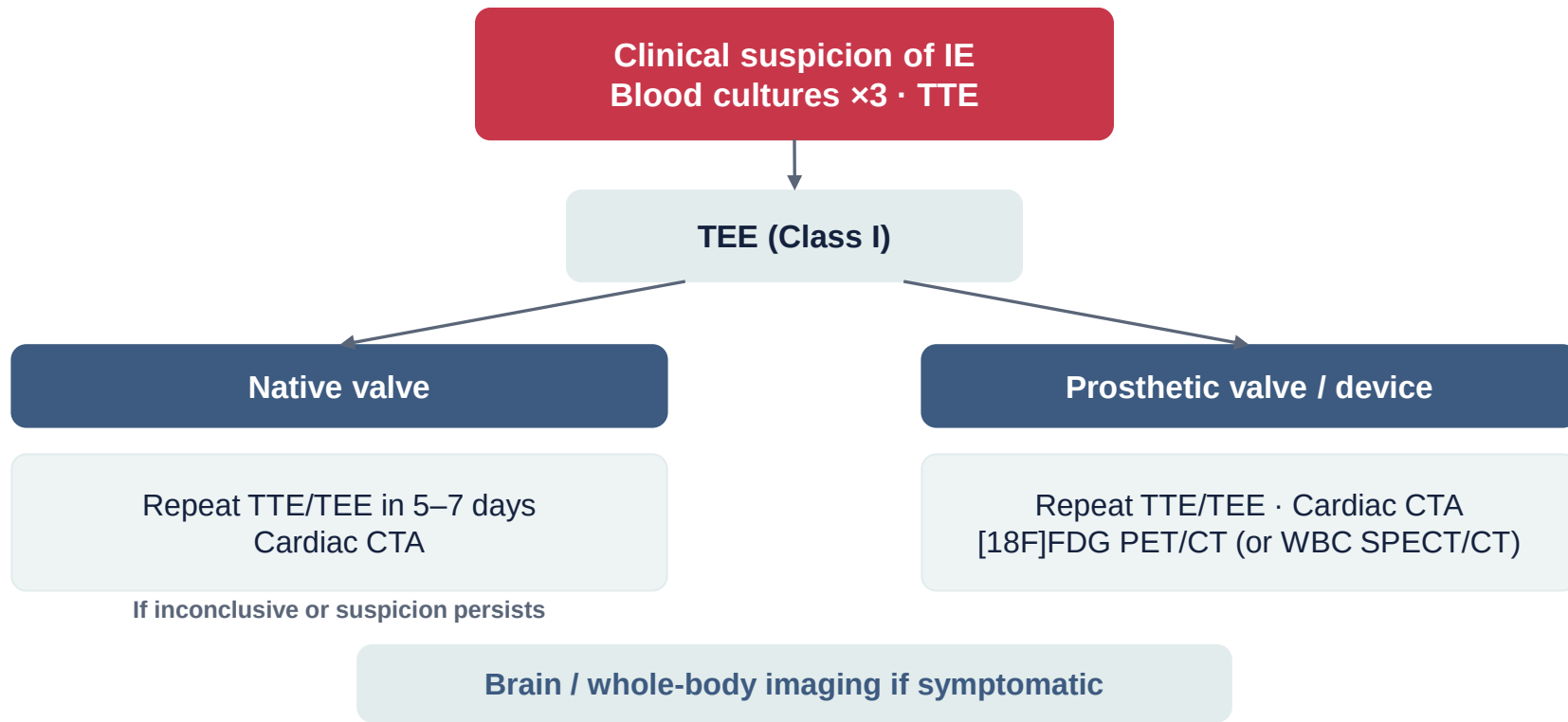
TAVI-related IE: echo sensitivity is low — PET/CT is particularly useful (AHA 2026)

Within 3 months of surgery, uptake may reflect post-operative inflammation



Intense FDG uptake at the sewing cuff of a prosthetic valve & TAVI infection

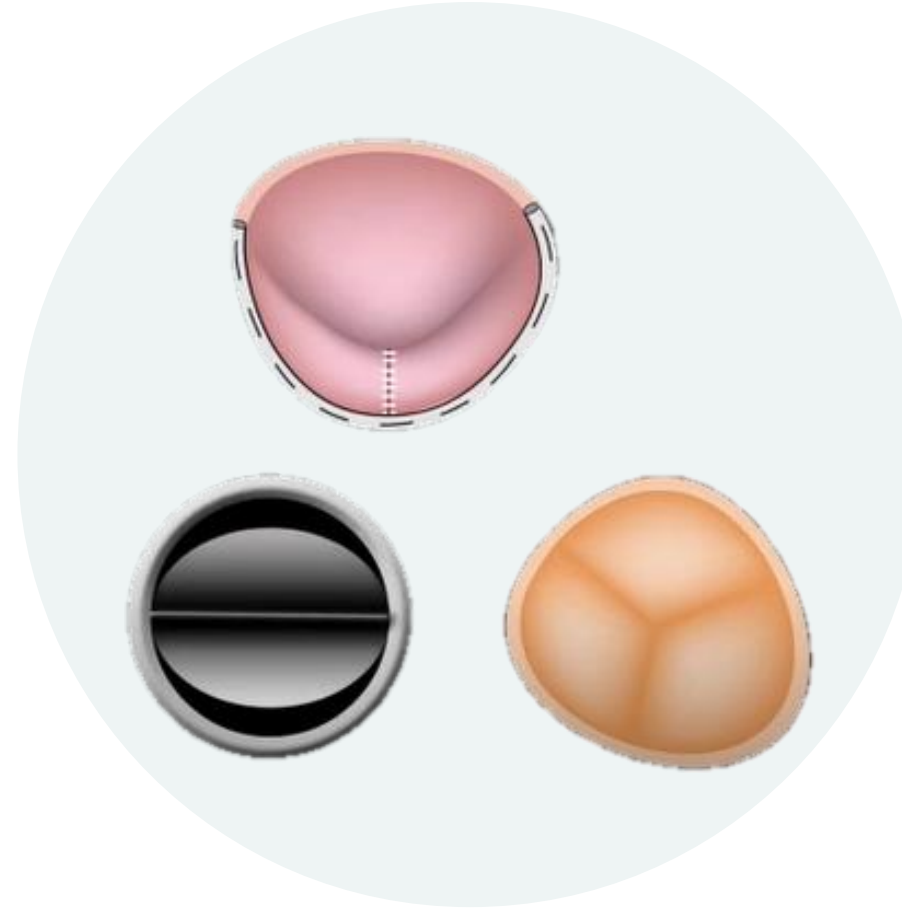
Multimodality diagnostic pathway



Based on the 2023 ESC Guidelines for the management of endocarditis (Delgado V, et al. Eur Heart J 2023;44:3948–4042)

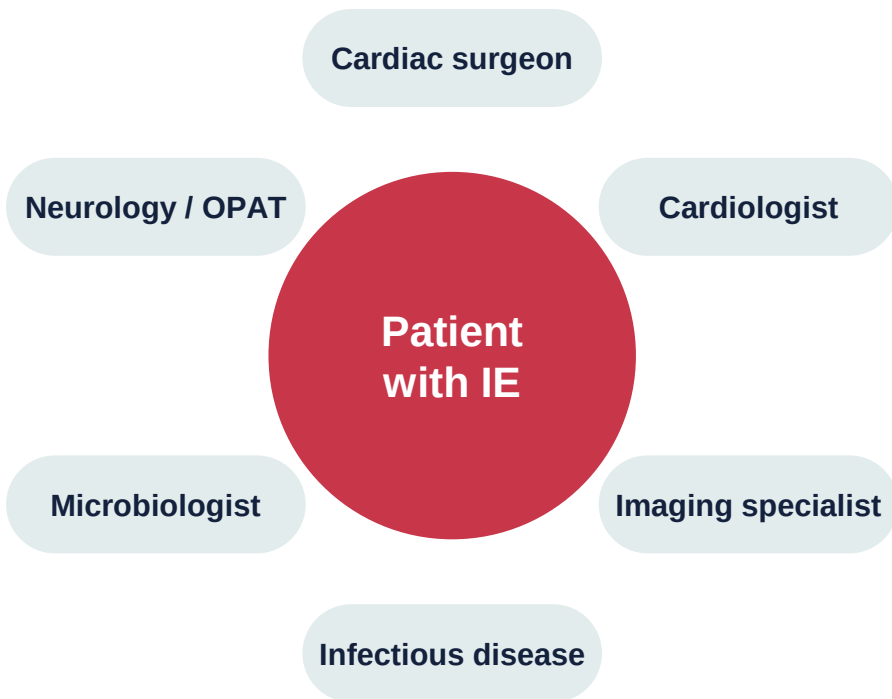
02

Management of IE



The Endocarditis Team

NEW



Complicated IE

Managed by the Endocarditis Team at a Heart Valve Centre with immediate surgical capability (Class I)

Uncomplicated IE

May be treated at the referring hospital with early and regular communication with the Heart Valve Centre (Class I)

Three pillars of treatment



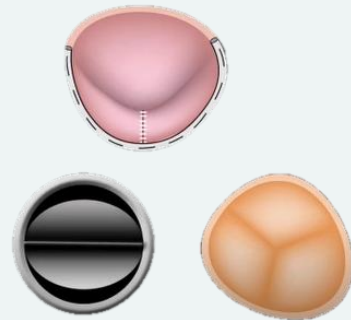
Antimicrobial therapy

Empirical first, then targeted
once the organism is identified
NVE 2–6 weeks · PVE $\geq$ 6
weeks



Source control

Remove infected central lines
and CIEDs
Drain abscesses · treat dental
infection



Valve Surgery

Valve repair or replacement
Indication and timing are key

Three pillars of treatment



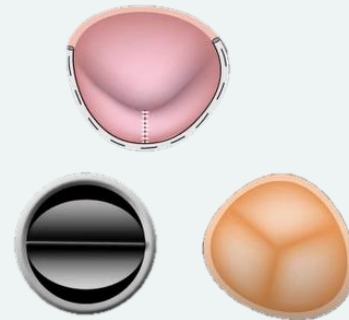
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Valve Surgery

Valve repair or replacement
Indication and timing are key

Antibiotic therapy: principles

Empirical

Start immediately after three sets of blood cultures

Community NVE / late PVE: cover staphylococci, streptococci and enterococci

Early PVE / nosocomial: also cover MRSA and Gram-negatives (vancomycin- or daptomycin-based)

De-escalate promptly according to susceptibility

Targeted · updated points

Duration: NVE 2–6 weeks, PVE ≥ 6 weeks (longer for enterococci and fungi)

Aminoglycosides: not for staphylococcal NVE; avoid in staphylococcal PVE (AHA 2026)

Rifampicin: only for foreign-material infection (PVE)

Daptomycin: high dose, 10 mg/kg

Positive valve culture: does not change post-operative duration (AHA 2026)

Doses: follow the 2023 ESC Guidelines and local infectious diseases protocols

Two-phase antibiotic treatment

NEW

Phase 1 · in-hospital IV
≥2 weeks (≥7 days after surgery)

Phase 2 · outpatient (selected patients)
OPAT or oral step-down, up to 6 weeks in total

Surgery, device removal and abscess drainage occur in phase 1

Before oral step-down, confirm



Left-sided IE: streptococci, E. faecalis, S. aureus or CoNS



Clinically stable · afebrile · bacteraemia cleared

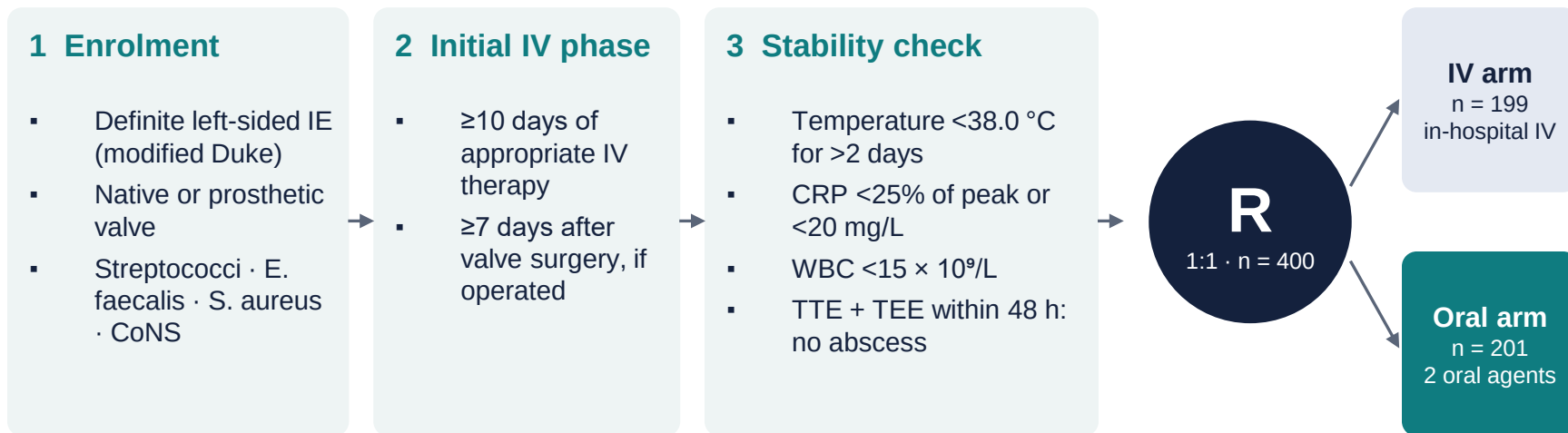


TEE: no abscess or valve lesion requiring surgery



Adherence and outpatient follow-up assured

POET trial: study protocol



Follow-up TEE 1 week before the end of therapy · visits at 1 week, 1, 3 and 6 months · primary endpoint at 6 months after completion

Primary endpoint all-cause death · unplanned cardiac surgery · clinical embolism · relapse of bacteraemia

Excluded abscess on TEE · BMI >40 · other infection needing IV therapy · impaired GI absorption · poor adherence

POET trial: oral therapy in practice

Principle

- Two agents from different classes
- High oral bioavailability
- Chosen by organism and susceptibility

Most common regimens

- Dicloxacillin + rifampicin
- Amoxicillin + moxifloxacin
- Amoxicillin + rifampicin
- Amoxicillin + linezolid

Monitoring

- Serum drug levels on days 1 and 5
- Outpatient visits 2–3 times a week
- TEE before completing therapy

3 vs 19 days

Median hospital stay after randomisation (oral vs IV)

17 vs 19 days

Mean antibiotic duration after randomisation

5% vs 6%

Adverse drug effects (oral vs IV)

Iversen K, et al. N Engl J Med 2019;380:415–24 (regimens and doses: supplementary appendix)

POET trial: results and long-term follow-up

Outcome at 6 months	Oral	IV
Primary composite	9.0%	12.1%
All-cause death	3.5%	6.5%
Unplanned cardiac surgery	3.0%	3.0%
Clinical embolism	1.5%	1.5%
Relapse of bacteraemia	2.5%	2.5%

Difference 3.1 percentage points (95% CI -3.4 to 9.6) → non-inferior

26.4% vs 38.2%

5-year composite (oral vs IV)

median follow-up 5.4 years

Guidelines now

ESC 2023: outpatient oral or parenteral therapy in stable patients (IIa)
 AHA 2026: partial oral therapy in selected patients

Caveat: few people who inject drugs and few with liver disease were enrolled — apply POET criteria strictly

Iversen K, et al. N Engl J Med 2019;380:415–24; Pries-Heje MM, et al. N Engl J Med 2022;386:601–2

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years

Guidelines now

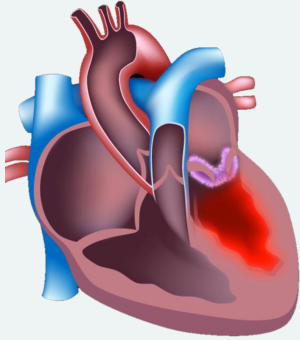
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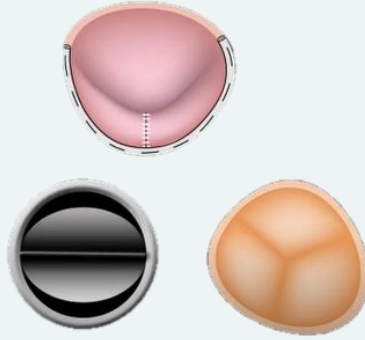
Iversen K, et al. N Engl J Med 2019;380:415–24; Pries-Heje MM, et al. N Engl J Med 2022;386:601–2

Indications for surgery: three questions



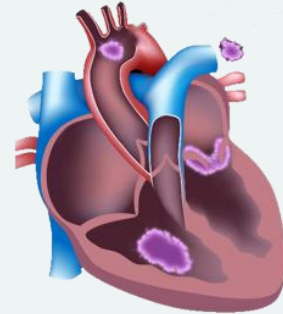
1 Heart failure

Severe valve dysfunction, prosthetic dehiscence or fistula causing heart failure



2 Uncontrolled infection

Abscess · pseudoaneurysm · fistula · enlarging vegetation · new AV block · persistent bacteraemia · fungi/MDR



3 Prevention of embolism

Vegetation ≥ 10 mm with embolism or another surgical indication

Timing of surgery: 2023 ESC

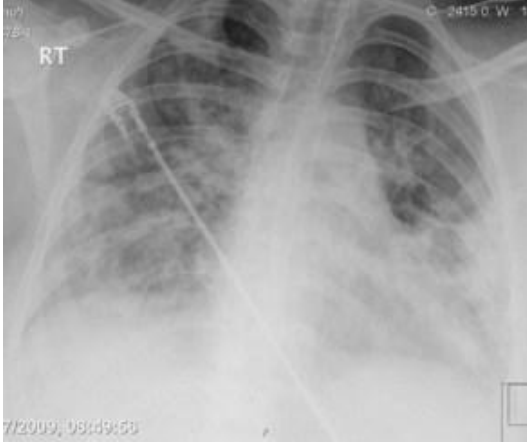
NEW

	Emergency < 24 h	Urgent 3–5 days	Non-urgent same admission
Heart failure	Severe AR/MR, obstruction, fistula → refractory pulmonary oedema / cardiogenic shock	Severe valve dysfunction with HF symptoms or poor haemodynamic tolerance	—
Uncontrolled infection	—	Abscess, pseudoaneurysm, fistula, enlarging vegetation, new AV block, prosthetic dehiscence Persistent bacteraemia despite appropriate therapy	Fungal or multiresistant organism (urgent if haemodynamically indicated)
Embolism prevention	—	Vegetation ≥10 mm after ≥1 embolic episode, or ≥10 mm with another indication (Class I) ≥10 mm, no emboli, low surgical risk (IIb)	—

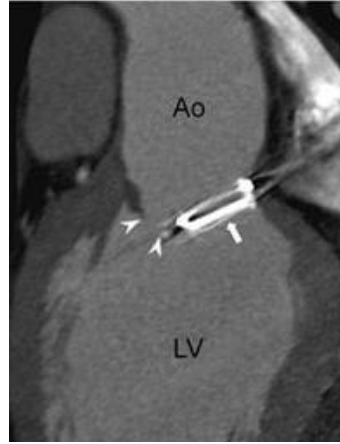
Early PVE (within 6 months of surgery): complete debridement + valve re-replacement

2023 ESC Guidelines (Delgado V, et al. Eur Heart J 2023;44:3948–4042); urgent window shortened from <7 days (2015)

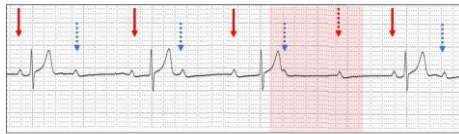
Recognise the emergency



Pulmonary oedema



Prosthetic dehiscence (CT)

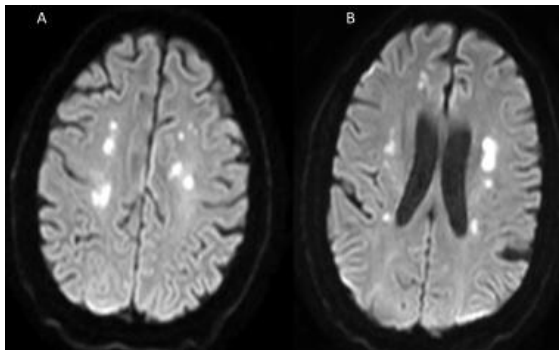


New complete heart block

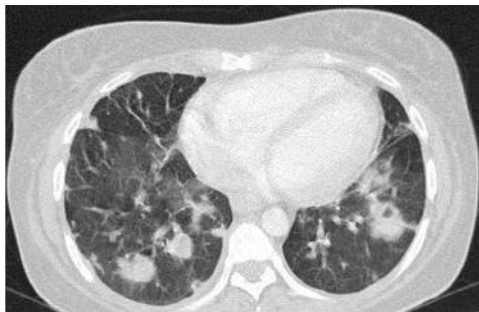
Signs that should prompt emergency or urgent surgery

- Progressive pulmonary oedema · rising oxygen requirement
- Haemodynamic instability · cardiogenic shock
- New AV block (suggests perivalvular abscess)
- Confirmed prosthetic dehiscence

Embolec risk and early surgery



Multiple cerebral emboli (DWI)



Septic pulmonary emboli

High embolic risk

- Vegetation >10 mm, especially >15–30 mm
- Mobile · mitral (anterior leaflet)
- *S. aureus*, *S. gallolyticus*, *Candida*
- Previous embolism
- Risk is highest in the first 2 weeks of antibiotics

EASE trial

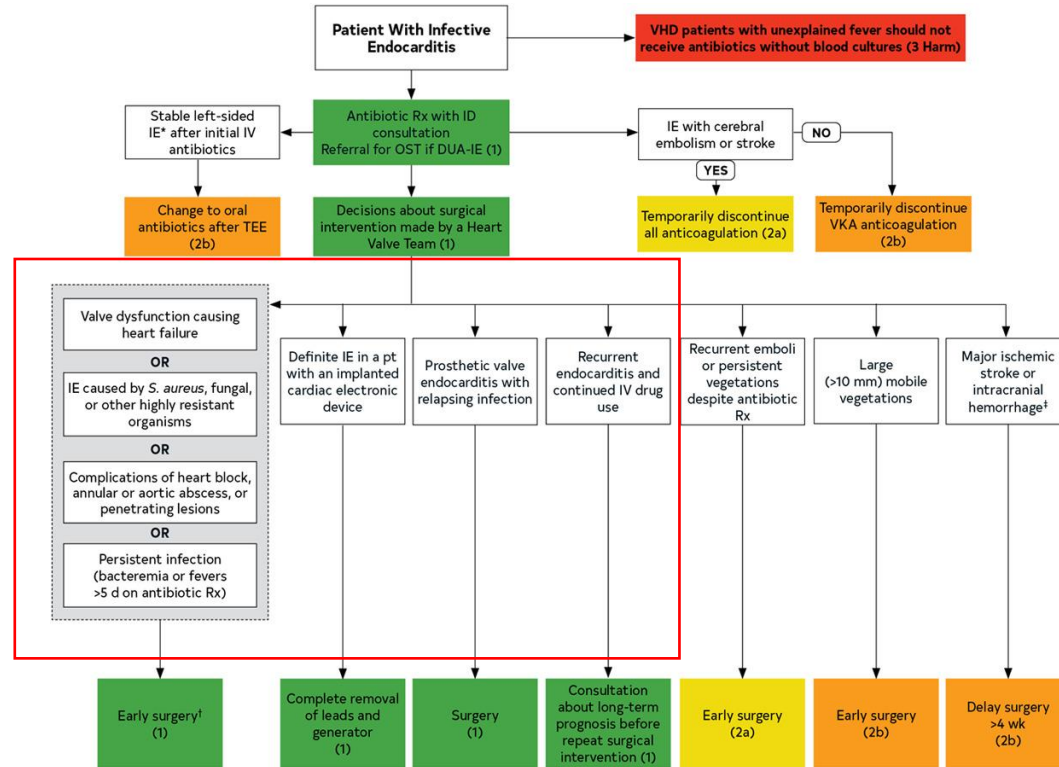
Vegetation >10 mm + severe valve disease: surgery within 48 h vs conventional care

3% vs 23%

In-hospital death or embolism at 6 weeks
(early surgery vs conventional)

Kang DH, et al. NEJM 2012;366:2466–73

2020 ACC/AHA: timing of surgery in left-sided IE



Otto CM, et al. 2020 ACC/AHA Guideline for the management of valvular heart disease. Circulation 2021;143:e72–e227

Special situations

Right-sided IE

- Severe TR with RV dysfunction despite antibiotics
- Recurrent pulmonary emboli needing ventilation
- Residual vegetation >20 mm
- Prefer tricuspid repair over replacement
- High risk: consider percutaneous aspiration (AHA 2026)

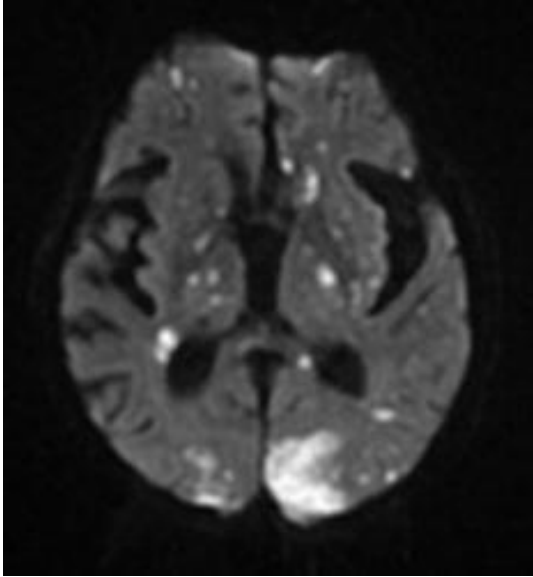
Prosthetic valve IE

- Early PVE (<6 months): surgery is the rule
- Dehiscence · abscess: urgent
- Staphylococcal PVE: avoid gentamicin
- TAVI-IE: use PET/CT liberally

CIED infection

- Complete system extraction without delay
- TEE to look for valve involvement
- Re-implant once infection is controlled
- No dental prophylaxis needed

Neurological complications



Cerebral infarct



Haemorrhage (mycotic aneurysm)



Brain abscess · meningitis

Neurological complications occur before surgery and during post-operative antibiotic therapy → brain imaging if symptomatic (Class I); screening if asymptomatic may be considered (IIb)

Neurological complications: when to operate

Surgical indication + neurological event
CT / MRI · neurology consultation

TIA · ischaemic stroke
(no coma, no haemorrhage)

Do not delay surgery (Class I)

Intracranial haemorrhage
(stable)

Consider ≥4-week delay · reassess

Haemorrhage + HF / uncontrolled infection

Urgent/emergent surgery if meaningful neurological recovery is likely (IIa)

Coma · large defect

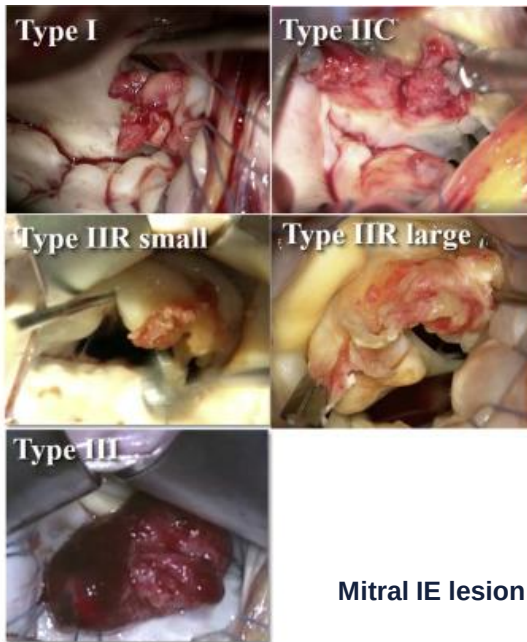
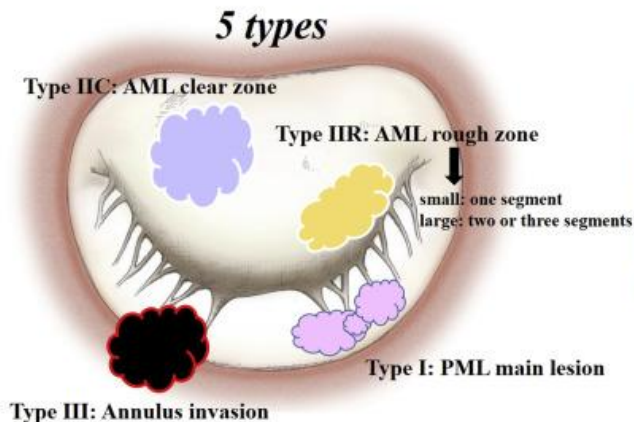
Conservative care and monitoring

Surgeon's tip

- Plan CPB to limit haemorrhagic transformation of a recent infarct
- Titrate heparin and ACT targets carefully
- Cerebral oximetry monitoring
- Maintain adequate perfusion pressure
- Mycotic aneurysm: pre-operative vascular imaging · endovascular treatment if needed

2023 ESC Guidelines; 2026 AHA Scientific Statement

No two IE lesions are alike

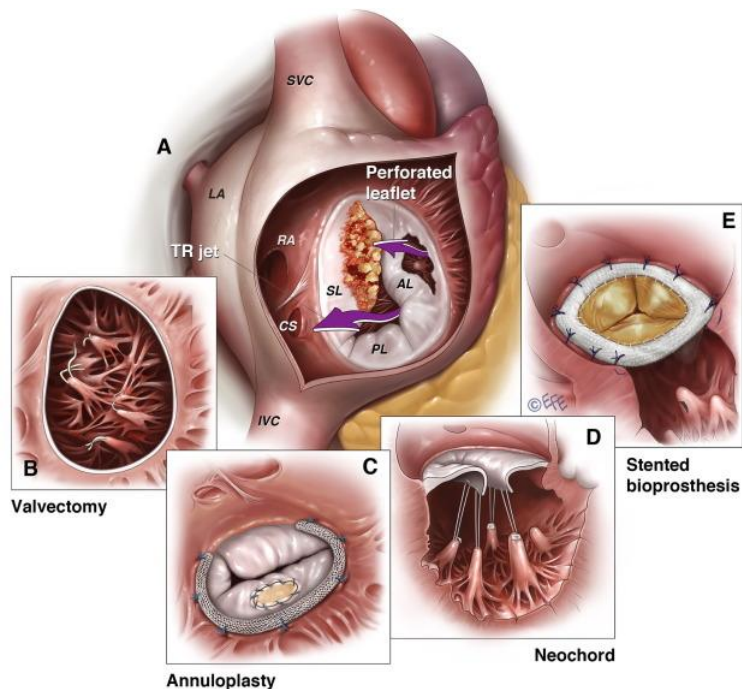


Even within mitral IE, location, extent and vegetation size produce five or more distinct patterns

Mitral IE lesion types — Ann Thorac Surg 2020;109:1335–42

Surgery must be tailored to the lesion rather than standardized.

Goals of surgery



1

Radical debridement

Remove vegetations and infected tissue and material as completely as possible; irrigate thoroughly

2

Reconstruction

Rebuild destroyed structures (e.g. aortomitral continuity) with bovine or autologous pericardium

3

Valve: repair or replace

Repair where feasible; choose the prosthesis by age and condition (mechanical · tissue · homograft)

Pre-operative coronary assessment: coronary CTA instead of angiography if aortic vegetation is present

Valve choice in IE: mechanical vs tissue

Meta-analysis

11 studies · 2,336 mechanical vs
2,057 tissue valves

HR 0.95

Reinfection (0.48–1.89), NS

HR 0.82

Reoperation (0.34–1.98), NS

Flynn, Ann Cardiothorac Surg 2019

Younger patients

- AVR, 40–65 y (INFECT registry): mechanical had better survival (HR 0.55) and less recurrent IE (HR 0.27)
- AVR, ≤70 y (Finland, n = 213): lower mid-term mortality with mechanical
- MVR, 50–69 y (PSM, n = 492): 15-y survival 80.6% vs 69.3%, favouring mechanical

Bottom line

- IE itself should not dictate prosthesis type
- Choose as in non-IE disease: age, life expectancy, bleeding risk
- STS: mechanical or stented tissue valve is reasonable after radical debridement, anchored to healthy tissue (IIa)
- Observational data only: beware selection bias

Flynn, Ann Cardiothorac Surg 2019; INFECT-Registry, J Clin Med 2023; Kytö 2019; Clin Cardiol 2020; STS guideline, Ann Thorac Surg 2011

Homograft in aortic IE: promising, not proven

Supportive series

- Berlin, 161 root abscesses: freedom from recurrent infection / PVL 91.6%; 17-y survival 70.4%
- Brussels, 112 active IE: recurrent IE 5.3% (median 7.8 y)
- Redo proximal aorta, 39 active IE: no reinfection (median 2.5 y)

Comparative data

Williams, Aorta 2022 · 11 studies, 810 complex aortic root IE

RR 0.89

Reinfection (0.45–1.78), NS

RR 0.99

Mortality (0.61–1.59), NS

*Kim, JTCVS 2016 (PS-adjusted):
reinfection HR 1.04 (0.49–2.18), NS*

Take-home

- Debridement matters more than the conduit
- Consider homograft for extensive root destruction or aorto-ventricular discontinuity, especially PVE (STS IIa–IIb)
- Limits: supply, technical demand, durability — freedom from reoperation 47% at 15 y

PMID 15982588; UCLouvain series; PMID 25043866; Kim, JTCVS 2016; Williams, Aorta 2022; STS guideline, Ann Thorac Surg 2011

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Take-home

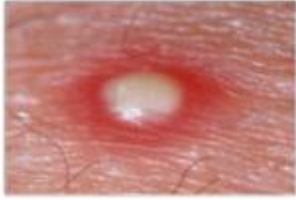
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03

Prophylaxis for IE



Which source can we prevent?



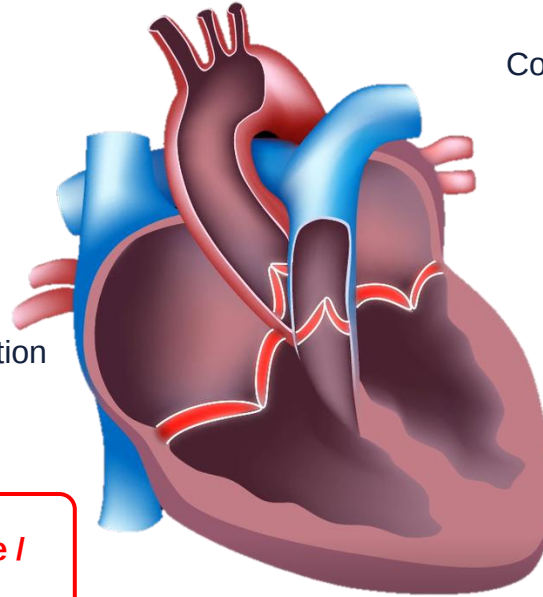
Skin abscess



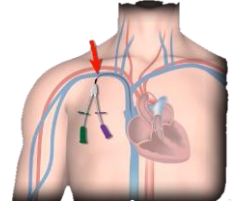
Urinary tract infection



**Dental procedure /
brushing
(viridans
streptococci)**



Contaminated central
line



Injection drug use



Acupuncture

Who needs prophylaxis?

Recommended (Class I)

- Previous IE
- Surgical prosthetic valve or repair material
- TAVI · transcatheter pulmonary valve
- Untreated cyanotic CHD; shunts and conduits (6 months after repair)
- Ventricular assist device

Should / may be considered

- Transcatheter mitral or tricuspid repair (IIa)
- Septal closure devices, LAA occluders, vascular grafts — first 6 months (IIa)
- Heart transplant recipients (IIb)

Not recommended

- CIED (pacemaker · ICD)
- Other intermediate-risk valve disease
- → Oral hygiene for all at-risk patients

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- → Oral hygiene for all at-risk patients

Which dental procedures?



Prophylaxis suggested

- Manipulation of gingival tissue or the periapical region
- Perforation of the oral mucosa
- e.g. extraction, implants, scaling, root canal treatment

Not suggested

- Local anaesthesia through non-infected tissue
- Dental radiographs
- Fitting or adjusting dentures and orthodontic appliances
- Shedding of primary teeth; bleeding from lip or mucosal trauma

Regimen: single dose 30–60 min before



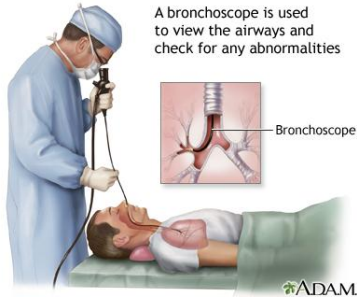
Clindamycin

no longer recommended
(adverse effects · C.
difficile)

Situation	Agent	Adult	Child
Oral	Amoxicillin	2 g	50 mg/kg
Unable to take oral	Ampicillin or cefazolin / ceftriaxone (IV, IM)	2 g / 1 g	50 mg/kg
Penicillin allergy · oral	Cephalexin*	2 g	50 mg/kg
	Azithromycin or clarithromycin	500 mg	15 mg/kg
	Doxycycline	100 mg	<45 kg 2.2 mg/kg
Allergy · no oral	Cefazolin or ceftriaxone*	1 g IV/IM	50 mg/kg

*Avoid cephalosporins after anaphylaxis, angio-oedema or urticaria with penicillin. If missed, may be given up to 2 h after the procedure — AHA 2021; ESC 2023

Non-dental procedures



Bronchoscopy



GI endoscopy



Vaginal delivery



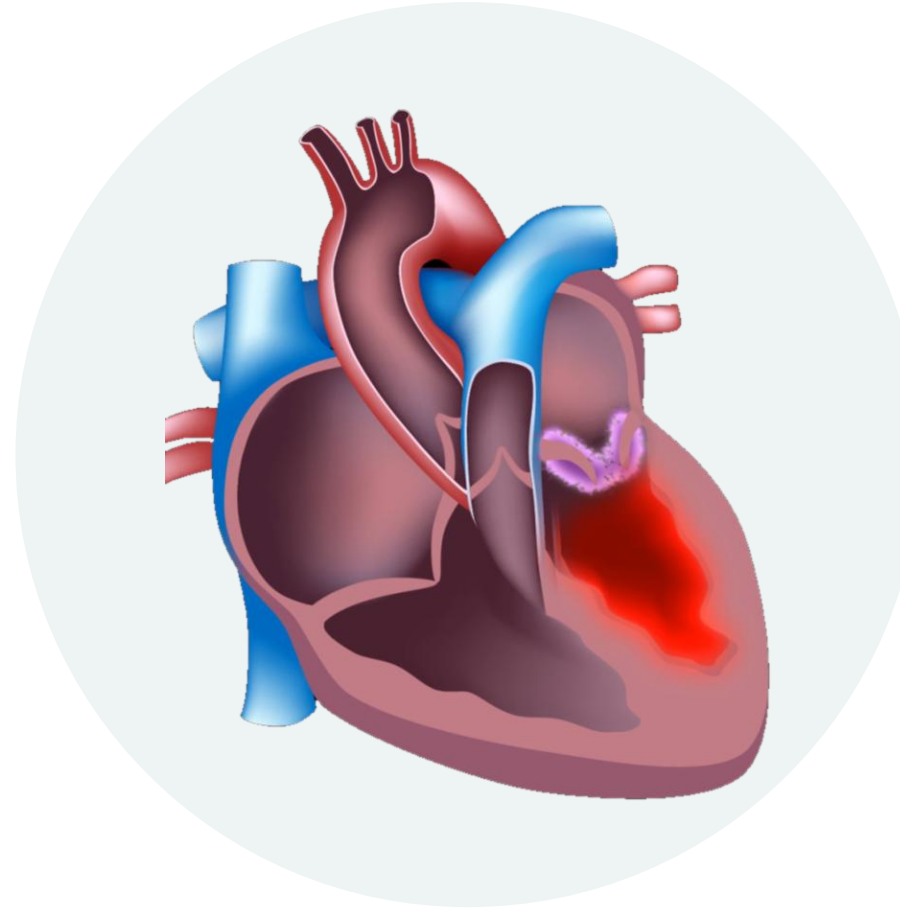
Skin procedures

Routine prophylaxis not needed

- Not routinely recommended for bronchoscopy, GI endoscopy, delivery or skin procedures
- In high-risk patients, may be considered for invasive respiratory, GI, GU, skin or musculoskeletal procedures (ESC 2023, IIb)
- For procedures on infected tissue, treat the relevant organism

04

Case review



Case I: F/60

No previous medical history

Fever, DOE, pitting oedema

COVID-19 negative

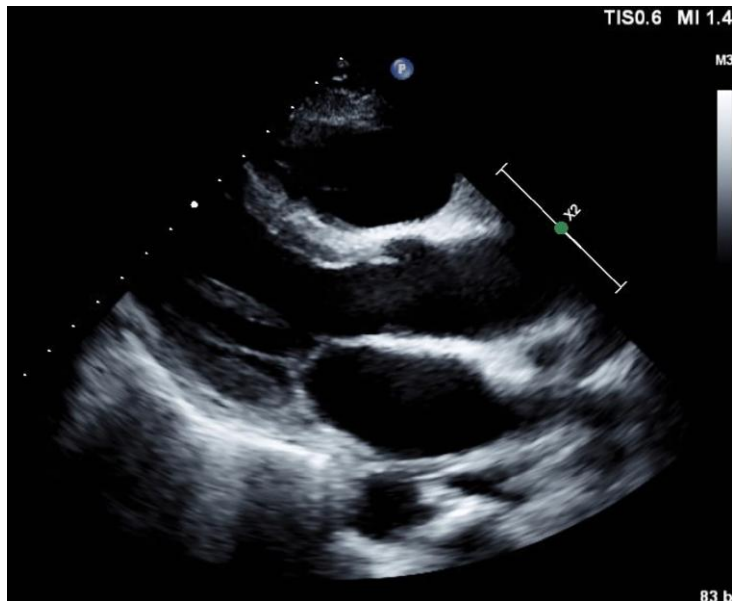
Blood culture: Gram-positive cocci

CXR: bilateral pulmonary oedema

**Fever + heart failure + bacteraemia →
suspect IE**



Case I: diagnosis and decision



Native MV vegetation 2.0 × 1.8 cm, hypermobile

Blood culture (+) + vegetation

2 major → definite IE

Left-sided NVE + pulmonary
oedema

Heart failure

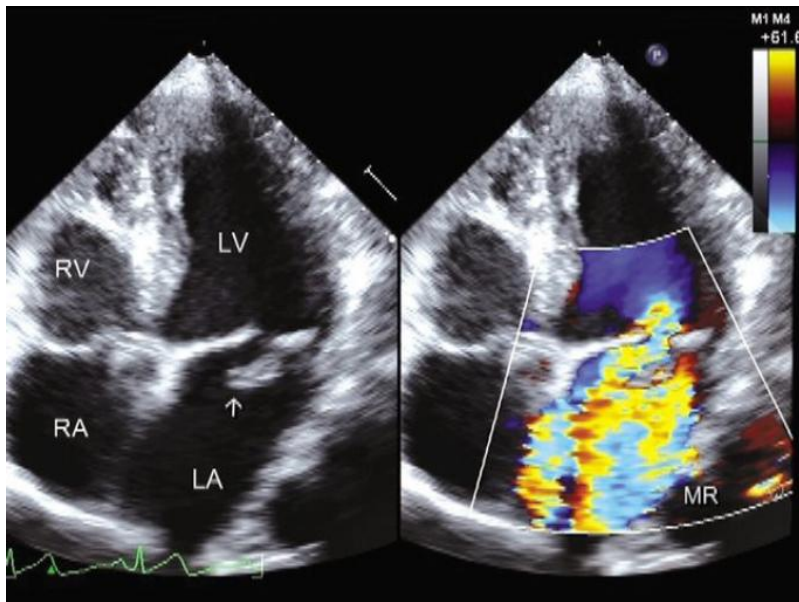
Vegetation ≥10 mm, mobile

High embolic risk

Urgent surgery (within 3–5 days)

HF + ≥10 mm vegetation → ESC 2023 Class I

Case I: diagnosis and decision



Native MV vegetation 2.0×1.8 cm, hypermobile
Severe MR

Blood culture (+) + vegetation

2 major → definite IE

Left-sided NVE + pulmonary
oedema

Heart failure

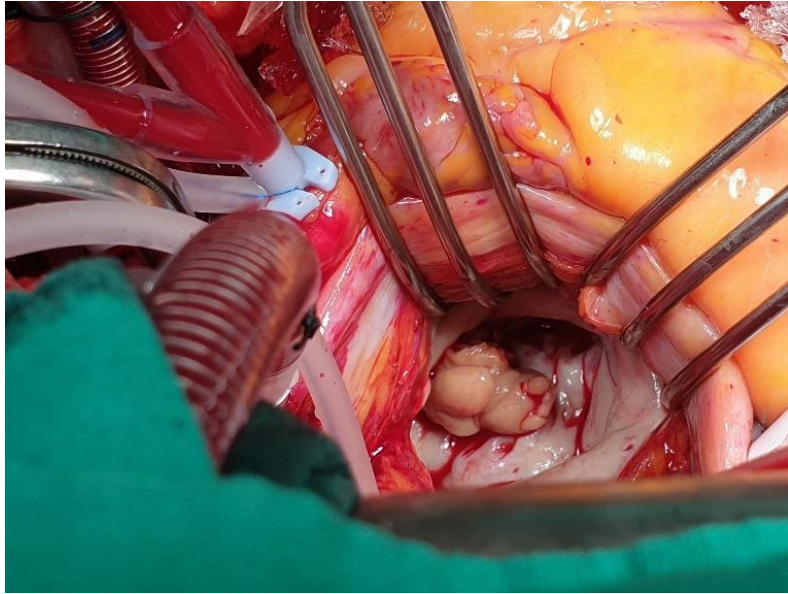
Vegetation ≥ 10 mm, mobile

High embolic risk

Urgent surgery (within 3–5 days)

HF + ≥ 10 mm vegetation → ESC 2023 Class I

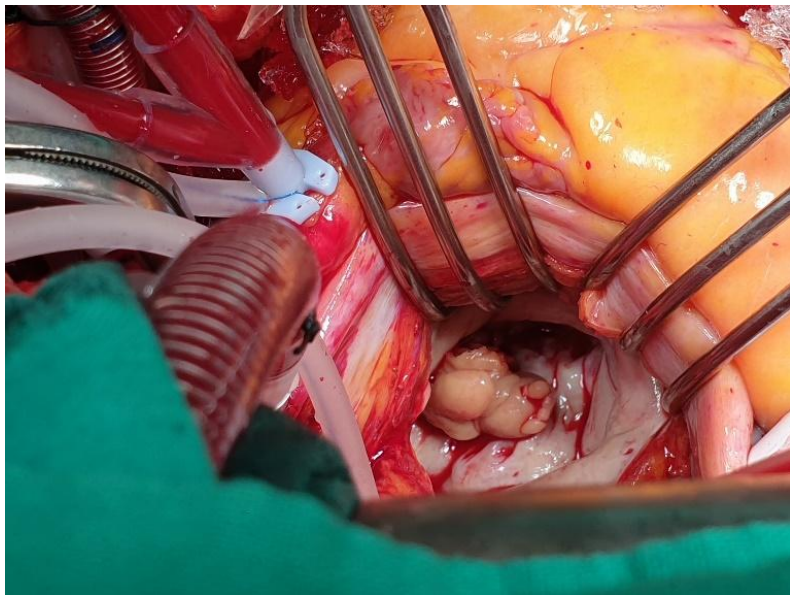
Case I: operation and outcome



Operative finding

- **Vegetation removal**
- **MVR with Mechanical valve**
+ annular reconstruction with
bovine pericardium
- **6 weeks of antibiotics**
- **Discharged**

Case I: operation and outcome



Operative finding

- **Vegetation removal**
- **MVR with Mechanical valve
+ annular reconstruction with
bovine pericardium**
- **6 weeks of antibiotics**
- **Discharged**



Case II: M/60, s/p AVR (2009)

s/p AVR (2009) — high-risk predisposition

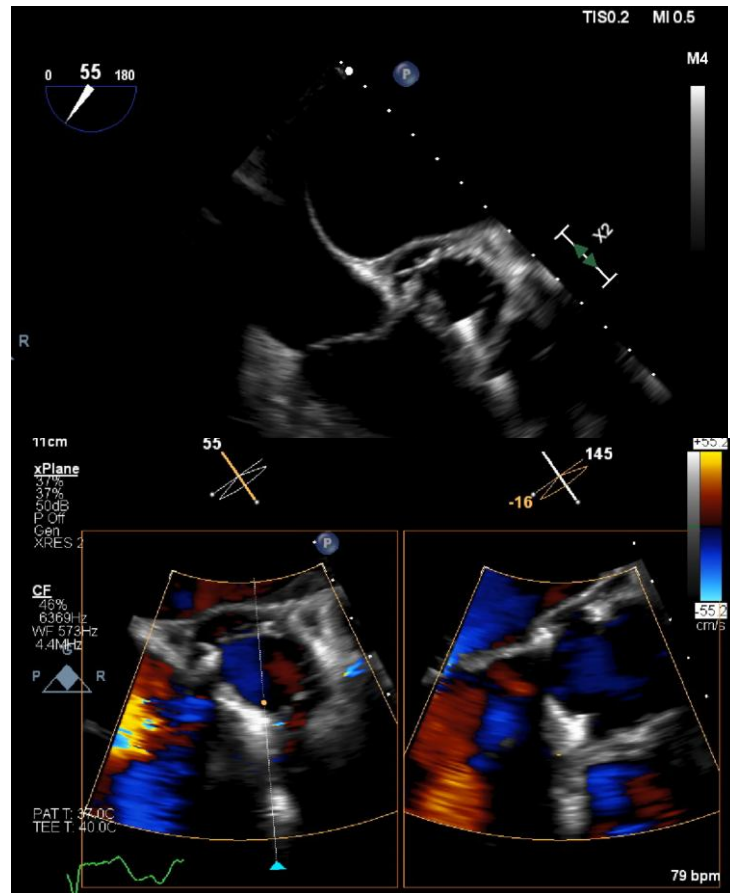
Admitted to infectious diseases with bacterial meningitis

Blood culture: *E. faecium*

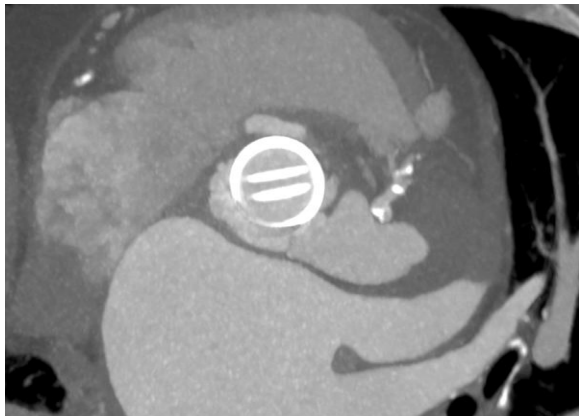
New DOE and pitting oedema during treatment

TEE: pocket and flow around the prosthesis
→ paravalvular leak

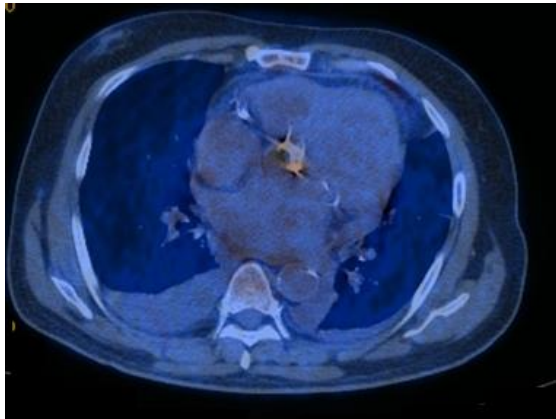
TEE: paravalvular pocket



Case II: multimodality imaging and decision



Cardiac CT: pseudoaneurysm, r/o dehiscence



PET-CT: FDG uptake (SUV 3.7)

Late PVE with dehiscence · pseudoaneurysm

Uncontrolled local infection + HF

Meningitis → pre-operative brain imaging

Teaching point *E. faecium* is not a Duke-ISCVID typical organism → ≥ 3 positive sets are needed for the microbiological major criterion; imaging supports the diagnosis

Urgent redo surgery

Radical debridement, root reconstruction, AVR

Take-home messages

● Suspect

- Fever + heart failure symptoms
- Emboli · peripheral lesions
- Predisposing heart disease

● Diagnose

- Three sets of blood cultures
- TTE → TEE
- CT · PET/CT
- Duke-ISCVID 2023

● Treat

- Endocarditis Team
- IV 2 weeks → selective oral switch
- HF · uncontrolled infection · embolism
- Emergency <24 h · urgent 3–5 days

● Prevent

- High-risk patient + dental procedure
- Amoxicillin 2 g, 30–60 min before
- No clindamycin
- Oral hygiene

Key references

1. Delgado V, et al. 2023 ESC Guidelines for the management of endocarditis. Eur Heart J 2023;44:3948–4042.
2. Fowler VG Jr, et al. The 2023 Duke-International Society for Cardiovascular Infectious Diseases criteria for infective endocarditis. Clin Infect Dis 2023;77:518–26.
3. DeSimone DC, Baddour LM, et al. Infective endocarditis: diagnosis, antibiotic therapy, and management. A scientific statement from the AHA. Circulation 2026 (published online Sep 8, 2026).
4. Otto CM, et al. 2020 ACC/AHA Guideline for the management of patients with valvular heart disease. Circulation 2021;143:e72–e227.
5. Wilson WR, et al. Prevention of viridans group streptococcal infective endocarditis: AHA scientific statement. Circulation 2021;143:e963–78.
6. Iversen K, et al. Partial oral versus intravenous antibiotic treatment of endocarditis (POET). N Engl J Med 2019;380:415–24; 5-year follow-up, N Engl J Med 2022;386:601–2.
7. Kang DH, et al. Early surgery versus conventional treatment for infective endocarditis (EASE). N Engl J Med 2012;366:2466–73.

Thank You Questions?



"Somebody's life will be in your hands one day"