

Aortic Stenosis: The Clinical Decision Pathway



AREA
> 1.5 cm²
Mean Gradient < 20 mmHg



AREA
1.0 - 1.5 cm²
Mean Gradient 20 - 40 mmHg



AREA
< 1.0 cm²
Mean Gradient > 40 mmHg



SYMPTOM STATUS:
ASYMPTOMATIC
Monitor & Educate



SYMPTOM STATUS:
EXERTIONAL DYSPNEA
Echocardiogram Follow-up



SYMPTOM STATUS:
SYNCOPE, ANGINA, HF
SURGICAL INTERVENTION

The Burden of Degenerative Disease in Australia

2–4%

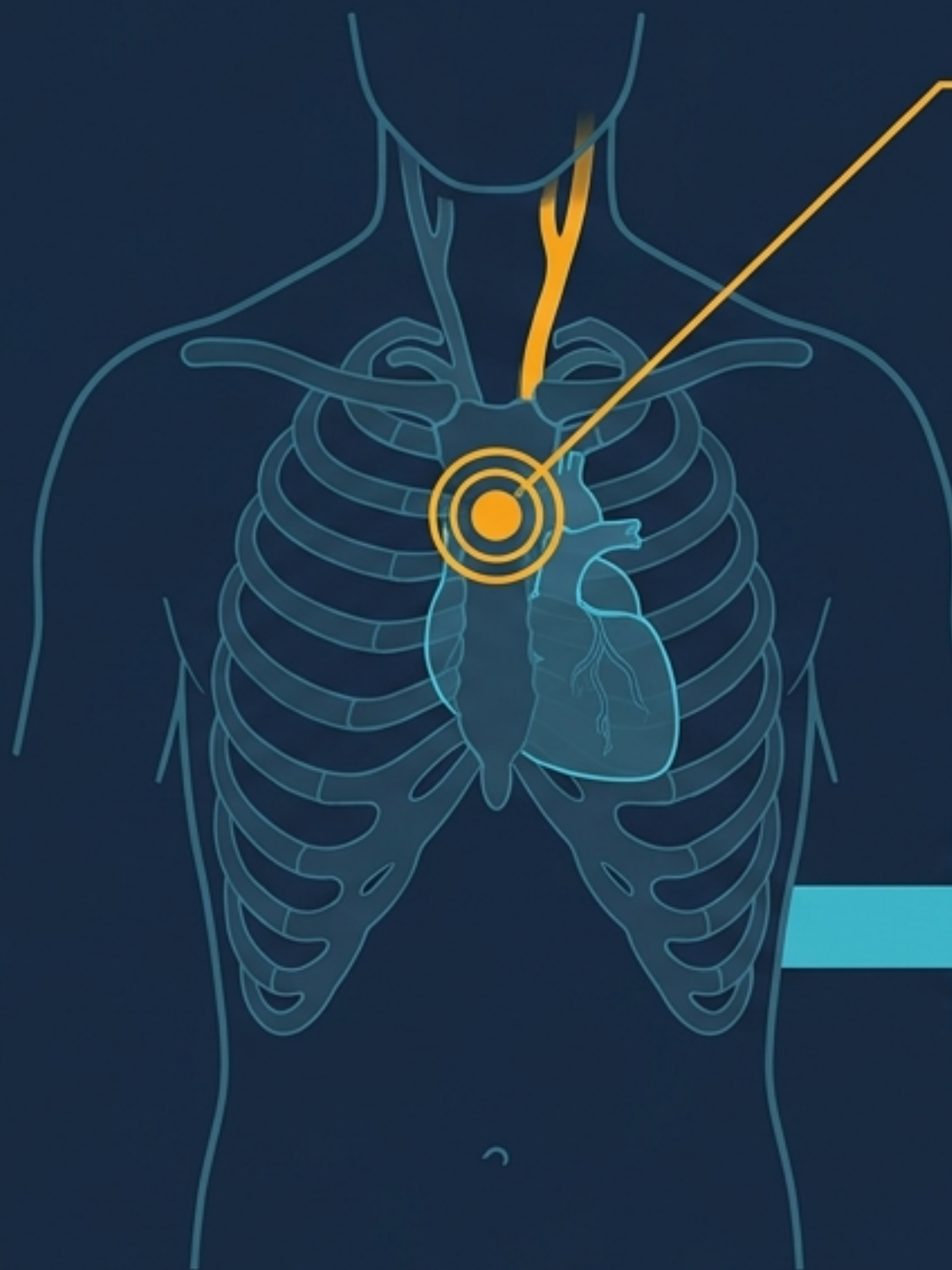


Prevalence in adults aged >65 years.
Driven by degenerative calcific disease.

10–15
Years Earlier



Presentation timeline for **Bicuspid Aortic Valve (BAV)**, affecting 1–2% of the population.



Screening Alert

- Opportunistic screening recommended for adults >65 presenting for routine health assessments.
- **Clinical Trigger:** Ejection systolic murmur at the right upper sternal border radiating to the carotids.

Next Step:
**Mandatory
Transthoracic
Echocardiography
(TTE)**

The Echocardiographic Grading Dashboard

Mild

AVA >1.5 cm²



Mean Gradient <20 mmHg



Vmax <3.0 m/s



Moderate

AVA 1.0–1.5 cm²



Mean Gradient 20–40 mmHg



Vmax 3.0–4.0 m/s



Severe

AVA ≤ 1.0 cm²



Mean Gradient ≥ 40 mmHg



Vmax ≥ 4.0 m/s



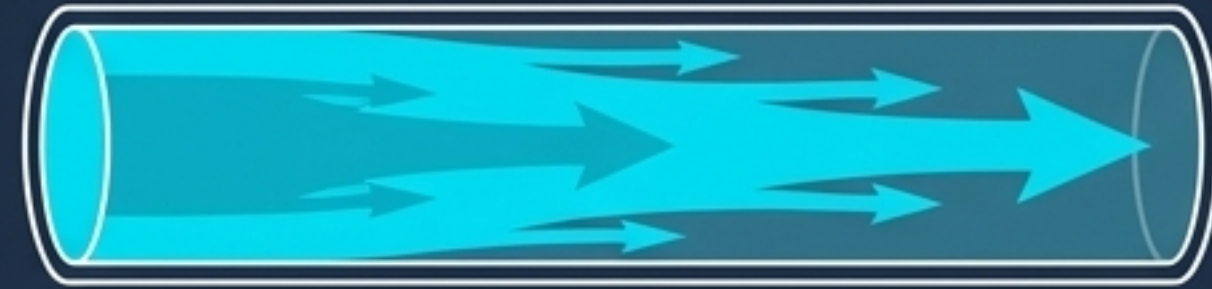
Indexed AVA (AVAi) ≤ 0.6 cm²/m² | Dimensionless velocity index (DVi) <0.25

The Diagnostic Pitfall: Parameter Discordance

30%

of patients with severe AS by AVA criteria have a mean gradient <40 mmHg.

Context: Never rely on a single parameter. Discordance requires investigating flow status, Left Ventricular Ejection Fraction (LVEF), and blood pressure.



Normal Flow



Low Flow

Paradoxical LF-LG (Preserved LVEF $\geq 50\%$): Caused by LV concentric remodelling, small cavity, or diastolic dysfunction. Stroke Volume Index (SVi) remains ≤ 35 mL/m².

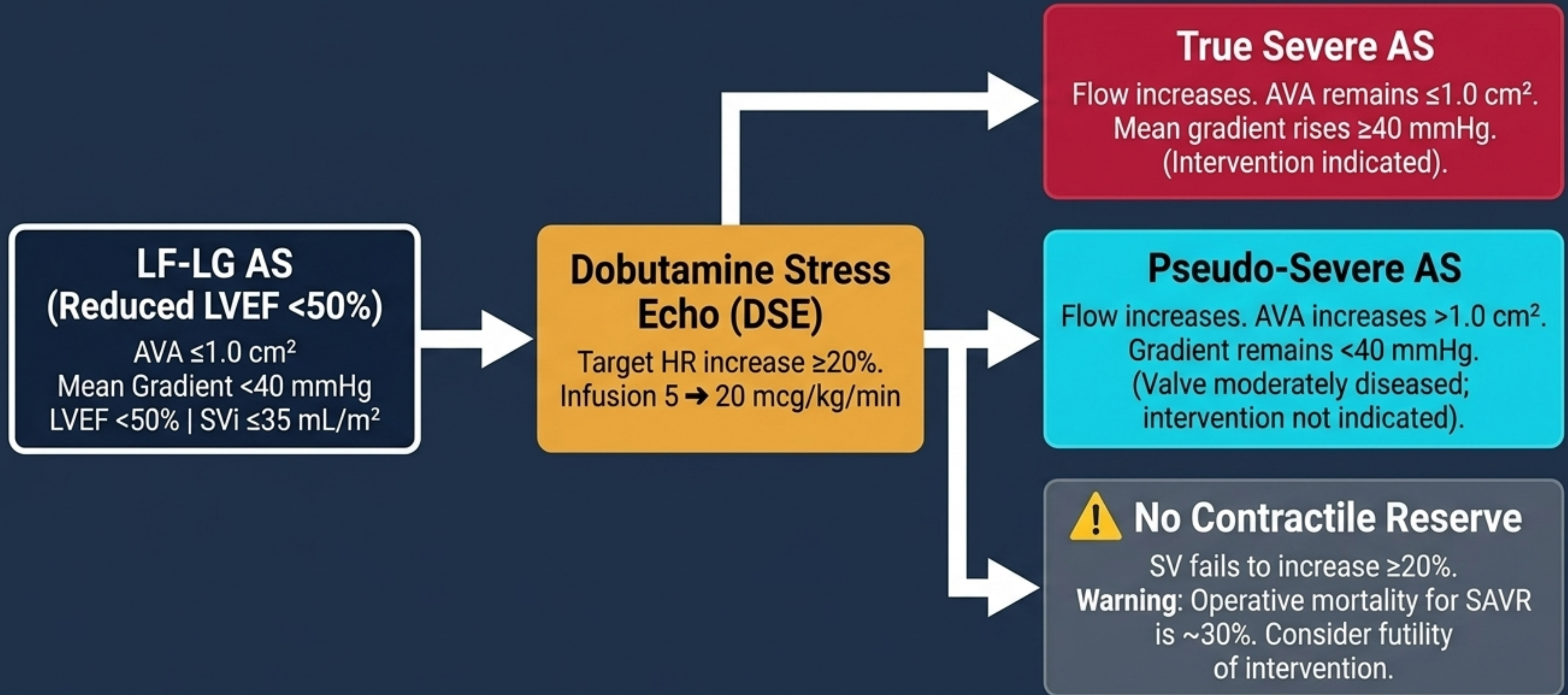
CT Calcium Scoring (Men):

>2,000 AU

CT Calcium Scoring (Women):

>1,200 AU

Unpacking Low-Flow Low-Gradient (LF-LG) AS



The Inflection Point: The Classic Triad Survival Countdown

Once symptoms emerge, the natural history of severe AS is devastating. Median survival drops precipitously without intervention.

5 Years

Angina

Exertional Chest Pain

Supply-demand mismatch.
Occurs in 35%.
50% have concomitant CAD.

3 Years

Syncope

Exertional Pre-Syncope

Fixed cardiac output unable to meet
vasodilation. Sudden death risk.

2 Years

Heart Failure

Dyspnoea / Pulmonary Oedema

The most ominous symptom.
Reflects LV decompensation.

STOP

Exercise testing is strictly contraindicated in symptomatic severe AS.
Medical therapy (statins, diuretics) does not slow progression; intervention cannot be delayed.

The Grey Zone: Watchful Waiting in Asymptomatic AS

Serial echocardiographic surveillance is the standard of care—unless high-risk features unmask latent risk.

Severe (AVA ≤ 1.0 cm²)	Echo Every 6–12 months	Clinical Review Every 6 months
Moderate (AVA 1.0–1.5 cm²)	Echo Every 1–2 years	Clinical Review Every 12 months
Mild (AVA > 1.5 cm²)	Echo Every 3–5 years	Clinical Review As per routine



The Role of Exercise Testing (Class IIa): Recommended in asymptomatic patients to unmask exertional symptoms (present in 30-40% who report feeling fine), abnormal BP response (failure to rise ≥ 20 mmHg), or arrhythmias.

The Asymptomatic Radar: Triggers for Early Intervention

Very Severe Anatomy

AVA ≤ 0.6 cm² or $V_{\max} \geq 5.0$ m/s.
(Event rates 20-40%/year;
intervention reasonable at
low-mortality centres).

Biomarker Surge

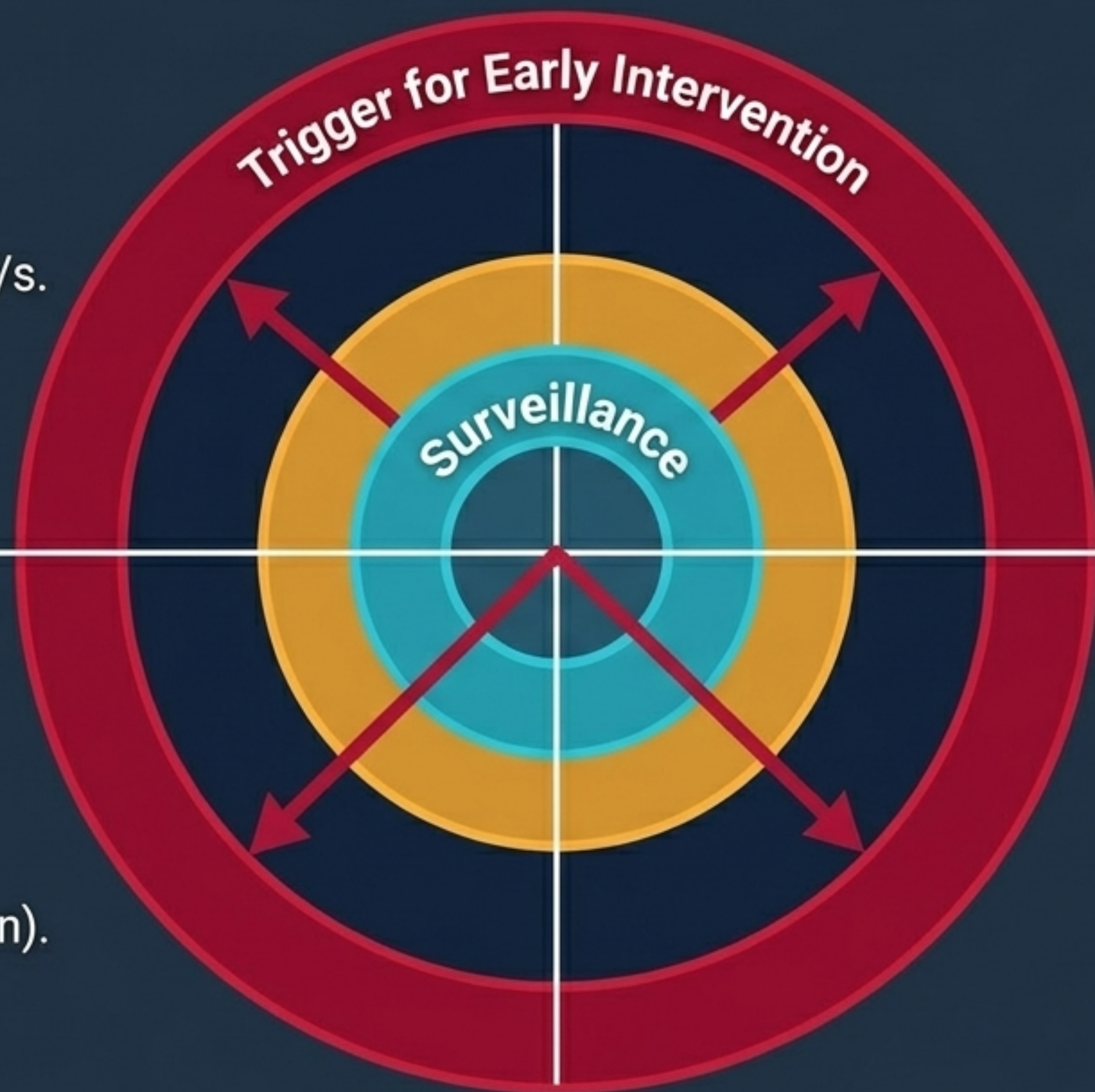
BNP / NT-proBNP $>3\times$ age-
and sex-adjusted normal
range.
(Rise of BNP >75 pg/mL
indicates LV decompensation).

Rapid Progression

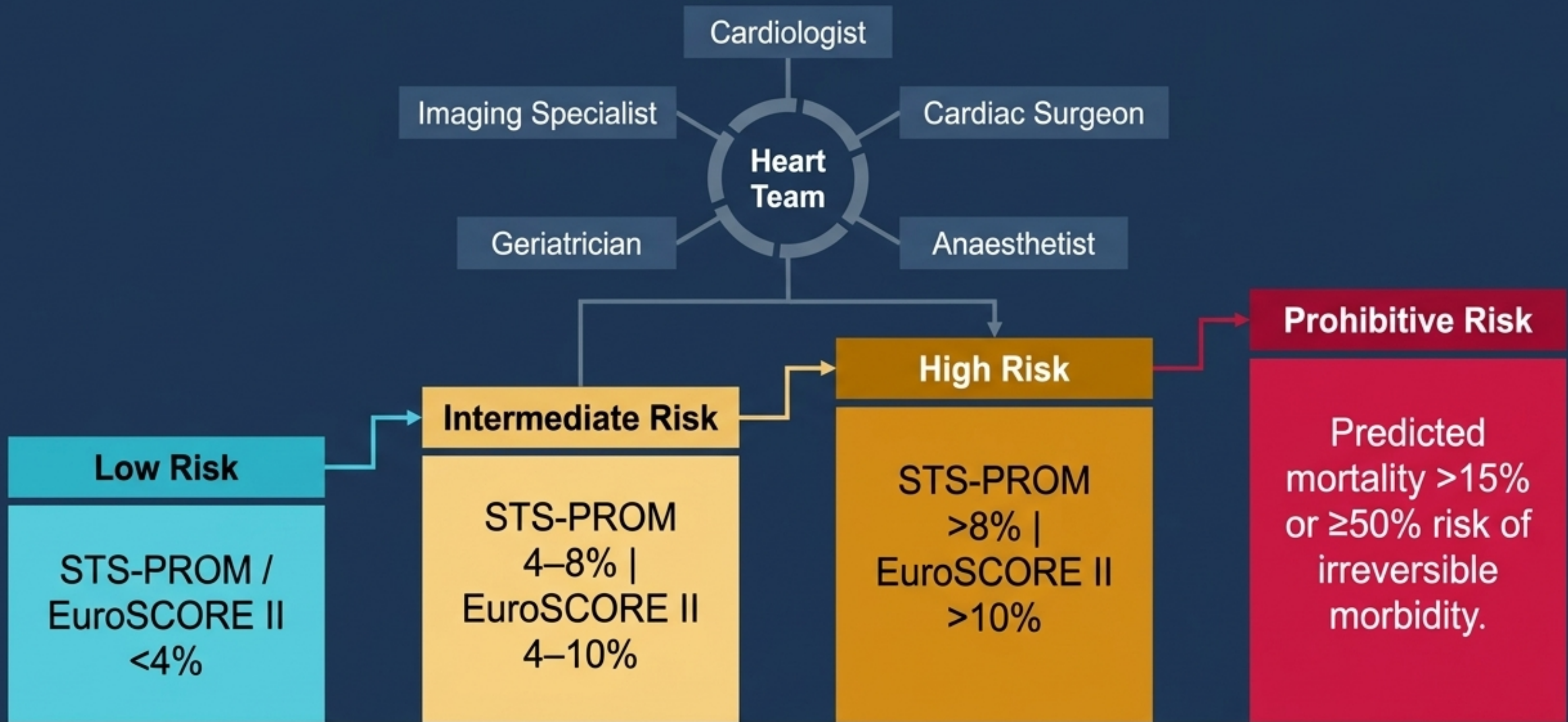
V_{\max} increase ≥ 0.3 m/s/year |
AVA decrease ≥ 0.1 cm²/year |
Mean gradient increase
 $\geq 7-10$ mmHg/year.

LV Decompensation & Exercise Failure

LVEF falls $<50\%$ OR an
abnormal exercise test
unmasks symptoms/BP drop.



The Heart Team Decision: Surgical Risk Stratification



Holistic Assessment Factors: Frailty indices, porcelain aorta, hostile chest (radiation/deformity), cognitive status, and patient values regarding anticoagulation.

The Anatomical Blueprint: CT Suitability for TAVR

1 Aortic Annulus

Perimeter, area, and mean diameter dictate prosthesis sizing.

2 Coronary Ostia Clearance

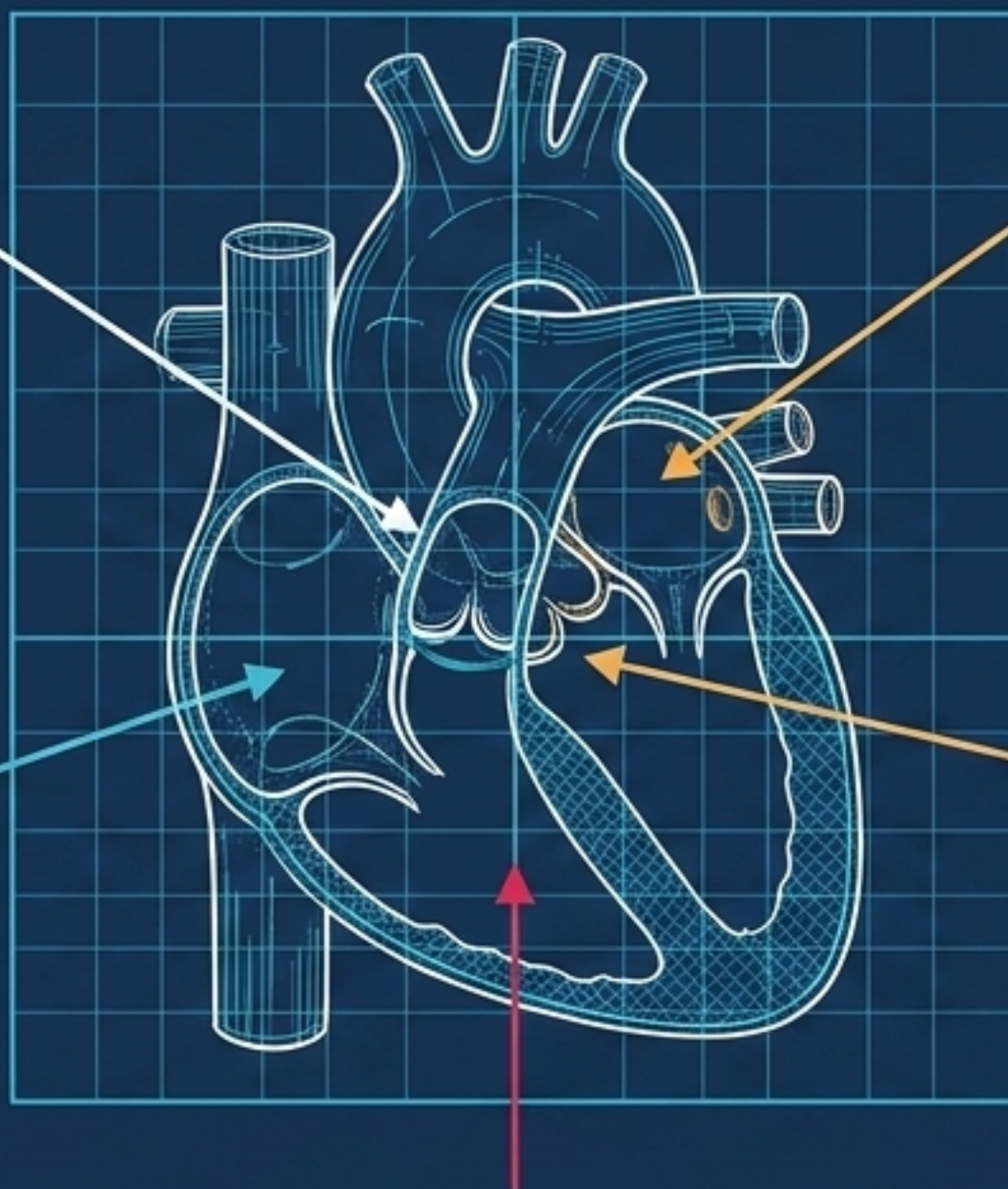
Distance from annulus to ostia must be ≥ 10 mm to reduce obstruction risk.

3 Sinus of Valsalva & Sinotubular Junction

Height/width and diameter dictate sealing and anchoring.

4 Aortic Valve Morphology

Bicuspid vs. Trileaflet. Bicuspid carries higher paravalvular leak and conduction disturbance risks.



5 Iliofemoral Access

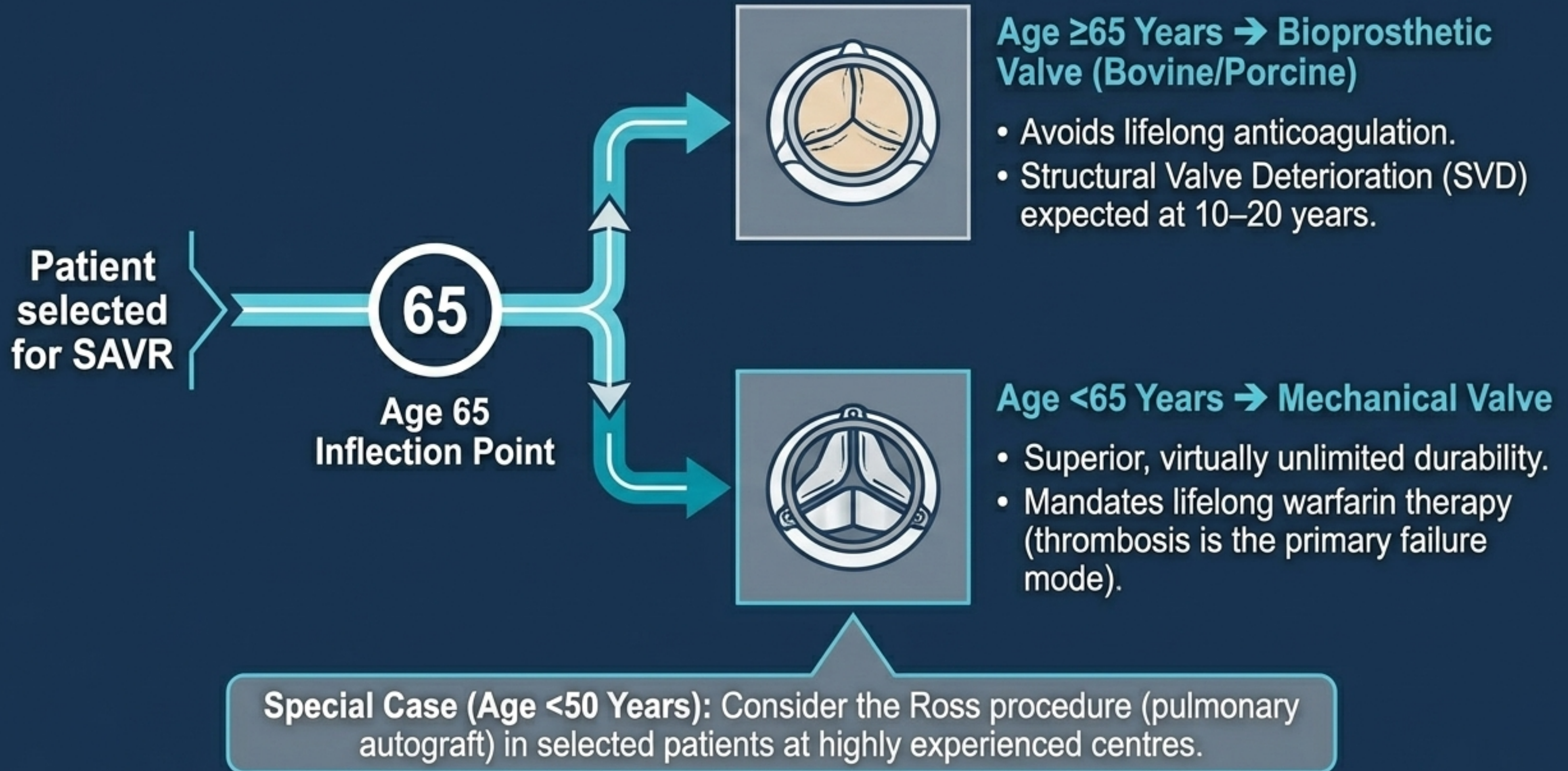
Minimum lumen diameter ≥ 5.0 – 5.5 mm required; must assess for tortuosity and calcification.

The Intervention Matrix: Aligning Patient Profile to Procedure

Prohibitive Risk	<p>Prohibitive / Extreme Risk. TAVR preferred. Palliative TAVR superior to medical therapy (PARTNER 1B). Assess for futility.</p>
High Risk	<p>High Risk (STS $\geq 8\%$). TAVR or SAVR. TAVR non-inferior or superior at 1-5 years. Transfemoral access preferred.</p>
Intermediate Risk (STS 4–8%)	<p>Intermediate Risk (STS 4–8%). TAVR or SAVR. TAVR increasingly favoured in the elderly. Anatomy and preference guide choice.</p>
Low Risk	<p>Low Risk (STS $< 4\%$). SAVR or TAVR. SAVR strictly preferred in younger patients ($< 65-70$ years) due to established > 10 year durability and future redo access.</p>

Key Caveat: TAVR is widely available on the MBS at major tertiary centres, but durability beyond 10 years for TAVR bioprostheses remains under investigation.

Valve Choice in SAVR: Bioprosthetic vs. Mechanical



Clinical Archetypes & Special Populations



The Elderly (>80 years)

TAVR generally preferred.

Severe frailty (Clinical Frailty Scale ≥ 7) predicts poor outcomes regardless of intervention. Integrate palliative goals if intervention is futile.

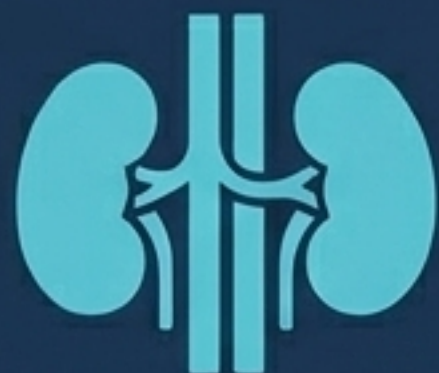


Pregnancy

Haemodynamic shifts precipitate decompensation. Pre-pregnancy SAVR/TAVR ideal.

Balloon Aortic Valvuloplasty (BAV) as a bridge during pregnancy.

Mechanical valves require warfarin or LMWH with anti-Xa monitoring—never discontinue without specialist input.



Renal Impairment (CKD/Dialysis)

High contrast nephropathy risk with pre-TAVR CT. Pre-hydrate (NaCl 0.9% 1mL/kg/hr). TAVR safe in dialysis, but bioprosthetic preferred as warfarin INR is highly erratic.



Hepatic Impairment

Liver disease (Child-Pugh B/C) exponentially raises bleeding risk. TAVR preferred to avoid cardiopulmonary bypass. DOACs contraindicated in Child-Pugh C.

Aboriginal and Torres Strait Islander Health Considerations



Rheumatic Heart Disease (RHD)

ARF and RHD drive AS at a younger age, often with multivalvular involvement, particularly in remote NT, QLD, and WA.



Access & Retrieval

Transfer to metropolitan hubs (Darwin, Adelaide, Brisbane, Perth) relies on Royal Flying Doctor Service. Telehealth manages follow-up.



Telehealth



Secondary Prophylaxis

Benzathine Penicillin G (BPG) 4-weekly IM injections are essential to prevent ARF recurrence and further damage.



4-Weekly

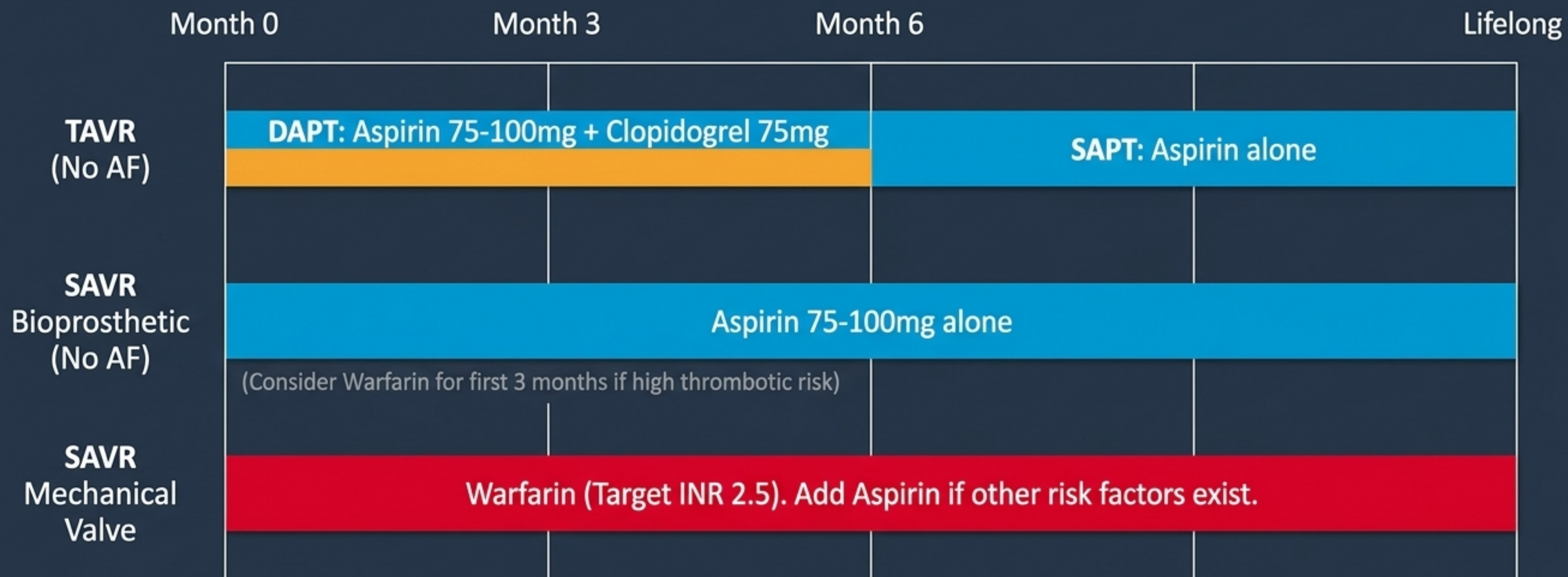


Culturally Safe Care

Engage Aboriginal Community Controlled Health Organisations (ACCHOs) and Health Workers. Respect Sorry Business and cultural obligations affecting attendance. Address social determinants to mitigate endocarditis risks.



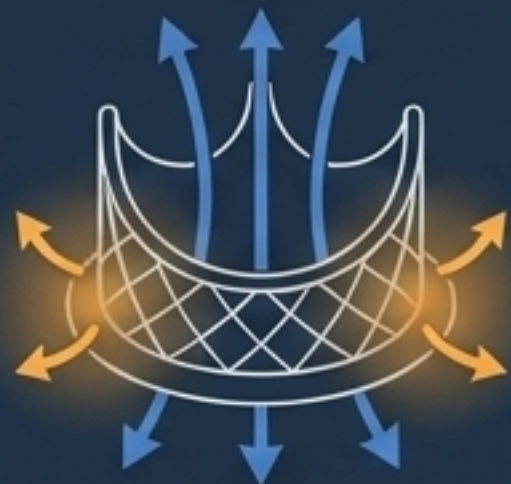
Post-Intervention Pharmacology: Antithrombotic Timelines



Concomitant Atrial Fibrillation (Any Valve): Anticoagulation is lifelong. DOACs acceptable post-TAVR (ATLANTIS/ENVISAGE-TAVI trials) and post-bioprosthetic SAVR. Warfarin is strictly mandatory for mechanical valves.

Post-Op Surveillance: PVL, SVD, and Echo Follow-Up

Paravalvular Leak (PVL)



More common post-TAVR (10-25% mild).
Moderate/Severe PVL causes haemolytic anaemia
and heart failure.
Treat with percutaneous closure (Amplatzer).

Structural Valve Deterioration (SVD)



Affects all bioprostheses over 10-20 years.
Defined by mean gradient increase ≥ 10 mmHg from
baseline or worsening regurgitation.
Treated with redo SAVR or Valve-in-Valve TAVR.

1 Month



TTE (Assess PVL, LVEF,
haemolysis screen). ⚠️

6 Months



TTE. Transition DAPT
to SAPT (TAVR).

12 Months



Establish definitive
baseline valve gradients
for future SVD comparison.

Annually



Monitor for PVL/SVD ⚠️
progression and new
arrhythmias. ⚠️

Endocarditis Prophylaxis: Lifelong Protection

The Imperative

Patients with **prosthetic heart valves** (including TAVR) are at severe risk for **prosthetic valve endocarditis** during high-risk dental procedures (extractions, implants, periodontal work).

Standard Regimen (Amoxicillin)

Adults: 2 g PO, 30–60 minutes before the procedure.

Paediatrics: 50 mg/kg PO (max 2 g), 30–60 minutes prior.

Penicillin Allergy Alternative (Clindamycin)

Adults: 600 mg PO.

Paediatrics: 20 mg/kg PO (max 600 mg).



Clinical Note: Regular dental review and optimal oral hygiene must be reinforced at every annual cardiovascular follow-up.

Master Algorithm: The Aortic Stenosis Clinical Pathway

