Evaluation of Palpitations in an Outpatient General Medicine Clinic

18 August 2025

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HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL

MASSACHUSETTS GENERAL HOSPITAL
CORRIGAN MINEHAN HEART CENTER

Disclosures: Consultant for Abbott, Anumana, Medtronic, Voiant; Research grant from Anumana

Objectives

1. *Select appropriate diagnostic testing for evaluation of palpitations.*
2. *Identify critical components in the outpatient evaluation and management of new-onset atrial fibrillation.*
3. *Learn bradycardia evaluation and indication for pacemaker implant.*
4. *Learn when to refer a patient to a cardiologist.*

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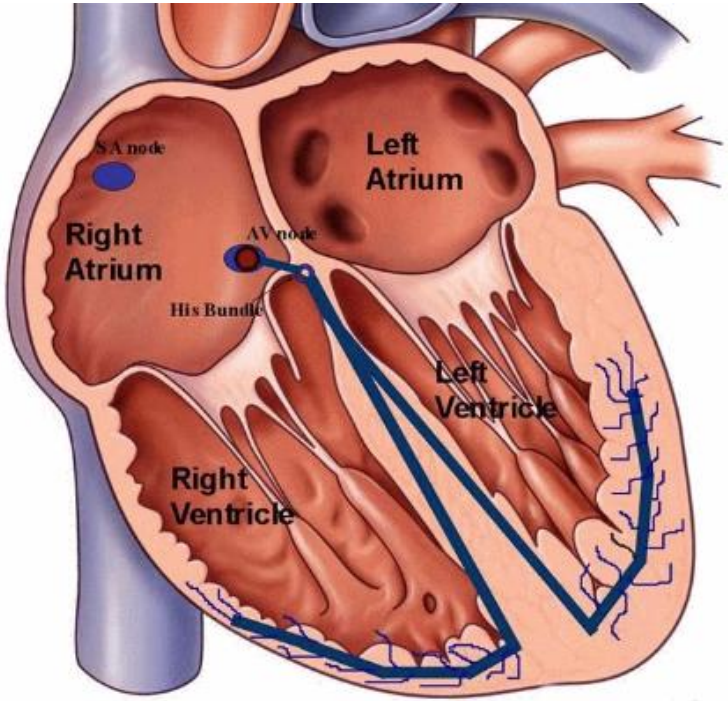
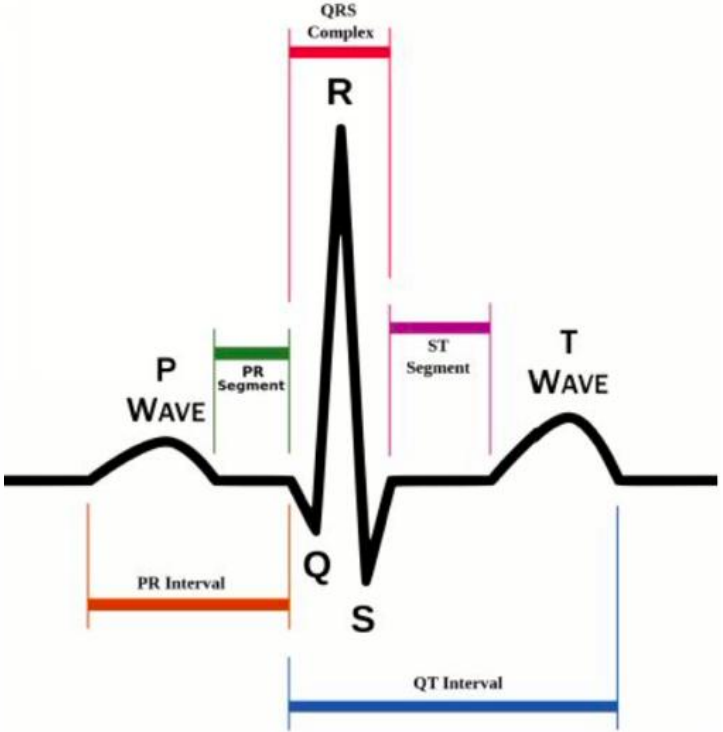
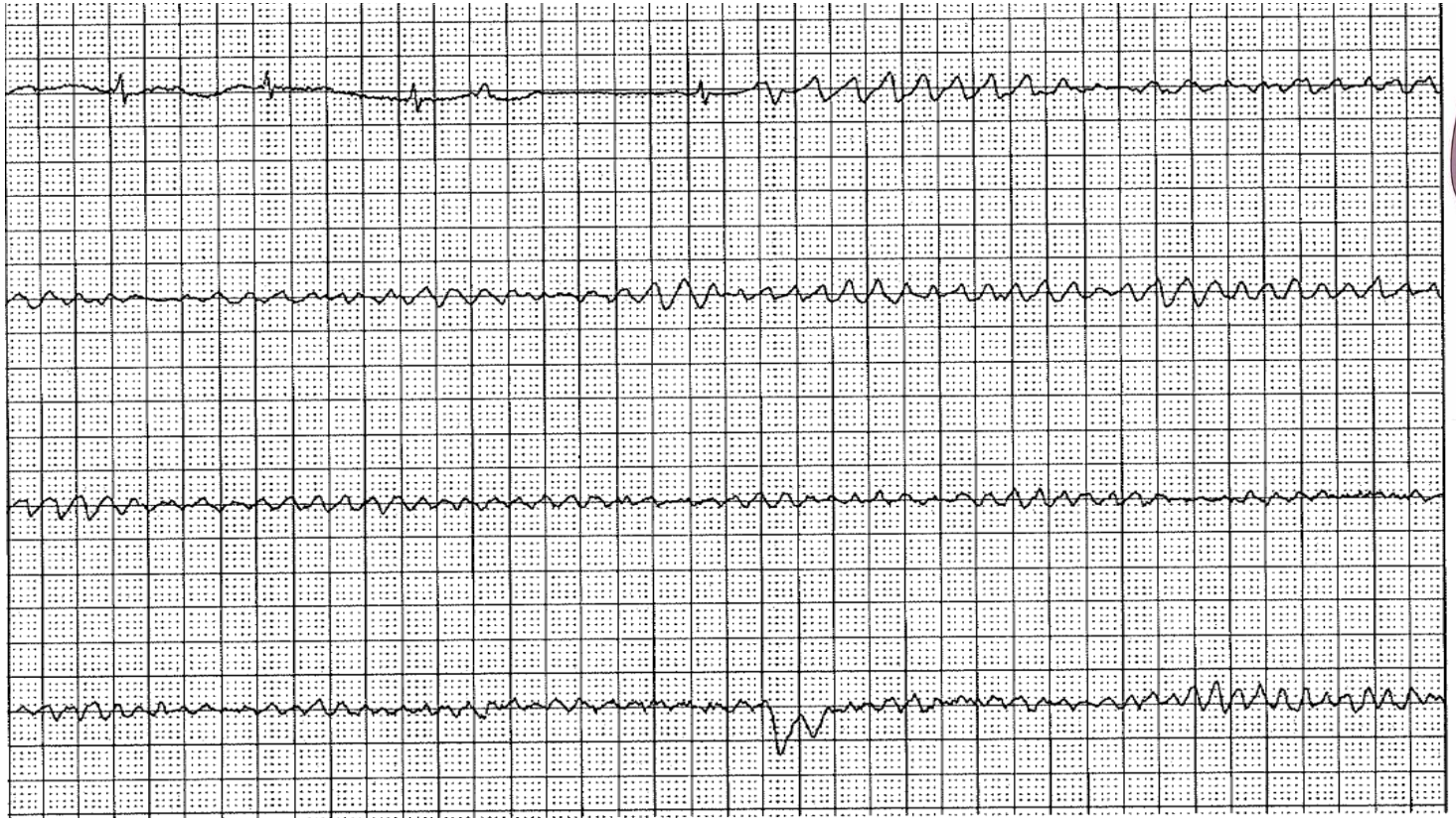
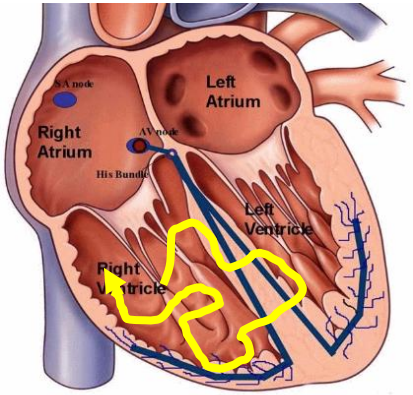
Function of the Cardiac Conduction System



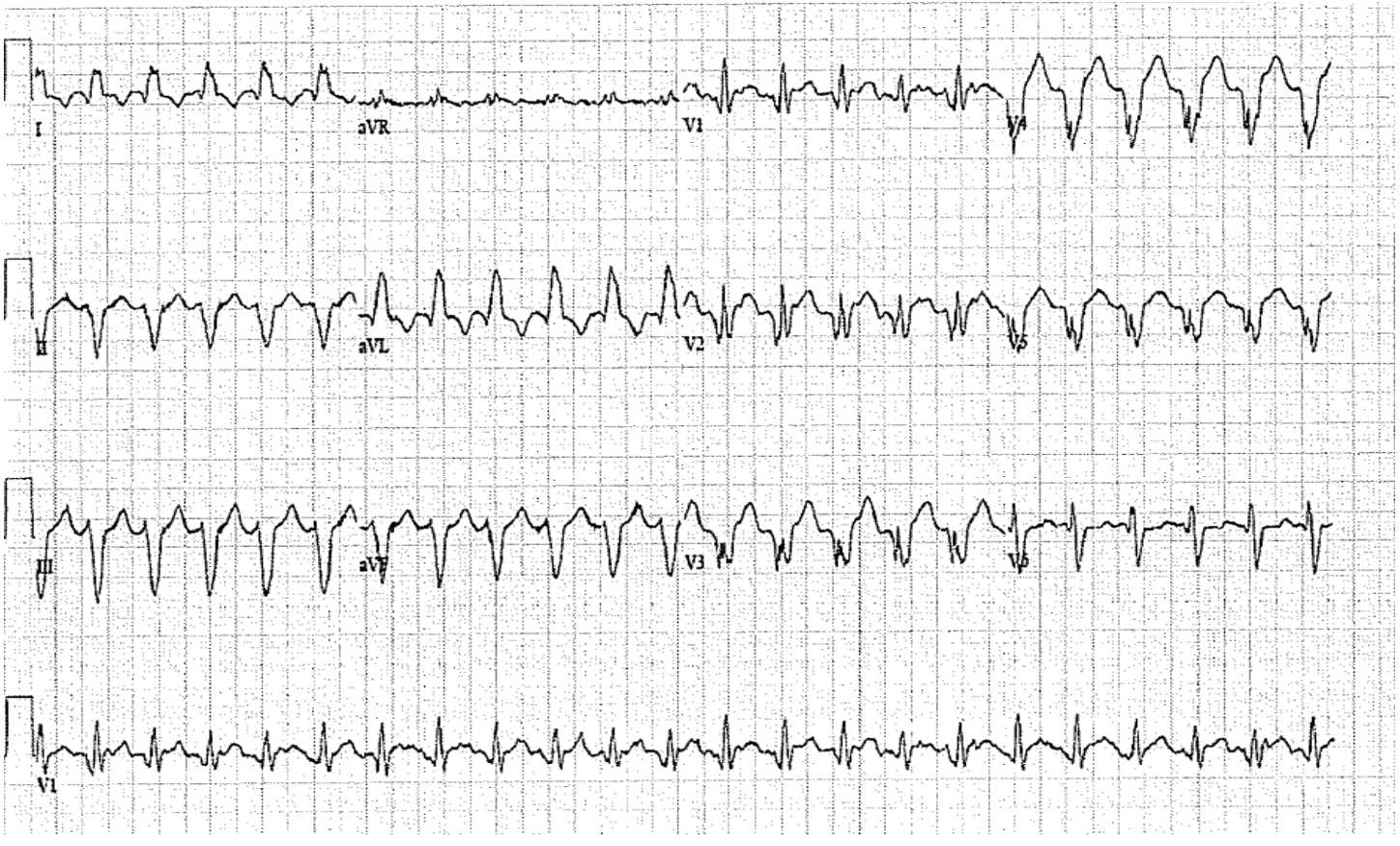


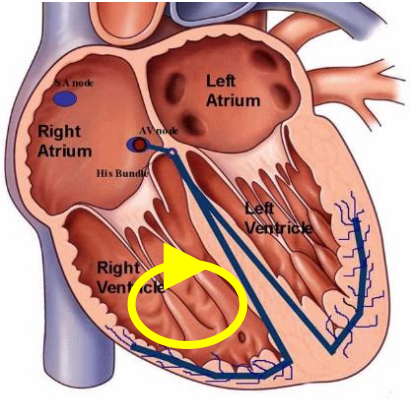
Ventricular Fibrillation





Ventricular Tachycardia





Question 1

Massachusetts General Hospital
Corrigan Minehan Heart Center

Which of the following is associated with VT?

1. Ischemic cardiomyopathy
2. Non-ischemic cardiomyopathy
3. Infiltrative cardiomyopathy
4. All of the above

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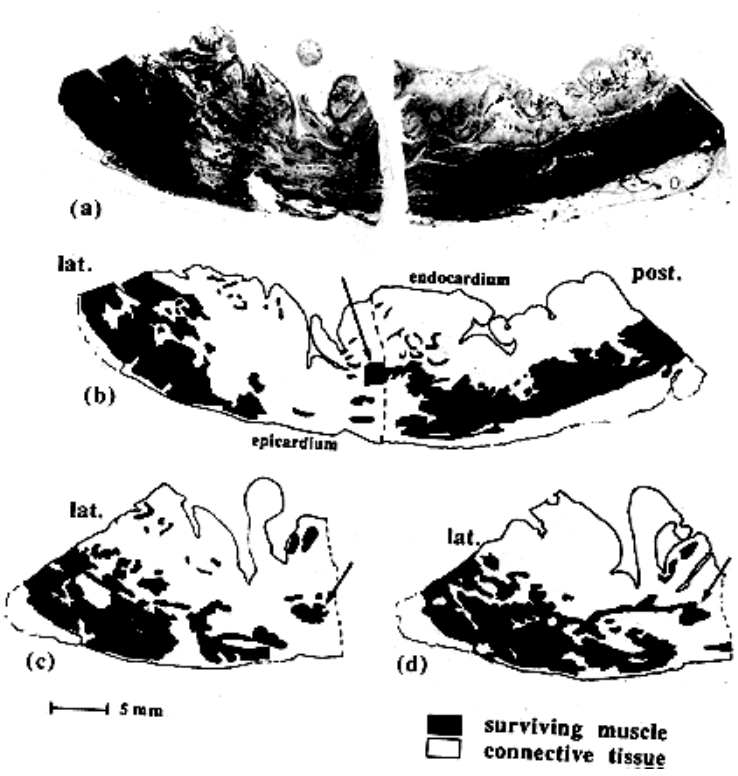
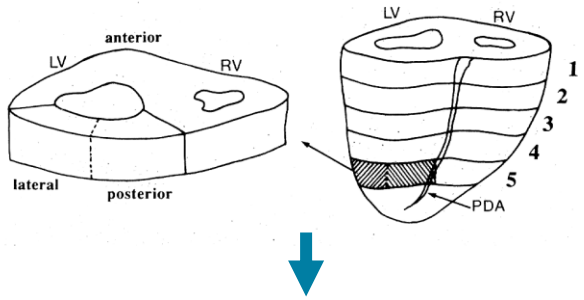
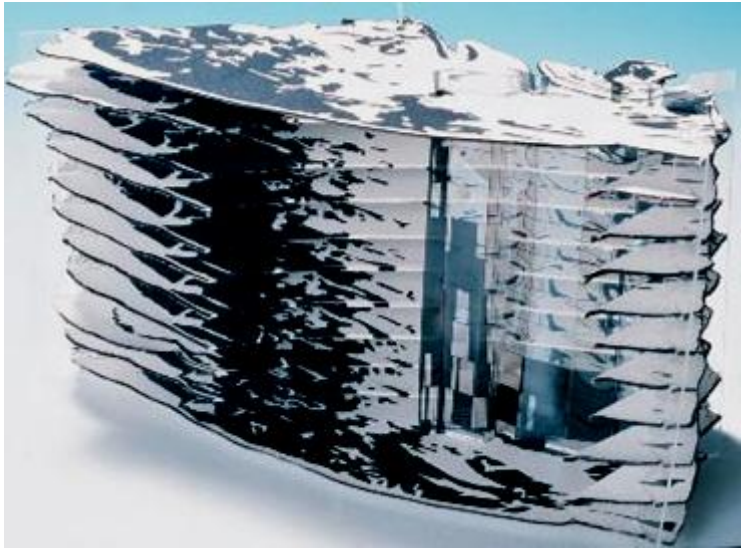
Substrate for Ventricular Arrhythmias







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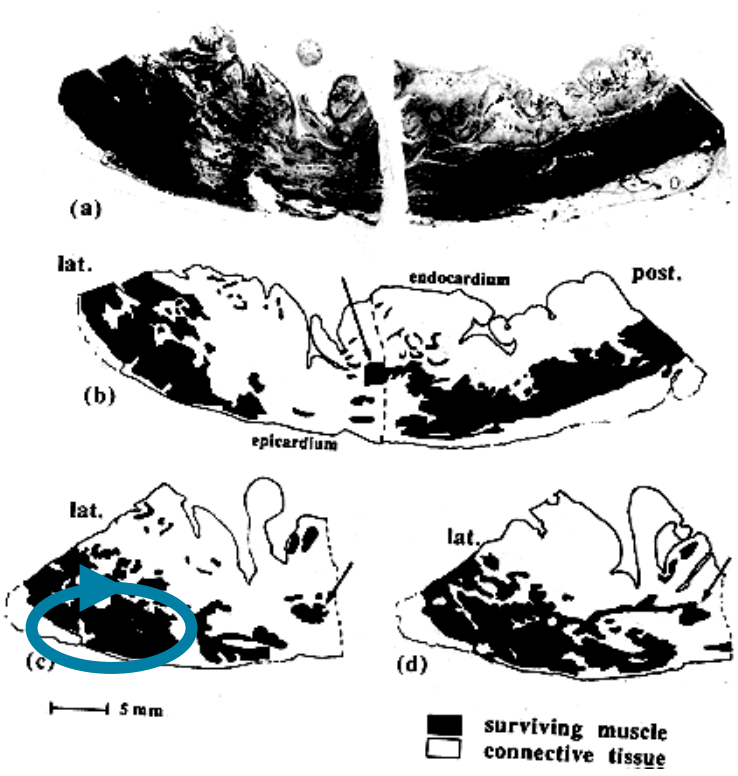

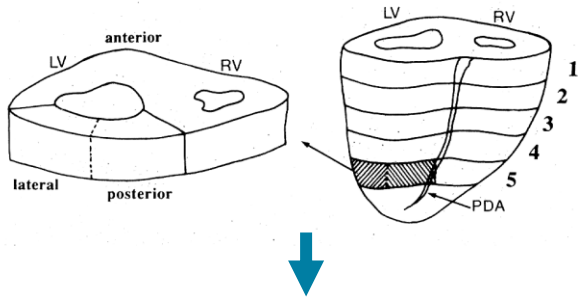

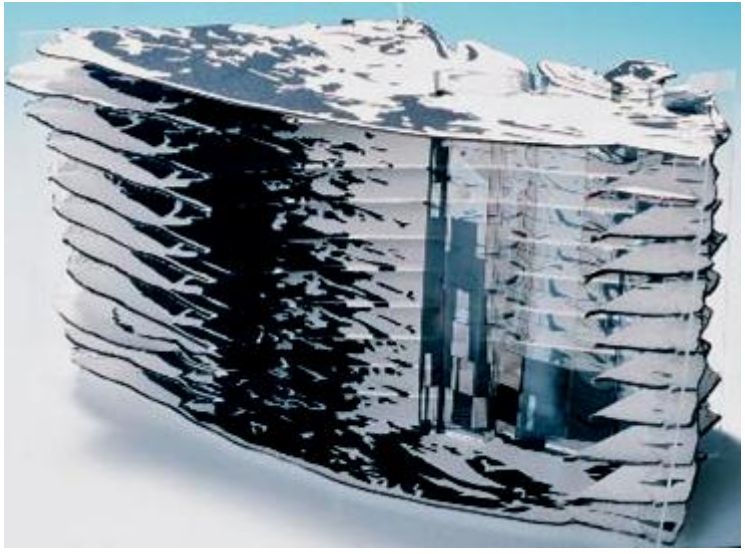

Supraventricular Arrhythmias

AF/AFL

AVNRT

WPW

AT

PSVT

Question 2

Which of the following supraventricular arrhythmias is associated with a risk of stroke:

1. AVRT
2. AF
3. AT
4. AFL
5. Both 2 and 4

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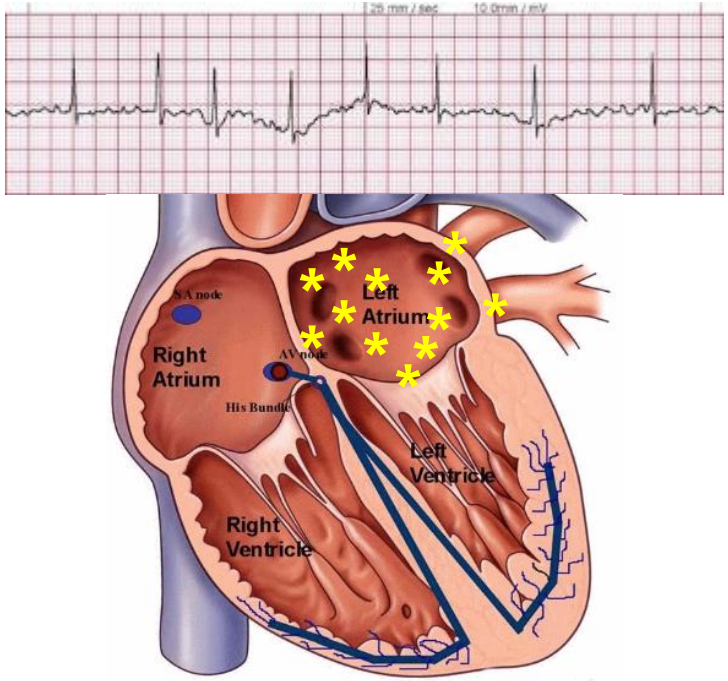
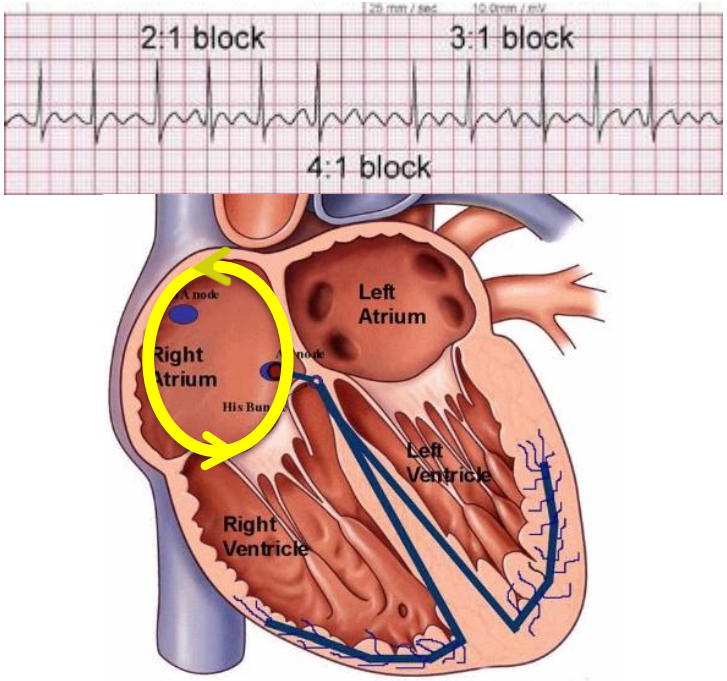
AF/AFL

Atrial Fibrillation



Atrial Flutter

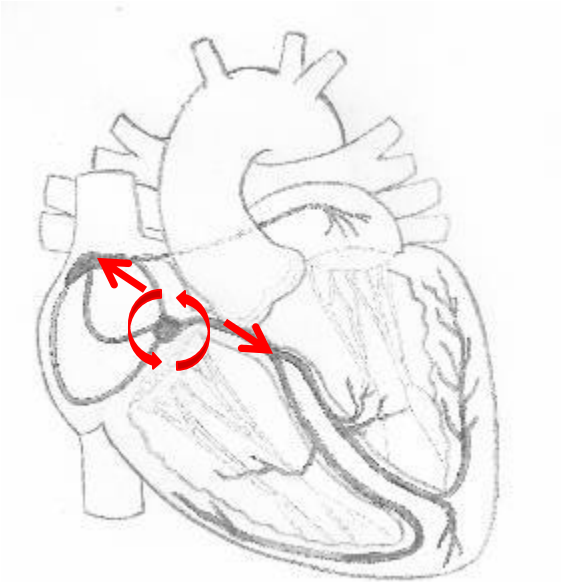


Typical = isthmus dependent

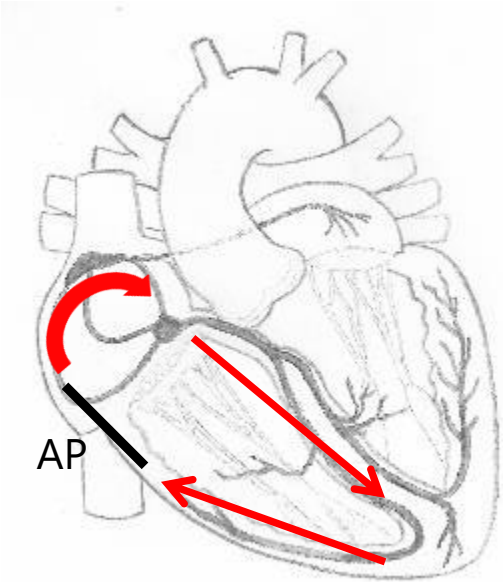
Atypical = non-isthmus dependent

Types of PSVT

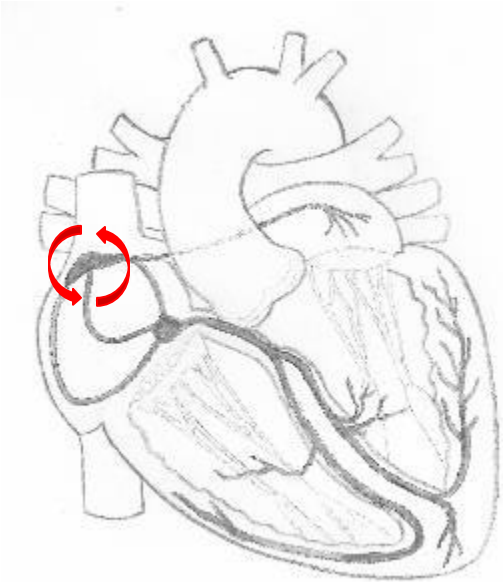
AVNRT: 60%



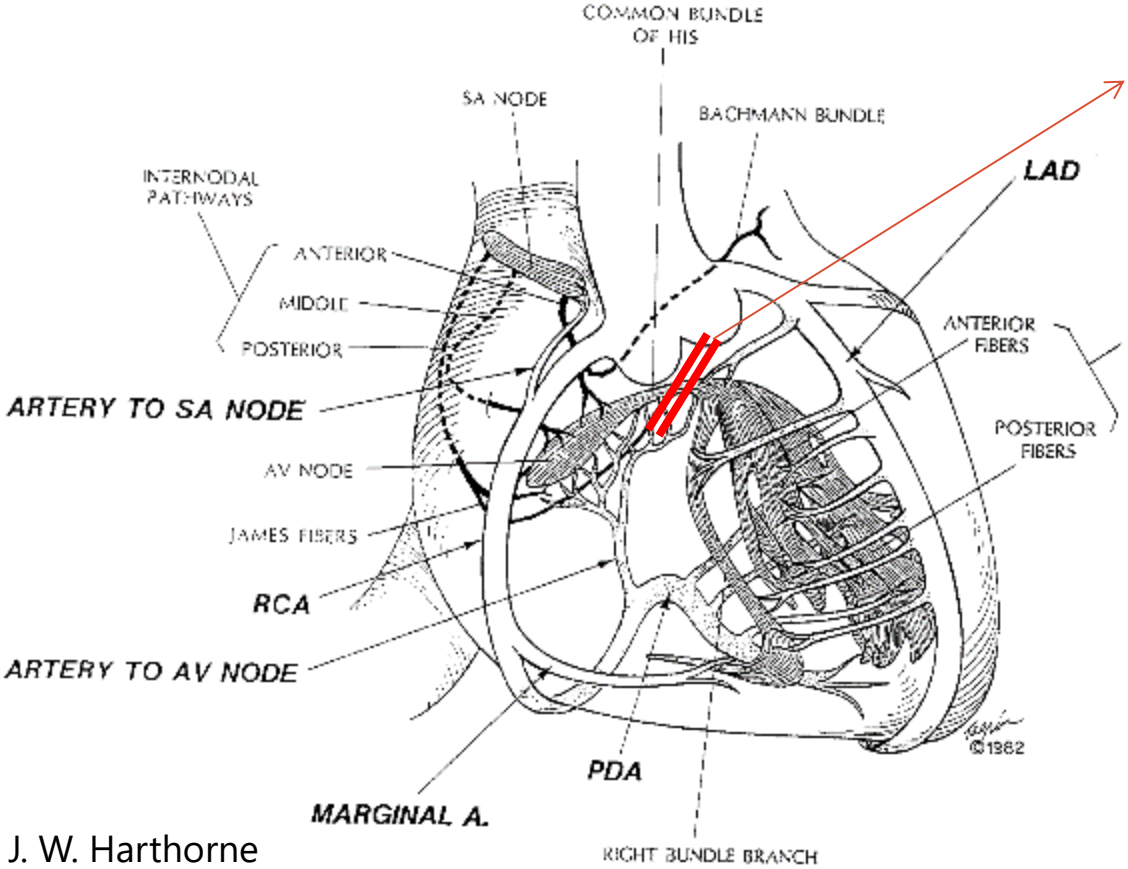
WPW: 30%



AT: 10%



Disease of the Cardiac Conduction System



J. W. Harthorne

Slowed/blocked conduction

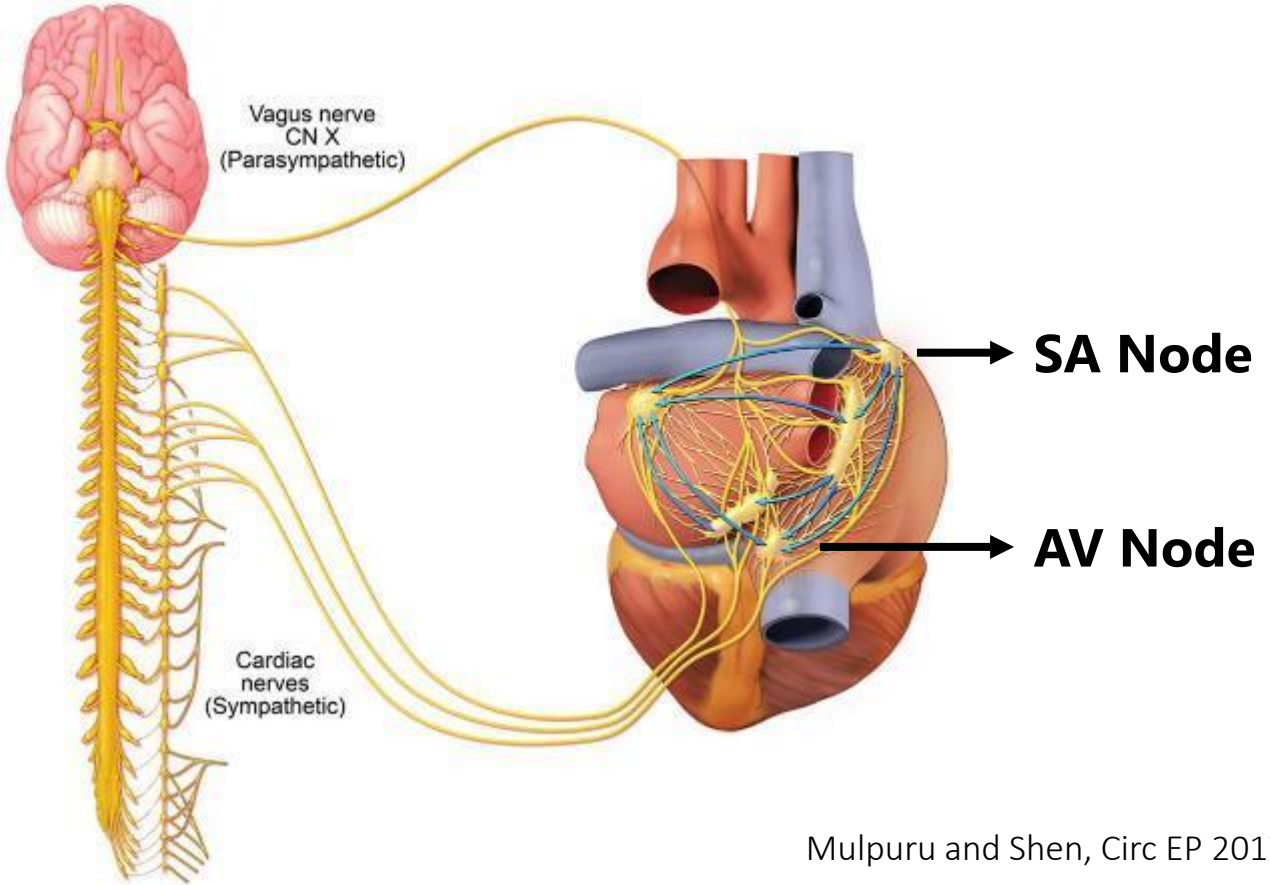
Irreversible Causes

- Idiopathic (age related)
- Ischemic
- Infiltrative (amyloid, sarcoid)
- Structural heart disease
- Surgery

Reversible Causes

- Medications
- Inflammation (SCD, Lyme)
- Metabolic

Autonomic Nervous System: Impact on Heart Rhythm



Mulpuru and Shen, Circ EP 2017

Evaluation of Palpitations

- Patient Description of Symptoms
- Pertinent Medical History
- Physical Exam
- Testing

Evaluation of Palpitations

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→ Differentiate life-threatening from non-life-threatening

Patient Description of Symptoms

- **Loss of consciousness?**
- **Episodes:**
  - Frequency/duration
  - Triggers
  - Rapid vs. slow
  - Regular vs. irregular
- **General cardiac symptoms:**
  - Exertional dyspnea/chest discomfort
  - LE edema/orthopnea

Pertinent Medical History

- **Cardiac History**
  - CAD/MI
  - CHF
  - Valve disease
  - Congenital heart disease
- **Non-Cardiac History**
  - Thyroid disease
  - Mental health
- **Social History**
  - Tobacco / EtOH / Stimulants
  - Non-prescribed medications
  - Barriers to care
- **Family History**
  - Sudden cardiac death
  - Cardiomyopathy
- **Medications**

Physical Exam

- Vital signs
- Orthostasis
- Cardiac auscultation
- Non-cardiac findings

Testing

- 12-lead ECG
- Laboratory studies (CBC, BMP, TSH, ?NT-proBNP, ?hs-TnT)
- Trans-thoracic echocardiogram (TTE)
- Exercise stress testing
- Ambulatory arrhythmia monitoring

Objectives

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Atrial Fibrillation

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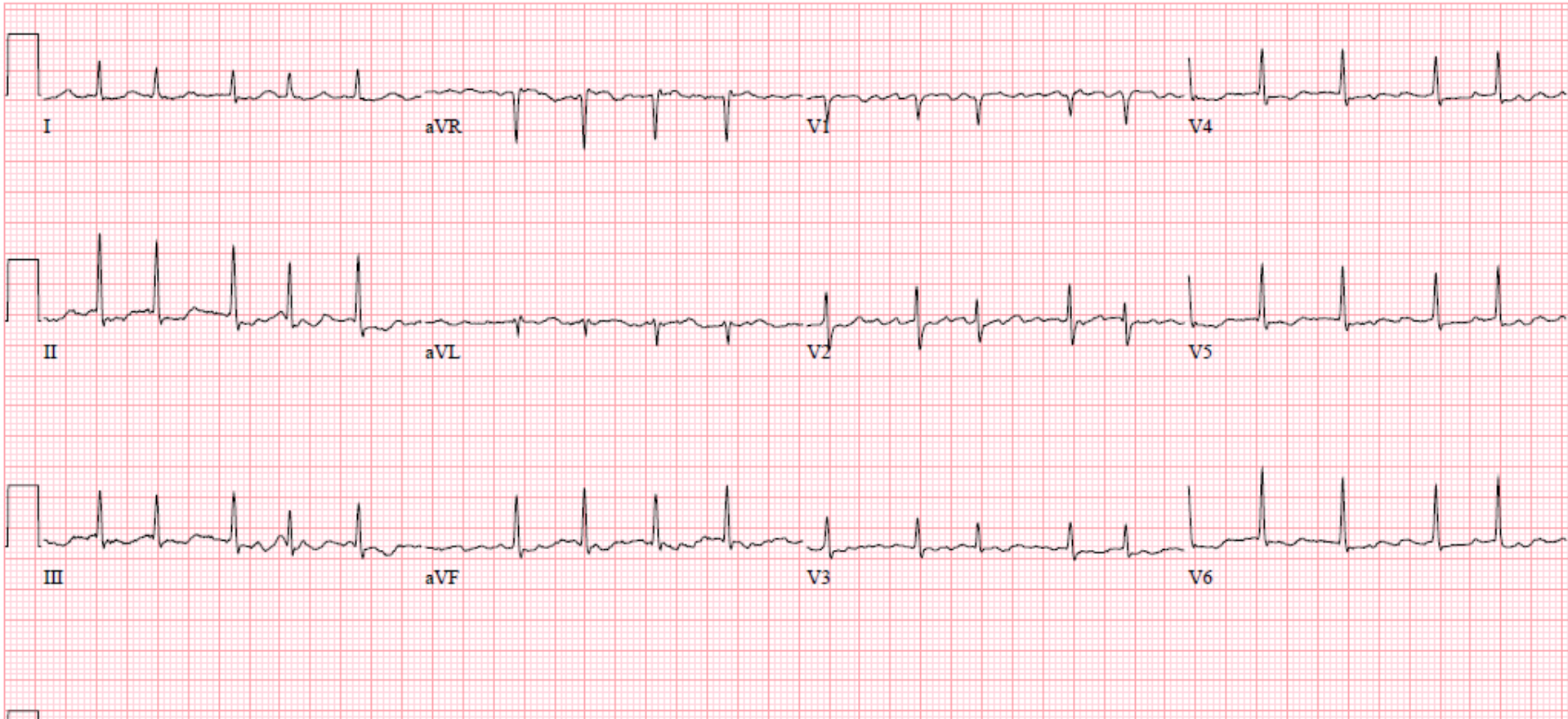

Question 3

Which of the following factors is primarily responsible for the increased risk of morbidity/mortality in patients with AF?

1. Heart Failure
2. Stroke
3. Cardiac Arrest
4. Syncope / Falls

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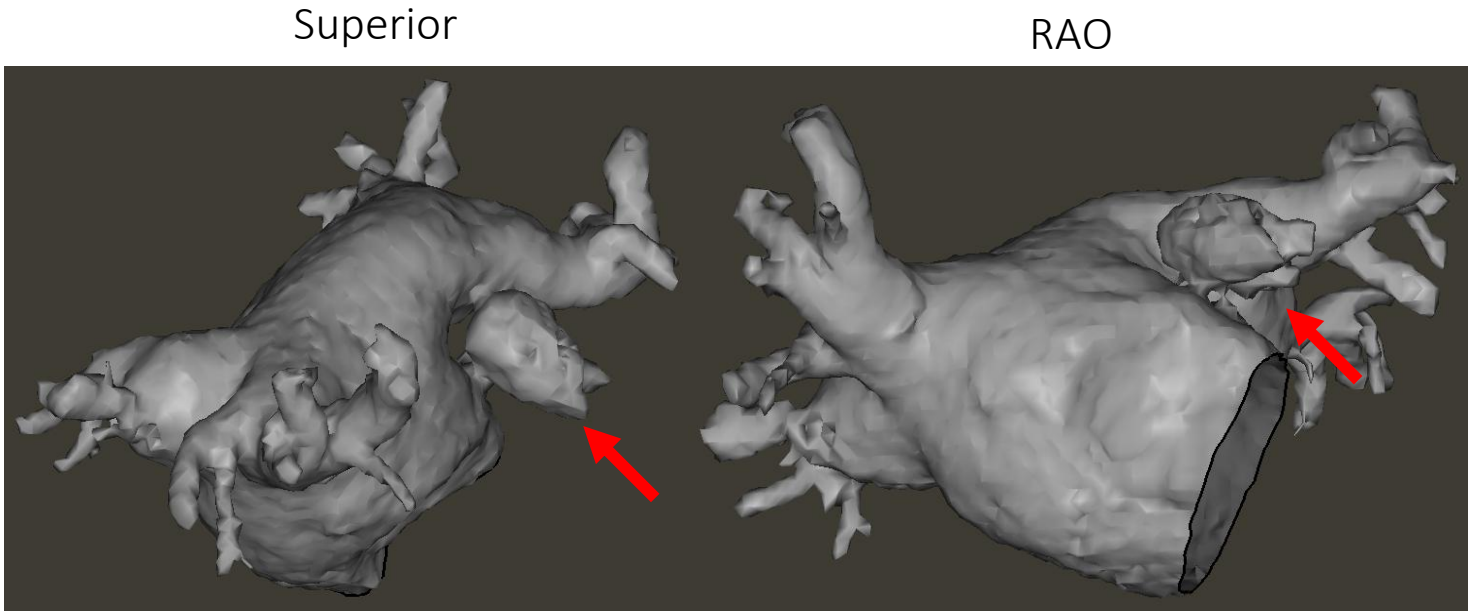
Management of Atrial Fibrillation

- **Stroke prevention**
  - OAC for qualifying patients

- **Palliation of symptoms associated with AF**
  - Rate or rhythm control
  - For rhythm control, consider anti-arrhythmic drugs (AADs) vs. ablation

Pathophysiology of AF-Related Stroke



Sluggish blood flow in left atrial appendage leads to thrombus formation and embolization.

Ptaszek LM et al., 2013 JICRM 4:1-5.

Calculating Risk of NAVF-Related Stroke

CHADS-VASC score

Congestive heart failure +1

HTN +1 → **Score = 1:** 0.6% CVA/year

Age ≥ 65 +1

Age ≥ 75 +1 → **Score ≥ 2:** ≥ 2.2% CVA/year

Diabetes +1

Stroke/TIA/thromboembolism +2

Sex (female) +1

Vascular disease (peripheral or CAD) +1

Friberg et al., 2012 Eur Heart J 33:1500-1510.

OAC Options

- **Warfarin (Coumadin)**
  - Reduce stroke risk by 65%
- **DOACs**
  - Superior stroke prevention than coumadin
  - Lower bleeding risk than coumadin
- **Anti-platelets**
  - Effectiveness debated
  - 19% stroke risk reduction (8 trials, >4,000 patients)

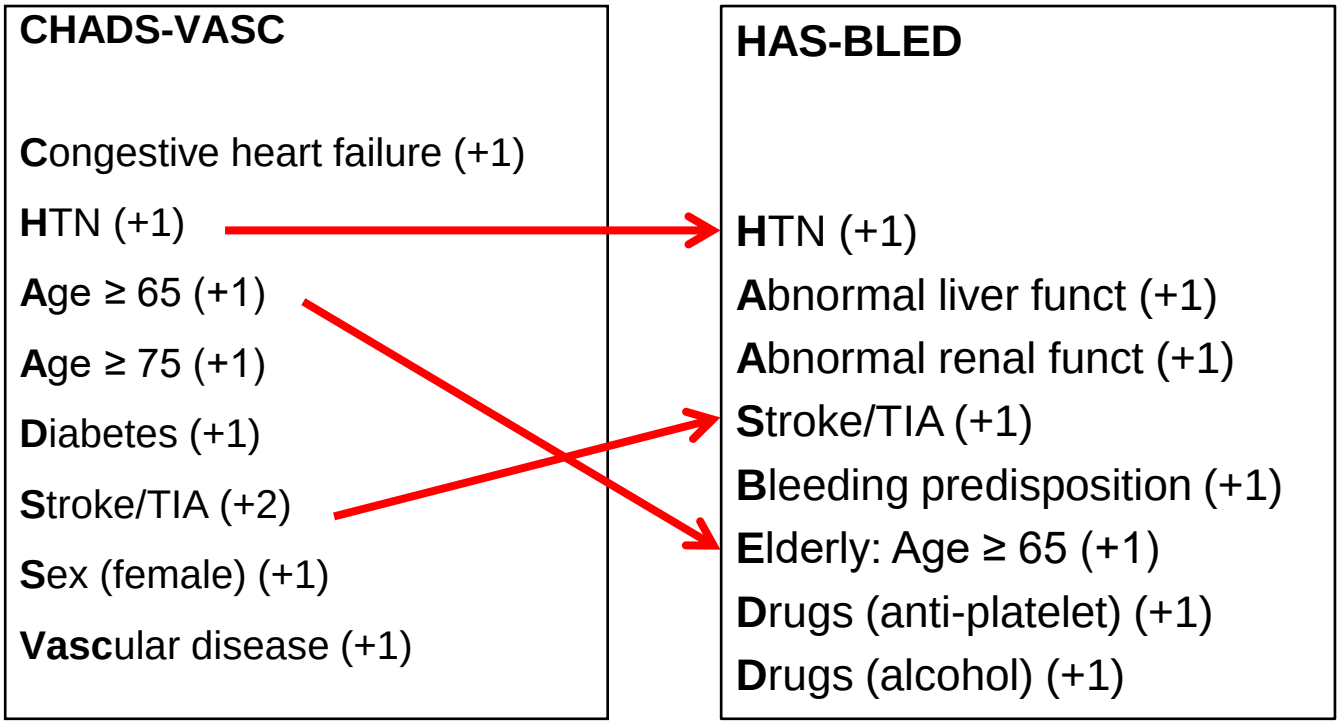
Hsu et al., 2018 Clin Pharmacol Ther 104:301-310.
Hsu et al., 2016 JACC 67:2913-2923.

Reasons for withholding anticoagulant

Bleeding risk associated with OAC use: HAS-BLED score

HTN (+1)
Abnormal liver fxn (+1) → **Score 1:** 1% bleed/yr
Abnormal renal fxn (+1) → **Score 2:** 1.9% bleed/yr
Stroke/TIA (+1) → **Score 3:** 3.7% bleed/yr
Bleeding predisposition (+1) → **Score 4:** 8.7% bleed/yr
Elderly: Age ≥ 65 (+1) → **Score 5:** >10% bleed/yr
Drugs (anti-platelet) (+1)
Drugs (alcohol) (+1)

Stroke Risk and Bleeding Risk Rise Together



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Question 4

Which of the following is an indication for pacemaker implantation?

1. Sick sinus syndrome with symptomatic bradycardia.
2. Complete heart block with stable blood pressure and no associated symptoms.
3. Persistent second-degree AV block with symptomatic bradycardia.
4. All of the above.

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Disease of the Cardiac Conduction System

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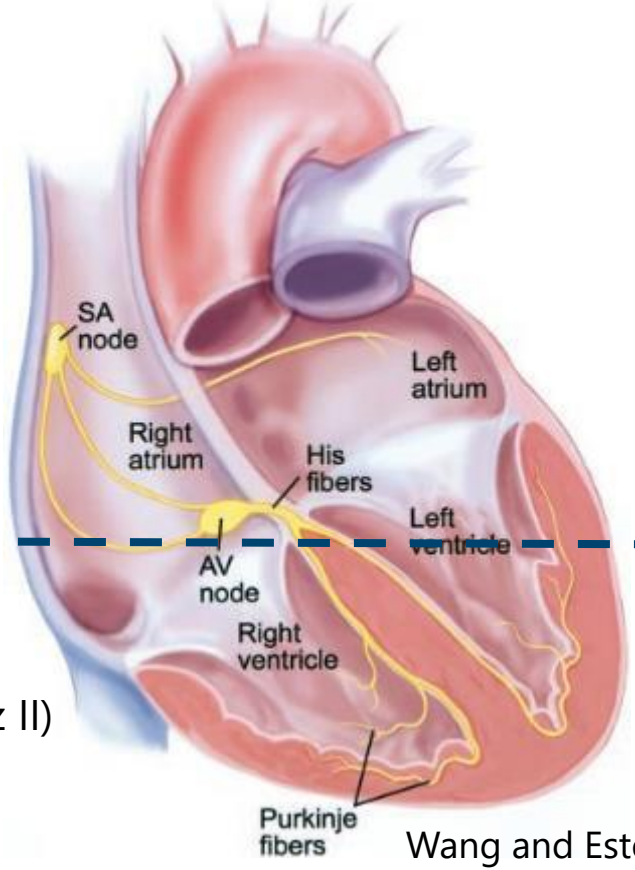
SAN Disease
- Sick sinus syndrome

AV Nodal Block
- 1st degree AV block
- 2nd degree AV block (Wenckebach)

Infranodal Block
- 2nd degree AV block (Mobitz II)
- Complete heart block

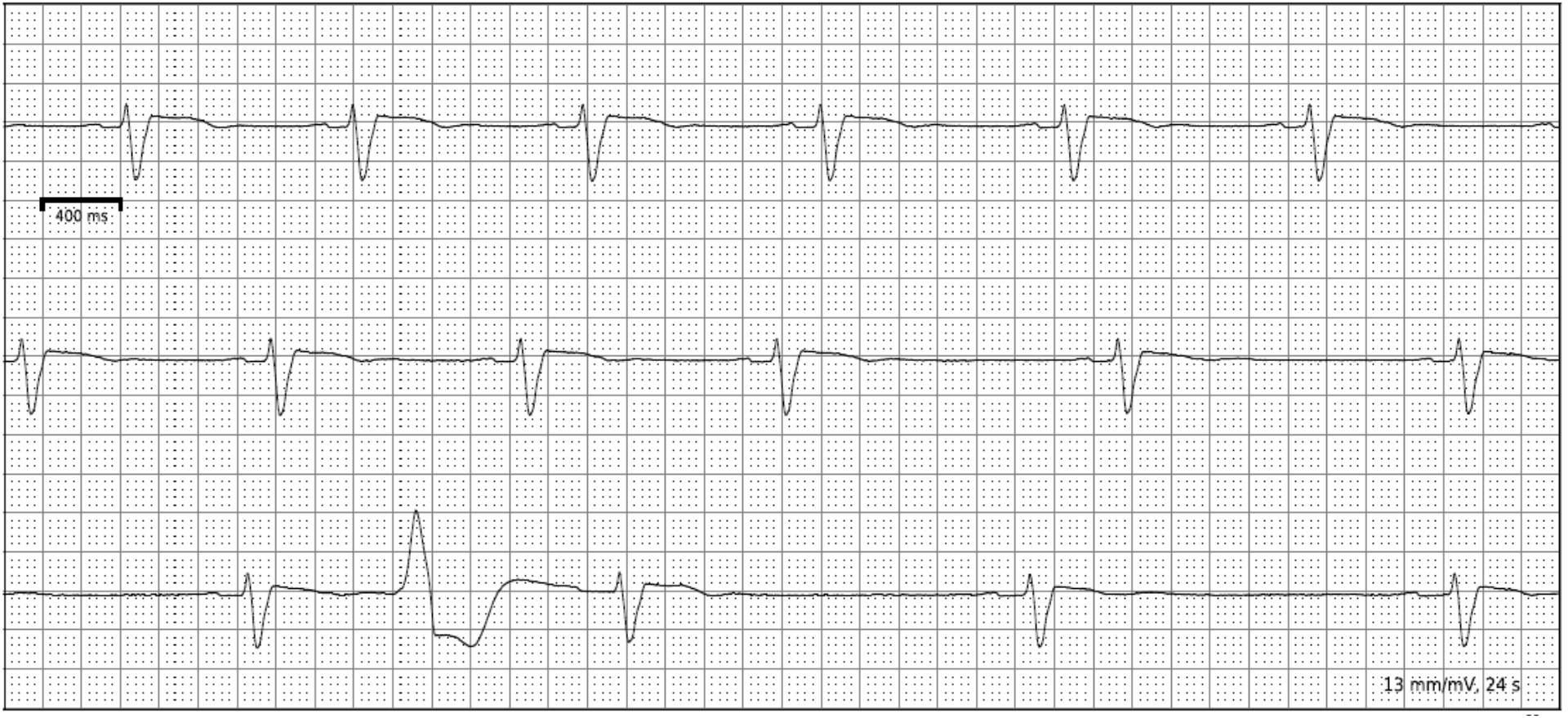


Less ominous

More ominous

Wang and Estes, Circulation 2002

Single-lead, continuous tracing



Sinus bradycardia with Sinus Arrhythmia

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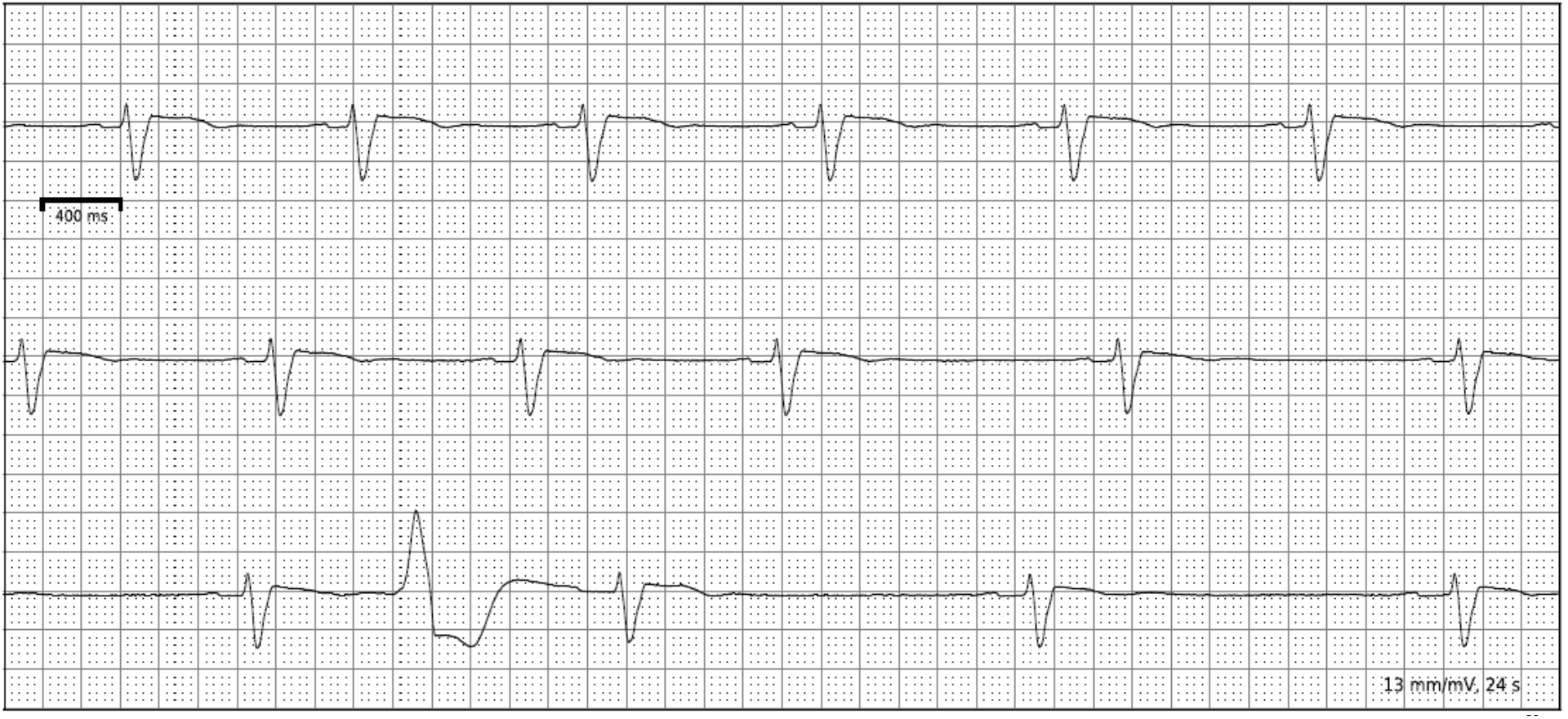
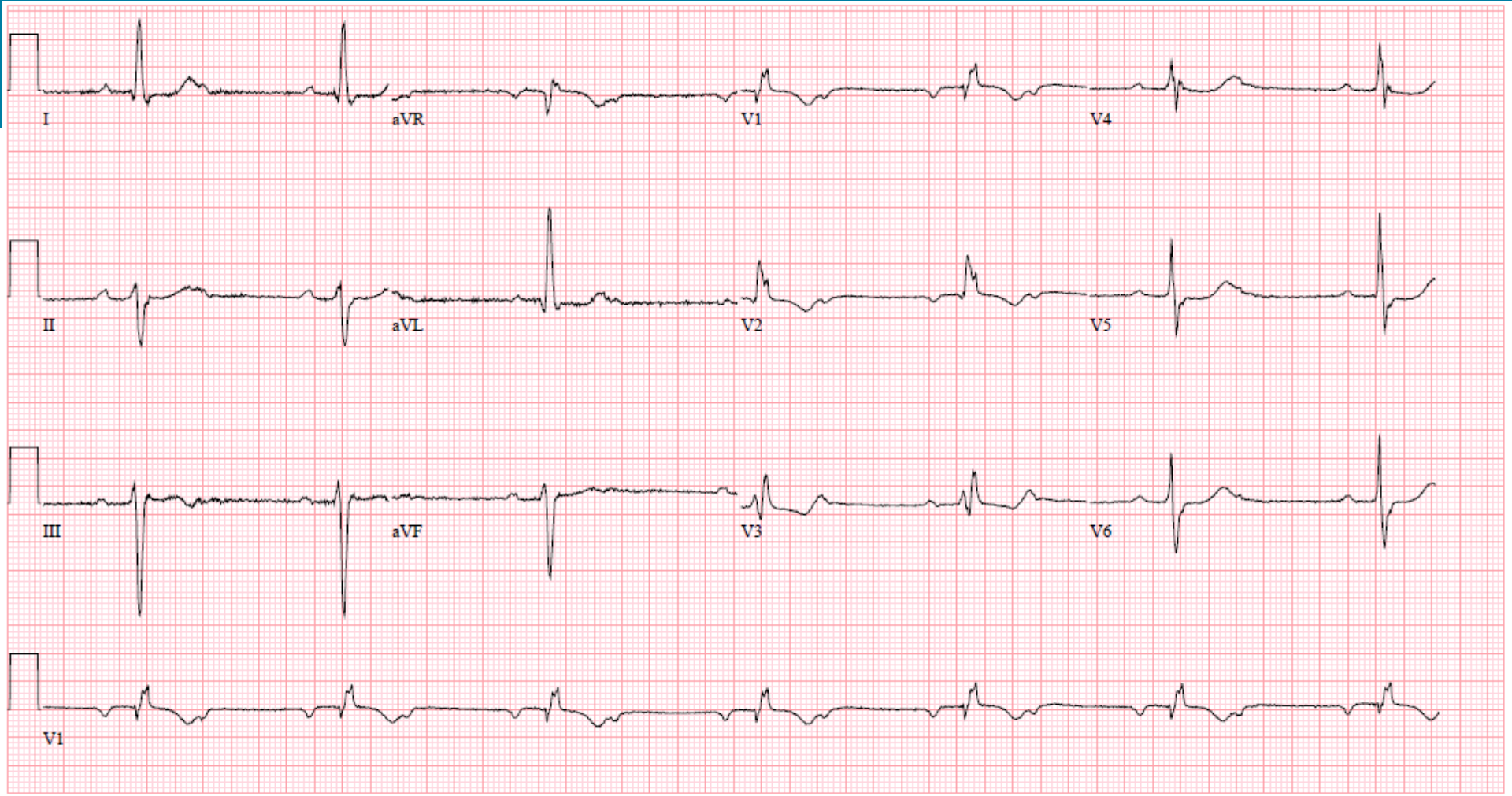
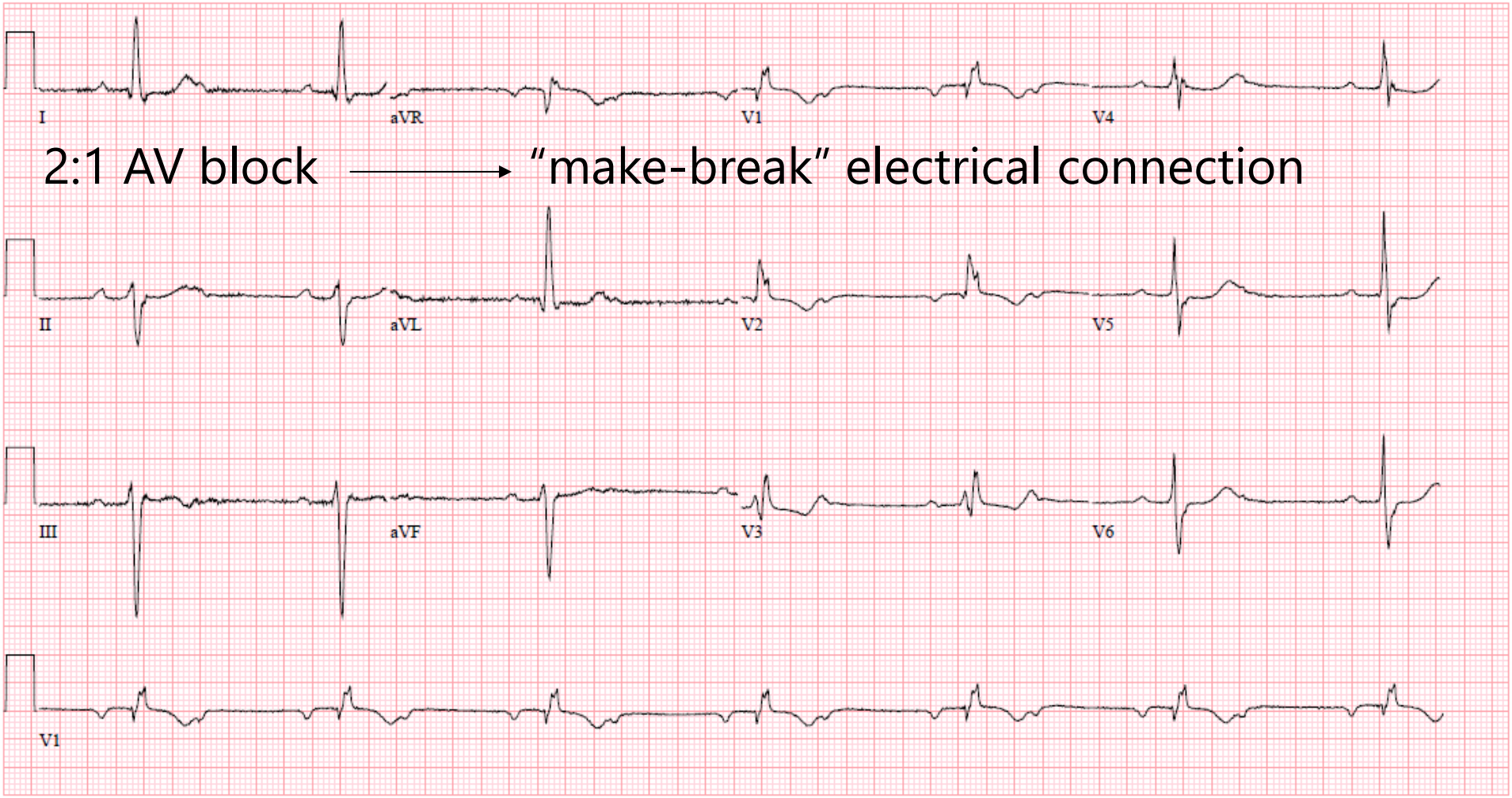


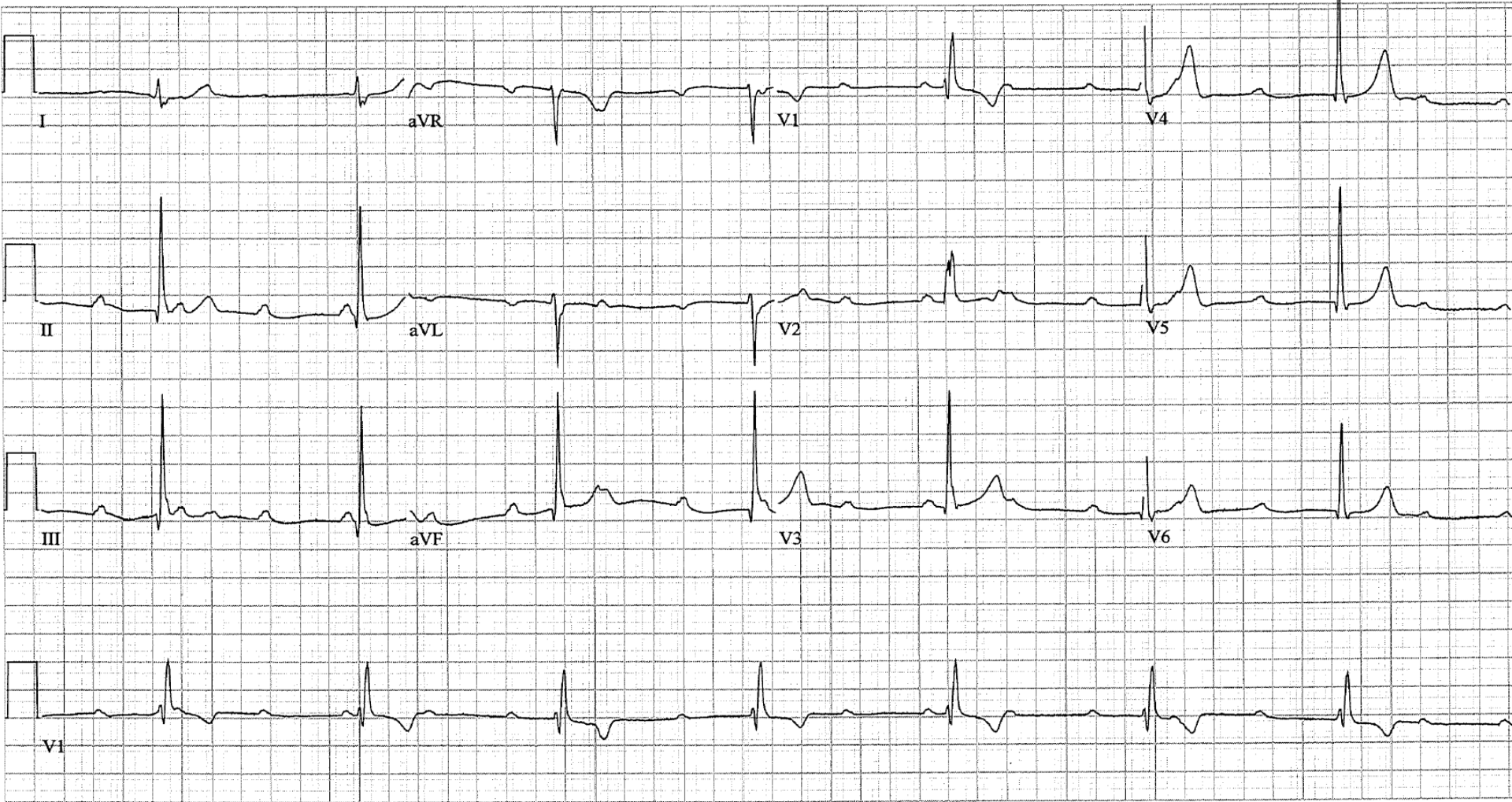
Asymptomatic patient


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1

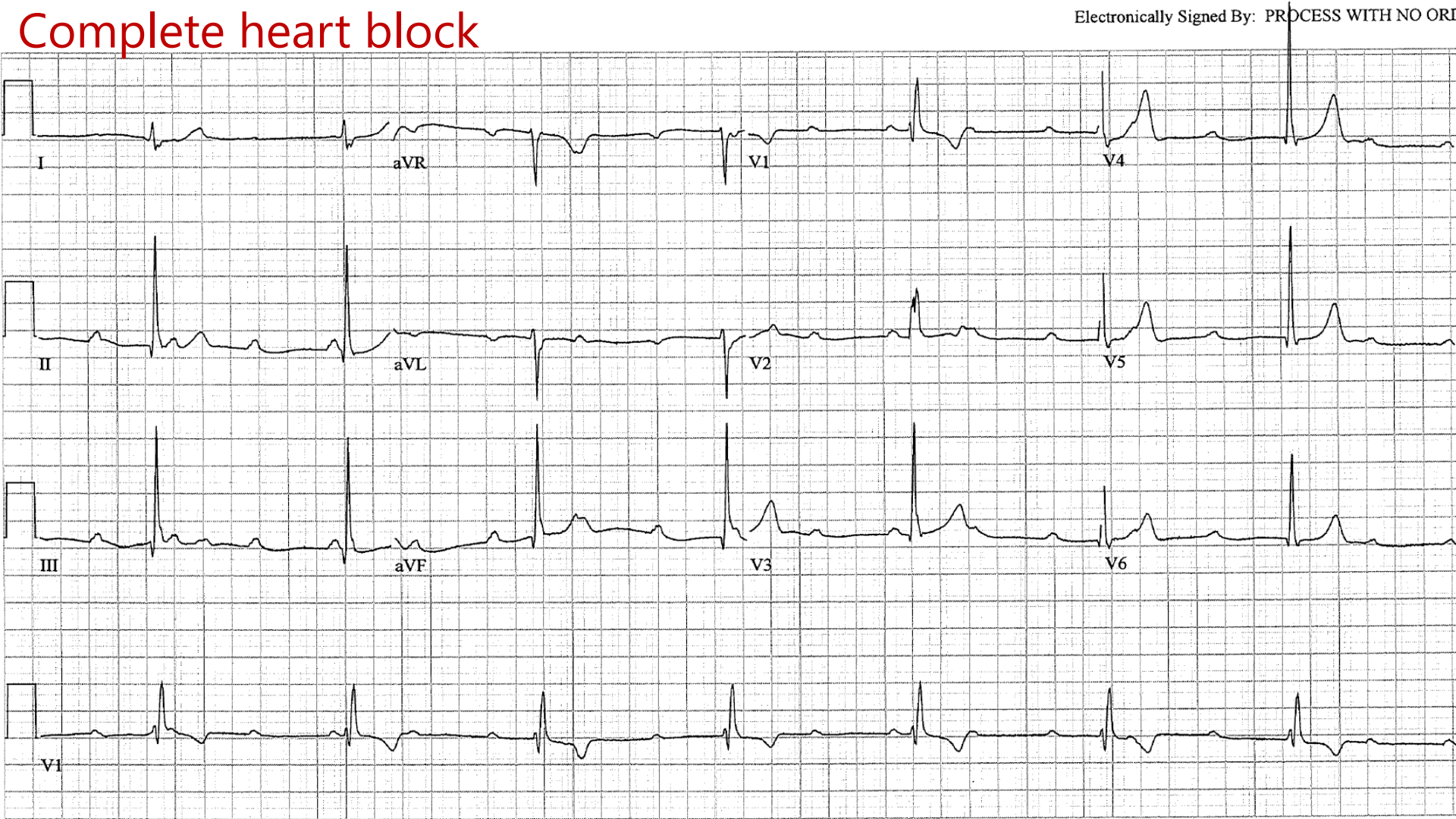


2:1 AV block ⟶ “make-break” electrical connection

Electronically Signed By: PROCESS WITH NO ORI



Complete heart block



Components of the Permanent Pacemaker

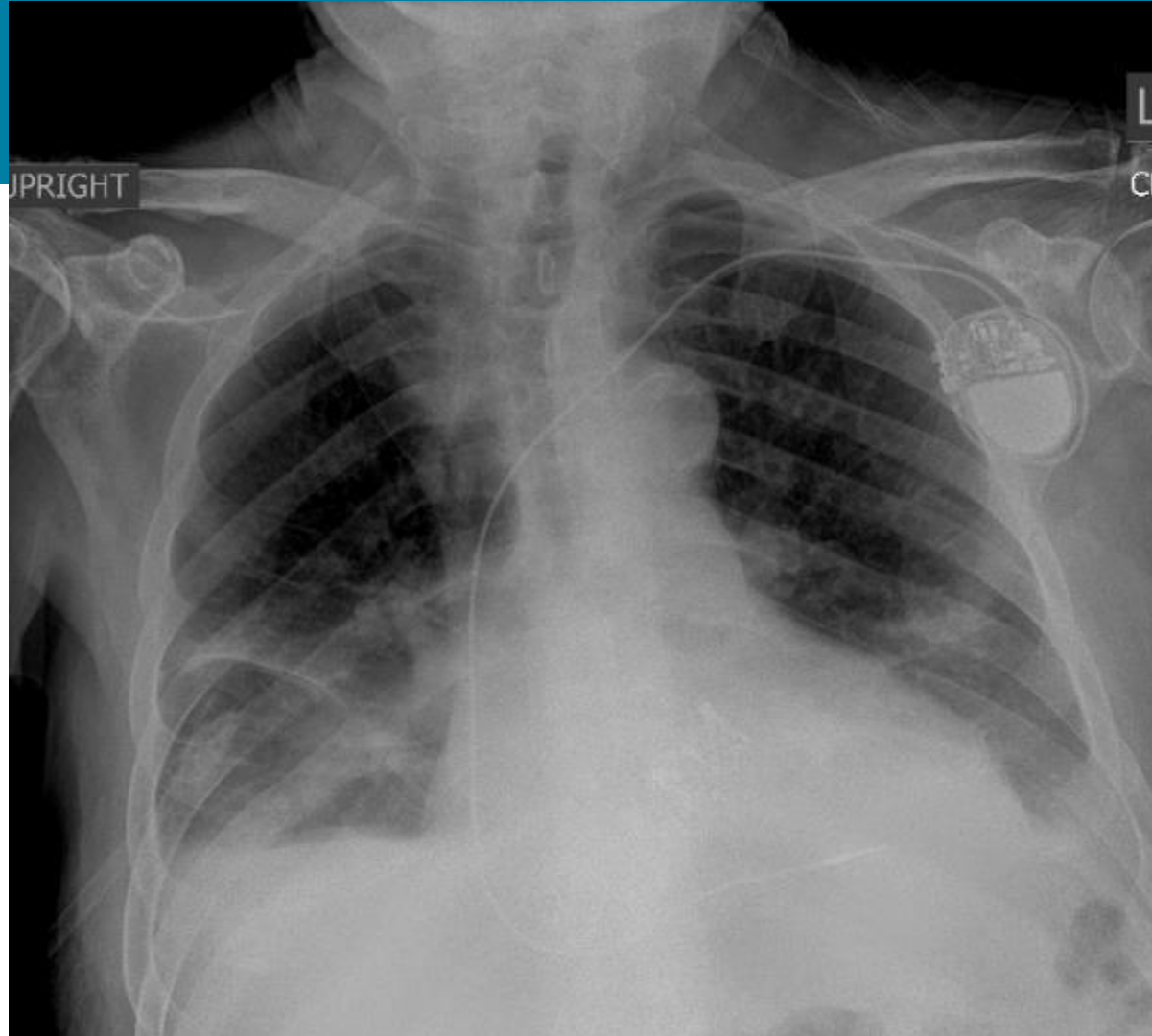
The Pulse Generator

The Leads

The Patient Care System
(Programmer, Support Equipment)

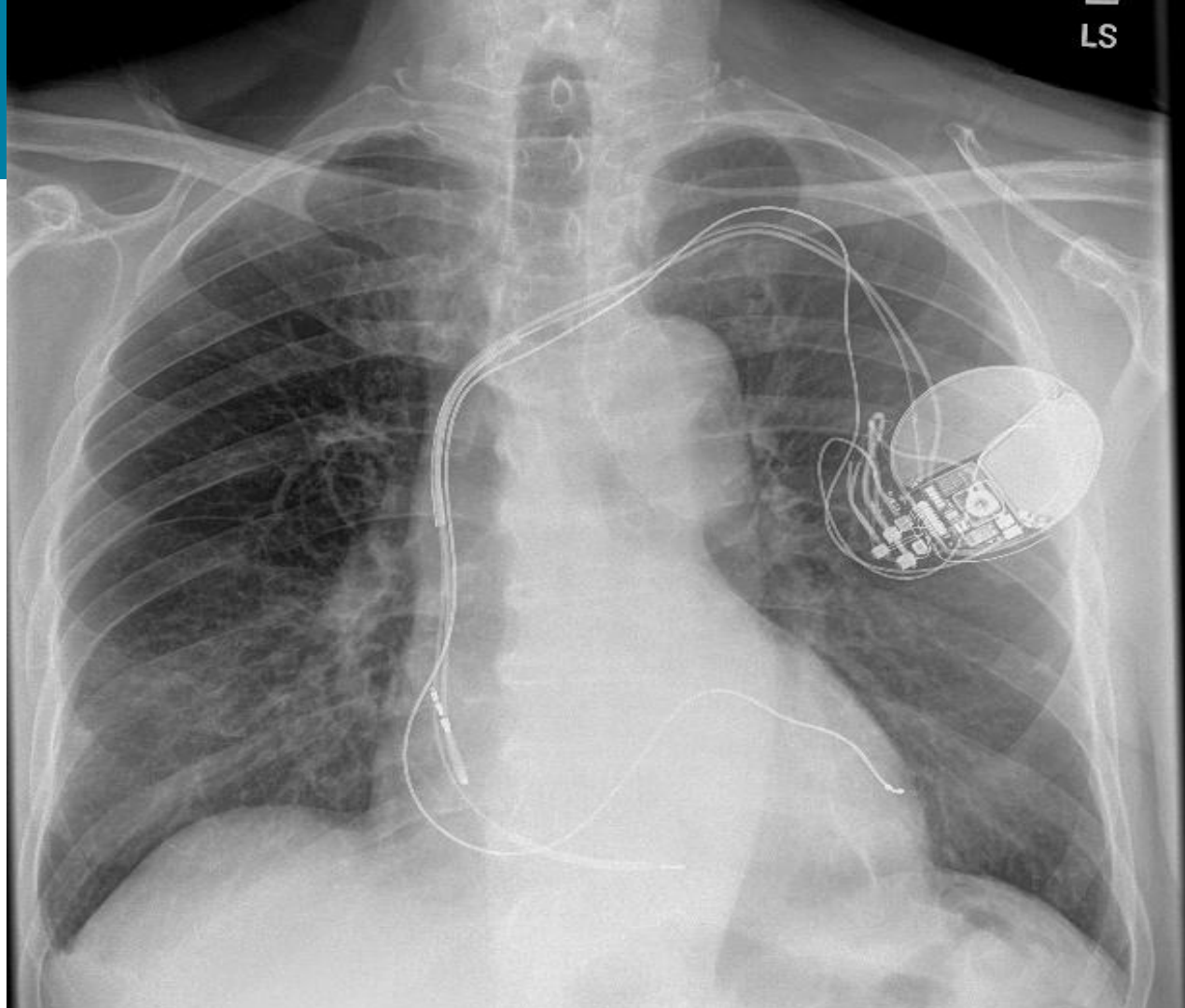
The Patient

Single-chamber PPM



Dual-chamber PPM

Biventricular ICD (CRT-D)



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Cardiologist Referral

- **History**
  - Syncope or near-syncope
  - High burden of symptoms
  - History of heart disease
- **Findings**
  - Abnormal study results (ECG, TTE, stress test)
  - Concerns that PPM is indicated
  - Arrhythmia requiring advanced therapies (AADs, ablation)

Thank you

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