Syncope

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Overview

- ***Epidemiology***
- Terminology
- Classification
- Diagnostic Strategy
- Treatment
- Summary

Epidemiology

- 1% of ED visits
- High recurrence rate - 35% within 3 year
- Aproximately10-20 % adults over lifetime
- Females > Males
- $ 12-15000 / hospitalization

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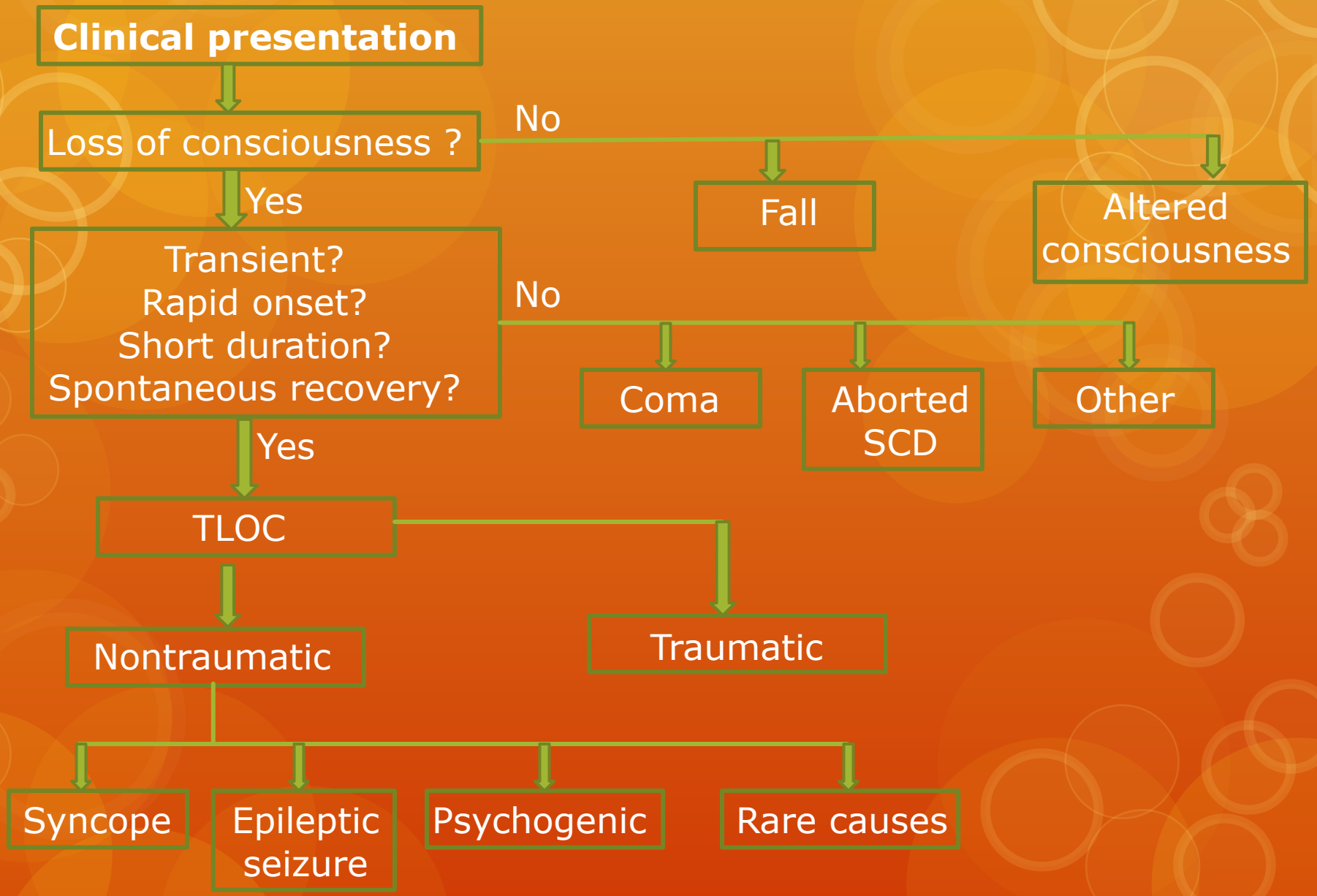
Terminology

Syncope: Transient, self-limited loss of consciousness associated with loss of postural tone

- Onset - relatively rapid
- Recovery - spontaneous, complete and usually prompt
- Mechanism - transient global cerebral hypoperfusion


Clinical presentation
Loss of consciousness ?
No
Fall
Altered consciousness
Yes
Transient?
Rapid onset?
Short duration?
Spontaneous recovery?
No
Coma
Aborted SCD
Other
Yes
TLOC
Nontraumatic
Traumatic
Syncope
Epileptic seizure
Psychogenic
Rare causes

Match each of the following clinical scenarios to the most likely cause of syncope

A. Ventricular tachycardia
B. High-degree atrioventricular block
C. Epilepsy
D. Neurocardiogenic syncope
E. Hysterical fainting

1. A 73-year-old man with a remote history of myocardial infarction feels the onset of palpitations while driving, then awakens having driven his car into a ditch, unaware of what has transpired
2. A 25-year-old woman on chronic antiseizure medication becomes warm, diaphoretic, and very pale after donating blood, then suffers frank syncope while seated upright in a chair. After being helped to the floor, she awakens embarrassed and alert

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3. A 73-year-old woman with recent episodes of dizziness begins to feel lightheaded while seated at church, then within seconds turns pale and slumps to the floor with a few clonic jerks. She regains consciousness 1 minute later, completely aware of where she is and asks what has happened. When an ambulance arrives, her blood pressure is 108/70 mm Hg and the heart rate is 60 beats/min

4. A 32-year-old man with a history of prior syncope notices an odd odor, after which he falls to the ground. He awakens 3 minutes later confused and disoriented and is found to be incontinent of urine

5. An 18-year-old Army recruit falls to the ground while standing at attention for 20 minutes during his first week of basic training. He immediately awakens, feels a bit groggy, but quickly is able to rejoin his squad

Answers

1. A
2. D
3. B
4. C
5. D

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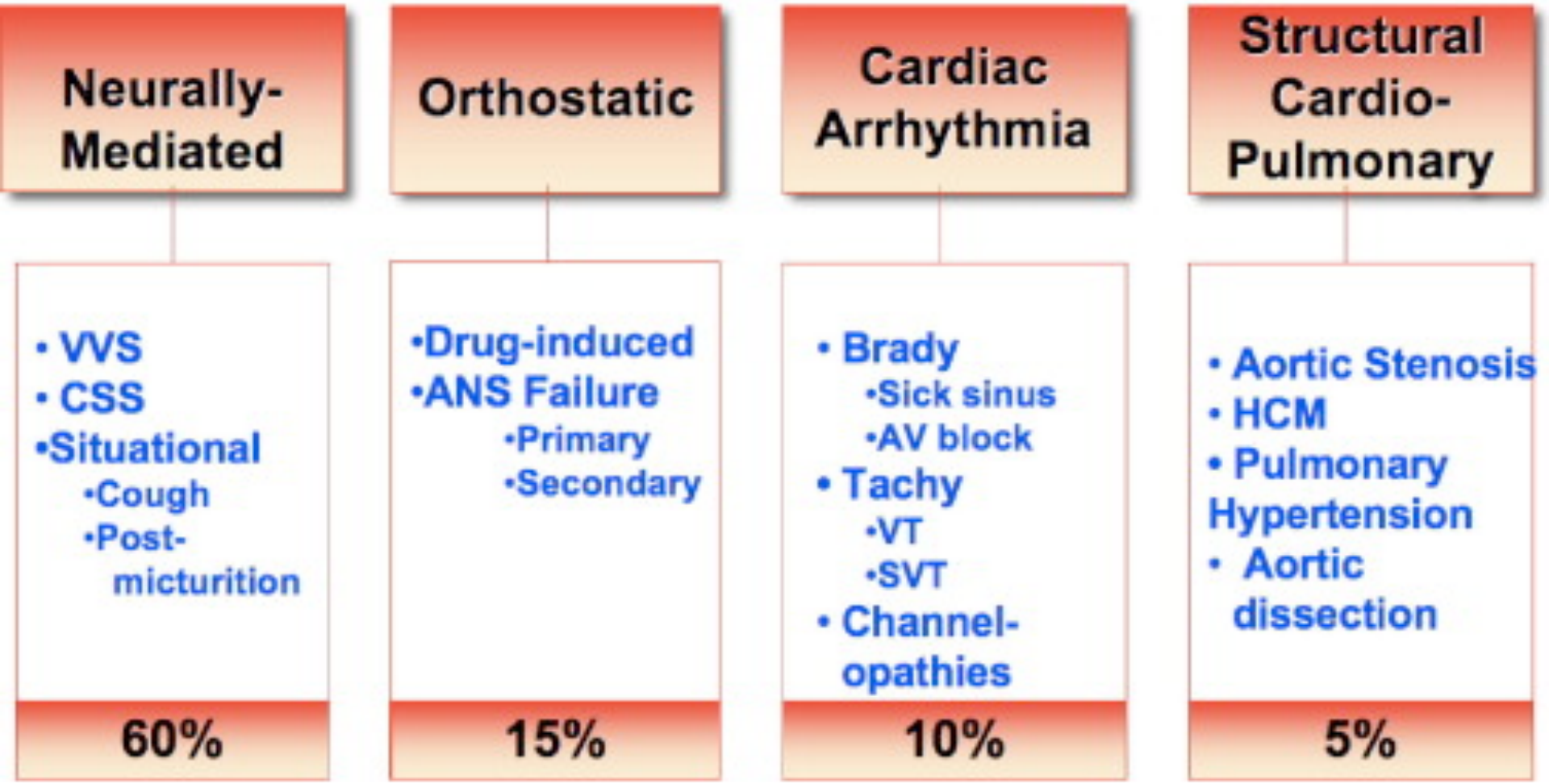
Causes of Syncope



Unknown Cause = Aproximately 10%

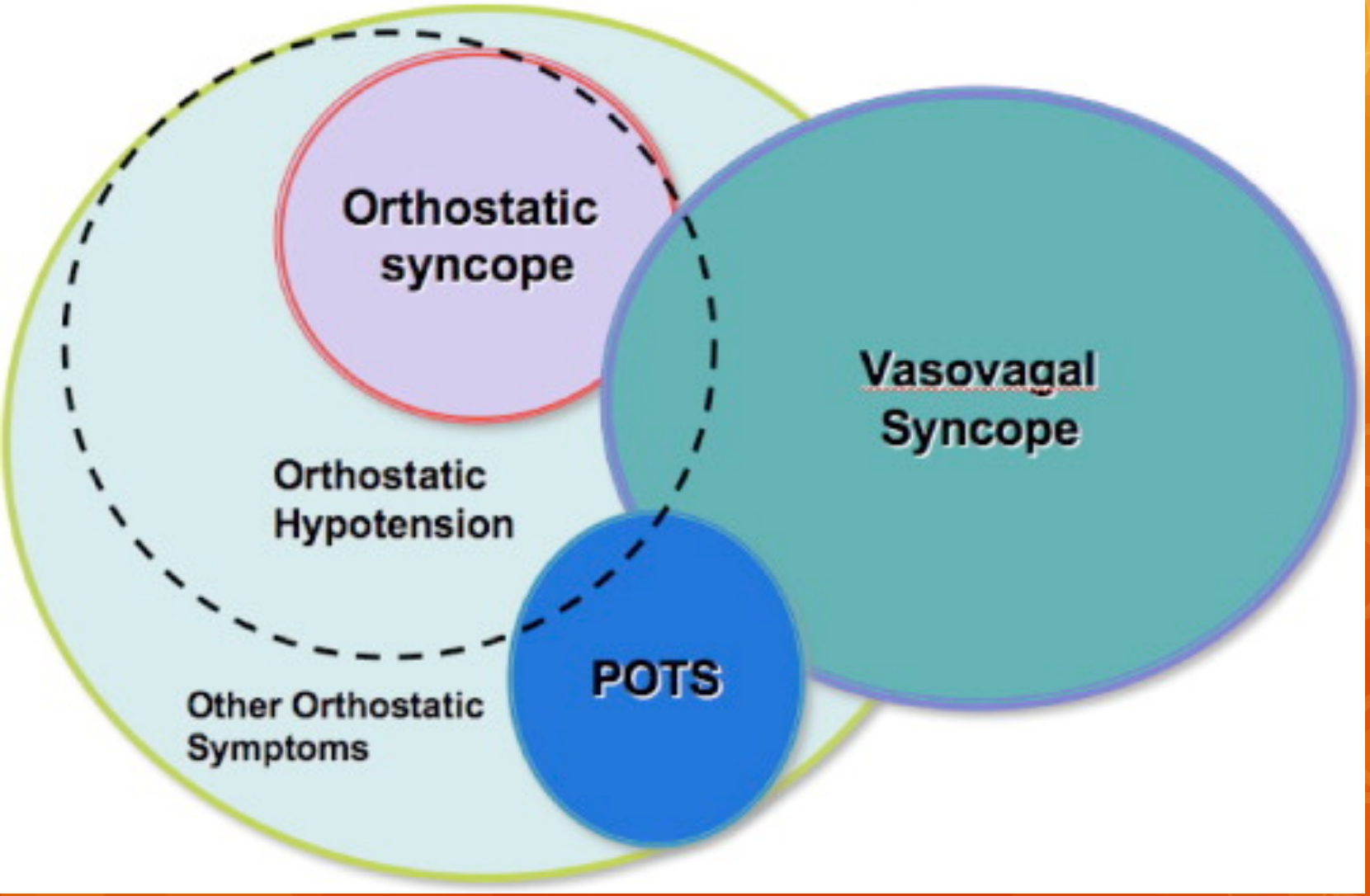
Neurally mediated reflex syncope

- Vasovagal (“common”) faint
- Carotid sinus syndrome
- Situational faints (cough, defecation, excessive heat, micturition, pain, prolonged upright posture, sneeze, swallow, venipuncture, volume depletion)
- Post-exercise variant
- Other (wind instrument, weightlifting, post-prandial)
- Glossopharyngeal and trigeminal neuralgia

Orthostatic syncope

- Secondary autonomic failure (diabetic neuropathy, amyloid neuropathy, drugs and alcohol)
- Volume depletion (hemorrhage, diarrhea, Addison's)
- Primary autonomic failure (pure autonomic failure, multiple system atrophy, Parkinson's disease with autonomic failure)
- Postural intolerance syndromes (POTS) in which syncope occurs rarely, probably of reflex origin

Orthostatic Intolerance Syndromes



Cardiac arrhythmias as primary cause

- Sinus node dysfunction (including bradycardia/ tachycardia syndrome) and AV conduction disease
- PSVT and VT's (including long/short QT, Brugada, ARVD)
- Implanted device (pacemaker/ICD) malfunction
- Drug-induced proarrhythmias

Structural cardiac or cardiopulmonary disease

- Acute myocardial infarction/ischemia
- Cardiac valvular disease
- Obstructive cardiomyopathy
- Acute aortic dissection
- Pulmonary embolus/pulmonary hypertension
- Atrial myxoma
- Pericardial disease/tamponade

Cerebrovascular

- Migraine (most often neurally-mediated reflex in origin)
- Vascular steal syndromes

All of the following statements regarding syncope are true EXCEPT:

A. Cardiac causes account for 10% to 20% of syncopal episodes
B. Syncope of cardiac origin is associated with a 30% 1-year mortality
C. The most common causes of syncope are vascular in origin, including reflex-mediated syncope and orthostatic hypotension
D. Supraventricular tachycardia has been identified as a common cause of syncope
E. The cause of syncope can be identified in a large percentage of patients based on history and physical examination alone

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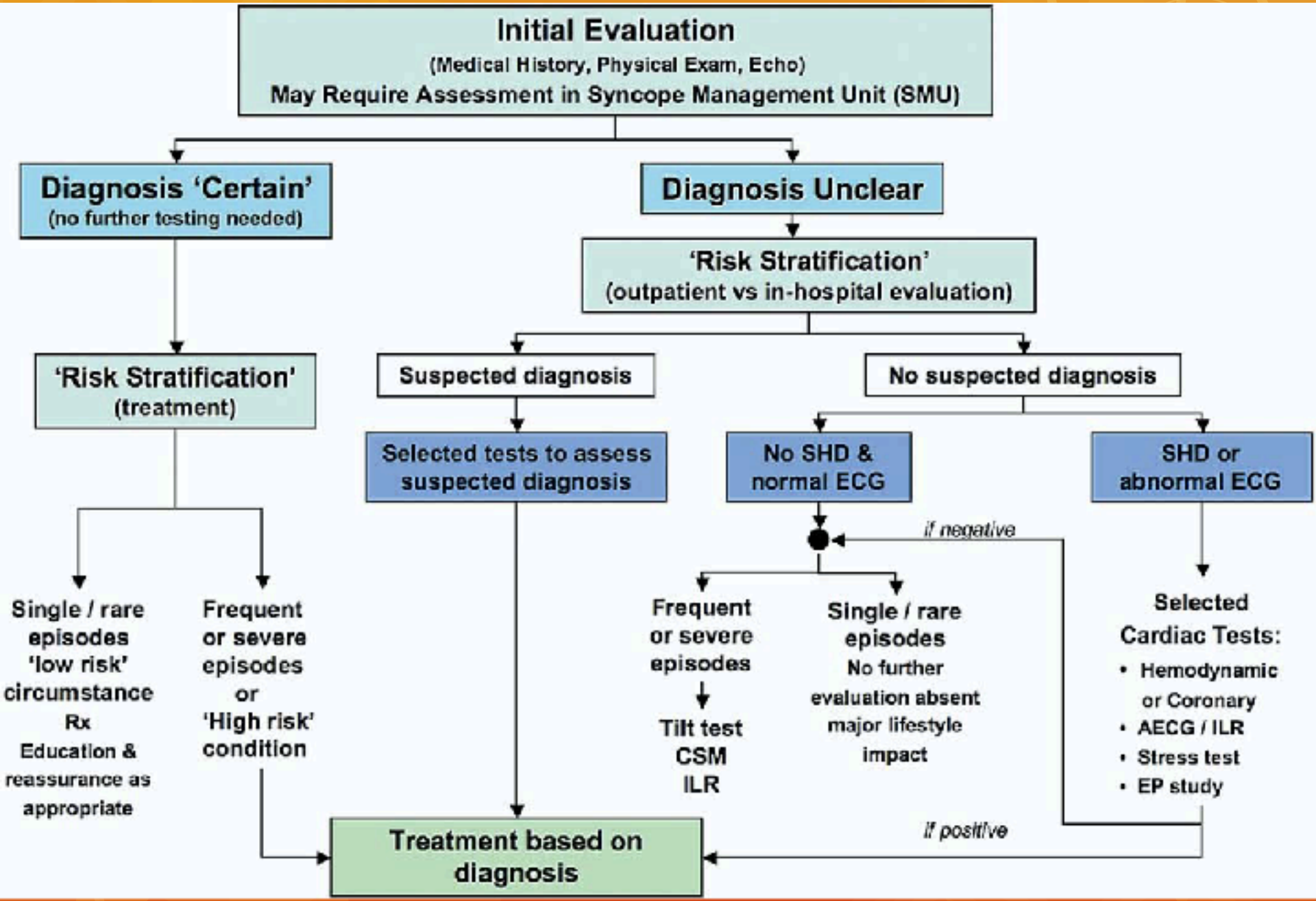

Initial Evaluation
(Medical History, Physical Exam, Echo)
May Require Assessment in Syncope Management Unit (SMU)
Diagnosis 'Certain'
(no further testing needed)
Diagnosis Unclear
'Risk Stratification'
(outpatient vs in-hospital evaluation)
'Risk Stratification'
(treatment)
Suspected diagnosis
No suspected diagnosis
Selected tests to assess suspected diagnosis
No SHD & normal ECG
SHD or abnormal ECG
if negative
Single / rare episodes 'low risk' circumstance Rx Education & reassurance as appropriate
Frequent or severe episodes or 'High risk' condition
Frequent or severe episodes
Tilt test CSM ILR
Single / rare episodes No further evaluation absent major lifestyle impact
Selected Cardiac Tests:
• Hemodynamic or Coronary
• AECG / ILR
• Stress test
• EP study
if positive
Treatment based on diagnosis

Initial Evaluation

- Detailed history (including FH, triggers, PMH, Drugs)
- Thorough physical exam
- CSM (usually > 60 yrs)
- Usually EKG, ECHO
- Exercise testing esp. in syncope with exertion/exercise
- Initial evaluation alone often yields a reasonably probable diagnosis to direct therapy

“Risk” Assessment

- General features favoring in-hospital evaluation
  - Suspected underlying problem is associated with high risk of early mortality and/or injury
  - Proposed treatment requires in-hospital care
  - Affected individual is unable to care for himself or herself

High risk - hospitalization

- Clinical picture of AMI, aortic dissection, CHF, PE, SHD (e.g., AS, HOCM)
- Syncope during exercise
- Syncope causing MVA / severe injury
- FH of premature sudden death
- EKG abnormalities (e.g., pre-excitation, high-grade AVB, prolonged pauses [typically 3 to 5 s], VT)
- Channelopathy (long/short QT, Brugada)

Intermediate risk

- First syncope at age > 50 yrs
- SHD absent active consequences of disease
- Suspected implanted cardiac device malfunction(Pacemaker/ICD, prosthetic valve)

Low risk

- Absence of evident SHD and a normal ECG
- History of recurrent syncope over many years
- Suspicion of “syncope mimic” (e.g., psychogenic pseudo-syncope)

Clinical Findings suggestive of Cardiac Etiology

- Exam / ECHO evidence of severe SHD
- Syncope during exertion or while in supine position
- Palpitations at the time of syncope
- History of heart failure
- Acute or prior AMI
- Evidence of LV dysfunction
- Abnormal EKG findings

EKG suggesting Arrhythmogenic Syncope

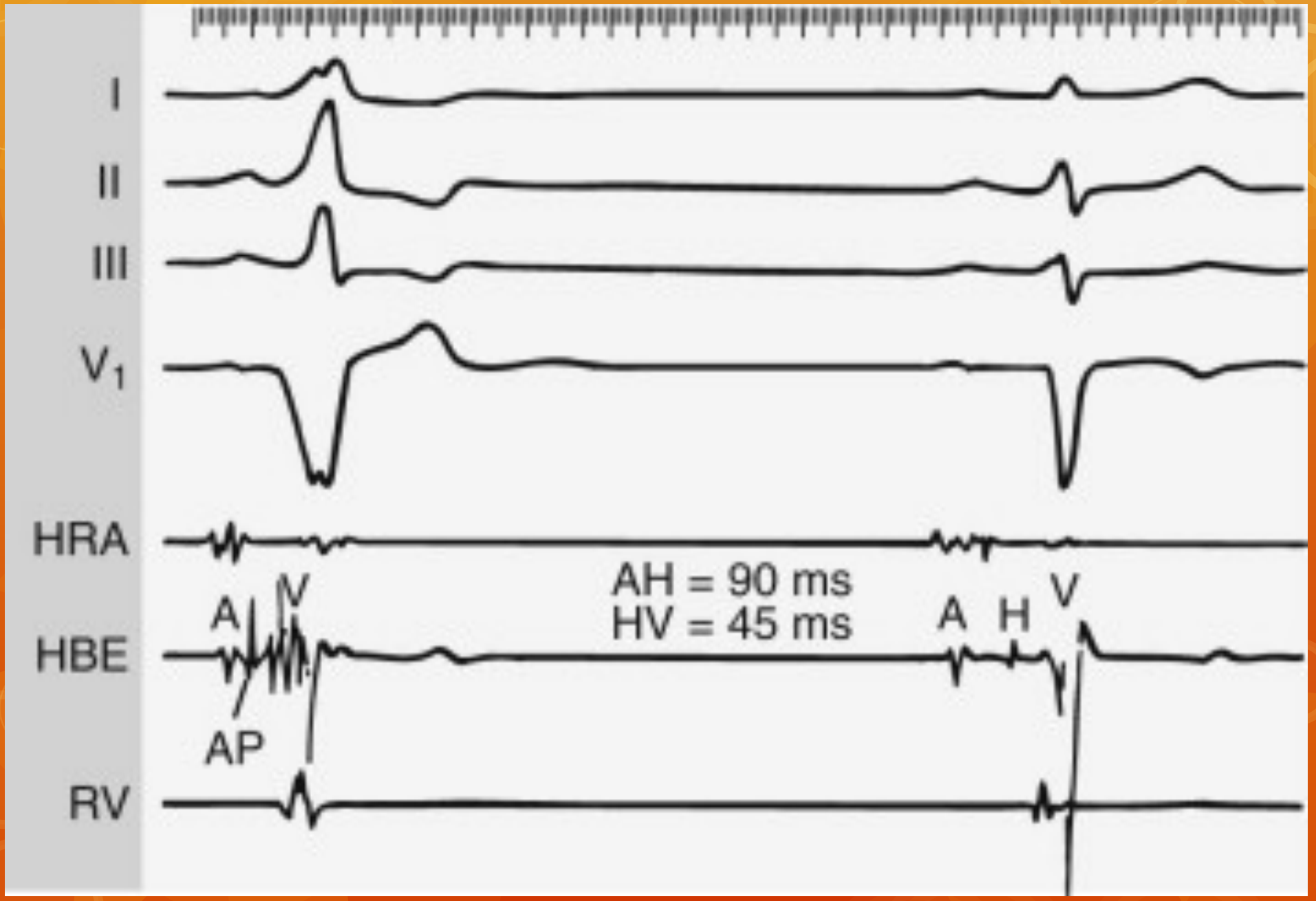
- Third-degree AVB
- Intermittent AVB (i.e., high-grade, Mobitz II, Mobitz I in elderly patients)
- Sustained severe SB (< 40 beats/min) while awake, SA block, or sinus pause ≥ 3 sec

EKG suggesting Arrhythmogenic Syncope

- Pre-excitation (e.g., WPW syndrome)
- Long/short QT interval, Brugada pattern
- Negative T waves in right precordial leads, epsilon waves, and ventricular late potentials suggestive of ARVD
- ST-segment or T-wave changes suggesting acute myocardial infarction/ischemia

The electrophysiologic study tracing in Figure 2-20 is obtained from a 28-year-old man with palpitations, recurrent syncope, and a structurally normal heart. Which of the following is the most appropriate therapy?

A. Atenolol
B. Verapamil
C. Pacemaker implantation
D. Radiofrequency catheter ablation
E. Defibrillator implantation


I
II
III
V1
HRA
HBE
RV
A
V
AP
AH = 90 ms
HV = 45 ms
A
H
V

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Tilt-Table Testing

- Pathophysiology of vasovagal syncope is incompletely understool- but it is generally accepted that physical or emotional stress trigger a chain of events that culminates into vasodilatation or bradycardia (or both)
- This leads to hypotension and LOC associated with vasovagal syncope
- It is believed that tilt-table testing provokes a vasovagal response by venous pooling and orthostatic distress

Tilt-Table Testing

- Protocols have not been standardized
- Most guidelines suggest duration of 20-45 min at 60 ° to 70°
- Pharmacologic agents used if syncope not induced by passive tilt-table test alone
- IV isoproterenol and SL nitroglycerin most common
- These agents increase sensitivity but decrease specificity

Classification of Positive Response

- Type 1 – Mixed

  HR ↓ at syncope, but ventricular rate is not <40 bpm or ↓ <40 bpm for <10s w/ or w/out asystole of <3s

  BP decreases before HR decreases

Classification of Positive Response

- Type 2A – Cardioinhibition w/out asystole

  HR ↓ to a ventricular rate <40 bpm for >10s

  w/out asystole of >3s

- Type 2B – Cardioinhibition w/ asystole

  Asystole occurs for >3s

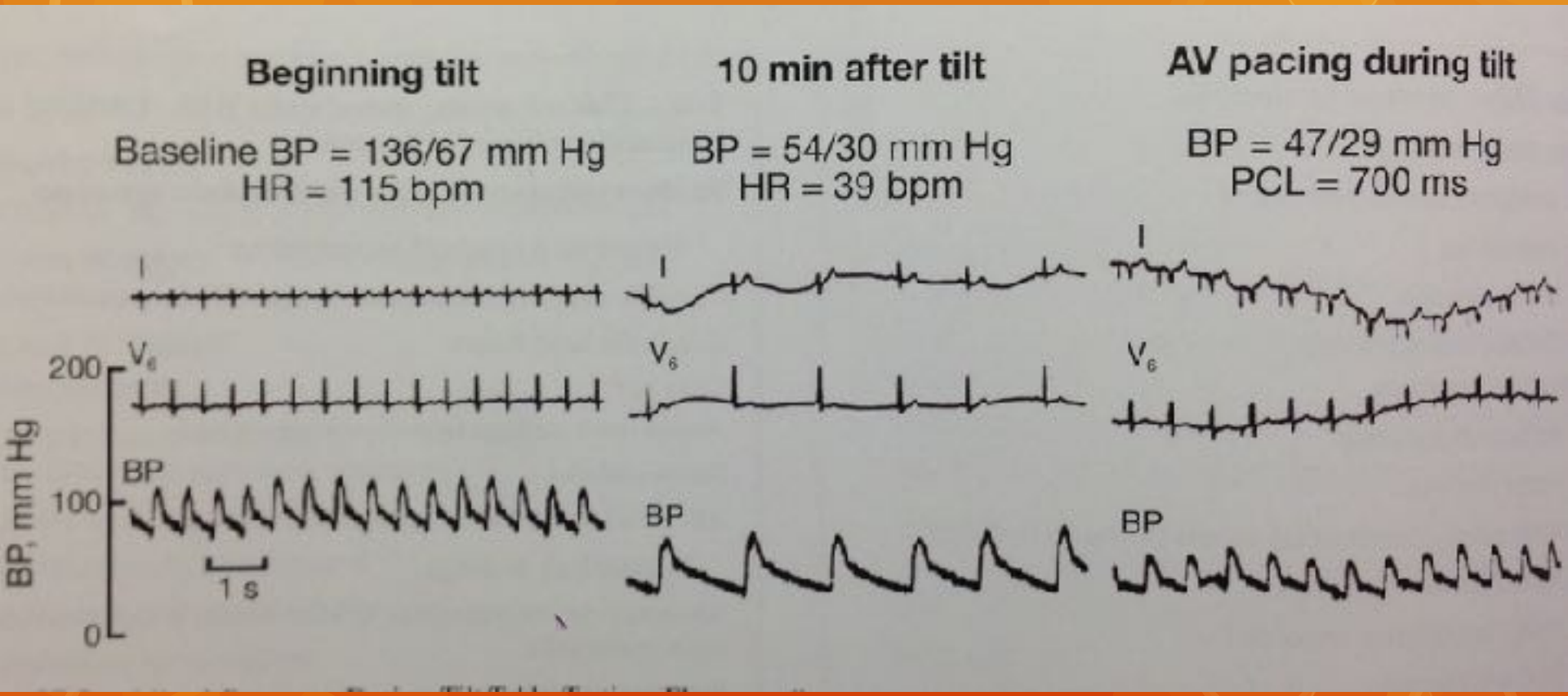
  Decrease in BP occurs w/ or before decrease in HR

Classification of Positive Response

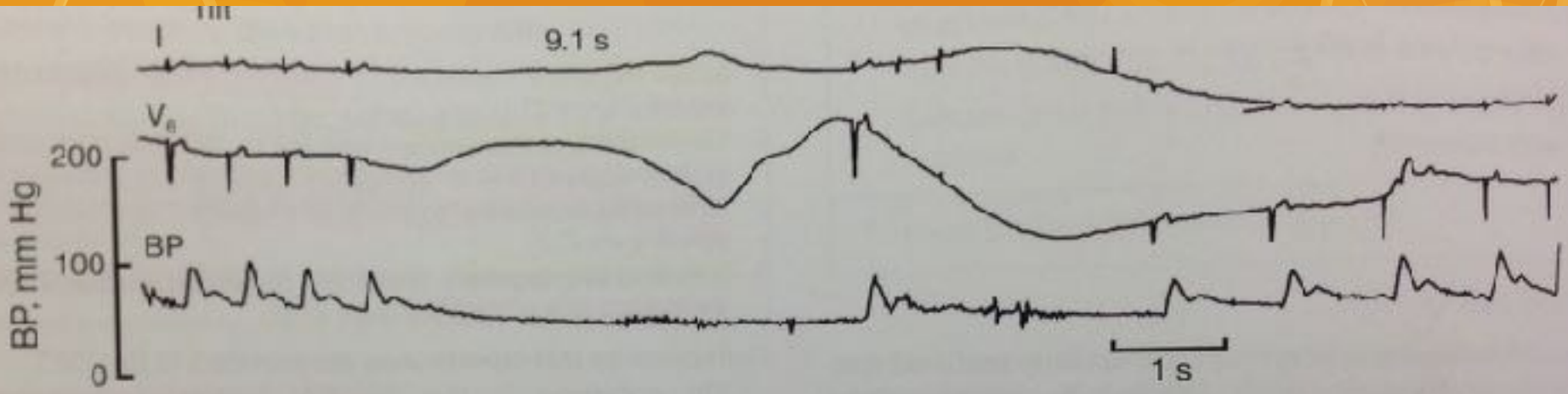
- Type 3 – Vasodepressor

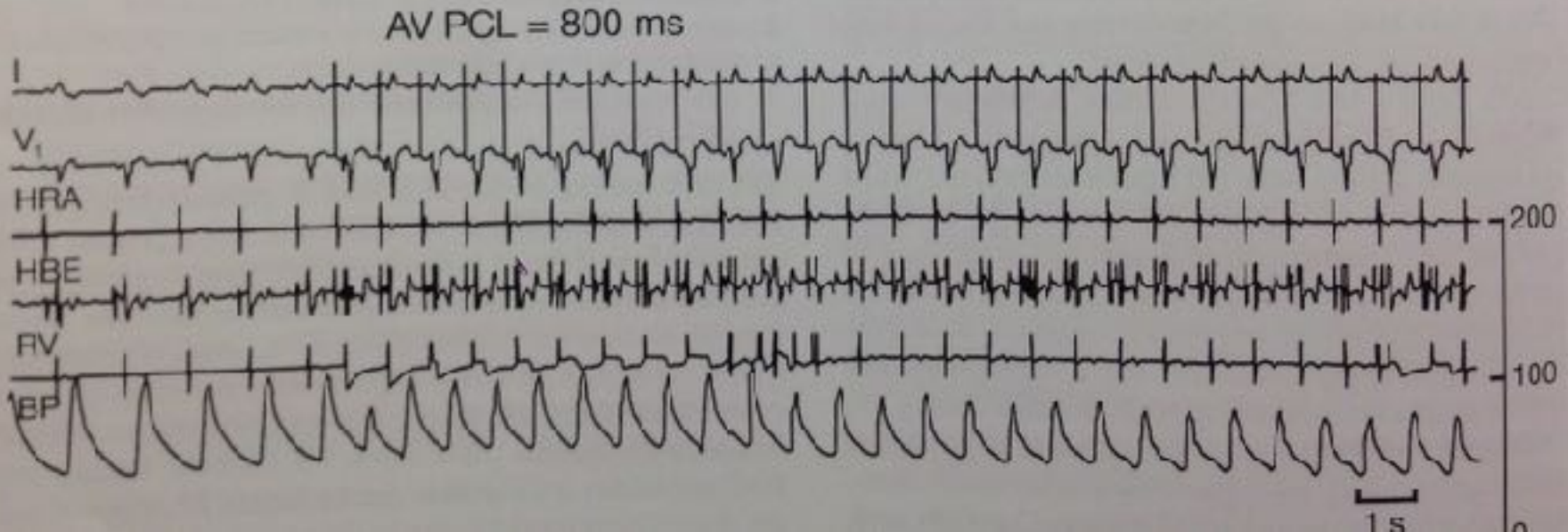
  HR does not decrease >10% from its peak at syncope

Mixed Response

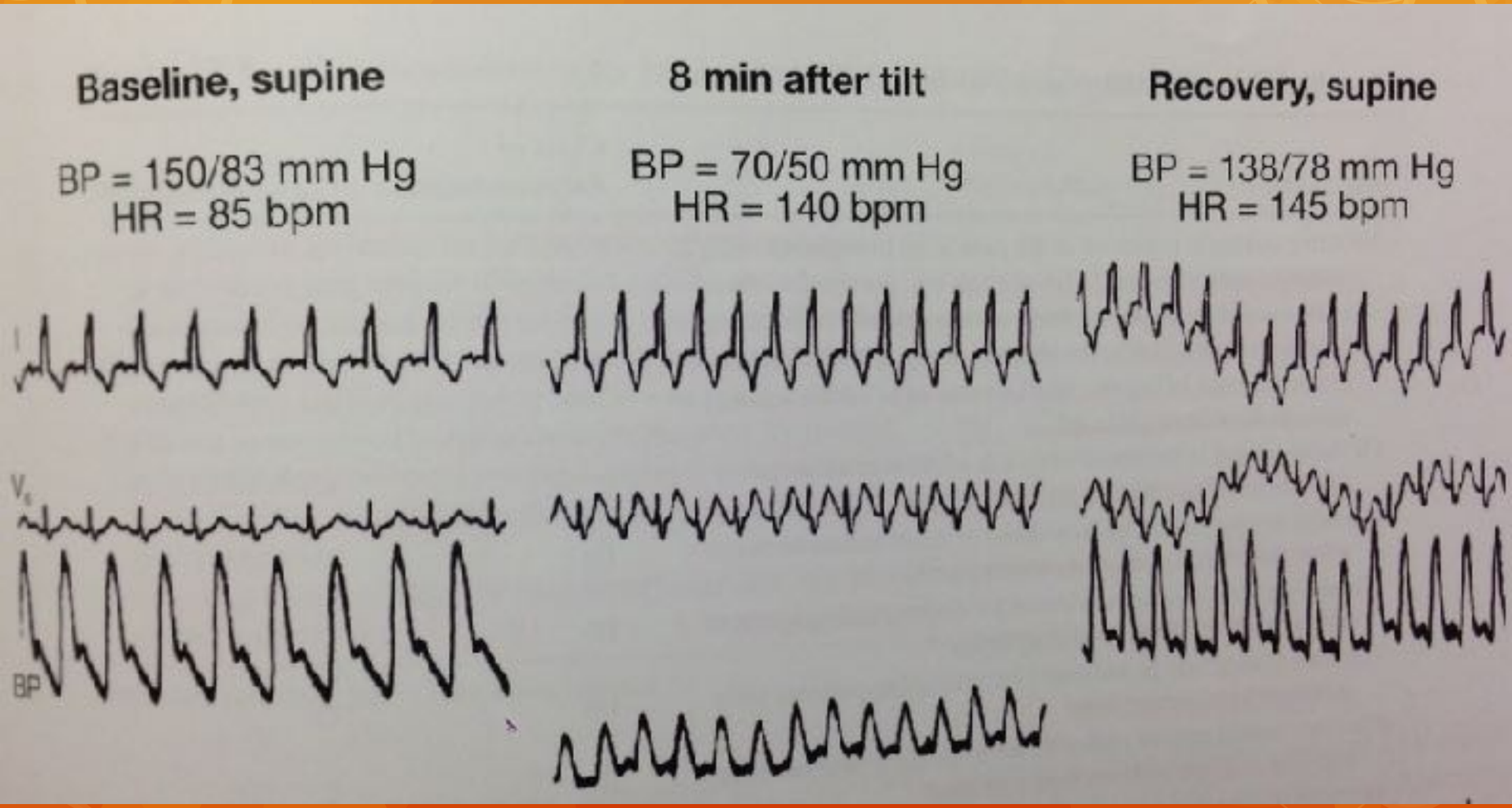


Cardioinhibitory Response





Vasodepressor Response



Indication for Tilt-Table

Indicated if patients have presumed vasovagal syncope or 1 or more of the following

- Syncope w/out evidence of organic heart disease
- One episode of syncope that occurred w/ an injury or a MVA or in high risk situation
- Syncope w/ a known cause and a treatment that vasovagal syncope could affect

Contraindication for Tilt-Table

- Critical obstructive cardiac disease
  - Critical stenosis of MV or proximal segment of coronary artery, severe obstruction of LV outflow tract
- Critical cerebrovascular stenosis

EP Study

Class I Indications

- Abnormal electrocardiogram suggesting conduction system cause
- Syncope during exertion or in supine position or with important structural heart disease
- Syncope with palpitations or angina-like chest pain
- Family history of sudden death

EP Study

Class II Indications

- Define/ablate an arrhythmia that has already been identified in patients with high-risk occupations

Class III Indications

- Absence of risk factors above, unless suspected paroxysmal supraventricular tachycardia

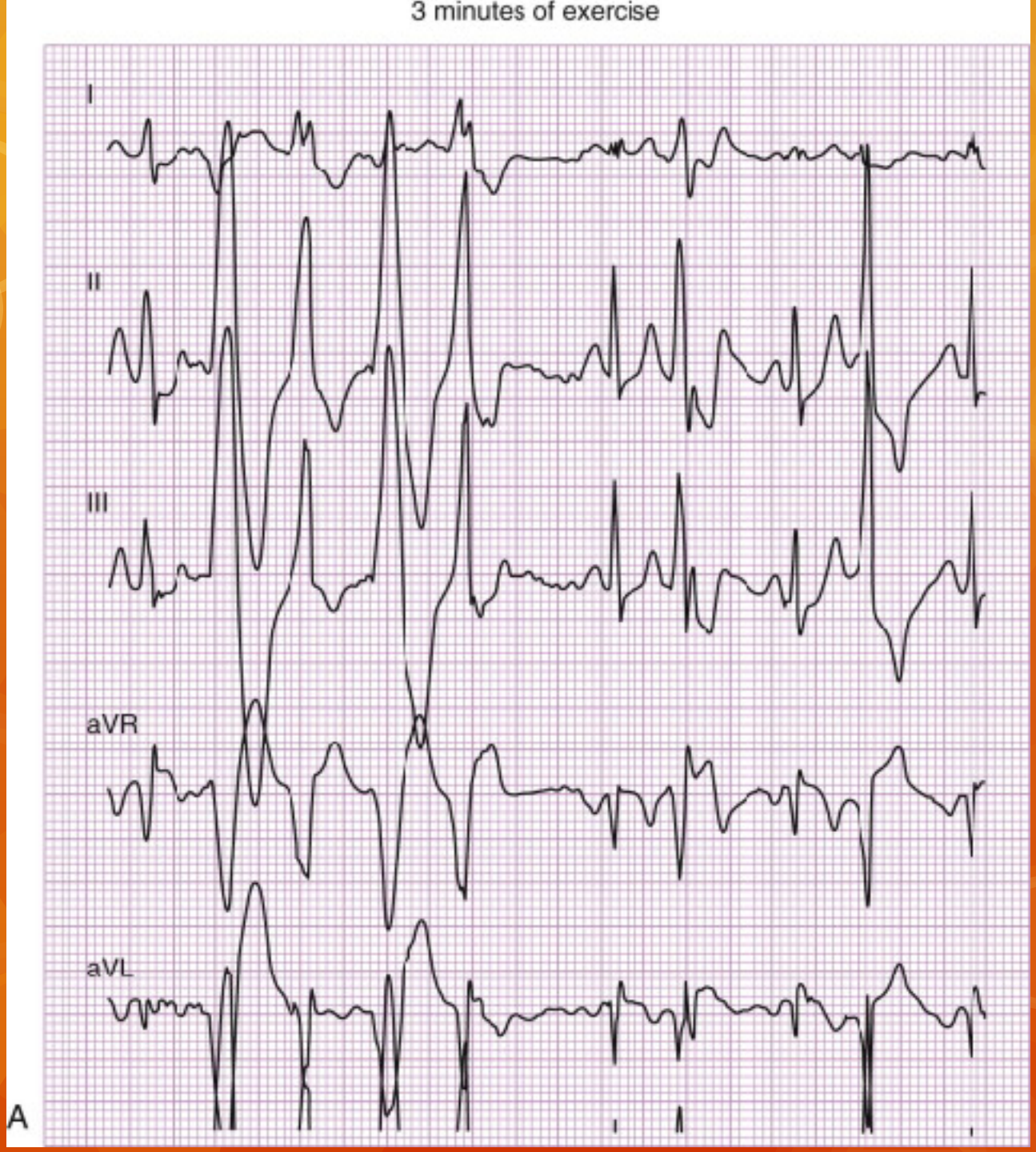
EP Study

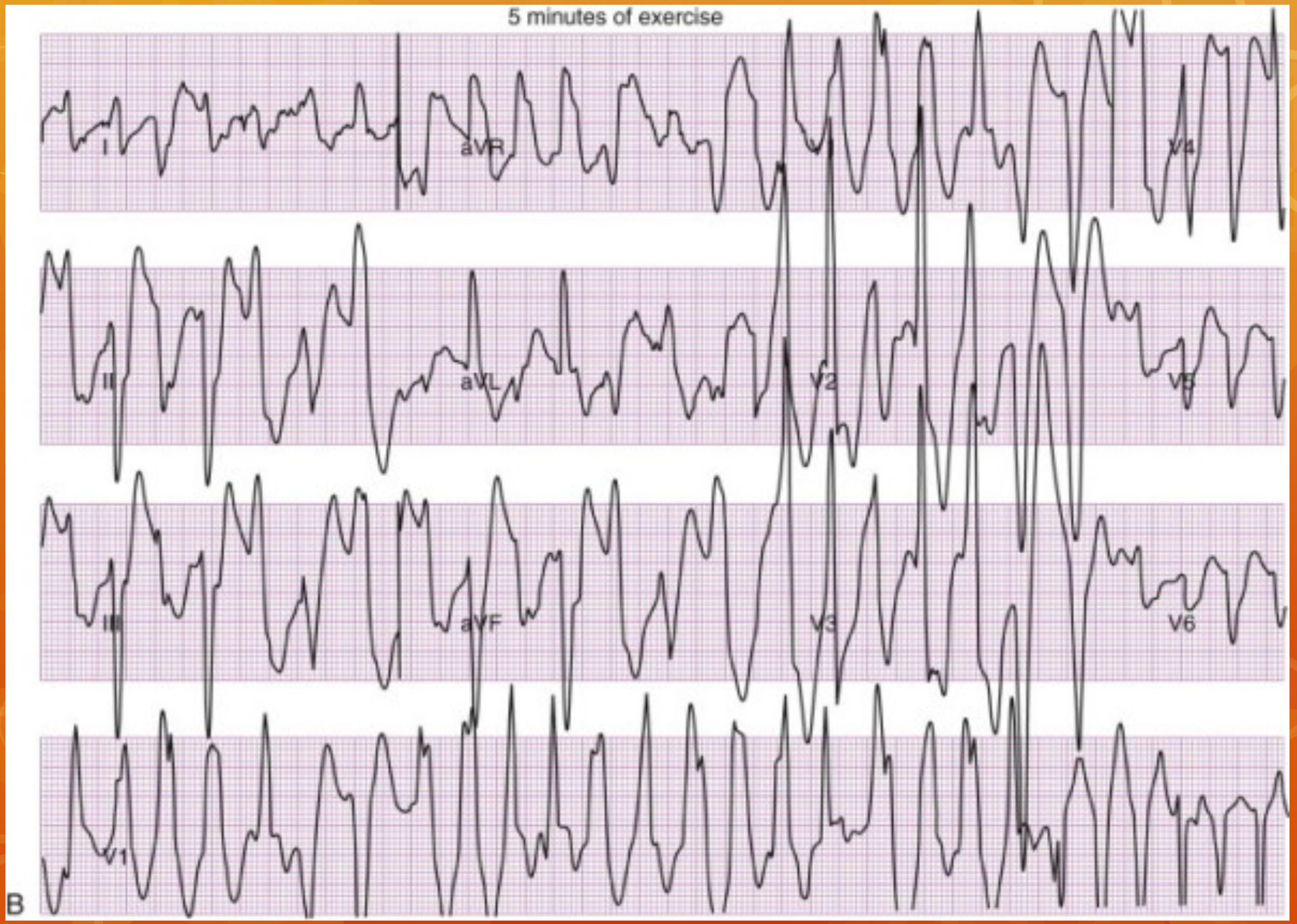
EPS Findings with strong correlation with susceptibility to Syncope

- Sustained monomorphic VT / SVT
- Prolonged (>100ms) HV interval (His bundle to Ventricle conduction interval)
- Sinus Bradycardia w/ Prolonged SNRT (Sinus node recovery time)

- A 14-year-old boy suffers two episodes of sudden syncope during gym class while jogging and is referred for further evaluation. His paternal uncle had died suddenly during physical exercise at age 20. Laboratory evaluation includes an ECG that shows normal sinus rhythm with a normal QTc interval. Cardiac magnetic resonance imaging reveals a structurally normal heart. CT angiography demonstrates normal coronary anatomy. He undergoes treadmill exercise testing, and the rhythm displayed in Figure 2-7 is noted after 3 minutes of exercise. What is the first-line treatment for this condition?

A. Magnesium
B. Dual-chamber pacemaker
C. Beta blocker and an implantable cardioverter-defibrillator
D. Exercise training with adequate hydration
E. Cardiac sympathectomy


3 minutes of exercise
I
II
III
aVR
aVL
A


5 minutes of exercise
I
aVR
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
B

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Conservative management

- Education and Reassurance
- Avoid identifiable triggers / Desensitization (NMS, OH)
- Hydration / Salt intake
- Exercise

Pharmacotherapy

- Volume expanders
- Adrenergic antagonists
- Vaso/veno constrictors
- SSRI’s
- Miscellaneous - Disopyramide, Pureanticholinergics (scopalamine) and Theophylline

Adrenergic antagonists

- Beta-blockers
- POST study (Sheldon et.al. Circ 2006) showed no benefit
- Post hoc analysis - some benefit in older pt > 42yrs

Vaso/veno constrictors

Midodrine

- Drug with most evidence
- Orthostatic Hypotension and Vasovagal Syncope

Methylphenidate

- Alternative for Midodrine intolerance
- But crosses BBB

Role of PPM

- It was listed as a class IIA indication in 2002 guidelines for vasovagal syncope
- Recent studies shows that efficacy is equivocal
- Reserved only for severe and refractory cases in pts w/ documented bradycardia

A 75-year-old woman presents following an episode of syncope. She was watching television with her husband when she suddenly lost consciousness and was unresponsive for approximately 20 seconds. She awoke slightly confused but otherwise felt well. Her past medical history is unremarkable. The baseline ECG demonstrates right bundle branch block and left anterior fascicular block. An electrophysiologic study was performed, and a panel from that procedure is shown in Figure 2-9. Which of the following is the most appropriate recommendation?

A. Catheter ablation for atrioventricular nodal reentrant tachycardia
B. Beta-blocker therapy
C. Neurologic consultation
D. Permanent pacemaker implantation
E. Coronary angiography with anticipated percutaneous revascularization


V1
V5
His distal
His mid
His proximal
RV
12:45:53 PM
12:45:54 PM

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Summary

- Syncope is only one of many causes of TLOC
- History and Physical is of highest yield
- Avoid multiple diagnostic tests at the same time
- Try conservative treatment initially

For each of the following conditions, match the corresponding clinical presentations of syncope:

A. A 20-year-old woman “blacked out” during phlebotomy for a routine blood test
B. A 65-year-old woman lost consciousness after arm exercises
C. A 35-year-old man sustained syncope during exercise and has a systolic murmur that intensifies on standing upright
D. A 74-year-old man experiences sudden syncope while shaving
E. A 28-year-old woman with recurrent episodes of breathlessness, lightheadedness, and syncope after changes in body position

1. Hypertrophic cardiomyopathy
2. Subclavian steal syndrome
3. Vasovagal syncope
4. Carotid sinus hypersensitivity
5. Left atrial myxoma

Answers

1. C
2. B
3. A
4. D
5. E