

SYNCOPE IN THE ELDERLY

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The background of the slide features several faint, concentric circles in a lighter shade of blue, resembling ripples in water, positioned in the lower right and bottom center areas.

Faculty/Presenter Disclosures

➤ Faculty: Sunil K. Sinha

- Relationships with commercial interests:
 - **Educational Grants:** Boston Scientific, Medtronic, and St. Jude Medical
 - **Consultant:** Boston Scientific, Medtronic, and St. Jude Medical
 - **Speaker's Bureau:** Janssen Pharmaceuticals

SYNCOPE: Topic Outline

- Definition
- Mechanism
- Differential diagnosis
- Non-syncopal conditions
- Investigations
- Case studies

SYNCOPE: Definition

➤ *Sunkopē* (Gk) – “pause”

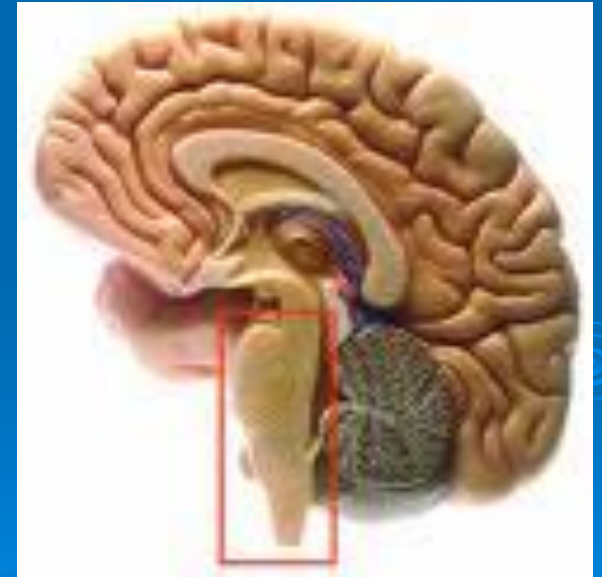


➤ Sudden transient loss of consciousness and postural tone with spontaneous recovery¹.

1. Calkins, H. Cardiac Electrophysiology, 4th ed : Ch. 96; Syncope. p884-894.

SYNCOPE: Mechanism

- Global reversible reduction of blood flow to the reticular activating system (RAS) – the neuronal network responsible for supporting consciousness¹.



Syncope: Differential Diagnosis²

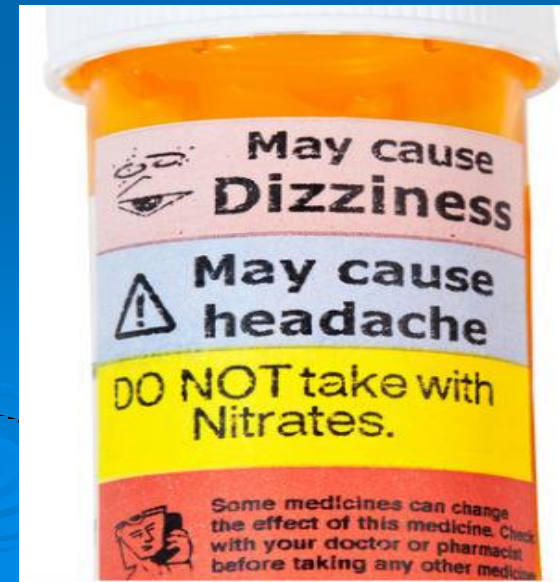
- Neurally-mediated (reflex) syncope
- Orthostatic hypotension
- Cardiac arrhythmias
- Structural cardiac or cardio-pulmonary disease
- Cerebrovascular

SYNCOPE: Neurally-Mediated

- Vasovagal (neurocardiogenic) syncope
- Hypersensitive carotid sinus syncope
- Situational syncope
 - Cough
 - Swallow
 - Post-micturation
 - Defecation
 - Post-exercise

SYNCOPE: Orthostatic Hypotension

- Volume depletion
 - dehydration
 - hemorrhage
 - emesis/diarrhea
 - Addison's disease
- Drug-induced
 - Clonidine, α -methyldopa, terazosin,
 - Labetalol, nitrates.....
 - Alcohol
- Autonomic failure
 - Parkinson's (Shy-Drager syndrome)
 - Diabetic neuropathy

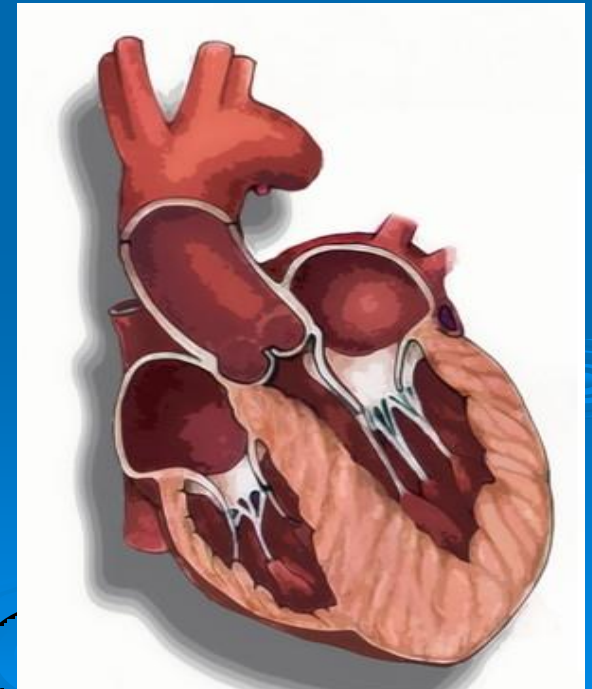


SYNCOPE: Cardiac Arrhythmias

- Sinus node dysfunction
- Atrio-ventricular conduction disease
- Paroxysmal supraventricular tachycardia
- Ventricular tachycardia
- Inheritable arrhythmias
 - LQTS, SQTS, ARVD, HCM, Brugada syndrome
- Drug induced pro-arrhythmias
 - Sotalol, flecainide, digoxin, erythromycin, methadone
- Pacemaker or ICD malfunction

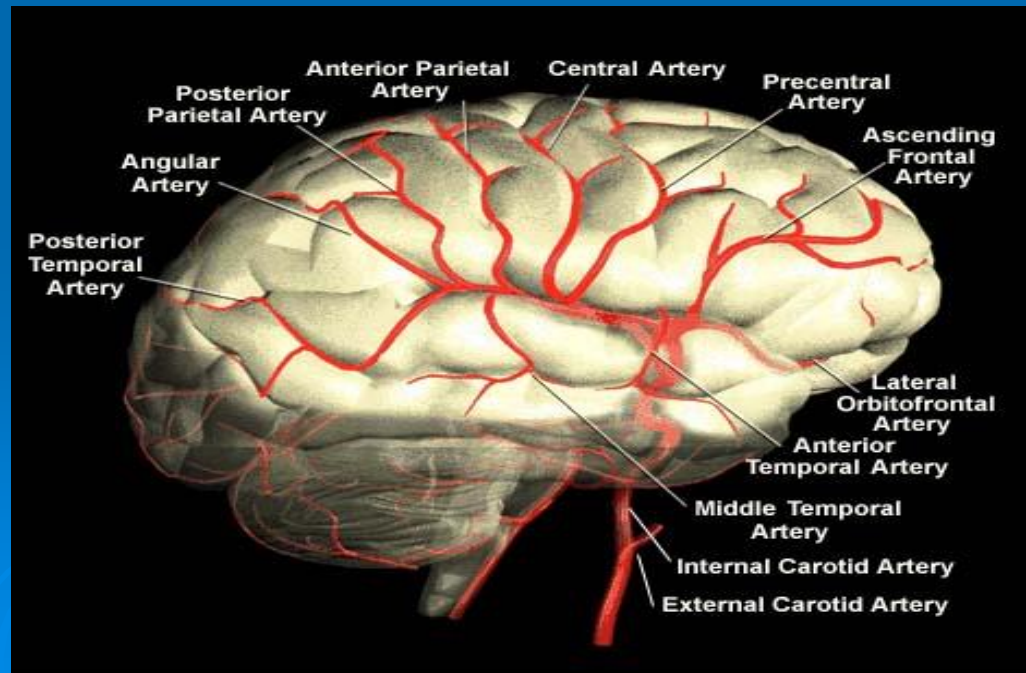
SYNCOPE: Structural Cardiac or Cardiopulmonary Disease

- Aortic or mitral stenosis, atrial myxoma
- Hypertrophic obstructive cardiomyopathy
- Acute myocardial ischemia/infarction
 - Coronary thrombosis
 - Coronary vasospasm
 - Coronary anomalies
- Acute aortic dissection
- Pericardial disease/tamponade
- Pulmonary embolus
- Severe pulmonary hypertension



SYNCOPE: Cerebrovascular

- Vascular steal syndromes;
 - Vertebral-basilar arterial insufficiency
 - Subclavian steal syndrome
- Migraines



Non-Syncopal Conditions

➤ Loss or alteration of consciousness

- Epilepsy
- Alcohol or drug intoxication
- Transient ischemic attack(s)
- Narcolepsy
- Metabolic disorders
 - Hypoglycemia
 - Hypoxemia (CO poisoning)
 - Hyperventilation (hypocapnea)



➤ “Apparent” loss of consciousness

- Frequent falls (concomitant dementia)
- Psychogenic pseudo-syncope (conversion disorder)
- Baron Von Munchausen’s disease

SYNCOPE: Investigations

➤ History

- Prodrome, episode, recovery (witnesses?)
- Environmental factors
- Medications (prescribed & OTCs)
- Recent and long term co-morbidities

➤ Physical

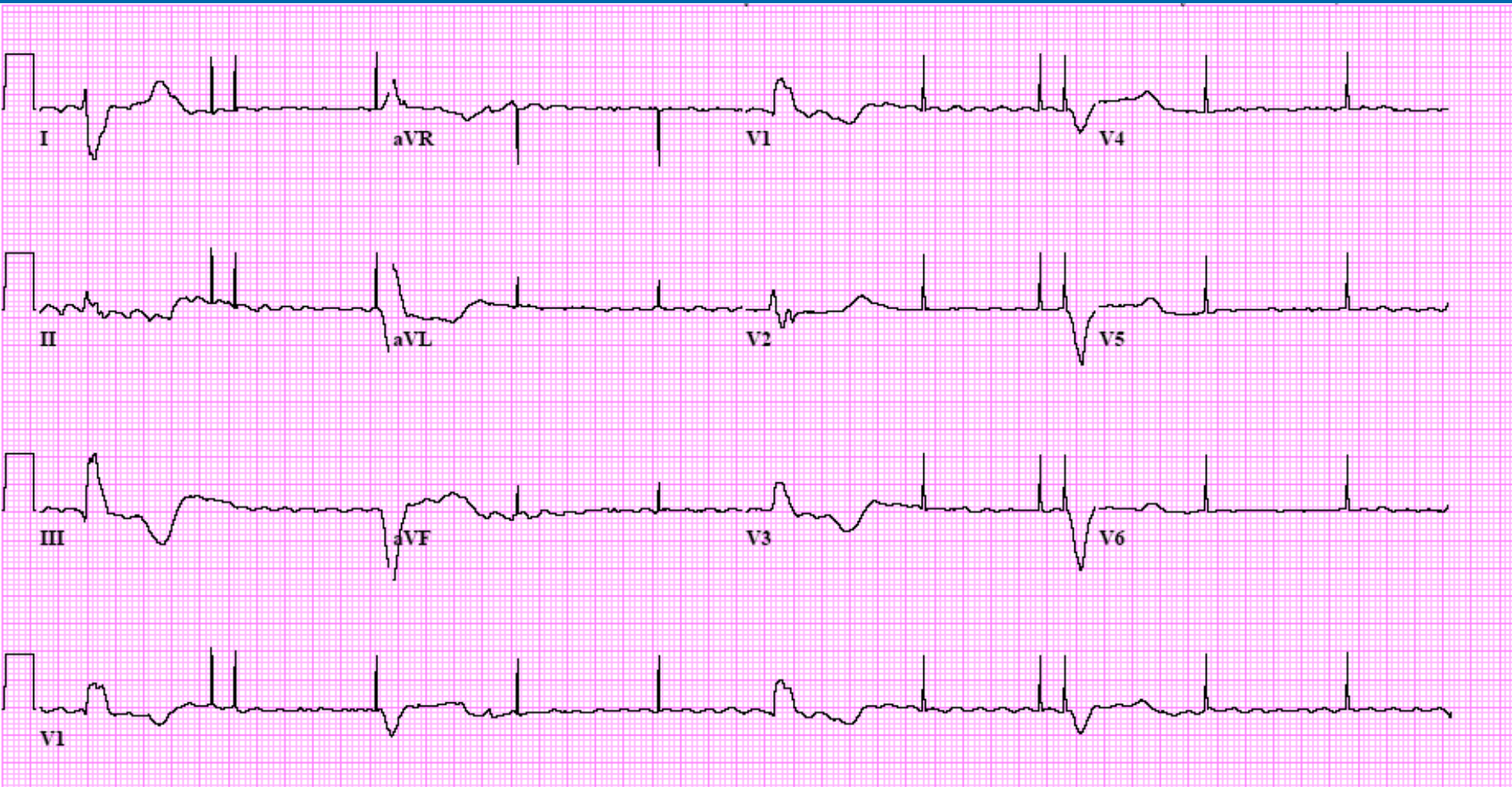
- Supine and standing BP & HR, flat JVP?
Carotid pressure? Include cardiovascular & neurologic exam.

➤ Electrocardiogram

- Evidence of arrhythmia or structural disease?

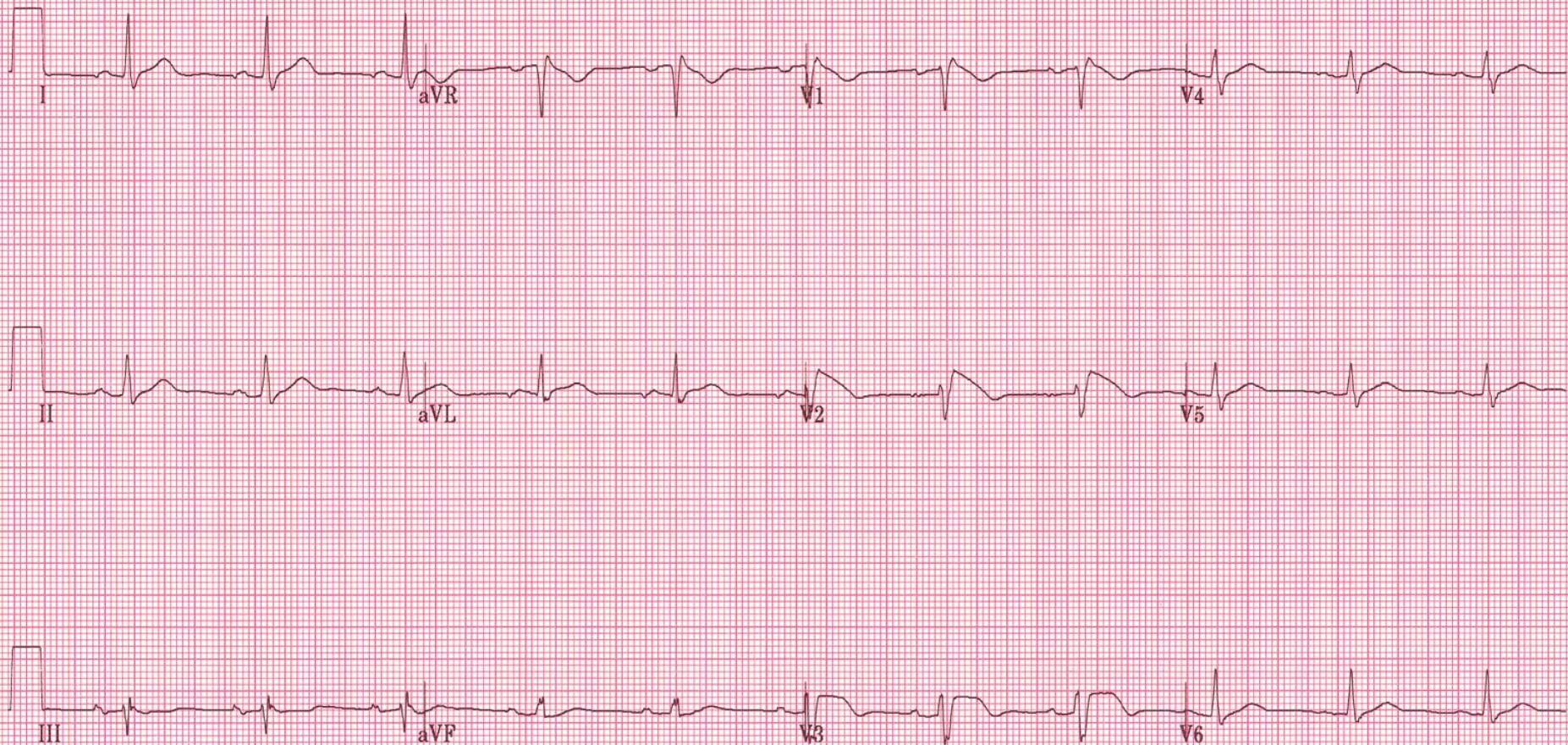
SYNCOPE: Investigations

- Standard 12 lead electrocardiogram:
Intermittent pacemaker non-capture



SYNCOPE: Investigations

- Standard 12 lead electrocardiogram:
Brugada Syndrome pattern Type I



SYNCOPE: Investigations

➤ Pacemaker or Defibrillator Interrogation

Atlas® II+ DR V-268 (#411842 pr73.0)

FastPath® Summary

Page 1 of 2
Sep 9, 2008 12:26 pm

Battery and Charge Information

Implant Date Oct 22, 2007
Battery Voltage 3.15 V
Last Max Charge 11.4 sec (Aug 25, 2008)



ERI (2.45V)

Status: 1 Alert

⚠ V. Pacing Lead Impedance

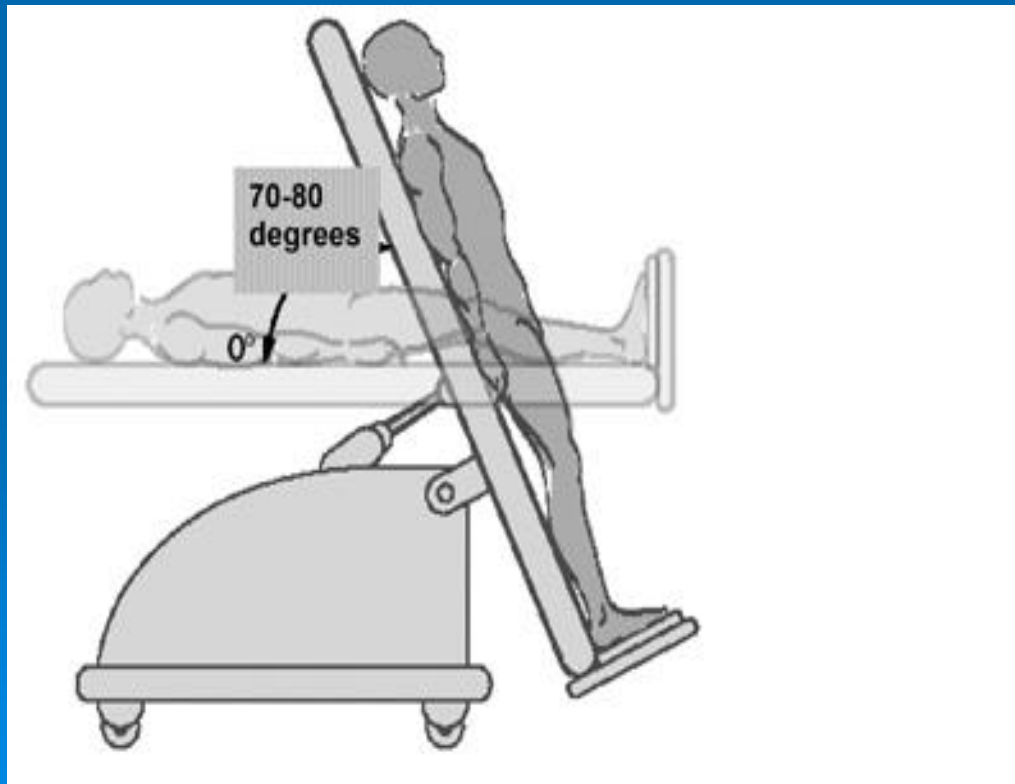
Test Results (Last Session: May 28, 2008)

	<u>Atrium</u>		<u>Ventricle</u>	
Capture Threshold	Today	To Be Performed	Today	To Be Performed
	Last Session	0.75 V	Last Session	1.25 V
Signal Amplitude	Today	≥ 3.0 mV	Today	> 12.0 mV
	Last Session	≥ 3.0 mV	Last Session	> 12.0 mV
Pacing Lead Impedance	Today	355 Ω	Today	< 100 Ω
	Last Session	345 Ω	Last Session	390 Ω
High Voltage Lead Impedance	Integrity Check	Today 45 Ω		
	Episode	Oct 22, 2007 43 Ω		

SYNCOPE: Investigations

➤ Tilt Table Testing

- Neurally-mediated syncope
- Orthostatic hypotension (eg. POTS)



SYNCOPE: Investigations

- Non-invasive ECG Monitoring (24h – 30 days)
 - Cardiac arrhythmias
 - Structural cardiac disease
- Invasive ECG Monitoring (~ 3 years)
 - Cardiac arrhythmias



Insertable Loop Recorder: Programmable Software

Parameters

	Detection	ECG Recording	Interval (Rate)	Duration
FVT	<input type="text" value="On"/>	<input type="text" value="On"/>	260 ms (231 bpm)	30/40 beats
VT	<input type="text" value="On"/>	<input type="text" value="On"/>	340 ms (176 bpm)	16 beats
Brady	<input type="text" value="On"/>	<input type="text" value="On"/>	2000 ms (30 bpm)	4 beats
Asystole	<input type="text" value="On"/>	<input type="text" value="On"/>		3 sec

	Detection	ECG Recording	Record ECG of
AT/AF	<input type="text" value="AF Only"/>	<input type="text" value="On"/>	<input type="text" value="All Episodes"/>

Additional Settings	Status Notifications	Device Data Collection...
<input type="text" value="Sensing..."/>	<input type="text" value="Patient Assistant Setup..."/>	<input type="text" value="On"/>
<input type="text" value="Detection Enhancements..."/>		

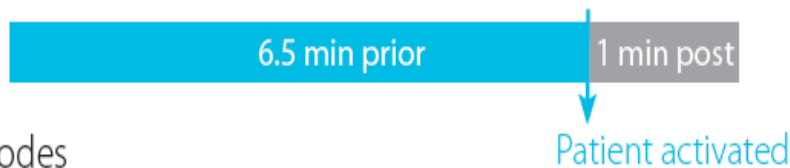


ILR: Patient Activation AND Automatic Activation

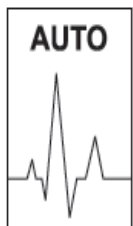
Patient Activation – 22.5 minutes



Up to 3 episodes



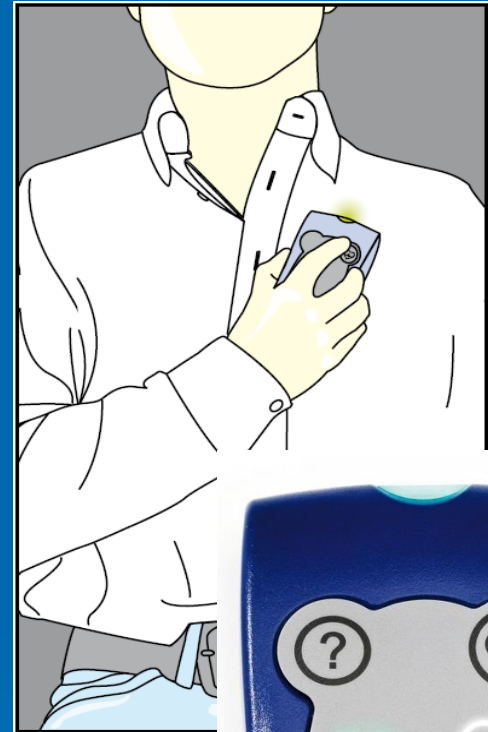
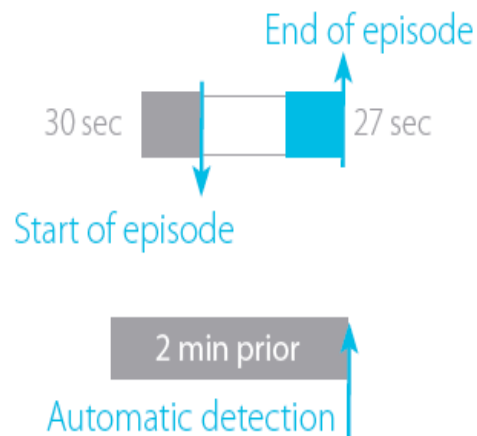
Automatic Activation – 27 minutes



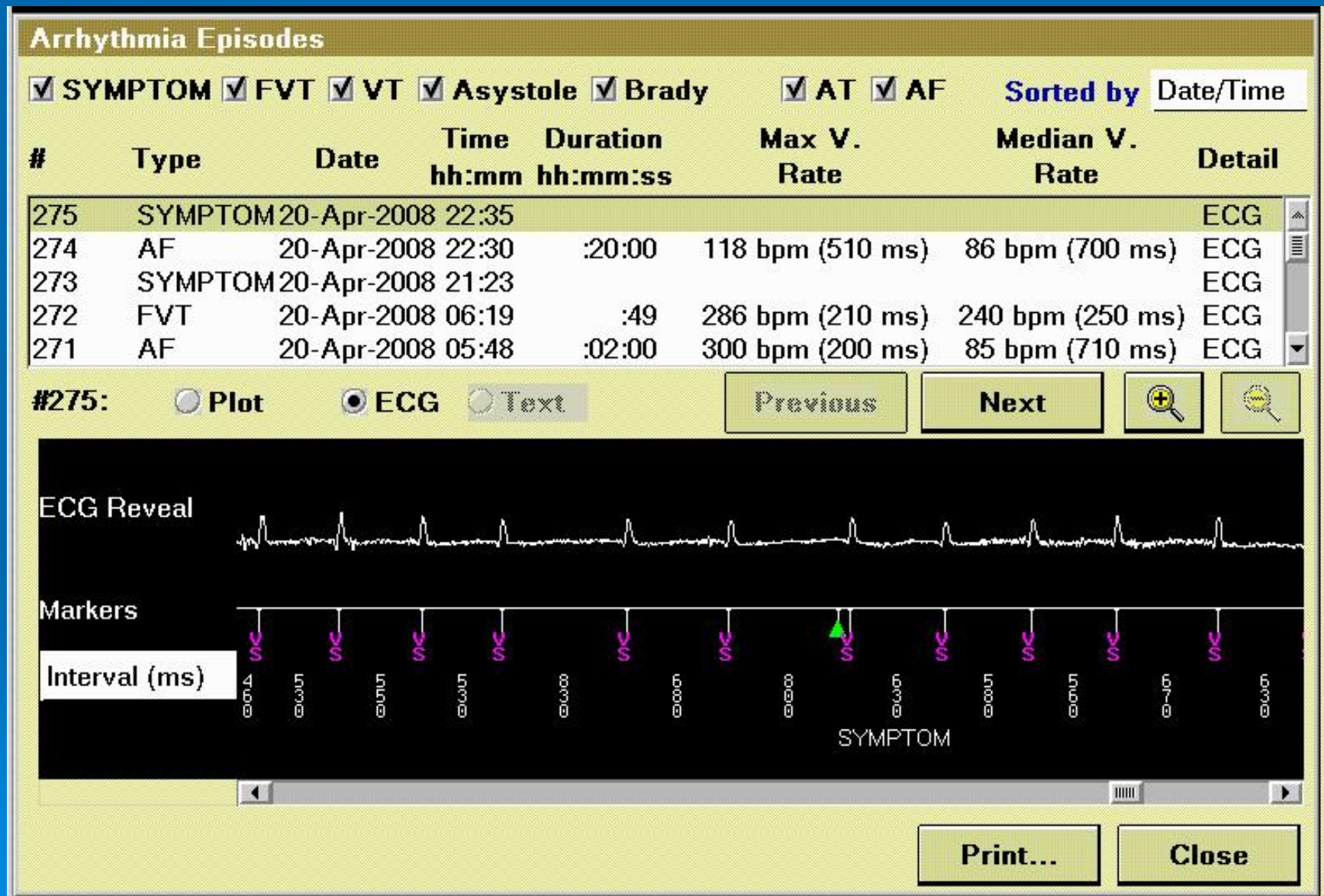
Up to 27 episodes

VT/FVT/Brady/Asystole

AT/AF



ILR: Intra-Cardiac Electrograms



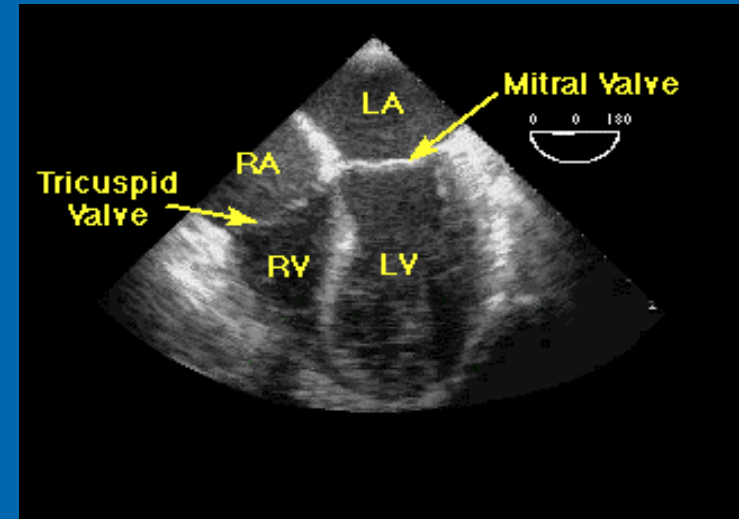
SYNCOPE: Investigations

- Invasive Electrophysiologic Study
 - Cardiac arrhythmias
 - Structural cardiac disease
 - Sinus Node Dysfunction (<5%), AV Node Dysfunction (10-15%), SVT (<5%), VT (20%)
- Negative study suggests *low risk* of sudden cardiac death

SYNCOPE: Investigations

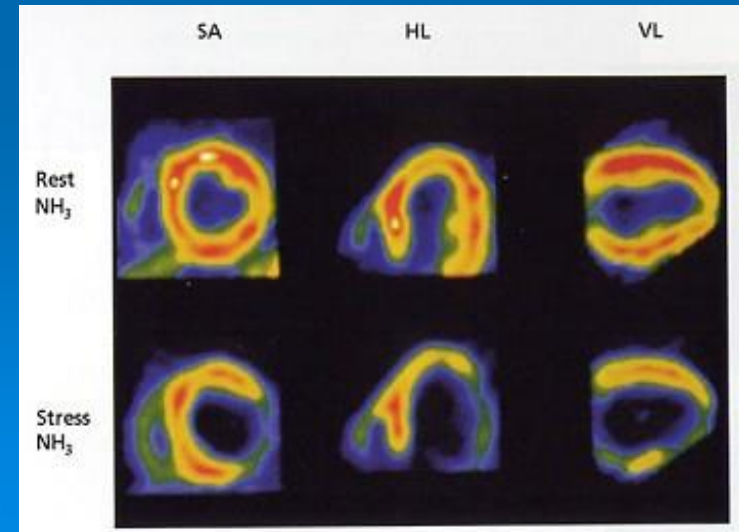
➤ Echocardiography

- Cardiac arrhythmias
- Structural cardiac disease



➤ Cardiac Stress Testing

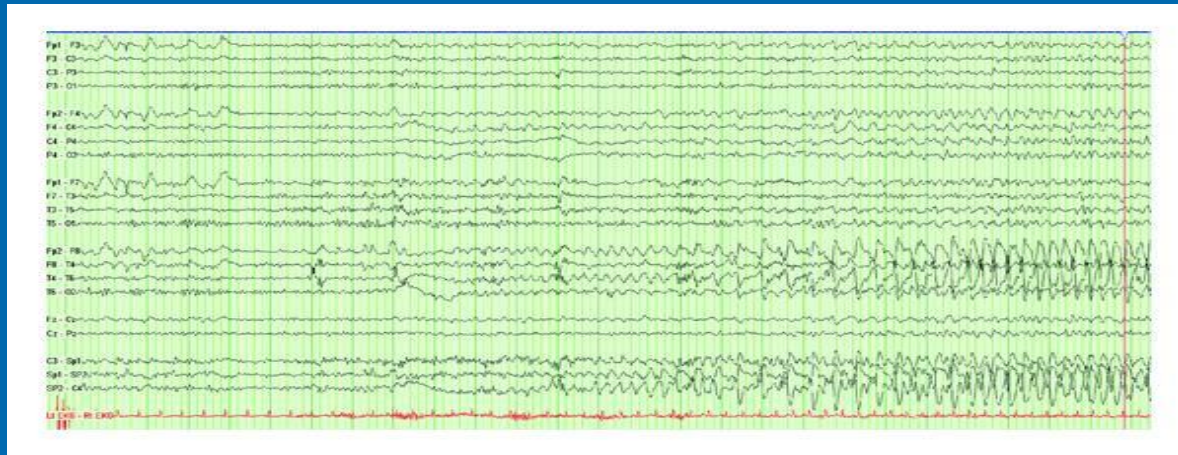
- Structural cardiac disease



SYNCOPE: Investigations

➤ Electroencephalography

- Non-syncopal condition (seizures)



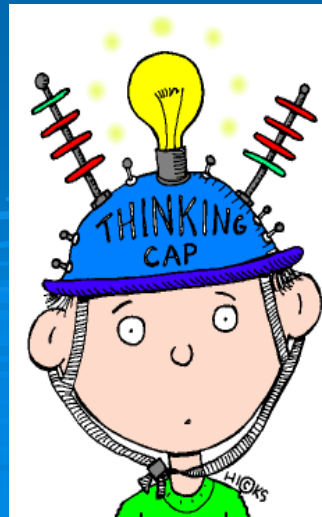
➤ CT or MRI or MRA (brain)

- Cerebrovascular (VBI)
- Non-syncopal condition (TIAs)



SYNCOPE: Investigational Efficacy

- History & Physical (25%)
- Electrocardiogram (10%)
- Tilt table test (85-90%)
- 24h Holter monitor (4%)
- 30 day event monitor (6-25%)
- Insertable loop recorder (59%)
- Electrophysiologic study (30%)
- Echocardiogram (44%)



Case 1: Mr. OM

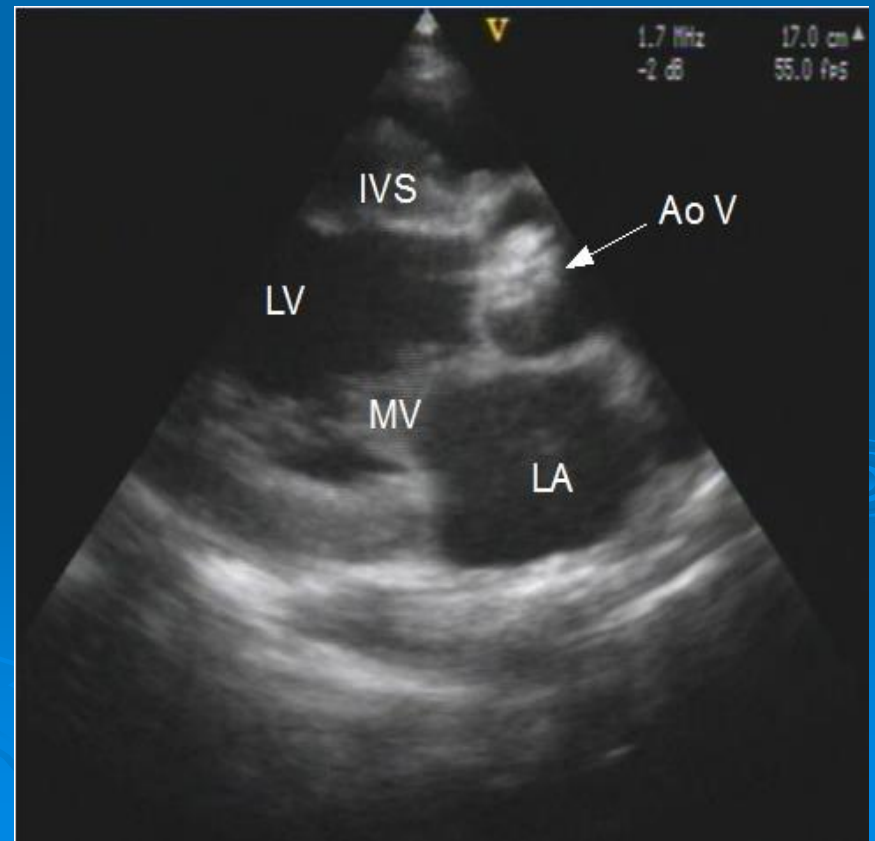
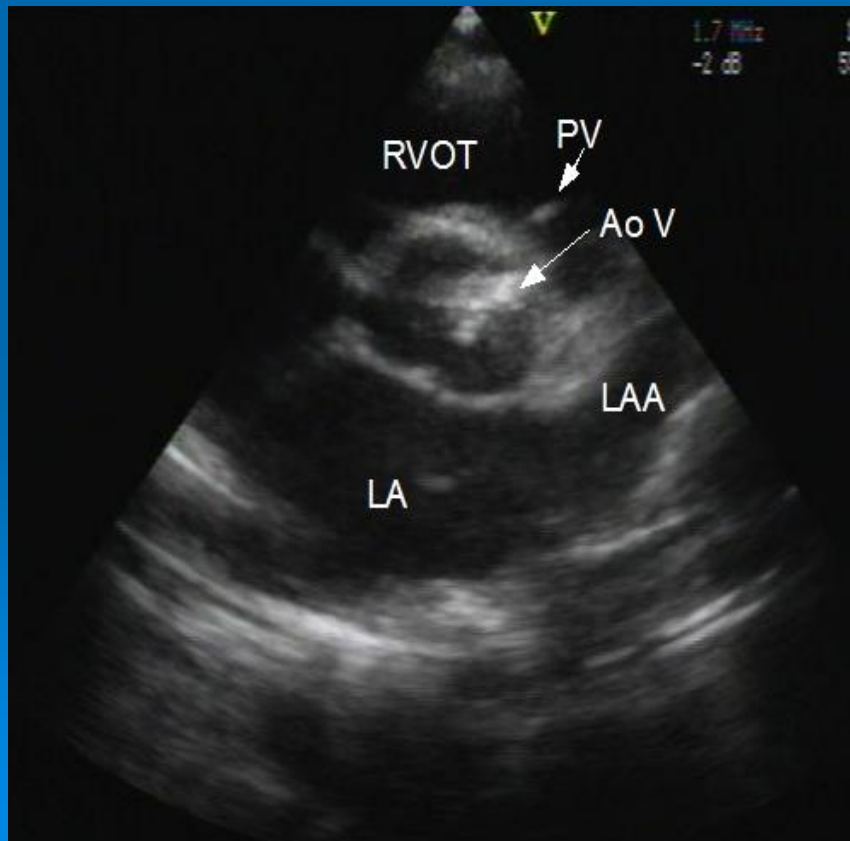
- 80 year old construction company owner with progressive exertional dyspnea x 1 year, chest pain x 3 months, and a recent syncopal episode.
- PMHx: Hypertension, COPD (ex-smoker)
- Medications: ACE Inhibitor, HCTZ
- Px Exam: reduced carotid upstrokes, barrel shaped chest, III/VI harsh systolic murmur radiating to the neck, 2+ bilateral pedal edema.
- ECG: sinus rhythm & LVH voltage criteria.

Case 1: What Should The Next Step Be?

- A. Neurology consultation (EEG, Brain MRI)
- B. 30 day event monitor
- C. Consult Cardiology re: echocardiogram or cardiac catheterization.
- D. Consult Cardiac Electrophysiology re: invasive electrophysiologic study or insertable loop recorder.
- E. Tilt Table Test

Case 1: Answer C.

- Echocardiogram & subsequent left cardiac catheterization confirmed severe calcific aortic stenosis.



Case 2: Dr. JD

- 69 year old dentist experienced *witnessed* syncope while jogging. Spouse performed “CPR” for 2 – 3 minutes with resolution.
- ECG revealed *prolonged QT interval*.
- In-hospital telemetry x 72 hours normal.
- Echocardiogram, Cardiac MRI and nuclear stress test unremarkable.

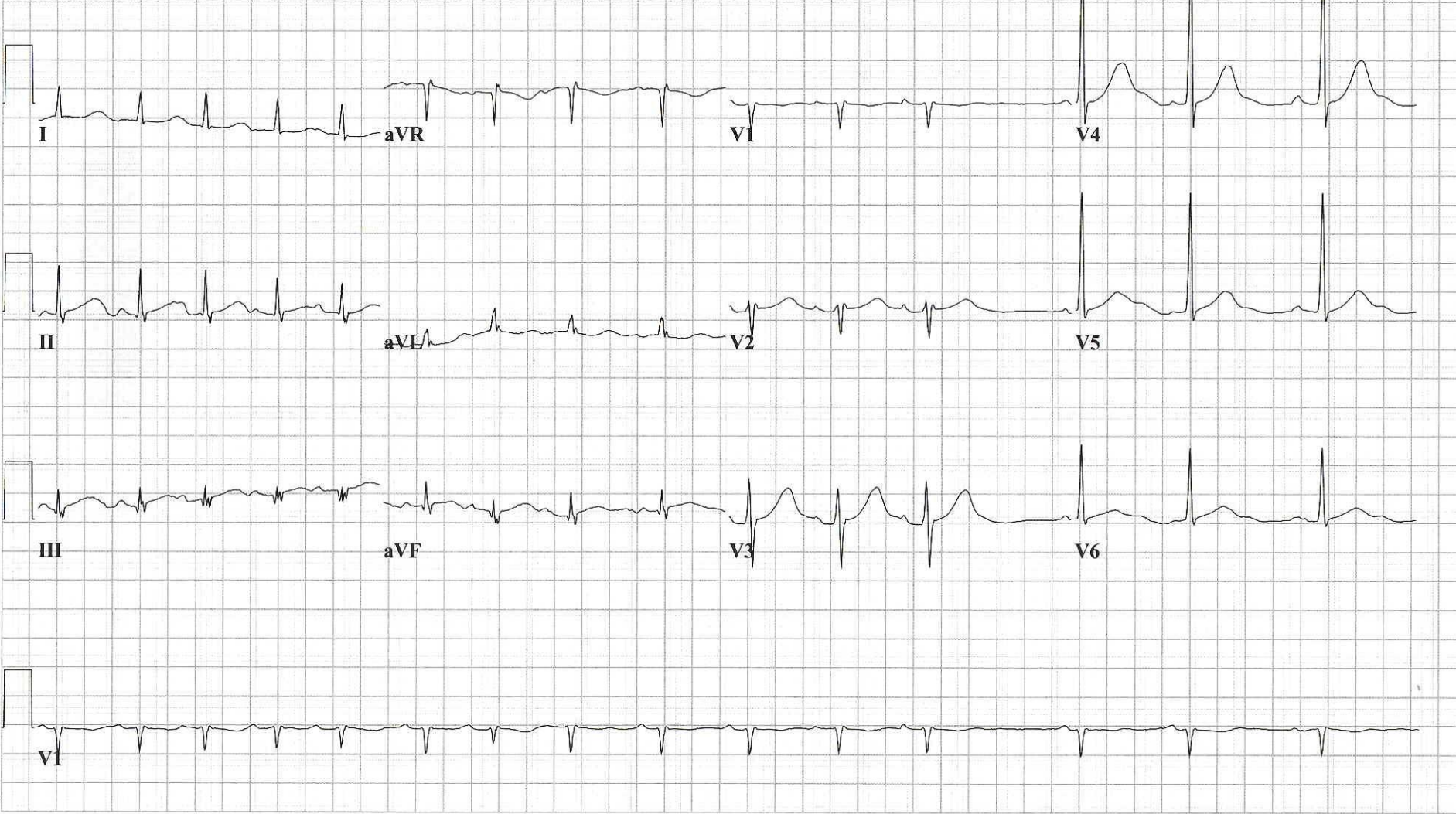
21-OCT-1947 (57 yr)
Male Caucasian
Room:RM04
Loc:30

Vent. rate 91 BPM
PR interval 132 ms
QRS duration 88 ms
QT/QTc 438/539 ms
P-R-T axes * 29 73


NORMAL SINUS RHYTHM WITH OCCASIONAL PREMATURE SUPRAVENTRICULAR COMPLEXES
PROLONGED QT INTERVAL OR TU FUSION, CONSIDER MYOCARDIAL DISEASE, ELECTROLYTE IMBALANCE, OR DRUG EFFECTS
ABNORMAL ECG
SINCE 10/8/05 INCREASE HR,PACS,INCREASE QTC

INTERPRETING M.D.: G.TOMASELLI #: 62029
GC: N

Referred by: Confirmed By: GORDON TOMASELLI, M.D.



Case 2: What Should The Next Step Be?

- A. Neurology consultation (EEG, Brain MRI)
 - B. 30 day event monitor
 - C. Insertable Loop Recorder
 - D. Consult Cardiac Electrophysiology re: invasive electrophysiologic study.
 - E. Tilt Table Test
- 
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Case 2: Answer D.

- Invasive EP Study: inducible sustained polymorphic ventricular tachycardia (suppressed with metoprolol).




Exertional Syncope

- Exertional or post-exertional syncope warrants thorough investigation;
 - Life threatening etiology?
 - Structural cardiac disease (eg. HOCM, ARVD, **CAD**)
 - Cardiac arrhythmias (eg. LQTS1)
 - Benign?
 - Neurally-mediated hypotension
 - Orthostatic hypotension
- ECG, treadmill stress test, echocardiogram (also cardiac MRI, CT angiography, tilt table test)

Case 3: Mrs PR

- 75 yr old retired secretary with poor exercise tolerance, pre-syncope and syncope > 5 years when *standing* for > 5 minutes. She has been compliant with drinking 5 – 6 glasses of water per day with modest improvement.
- PMHx: Hypertension.
- Medications: Ace Inhibitor, nondihydropyridine CCB.
- Px Exam: BP (supine): 160/90, 130/85 (sitting), 90/60 (standing), HR 84 bpm. No neurologic deficits.
- ECG: Normal sinus rhythm, borderline LVH criteria.
- Blood Tests: normal glucose, electrolytes, creatinine, and cortisol level.

Case 3: What Should The Next Step Be?

- A. Neurology consultation (EEG, Brain MRI).
 - B. 30 day cardiac event monitor.
 - C. Consult Cardiology re: echocardiogram or stress test.
 - D. Curtail anti-hypertensive therapy.
 - E. Tilt Table Test.
- 
- The bottom right corner of the slide features a decorative graphic consisting of several sets of concentric circles, resembling ripples in water, rendered in a lighter blue shade against the main blue background.

Case 3: Answer D.

- Patient likely manifests Systolic Hypertension *and* marked Orthostatic Hypotension.
- Encourage hydration and attenuate anti-hypertensive regimen while acknowledging potential long term increased risk stroke.

Case 4: Mr MS

- 67 year old accountant with infrequent recurrent unexplained syncope ~ 15 years
- Admitted following “syncope” at home
- Pt complains of headache, nausea and fatigue post-event
- Px exam – left lateral tongue bite
- Unresponsive episode ~ 5 minutes witnessed in ER (15 second sinus pause recorded on telemetry monitoring)

Case 4: Investigations

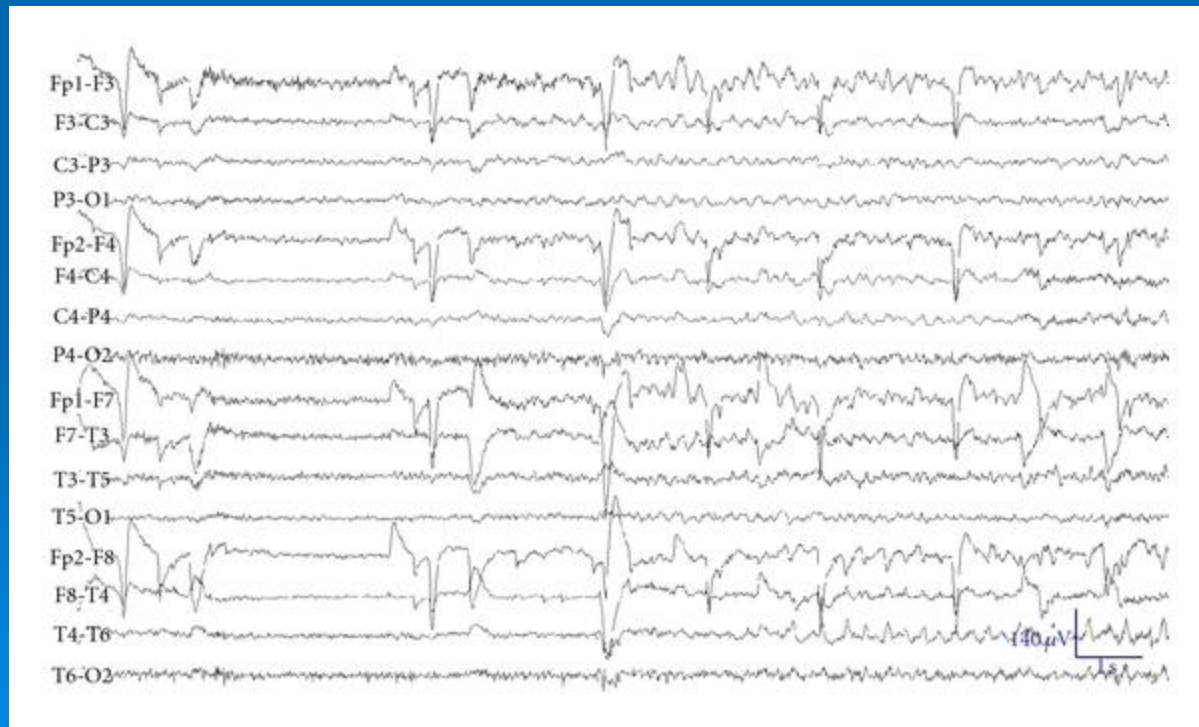
- ECGs & in-hospital telemetry: normal.
- Blood tests: normal random glucose, electrolytes, creatinine, liver enzymes, D-dimer, and cardiac enzymes.
- Echocardiogram: normal.
- Exercise treadmill Technetium⁹⁹ Myocardial Perfusion SPECT Scan: normal.

Case 4: What Should The Next Step Be?

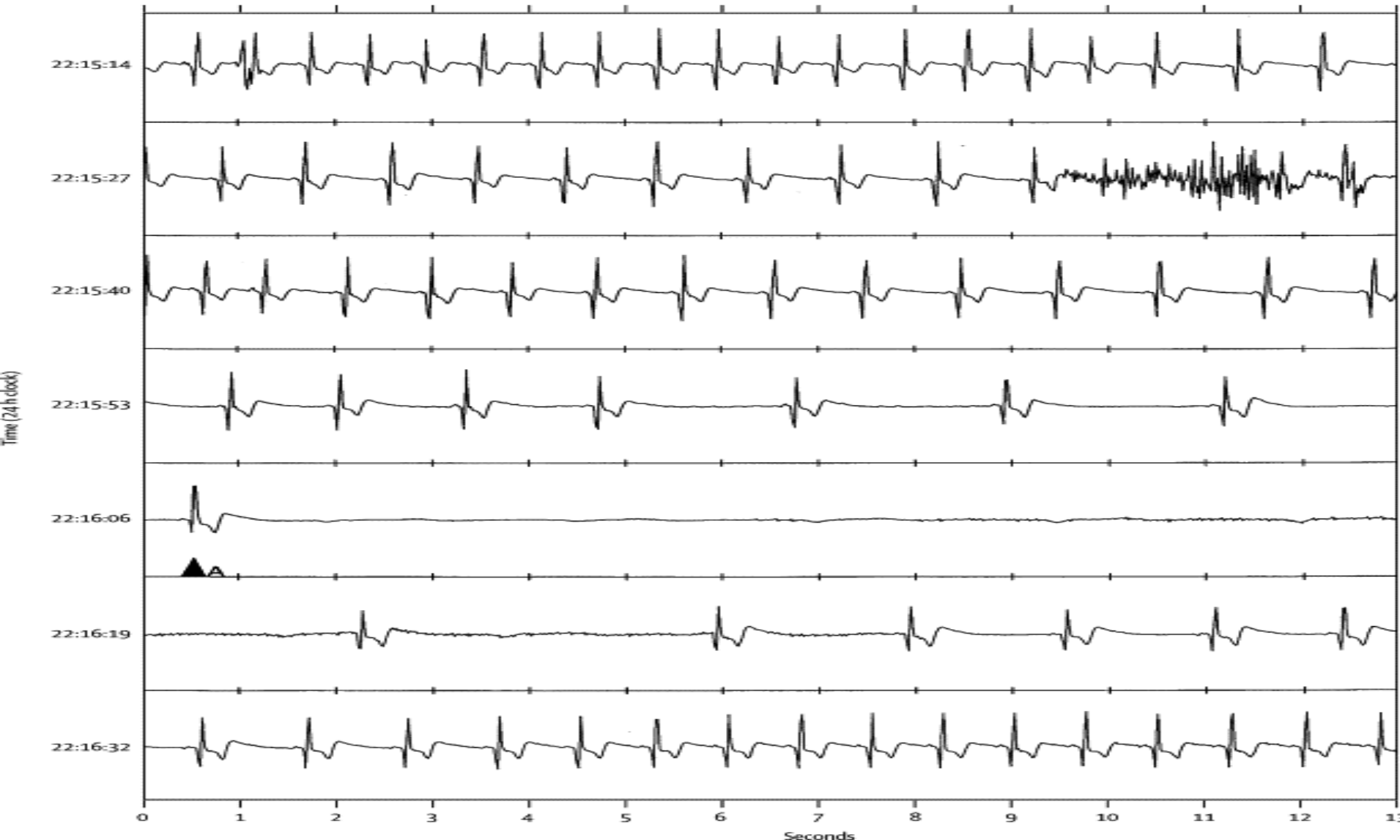
- A. Consult Neurology re: EEG & Brain MRI.
- B. 30 day event monitor.
- C. Insertable Loop Recorder.
- D. Consult Cardiac Electrophysiology re: permanent pacemaker insertion.
- E. Tilt Table Test.

Case 4: Answer A.

- MRI/MRA (brain): normal
- EEG: revealed paroxysmal left temporal lobe epileptiform activity



Temporal Lobe Seizure and associated Bradycardia & Asystole³



Case 4: Management

- “Ictal Bradycardia Syndrome”³
 - Marked parasympathetic discharge due to temporal lobe epilepsy
- Anti-epileptic therapy (*Keppra*) prescribed
- 24h ambulatory EEG confirmed no recurrent epileptiform activity

3. Rugg-Gunn et al. Cardiac arrhythmias in focal epilepsy.
Lancet. Vol 364; No 9452; 2004, p2212-2219.



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