The Young and the Dizzy: Pediatric Syncope

I have no disclosures.

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Scope of the Problem

- 40% of girls and 20% of boys experience syncope by age 18 years
- Incidence increases with age, peaks in adolescence
- Etiology for pediatric ED syncope:
  - Vasovagal or orthostatic
  - 9% neuro
  - 2% cardiac (<1% new cardiac diagnosis)

Exclusions today:

- Syncope due to known Congenital Heart Disease
  - Unrepaired and repaired

- Syncope in patients with devices
  - Pacemakers, ICD, Anti-tachycardia devices
  - ILR (implantable loop recorders)

Common Syncope:

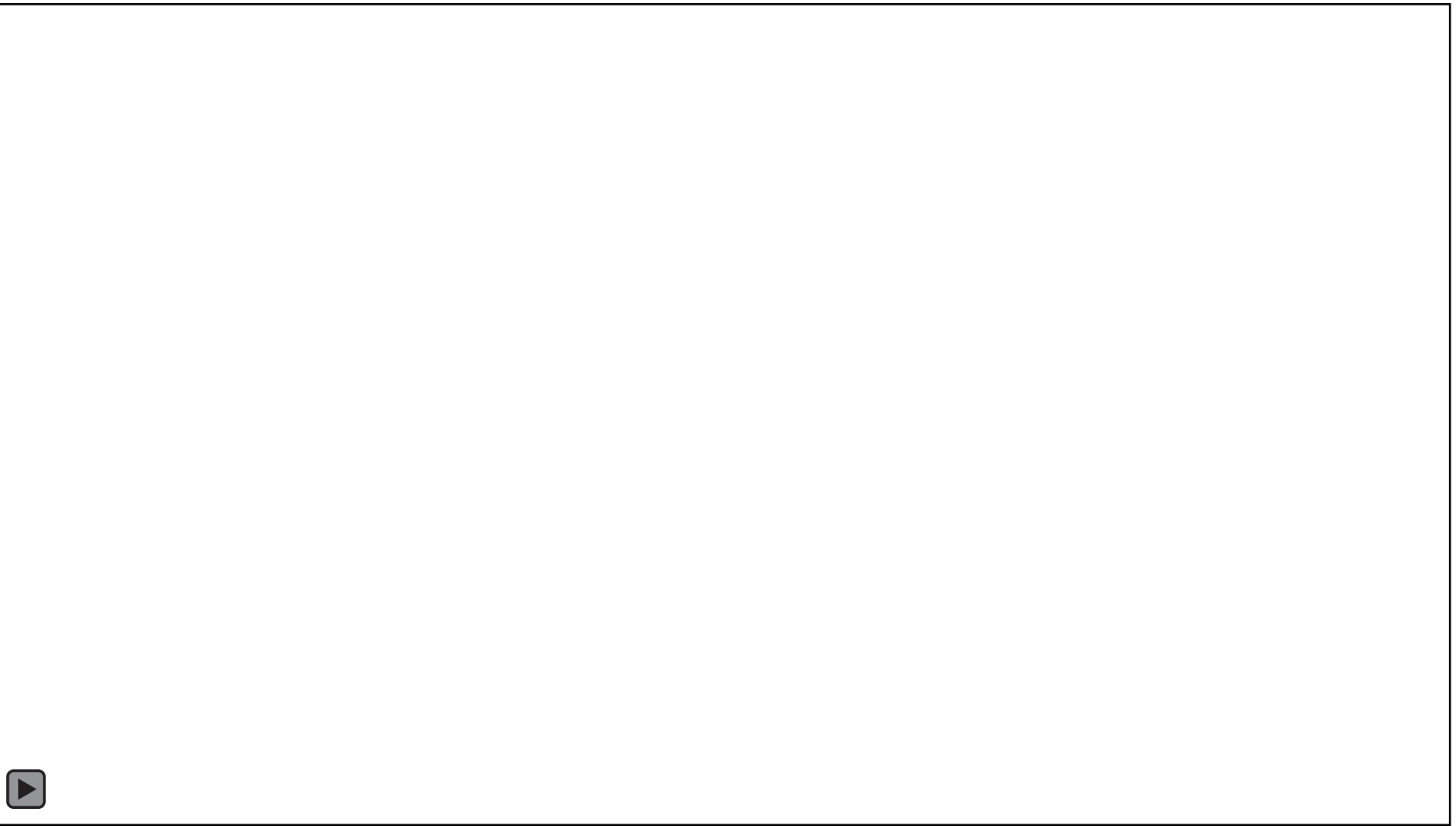
- Vasovagal (neurally-mediated)
  - Trigger: pain, fear, warm environment, position
  - Situational: Valsalva, micturition/defication, cough/sneeze, hair-pulling

- Orthostatic
  - Hypovolemia
  - Autonomic: POTS (postural orthostatic tachycardia syndrome)

POTS

- Diagnosis (made in outpatient clinic):
  - Persistent elevated sinus rate on standing of ≥120 BPM or increase of 30-40 BPM from the resting supine HR
  - Feeling of fast HR, dizziness or lightheadedness, frank syncope is rare, associated fatigue, constipation, abd pain
- Management:
  - Acute ED: IVF may be helpful, then follow up in clinic
  - Chronic Outpatient: increase fluid intake, salty snacks, exercise program including regular isometric LE conditioning, compression stockings, medications.

Common Syncope



Common Syncope

Sudden Cardiac Death

- Rare: 1-2/200,000 in US
- FH: seizures, syncope, early sudden death, SIDS, ICDs/pacemakers at a young age, drownings, single car accidents

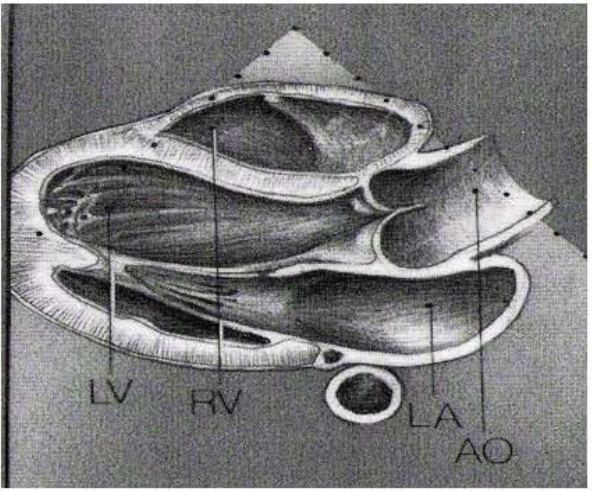
The 2017 American College of Cardiology/American Heart Association guidelines recommended that a detailed medical history, physical examination, family history, and 12-lead ECG should be performed in all pediatric patients presenting with syncope as a Class I recommendation.

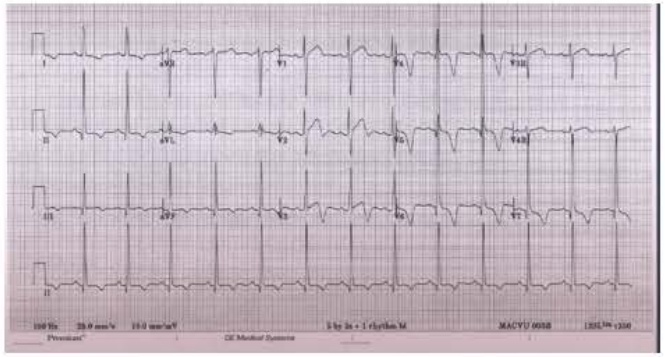
Hypertrophic Cardiomyopathy

- 1/500, autosomal dominant
- ECG: increased QRS voltages, abnormal repolarization
- VT due to: primary arrhythmia (abnormal myocytes/scarring) or ischemia

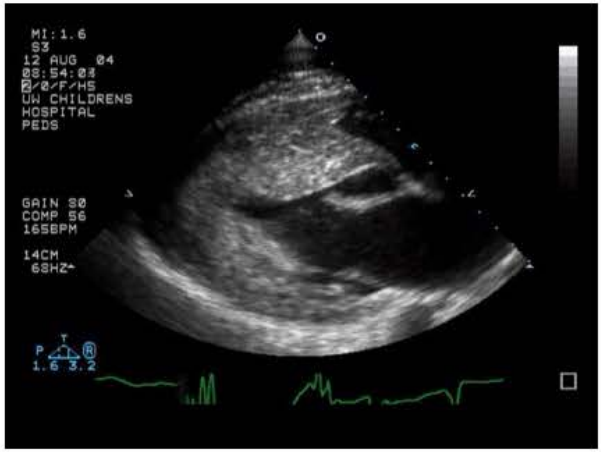
Hypertrophic Cardiomyopathy

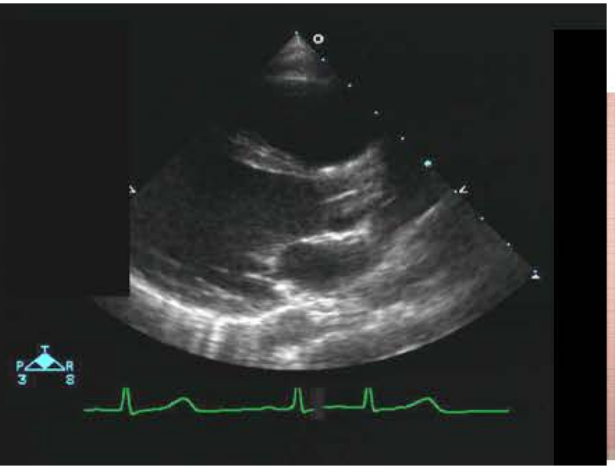
Parasternal Long Axis View: Normal

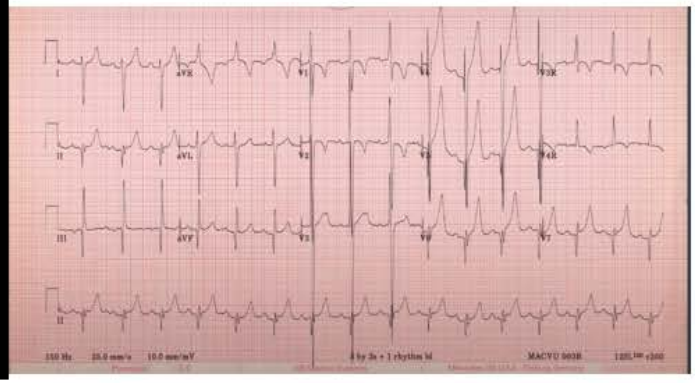




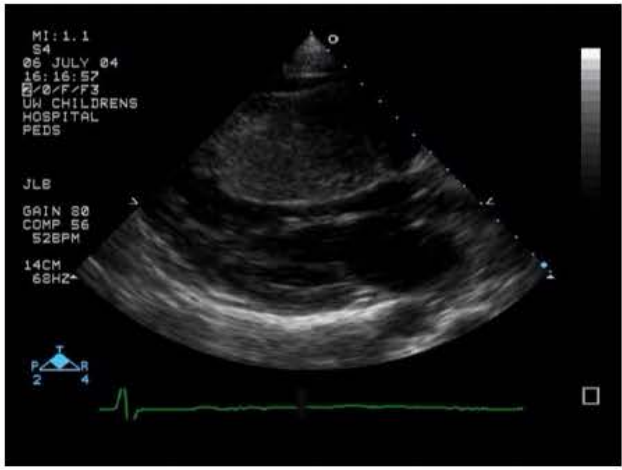
Concentric LVH





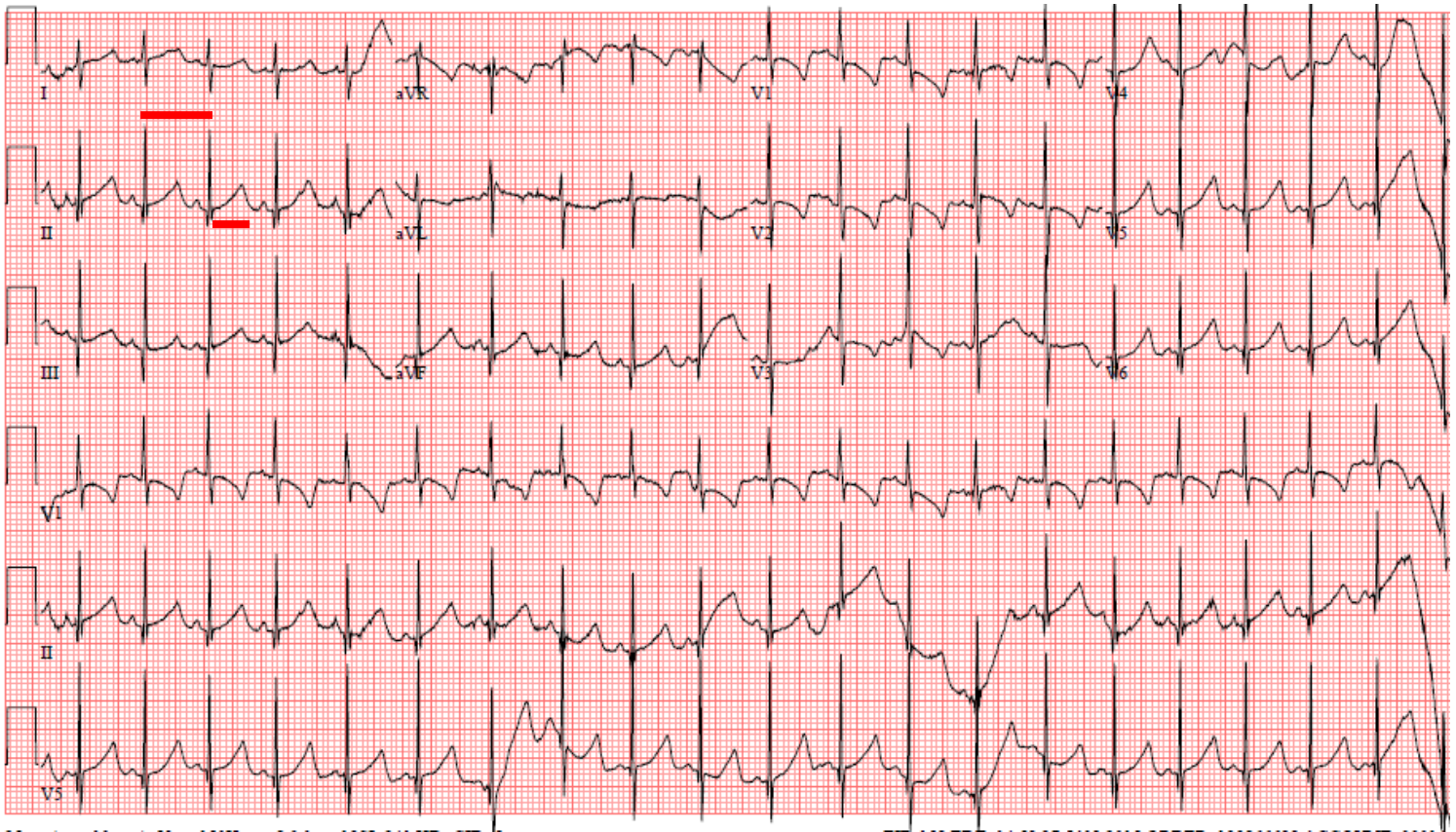


Asymmetric septal hypertrophy



Long QT Syndrome

- Incidence: 1/2,500-1/5,000. Primarily autosomal dominant
- Ion channelopathy: typical Na or K ion channels
- Prolonged repolarization



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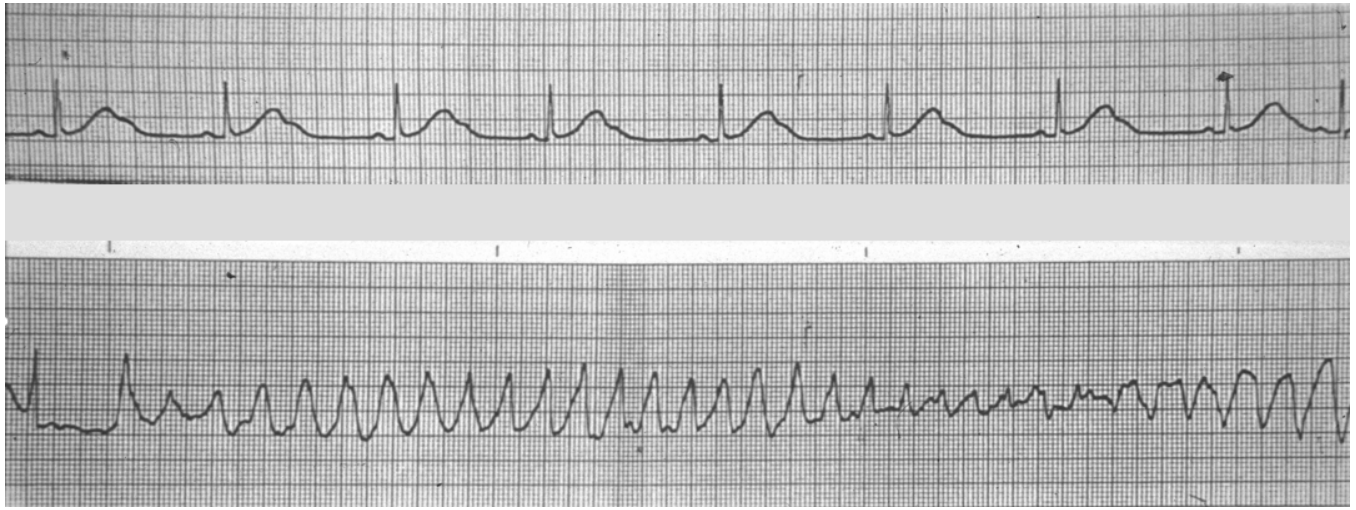
Long QT Syndrome

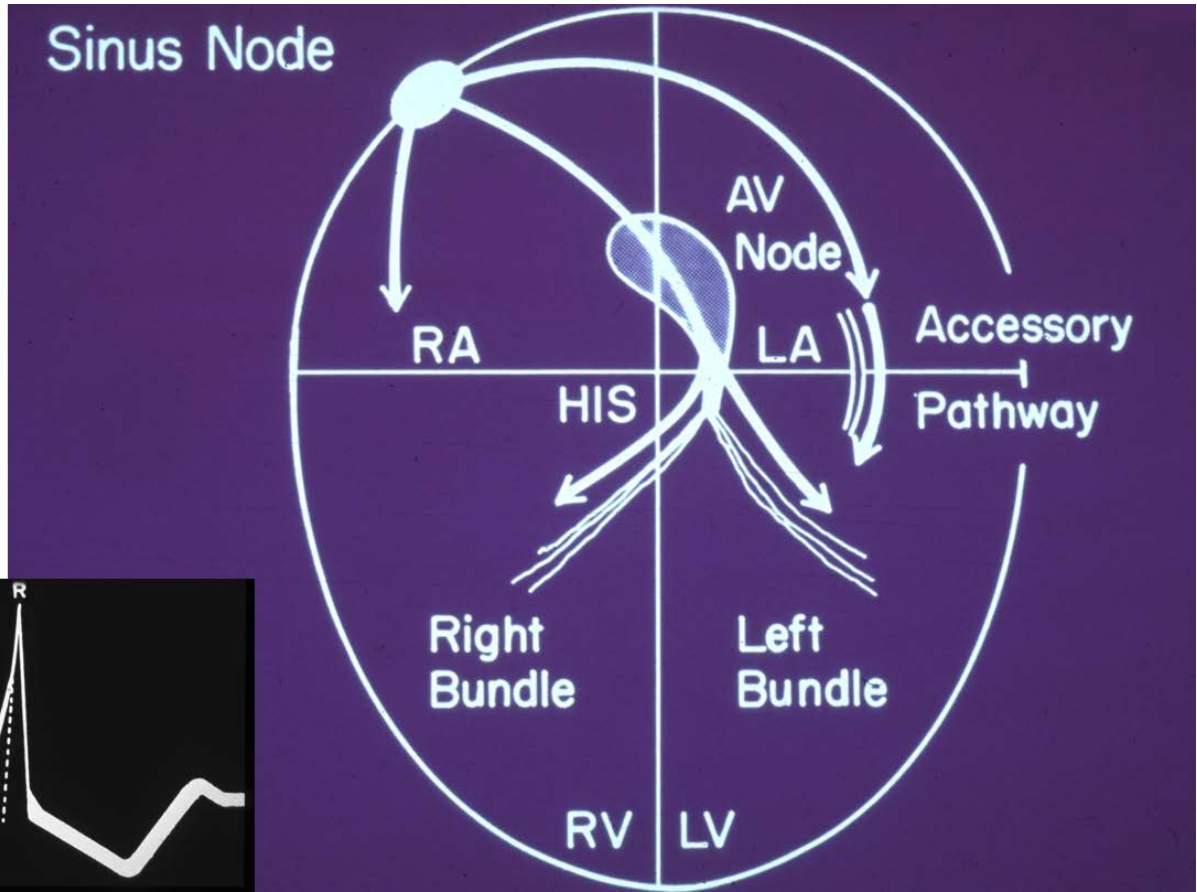
- Can lead to Torsades de Pointes



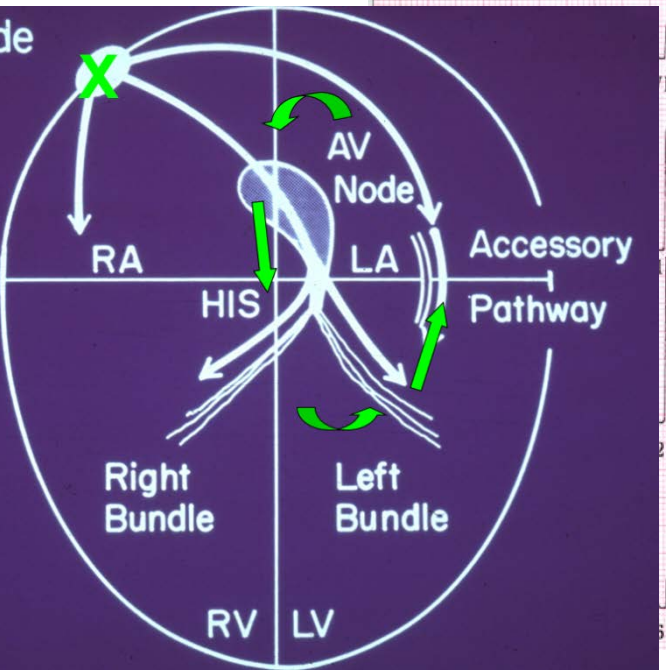
- Syncope with exertion, stress, or startle (LQT1, LQT2) but can occur at rest/sleep (LQT3)
- ACQUIRED LQTS: medications, electrolyte disturbance, CNS tumors or trauma
- Medications to avoid: Crediblemeds.org

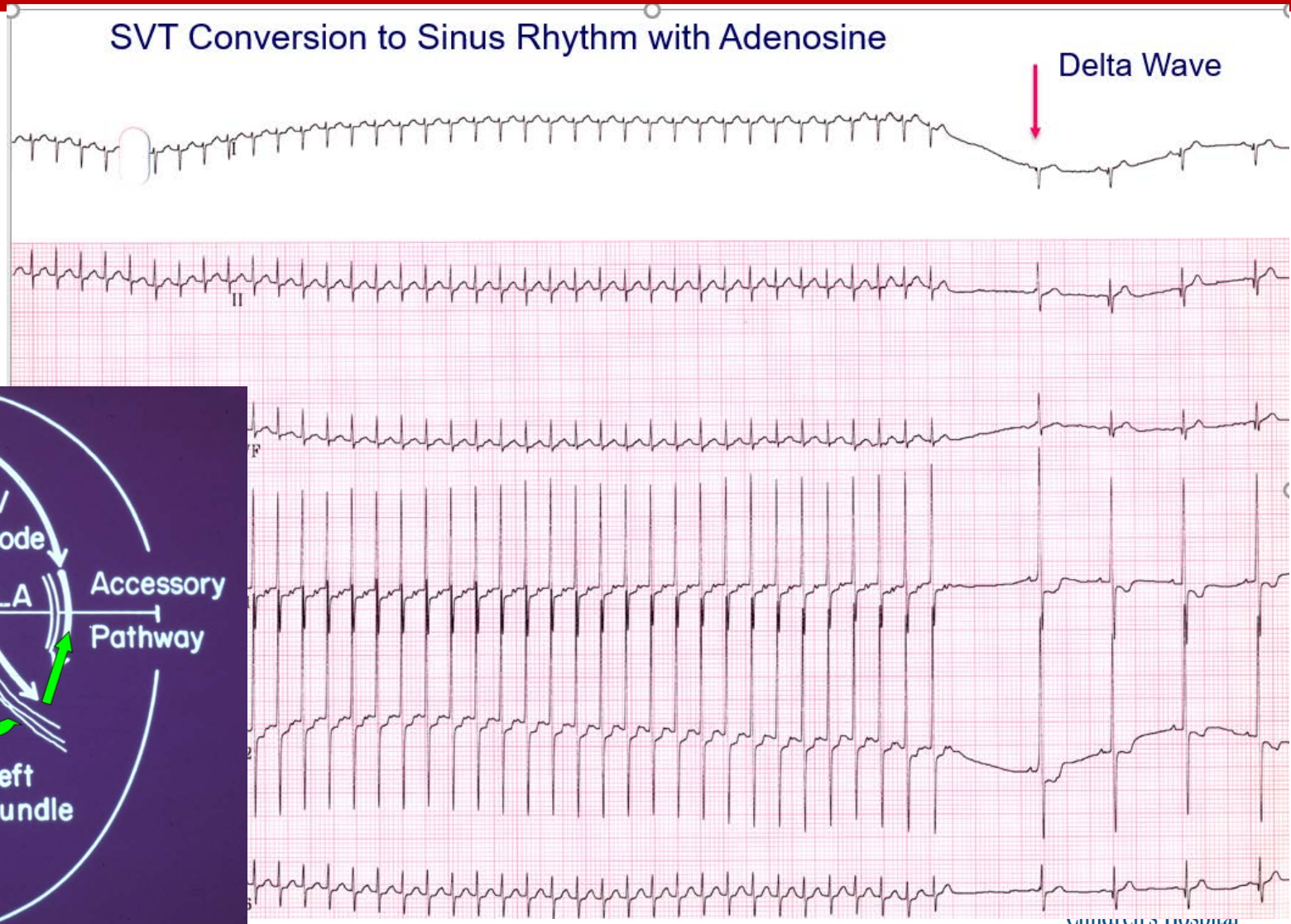
WPW
(Wolff Parkinson White Syndrome)

- 1.5/1,000 ECG: Delta wave
- Atrio-ventricular accessory pathway



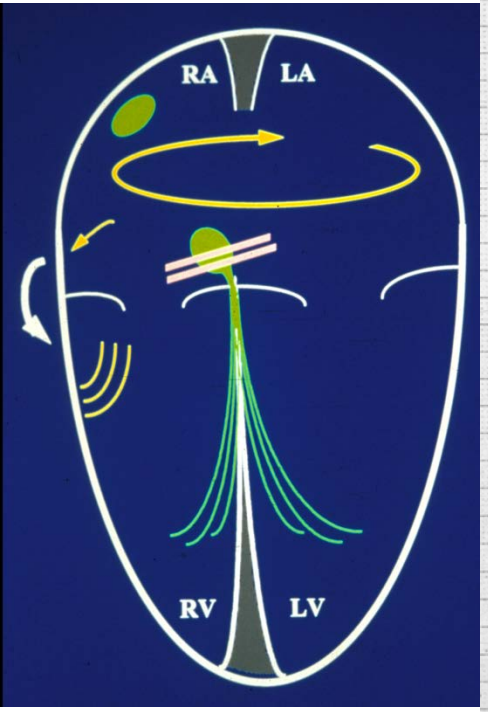
WPW with SVT Conversion

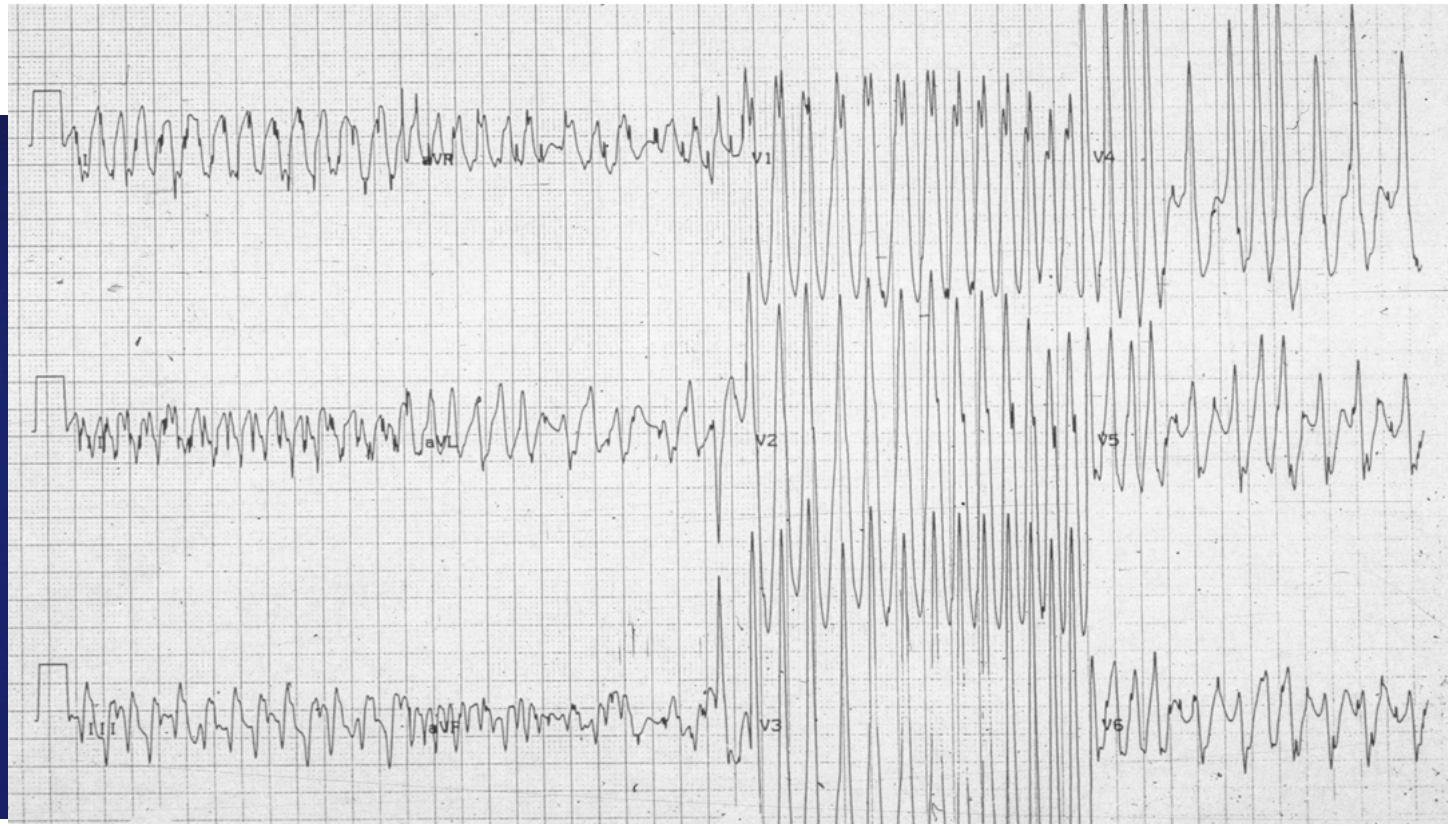




WPW

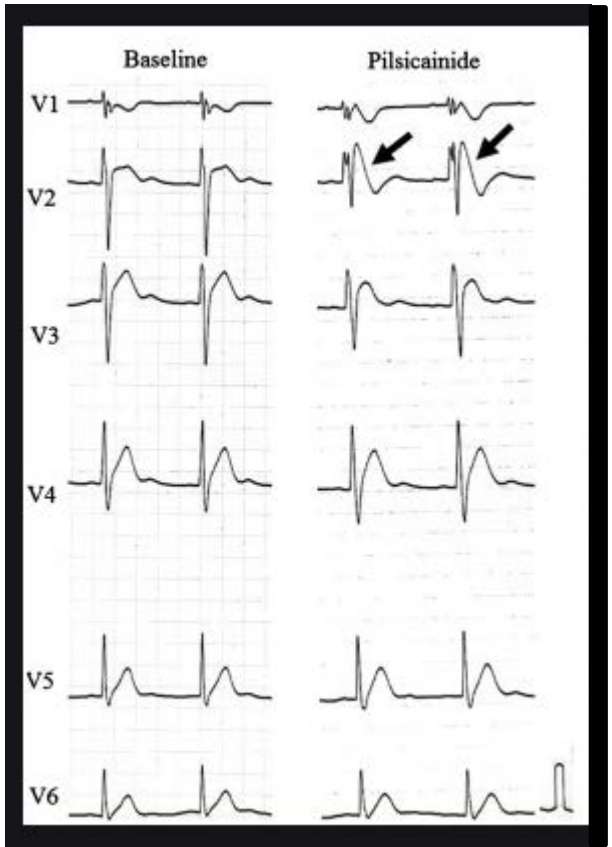
- 1.5/1,000 have delta wave, <1% risk of SCD
- Rapid antegrade conduction down accessory pathway





Brugada Syndrome

- 1.5/1000, primarily autosomal dominant
- Ion channelopathy: Na (SCN5A), Ca, K, channels



- ECG: may be normal
- ST elevation R precordial leads
- BBB in R precordial leads
- Provocation: fever, drugs
- Avoid Brugadadrugs.org

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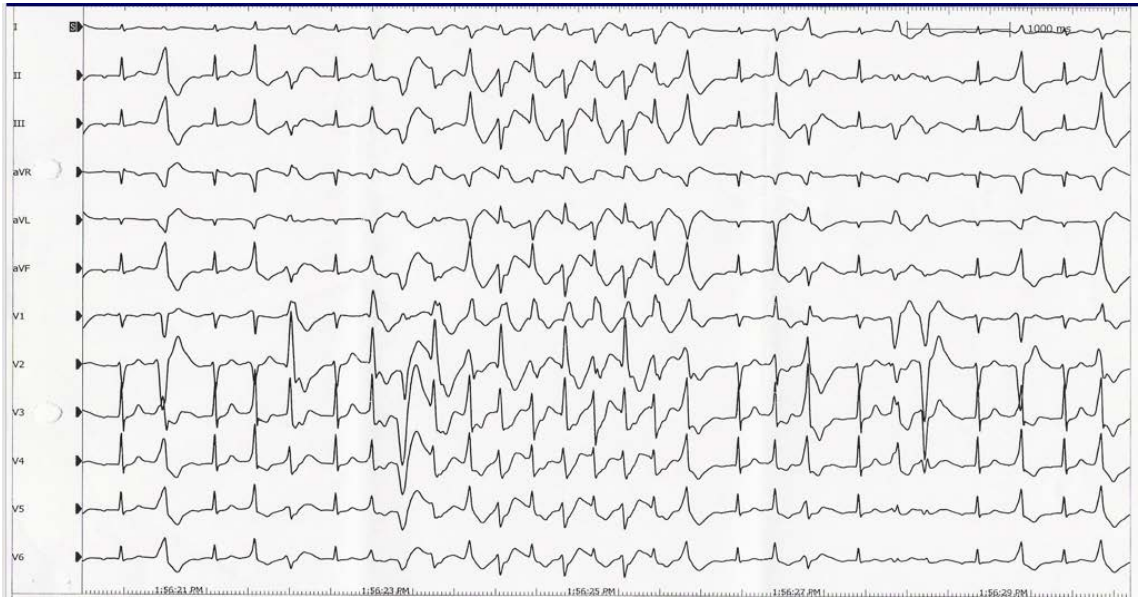
CPVT
(Catecholaminergic Polymorphic Ventricular Tachycardia)

- 1/10,000. Primarily autosomal dominant
- Ion channelopathy: Ca regulation in SR
  - ryanodine receptor, calsequestron
- Normal ECG, Normal Echo
- Exercise-induced ventricular arrhythmias: polymorphic VT



Syncope Pearls

- Most common etiology: vasovagal or postural
- History and FH are important
- Get screening ECG for first time syncope/seizure
- ECG patterns to know: HCM, WPW, LQTS, Brugada
- CPVT pts often have a normal ECG and echo

Mechanism of Common Syncope

- Vasovagal
  - Exaggerated sympathetic response
  - Bezold-Jarisch reflex: vagal-activation-mediated sympathosupression causes cerebral hypoperfusion: hyperactivity of LV wall: activation of cardiac muscle strectch receptors C-fiber activation to NTS (nucleus tracture solitaries) in the medulla: activates vagal nerve to cause bradycardia
- Orthostatic Hypotension
  - Lack of sympathetic nerve activity to orthostatic challenge
  - Hypovolemia, venous pooling, sympathetic activity failure (baroreceptor), poor peripheral vascular resistance