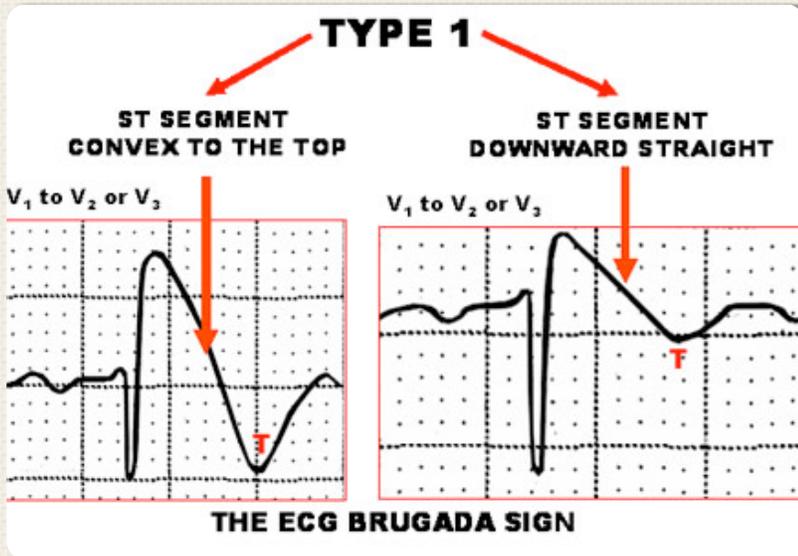


# EMERGENCY MEDICINE CASES



EPISODE 25: SYNCOPE  
WITH DR. ANNA JARVIS AND  
DR. ERIC LETOVSKY

## Key questions:

- **Is it truly syncope?** (or could it be something else, i.e. seizure?)
- **Is the underlying cause serious, or life-threatening?** (i.e. cardiac dysrhythmia, MI, GI bleed, PE, SAH, ectopic pregnancy ...)
- **Is the patient at high risk for a cardiovascular event, or death?**

## Major categories of syncope:

- **Vasovagal:** prodrome of nausea, presyncope & sweating; triggered by pain, anxiety, distress, or by prolonged standing or kneeling in a warm and/or crowded place
- **Situational:** occurs with micturition, cough, defecation; or by carotid sinus pressure (i.e. turning head, shaving), or subclavian steal (i.e. during arm exercises)
- **Orthostatic:** triggered by BP meds, dehydration, alcohol, & autonomic dysfunction
- **CNS:** rarely the cause of syncope as the only symptom
- **Cardiovascular:** dysrhythmia, structural heart disease or ischemia; clues are family history of sudden/unexplained death, exertional syncope and no prodrome

## WHAT ARE THE KEY CLUES FOR SERIOUS CAUSES OF SYNCOPE IN A CHILD?

**Family History** of sudden cardiac or unexplained death is worrisome. Ask about deafness or pacemaker implantation in younger family members, or inherited metabolic disorders which may indicate a familial cardiac cause.

**Triggers:** emotional upset may trigger a benign breath holding spell, while a loud, startling noise may cause syncope in a child with congenital long QT syndrome.

Always assess children for evidence of non-accidental trauma (abuse), and interview the older child about substance use.



## Was it a seizure?

If there are soft tissue injuries at **multiple** sites, or if posturing or a rigid (tonic) phase was observed before rhythmic activity (clonus), it more

likely a seizure. Both syncope and seizure can cause urinary incontinence, but unlike seizure, patients with syncope return quickly to alertness.

# Physical exam pearls and investigations for syncope

## PHYSICAL EXAM

**Look for injuries:** serious head injuries are possible. Also look for evidence of seizure (bitten tongue, cheeks, multiple bruises).

**Measure orthostatic vitals:** they have higher yield for older pts (I) who may have orthostatic syncope, however, abnormal findings do not rule out other causes of syncope.

**Do a careful cardiac exam:** auscultate for valvular murmurs (i.e. mitral or aortic valve disease).  
**\*\*Any outflow murmur that increases with valsalva in syncope is hypertrophic cardiomyopathy (HCM) until proven otherwise!\*\***

**Do a rectal exam for occult blood** if a GI bleed is suspected based on history, Hb or hematocrit.

## Other investigations?

Always do an ECG. Laboratory testing has low yield, so investigate *strategically*, based on the history and physical. Consider BhCG (ectopic), Hb (anemia), lytes (hypoK, hypoCa, hypoMg), Trop (very low yield in pts with syncope as their only symptom).

## Who needs a head CT?

Only in adult patients where history or physical suggest SAH, TIA/stroke, or first onset of seizure disorder.

**ED Ultrasound:** Syncope preceding or accompanying abdominal pain could be due to an ectopic pregnancy, or a leaking AAA.

## ECG PEARLS

**It's all about the intervals!**

**short PR:** WPW

**long PR:** AV conduction block

**narrow, deep QRS:** HCM

**wide QRS + Epsilon waves:** arrhythmogenic RV hypertrophy

**wide QRS:** Vtach, WPW, BBB

**QT interval:** long QT syndrome, (also short QT)

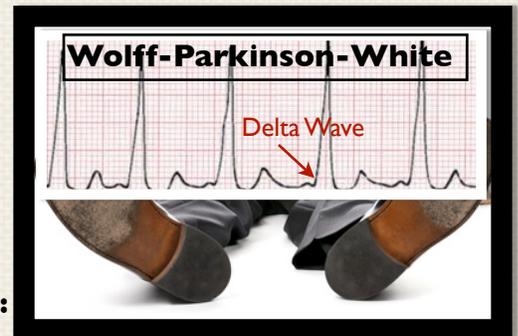
**Also, look for Brugada (see pg. 1 image), ACS, myocarditis, and PE changes on ECG**

**Wolff-Parkinson-White:** ventricular pre-excitation from accessory conduction, with a short PR and delta wave, susceptible to paroxysmal SVT, Afib, Aflutter, and (rarely) Vfib. **Avoid nodal blockers!**

**Hypertrophic Cardiomyopathy:** Genetic disorder of cardiac hypertrophy which can progress to block the LV outflow track. ECG findings include increased QRS complex width and voltage, and ST-segment and T-wave signs of LV hypertrophy.

HCM is the most common cause of sudden death during exercise in young adults and children!

In young patients, ECG may show Q-waves in leads II, III, aVF, V5, V6.



## PROLONGED QT SYNDROME

A QTc interval  $>500$  is worrisome ( $>450$  in kids) for high risk for Torsade de Pointes, and sudden death.

**Congenital Long QT:** inherited, often with deafness; syncope can be triggered by sudden loud noises or startling events, or spontaneously.

**Acquired Causes:** (& examples)

Antiarrhythmics (amiodarone, sotalolol)

Antibiotics (macrolides)

Antidepressants (TCAs, citalopram)

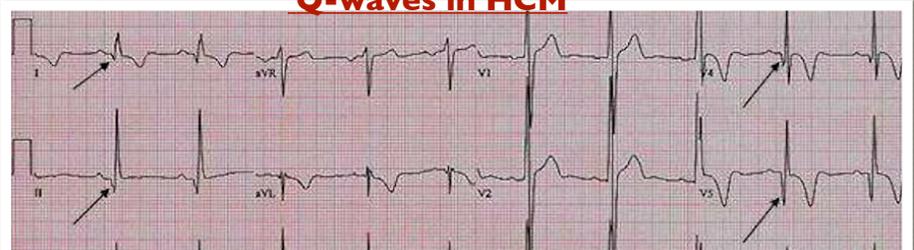
Antipsychotics (haldol, seroquel)

Antihistamines (loratidine, benadryl)

**\*\*Numerous other medications, as well as low K<sup>+</sup>, Ca<sup>+</sup>, and Mg<sup>+</sup> (due to alcohol abuse, diuretics, malnutrition), myocarditis, hypothermia, methadone, and carbon monoxide, can lengthen the QT segment.\*\***

**Short QT Syndrome** (QTc  $<340$ , or  $<360$  in patients with a family history of sudden death) **is also a rare but lethal ECG finding, and must be investigated.**

## Q-waves in HCM



# Risk stratification and disposition for syncope:

## Who are the high risk patients?

While outcomes after discharge from ED for most patients with syncope are generally benign, patients with high risk features (signs of cardiac disease or arrhythmias) need admission for urgent cardiac assessment (2).

## Which patients need an echo?

Any suggestion of structural cardiac disease based on history, exam, ECG, or exercise-induced syncope, or family history of death, requires an *urgent* echocardiogram.

## What about a Holter Monitor?

Holter have very low yield (1–3%), but in an adult patient with frequent episodes, or features suggesting arrhythmogenic syncope, a Holter is indicated (3).

## Who needs stress testing?

Our experts recommend stress testing in patients suspected of cardiac syncope only *after an echocardiogram*, and consultation with a cardiologist.

## Who needs admission?

ACEP guidelines for syncope (4) recommend (B level) that these clinical features warrant admission:

- 1) history of CHF,
- 2) history of ventricular arrhythmias,
- 3) associated symptoms of ACS,
- 4) exam evidence of significant CHF,
- 5) exam evidence of significant valvular disease,
- 6) abnormal ECG (ischemia, arrhythmia, BBB, prolonged QTc)

## San Francisco Syncope Rule?

Validation studies show poor sensitivities so our experts do not recommend its use as a sole tool for risk stratification.

## Risk Stratification Of Syncope in the ED (ROSE)

The ROSE rule (5) advises admission of a patient with any one of the following:

**BNP** >300, **Bradycardia** <50, **Rectal** exam showing blood or suspicion of GI bleed, **Anemia** (Hb<90), **Chest** pain with syncope, **ECG** showing Q waves (except in lead III), or **Saturation** <94% on room air. (Mnemonic: **BBRACES**)

## Medical Short Stay Units?

Our experts have found in their practice that prolonged ED observation alone does not have a role, unless a further test (i.e. a cardiac echo) is planned.

## Syncope Discharge Instructions:

**For vasovagal:** avoid known triggers, such as alcohol and warm environments, and maintain adequate hydration, food and sleep.

**To reduce injury:** once syncope prodrome starts, lie down, and avoid driving or high risk activities.

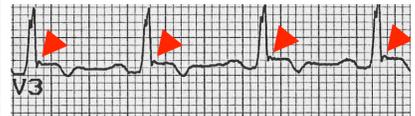
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- 1) Mendu, M et al. Arch Int Med. 2009;169:1299.
- 2) Sheldon, R et al. Can J Cardiol. 2011;27:246.
- 3) Moya, A et al. Euro Heart J. 2009;30:2631.
- 4) ACEP Clinical Guidelines. Ann Emerg Med. 2001;37:771.
- 5) Matthew, J et al. JACC. 2010;55:713.
- 6) Hulot, JS et al. Circulation. 2004;110:1879.
- 7) Haissaguerre, M et al. NEJM. 2008; 358:2016.

## MORE ECG PEARLS

### Arrhythmogenic right ventricular cardiomyopathy:

Genetic disorder leading to fibro-fatty changes, which may result in sudden cardiac death in young people (6).

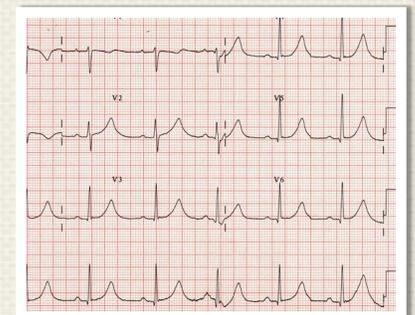


Classic ECG findings:

- 1) Inverted T waves in right precordial leads (V1, V2, V3)
- 2) QRS in Lead I > 110 msec
- 3) **Epsilon waves** (low amplitude notches after QRS and before T wave) in right precordial leads (V1-V3)

### Benign Early Repolarization:

Common in young, healthy patients, BER shows a j-point elevation with notching in the anterior leads. However, BER pattern in inferolateral leads has been associated with risk for Vfib (7). Consider referring these patients to cardiology if they present with syncope.



ECG showing features of benign early repolarization.



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