



Foundations EKG I - Unit 3 Summary

Approach to Syncope

Syncope has a wide and varied differential for causes. Syncope due to cardiovascular disease has the highest associated mortality of all causes. It is imperative for an Emergency Physician to evaluate patients who have synopsized for a possible cardiac cause.

A careful history including preceding symptoms (or lack thereof), activity prior to syncopal episodes, exacerbating or relieving factors, medications the patient is currently taking and a detailed family medical history can help provide clues as to the cause of syncopal episodes.

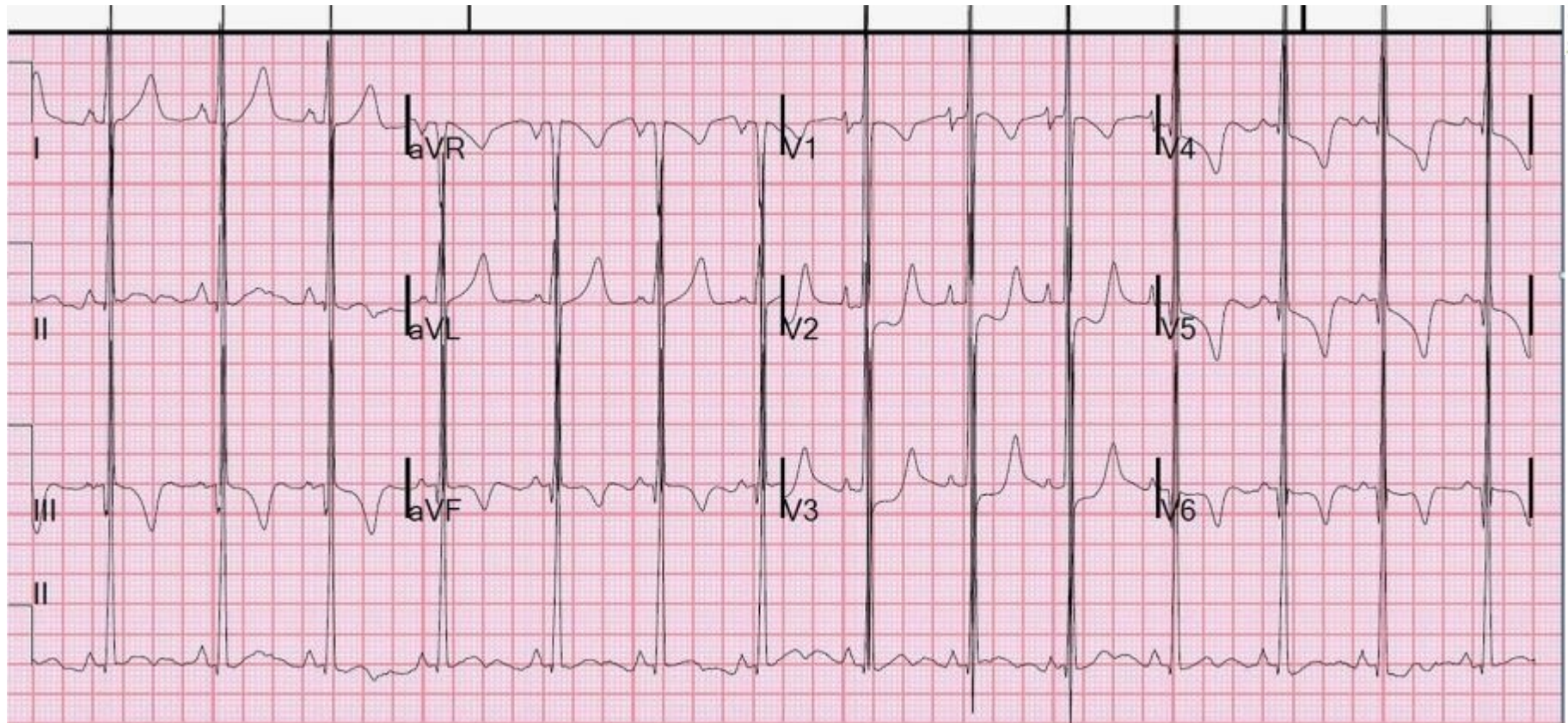
It is important to remember that EKG abnormalities may not be present on a single EKG following a syncopal episode. For example, a patient with intermittent complete (3rd degree heart block) or sick sinus syndrome may have a normal EKG at the time you obtain in. Cardiac monitoring during the ED visit and repeated EKGs increase the likelihood of capturing an event.

Family history of sudden cardiac death or an unexplained death at a young age can clue the Emergency Physician into possible inherited causes of dysrhythmia.

Brugada Syndrome is a cardiac sodium channel mutation (inherited or spontaneous) that predisposes the patient to ventricular tachyarrhythmias and sudden death. There are two typical EKG morphologies seen on EKG: Type I has a coved ST-elevation in C-C2 that slopes into an inverted t-wave (as is seen above left) whereas Type 2 has a “saddle-back” shape in V1, V2 with over 2mm STE (as is seen above right). Type 3 is either of the morphologies with less than 2mm STE. Identification of Brugada Syndrome should prompt immediate cardiology consultation and possible ICD placement



Courtesy of Dr. Susan Torrey of TorreyEKG.com



Hypertrophic cardiomyopathy causes LVH with “needle-like” Q waves in the lateral and inferior leads and deep t wave inversions. It is a commonly inherited disorder that most classically causes sudden cardiac death in young athletes. The severely thickened interventricular septum can block outflow and cause ventricular arrhythmia due to abnormal structure of myocytes. Patients who are newly diagnosed with hypertrophic cardiomyopathy should be admitted for echo and cardiology consultation. Initial treatment with beta-blockers is appropriate.

Courtesy of Steve Smith of [Dr. Smith's ECG Blog](#)

Wolff-Parkinson-White syndrome (WPW) is the presence of an accessory pathway that can cause symptomatic tachyarrhythmias and occasionally sudden cardiac death. Identified by a narrow PR interval and upstroke to the QRS complex (delta wave) suggest the presence of this accessory pathway which can cause preexcitation. Patients with WPW should undergo ablation therapy if feasible. The history of syncope in a patient with WPW should make the clinician suspicious for intermittent tachyarrhythmia due to the accessory pathway.



Unstable tachyarrhythmia with WPW should be treated with synchronized cardioversion. Stable tachyarrhythmia with WPW should be treated with anti-arrhythmics aimed at prolonging the accessory pathway, mainly procainamide.

Deep Dive: [ECG Medical Training WPW Part 1](#)

[ECG Medical Training WPW Part 2](#)

Common **medications** such as antipsychotics (haloperidol, quetiapine, olanzapine to name a few), antiarrhythmics (flecainide, amiodarone, sotalol), tricyclic antidepressants (for example, amitriptyline), antihistamines, and macrolides can cause a prolonged QT interval.

Careful evaluation of EKGs for abnormal intervals can lead to identification of a **prolonged QT interval**. A long QT interval may lead to ventricular arrhythmia when an ectopic beat occurs during repolarization from the previous impulse (R on T phenomenon). Torsades des Pointes is the classic arrhythmia caused by long QT.



Torsades des Pointes

The QT interval is measured from the start of the Q wave to the end of the T wave. It is a measure of ventricular depolarization and repolarization. It is best measured in either lead II or V5-V6. As the QT interval varies with heart rate, many formulas exist to calculate the QTc (corrected for heart rate). A normal QTc is less than 440 ms in men or 460 ms in women. Over 500 ms is associated with an increased risk of Torsades des Points.

In general, a normal QT is less than 1/2 the previous R to R interval.