Guideline

Syncope - Emergency management in children

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Purpose

This document provides clinical guidance for all staff involved in the care and management of a child presenting to an Emergency Department (ED) with symptoms suggestive of syncope in Queensland.

This guideline has been developed by senior ED clinicians, with input from cardiology and neurology, Queensland Children's Hospital, Brisbane.

Scope

This guideline applies to emergency staff who are caring for children who have a presumptive diagnosis of syncope.

Guideline

Syncope is a common presentation to the paediatric emergency department that can be due to a variety of causes, often categorised as either due to cardiac or non-cardiac aetiologies. The majority of these presentations occur in the teenage cohort, and on the whole most of these presentations are due to benign aetiology. Rarely, syncope may be the sentinel event heralding a potentially catastrophic underlying diagnosis. This guideline has been created to provide a uniformity of care and rationalisation of investigations for these patients.

ALERT

By definition, patient who present with syncope should have recovered to baseline after a brief period of altered level of consciousness

Initial evaluation

Evaluation of patients who present with syncope is largely based on a comprehensive history and examination. A 12 lead ECG is often the only investigation required. Radiological and biochemical testing are only required in specific circumstances based largely on history and examination.

History

Obtaining a detailed history of the event, both from the patient as well as any witnesses of the event is the corner stone to diagnosing the cause of the syncopal event. The following is an example of questions that may be useful during history taking:

- Details of what happened:
  - What were they doing leading up the event? - i.e., hot day, physical activity, history of volume loss, long periods of standing.
  - What symptoms (if any) did they experienced? - i.e., light-headedness, chest pain, palpitations, altered level of consciousness, change in vision, shortness of breath.
  - Witness accounts and video recordings?
  - Are there persisting symptoms? - i.e., weakness, headaches, palpitations.
- Past medical history - particularly known structural heart disease, dysrhythmia, previous syncopes, Kawasaki disease, sensorineural hearing loss, history of eating disorders, weight loss (particularly rapid weight loss).
- Family history of conditions listed above, sudden or unexplained deaths in < 50 year old (i.e., drowning, single vehicle accidents).

Medications/non-prescribed substances - particularly QT prolonging, sodium channel blocking medications (i.e., ondansetron, tricyclic antidepressants), digoxin/digitalis containing substances, solvents.

Red Flags

- Exertional Syncope - Collapse or chest pain at Maximal Exertion
- Previous Cardiac Arrest
- Congenital/Acquired Heart Disease/Surgery
- Palpitations
- First degree relative with Sudden Unexplained Cardiac Death/Cardiomyopathy/Arrhythmia
- Implantable cardioverter defibrillator Insitu
- Connective Tissue Disorder
- Systemic Inflammatory Condition (ie Kawasaki)
- Hypercoagulable State
- Recent or history of cocaine/amphetaime abuse

Types of Syncope	
Orthostatic hypotension	Systolic BP drop of 20 mmHg or diastolic BP drop of 10mmHg when going from supine to standing
Neurogenic	Independent of environmental triggers
Cardiac	Due to dysrhythmia, may be exertional
Vasovagal	Triggered by stimuli (eg pain)
Situational	Triggered by various actions (eg micturition)
Breath holding spells	6 months to 6 years, often preceeded by crying, associated with iron deficiency anaemia
Reflex Anoxic Syncope	From infancy, preceded by noxious stimulus, brief cry/grunt then pale and loss of consciousness. Decerebrate posturing and extensor stiffening can mimic a tonic seizure lasting for seconds. Recover rapidly but may sleep after.

All patients should have a full set of vital signs, including postural heart rate and blood pressure.

All patients should be placed on continuous cardiac monitoring during their stay in ED, until it is clear that the cause of the syncopal event was non cardiac in origin.

A full physical examination is important – both to elucidate a cause of the syncopal episode and to exclude any potential injuries secondary to the collapse. Emphasis should be placed on the cardiac and neurological examination.

Special Populations

Athletes are a specific population who present with syncope that require specific attention as although the majority of syncope in this population is due to a vasovagal cause, an underlying cardiac cause can be catastrophic. Exertional syncope increases the risk of an underlying cardiac disorder. Certain medications (i.e. macrolides, antihistamines) as well as illicit substances (i.e. stimulants, somatotrophic compounds, diuretics) can precipitate syncope.

Patients with exertional syncope and a normal assessment in ED, should have a formal assessment by either a cardiologist or a qualified sports physician before being allowed back to active sports. There is currently insufficient evidence for baseline ECGs and/or echocardiogram for all athletes.

- Consider seeking senior emergency/paediatric advice as per local protocols for child with history and examination suggestive of a benign cause of syncope (i.e. no previous known underlying cardiac condition, orthostatic syncope, triggered by noxious stimuli)
- Seek senior emergency/paediatric advice as per local protocols for a child with history and/or examination finding suggestive of a cardiogenic cause of syncope (i.e. exertional, unheralded, syncope in a seated/supine position, abnormal cardiac findings, family history of arrhythmias)
- Contact paediatric critical care specialist/paediatric cardiologist (onsite or via RSQ) for a child with life-threatening dysrrhymias

Investigations

Blanket routine investigations in all patients are of low yield, thus investigations should be targeted based on history and examination.

A 12 lead ECG should be performed for all patients. A 12 lead ECG performed by the ambulance, if available, should be reviewed as some arrhythmias can be transient.

Assessing for Short QT syndrome, Long QT syndrome LQTS, Wolff Parkinson White (WPW) syndrome, Brugada syndrome and other sodium channelopathies, catecholaminergic polymorphic ventricular tachycardia CPVT hypertrophic cardiomyopathy HCM, arrhythmogenic right ventricular cardiomyopathy ARVC, pericarditis. See Appendix 2 for ECG patterns that are concerning for an arrhythmogenic cause of syncope.

The following investigations should be considered from a case-by-case basis as the yield is generally low in a patient presenting with syncope:

Investigations for the management of (insert condition) in children	
Investigation type	Utility
Blood sugar	Hypoglycemic patients are often still symptomatic, however low blood sugar with postural hypotension/borderline hypotension should raise suspicion of an eating disorder or hypocortisolemia
bHCG	A bedside βHCG test is sufficient as a screen in sexually active post menarchal patients
Hb	In patients with a history of bleeding or at risk for an occult bleed
Troponin	In patients with symptoms or ECG changes suggestive of myo/pericarditis
Echocardiogram	In patients with history or examination findings concerning for an undiagnosed structural heart disease, or at risk of a pericardial effusion/tamponade
Chest XR	To assess for cardiomegaly, pulmonary oedema secondary to congestive cardiac failure

Investigations for the management of (insert condition) in children	
Stress testing	May be appropriate for adrenegically induced arrhythmias CPVT, LQTS. This test is only organised in discussion with cardiology
Extended telemetry Event Monitor	May be appropriate if dysrhythmia as a diagnosis is suspected. This may provide correlation between syncopal symptoms and an underlying dysrhythmia. The yield is higher if there was a history of exertional syncope and/or previous cardiac disease. This can only be organised in discussion with the cardiology team.

Management

Management of syncope is dependent on the underlying cause of the event. The majority of paediatric patients, reassurance and ensuring adequate oral intake is sufficient. In patients with postural hypotension, oral or intravenous fluids at 10-20 ml/kg over an hour may be required. If no concerning features are elicited, follow up with the GP is advised.

When to escalate care

Follow your local facility escalation protocols for children of concern. Transfer is recommended if the child requires care beyond the level of comfort of the treating hospital. Clinicians can contact the services outlined below to escalate the care of a paediatric patient.

Service	Reason for contact by clinician	Contact
Local Paediatric service	For specialist paediatric advice and assistance with local transfers as per local arrangements.	As per local arrangements
Children's Advice and Transport Coordination Hub (CATCH)	For access to specialist paediatric advice and assistance with inter-hospital transfer of non-critical patients into and out of Lady Cilento Children's Hospital. For assistance with decision making regarding safe and appropriate inter-hospital transfer of children in Queensland. For QH staff, click here for the QH Inter-hospital transfer request form (access via intranet).	(07) 3068 4510 24 hours CATCH website
Telehealth Emergency Management Support Unit (TEMSU)	For access to generalist and specialist acute support and advice via videoconferencing, as per locally agreed pathways, in regional, rural and remote areas in Queensland.	TEMSU QHEPS website 24 hours
Retrieval Services Queensland (RSQ)	For access to telehealth support for, and to notify of, critically unwell patients requiring retrieval in Queensland. For any patients potentially requiring aeromedical retrieval or transfer in Queensland.	RSQ QHEPS website 24 hours

When to consider discharge

Patients with normal vital signs, physical examination, ECG and a history suggestive of a non-cardiogenic cause of syncope can be discharged. Patients who there is a concern for a cardiogenic cause of syncope (either due to suggestive history, physical examination findings or abnormalities on ECG) should be discussed with a paediatric cardiologist for consideration of admission or follow up.

When to consider admission

Admission should be considered in patients with persistent symptoms requiring further medical management (i.e. eating disorder, dehydration). Admission for prolonged cardiac monitoring can be considered in patients with a history suggestive of recurrent cardiac syncope after discussion with a paediatic cardiologist.

Supporting documents

Procedures, Guidelines, Protocols

- CHQ-GDL-00740 Chest Pain
- PREDICT assessment of possible vaccine induced pericarditis/myocarditis in children

Consultation

Key stakeholders who reviewed this version:

- Senior Medical Officer, Emergency Department
- Cardiology Fellow
- Neurology Fellow
- Pharmacist

Definition of terms

Term	Definition
Syncope	A abrupt, transient, complete loss of consciousness due to presumed cerebral hypoperfusion followed by a rapid spontaneous recovery. This may be heralded by light-headedness, visual sensations, varying degrees of altered level of consciousness.
Pre-syncope or near-syncope	Symptoms of syncope without the complete loss of consciousness. Syncope and near-syncope exist on same spectrum of disease state and are triggered by the same underlying causes. Thus, near syncope should not be treated with as a "lesser" form or "less" significant form of syncope, but more as a potential sentinel event.

Orthostatic hypotension	Drop in systolic BP 20mmHg or diastolic BP 10mmHg when going from a supine to an upright posture • Immediate - drop in BP within 10s • Classic - sustained drop in BP within 3 minutes • Delayed - sustained drop in BP taking long than 3 minutes to develop. The fall in BP is gradual until reaching this threshold
Neurogenic	Due to dysfunction in the autonomic nervous system independent of environmental triggers
Orthostatic Tachycardia	Increase in heart rate of 30bpm (adult) 40bpm (<18 years) or within 10 minutes
Orthostatic Intolerance	Symptoms of light-headedness, palpitations, visual changes, generalised weakness, fatigue, exercise intolerance with or without orthostatic tachycardia, hypotension or syncope.
Reflex/neurally mediated syncope	Syncope due to vasodilation (resulting in hypotension), bradycardia or both. Listed are some of the subclasses of reflex syncope
Vasovagal syncope	Characterised by diaphoresis, warmth, nausea and pallor, which can be triggered by a variety of stimuli (i.e. going to an upright posture, pain, heightened emotional state).
Situational Syncope	Reflex syncope triggered by specific actions (i.e. micturition, coughing, laughing)
Cardiac syncope	Syncope due to dysrhythmias, bradycardia, tachycardia resulting in impaired cardiac output and subsequent impairment in cerebral perfusion.
Breath holding spells	Uniquely paediatric cause of syncope which occurs between the age of 6 months to 6 years. Usually characterised by an episode of crying with a subsequent breath hold resulting in either apnoea with apparent cyanosis, pallor or loss of tone. Episodes are typically brief and are largely benign. There is a correlation between iron deficiency anaemia and the occurrences of breath holding spells - the exact association is unknown

References and suggested reading

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8. An approach to the evaluation and management of syncope in adults. **Parry, Steve W. and Tan, Maw Pin.** 7744, 2010, BMJ, Vol. 340, pp. 468-473.
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11. 2018 ESC Guidelines for the diagnosis and Management of Syncope. **Michele Brignole, Angel Moya, Frederik Lange, et al.** s.l. : European Heart Journal, 2018, Vol. 39. 1883-1948.

Guideline revision and approval history

Version No.	Modified by	Amendments authorised by	Approved by
1.0 21/09/2022	Senior Medical Officer, Emergency Department	Director Emergency	A/Divisional Director Critical Care

Keywords	Paediatric, emergency, guideline, syncope, vasovagal, Brugada, arrhythmia, 00722
Accreditation references	NSQHS Standards (1-8): 1 Clinical Governance, 4 Medication Safety, 8 Recognising and Responding to Acute deterioration ISO 9001:2015 Quality Management Systems: (4-10)

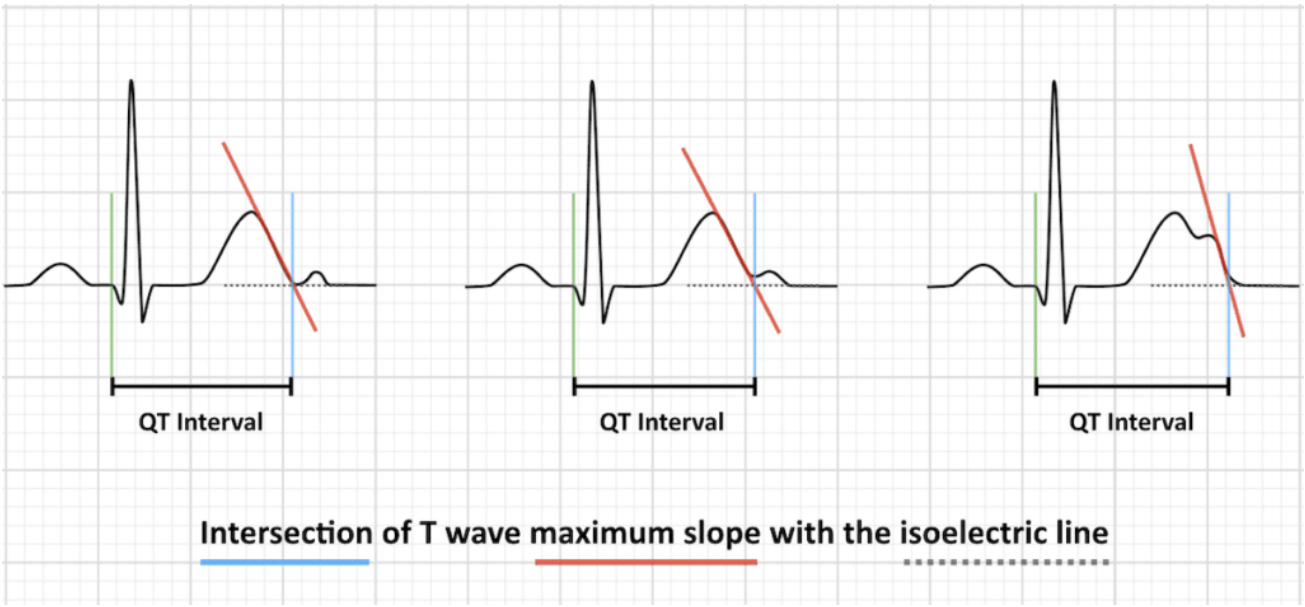
Appendix 1: QTc Interval measurement

Measuring QTc Interval:

The QT interval is affected by the rate of the ECG. There are a number of methods used to calculate the corrected QT interval (QTc), and the one generally used in most literature is the Bazett formula (1) QT interval can vary significantly across the leads. Reference ranges are based on the QTc from lead II. If it is unclear in II then the next best lead is V5. V2 and V3 are typically the longest and while reassuring if normal, can be contaminated in calculation by a U wave which is a normal paediatric finding.

Bazett formula $QT_C = QT / \sqrt{RR}$

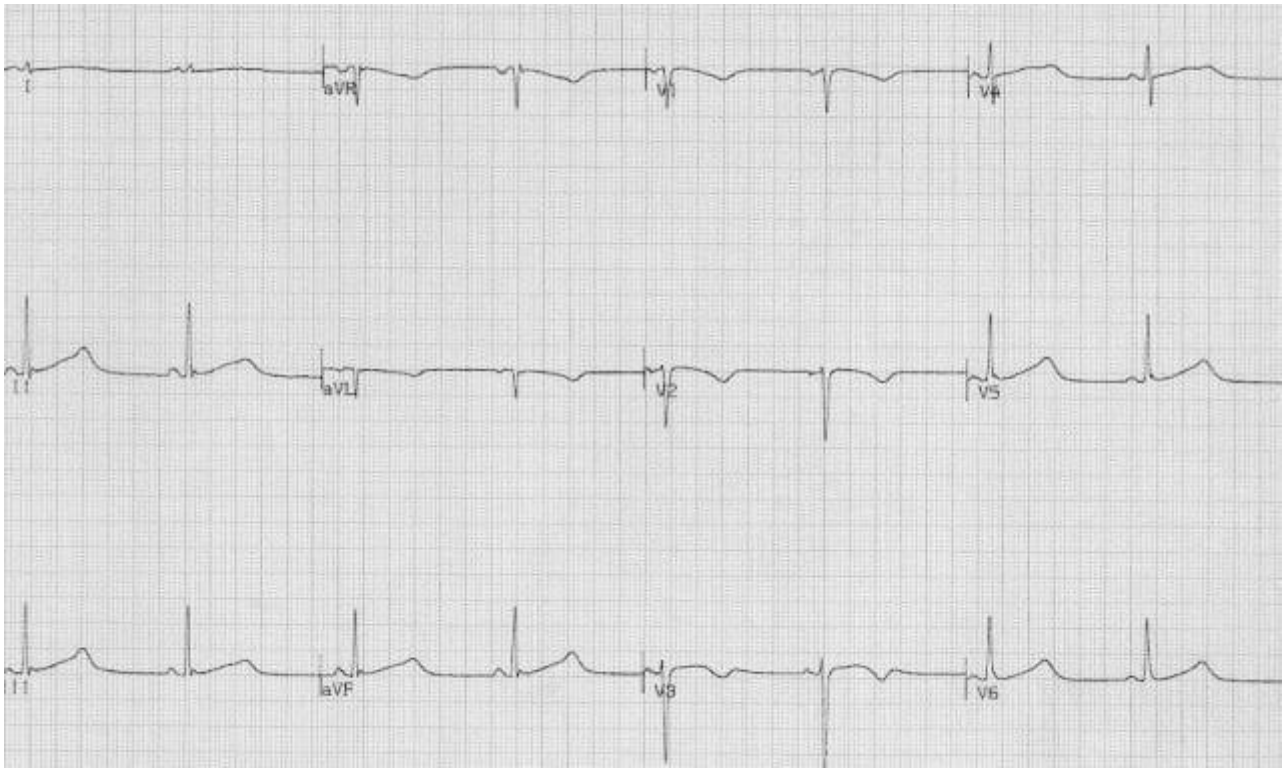
MDCalc QTc calculation



Source: QT Interval • LITFL • ECG Library Basics

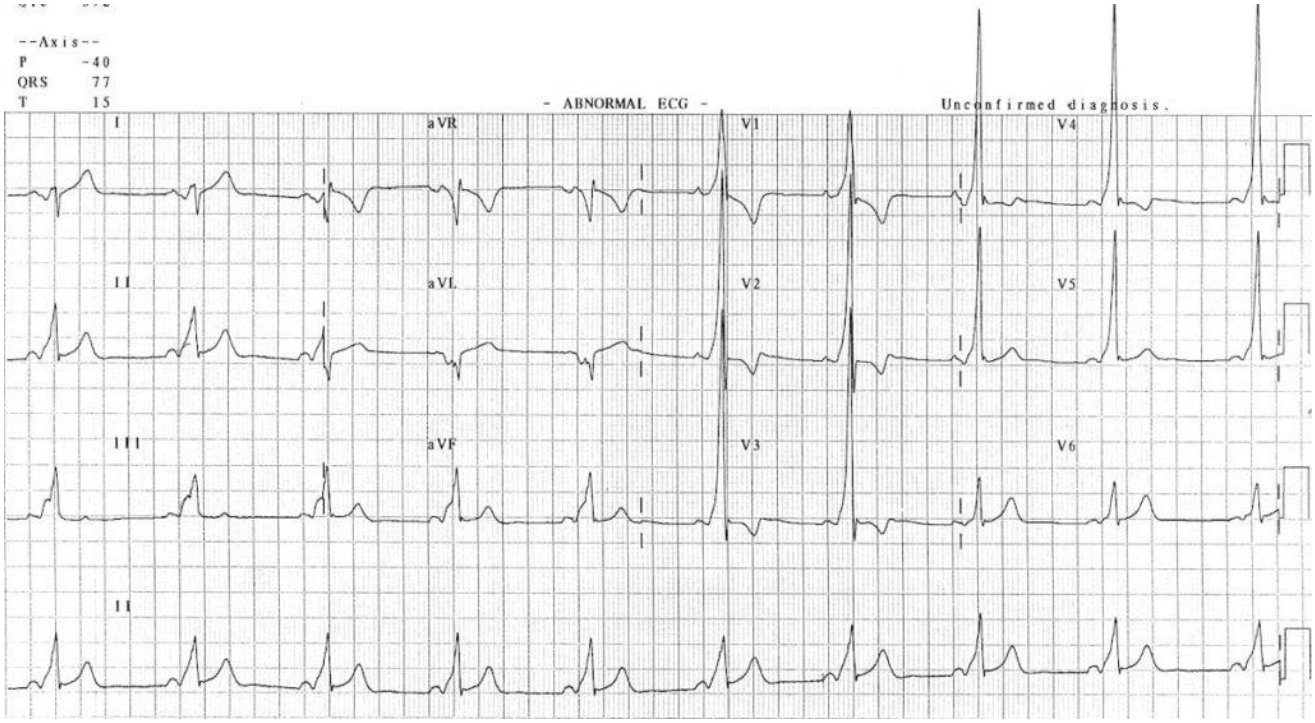
Appendix 2: ECG Patterns

Long QT syndrome



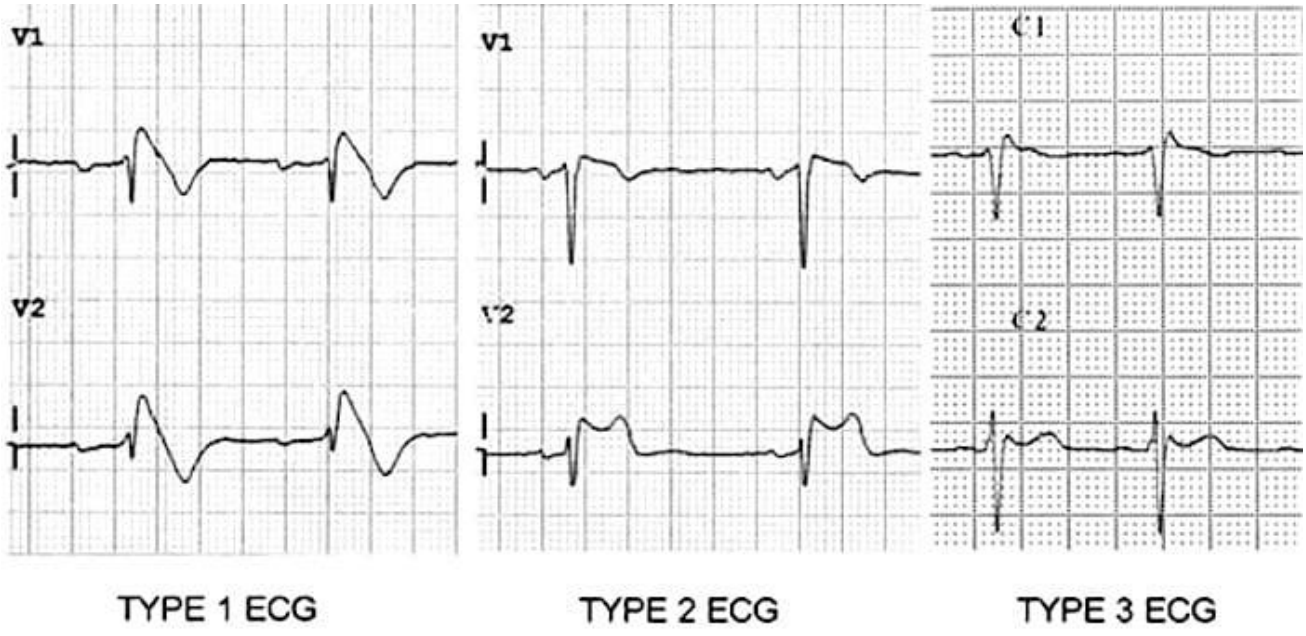
Source: QT Interval • LITFL • ECG Library Basics

Wolff Parkinson White (WPW) syndrome



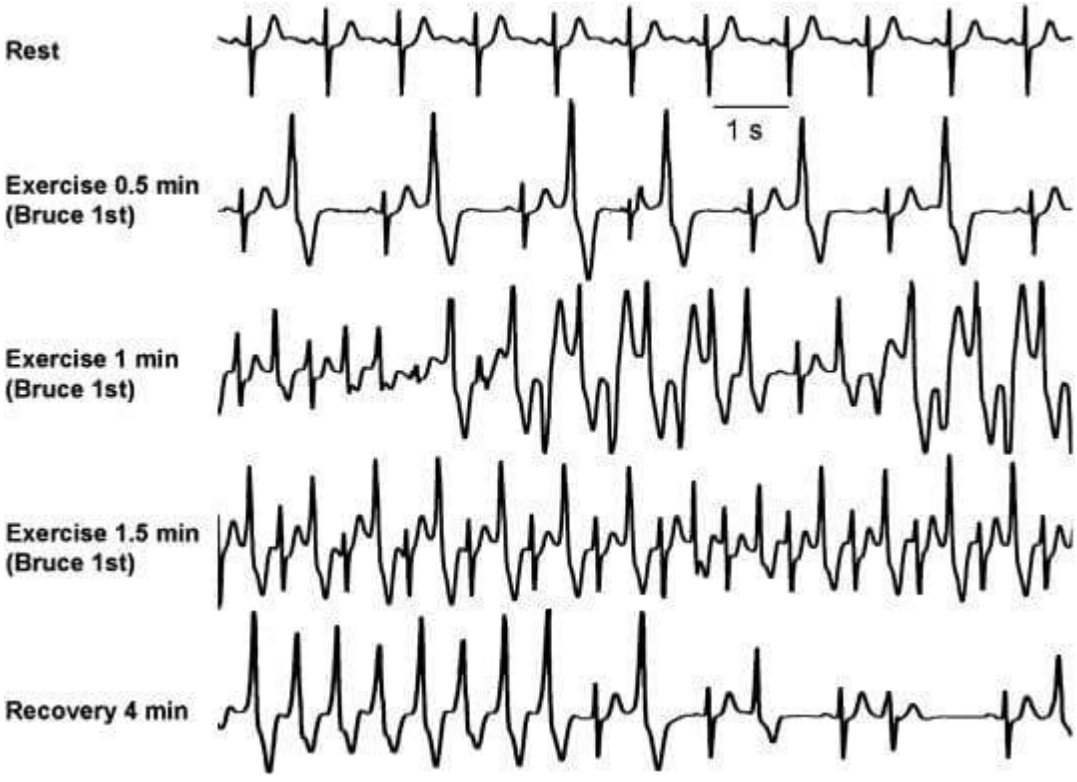
Source: Pre-excitation syndromes • LITFL • ECG Library Diagnosis

Brugada syndrome



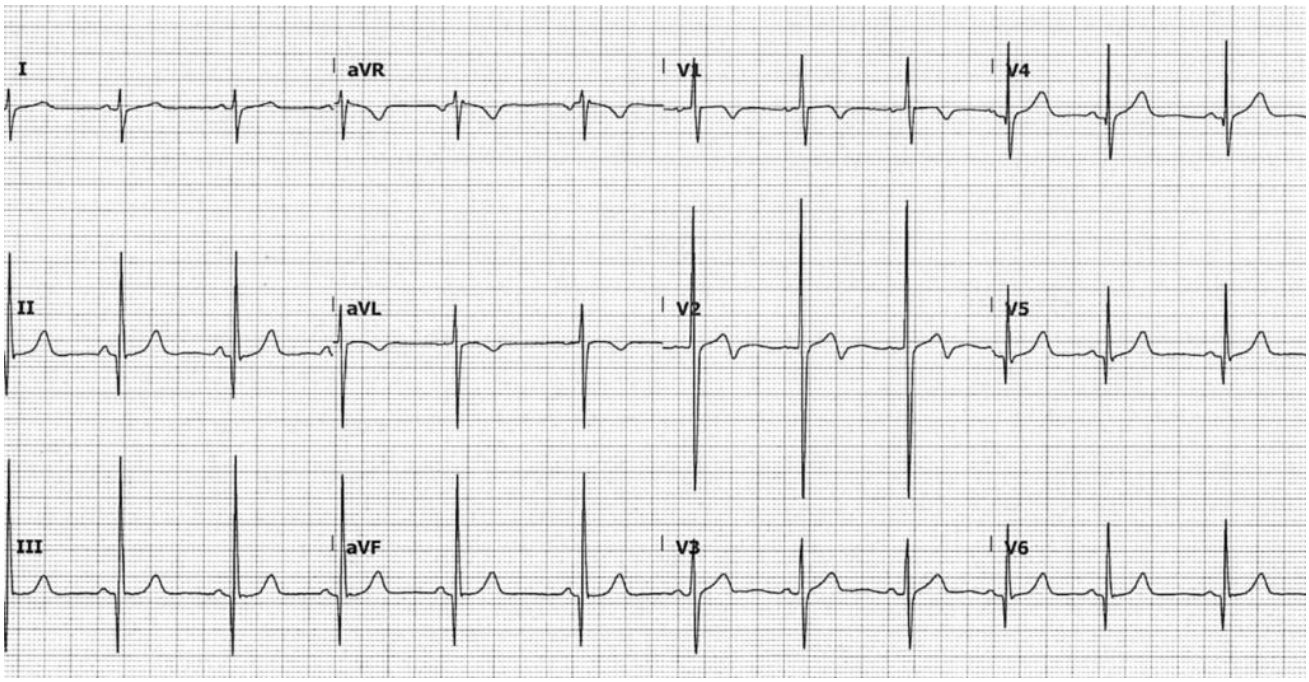
Source: Brugada Syndrome • LITFL • ECG Library Diagnosis

Catecholaminergic polymorphic ventricular tachycardia



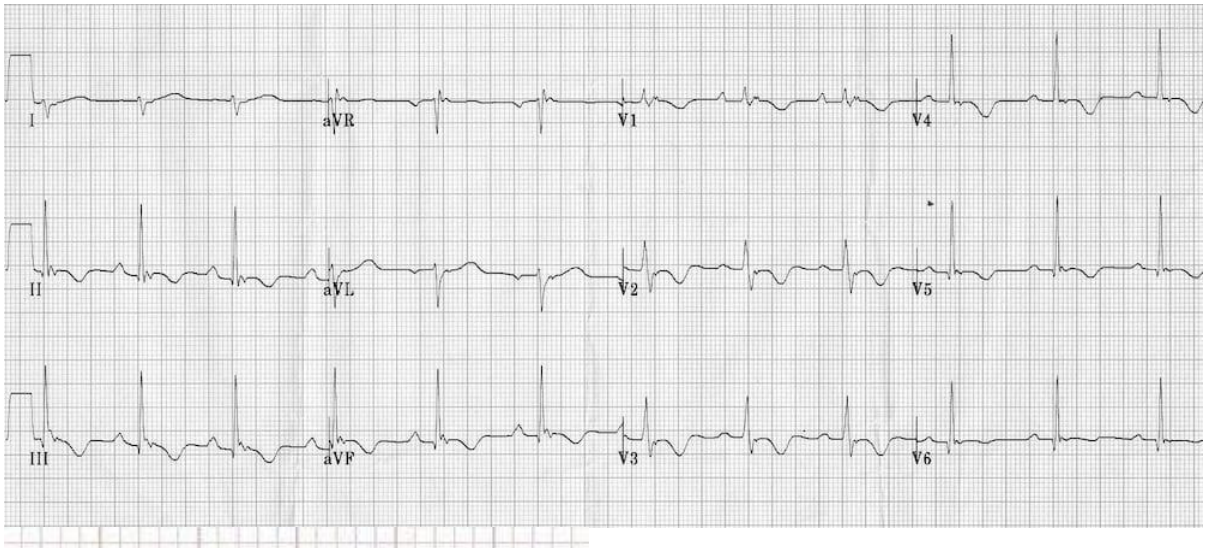
Source: Troubling Tachycardia • LITFL • Clinical Cases ECG Exigency

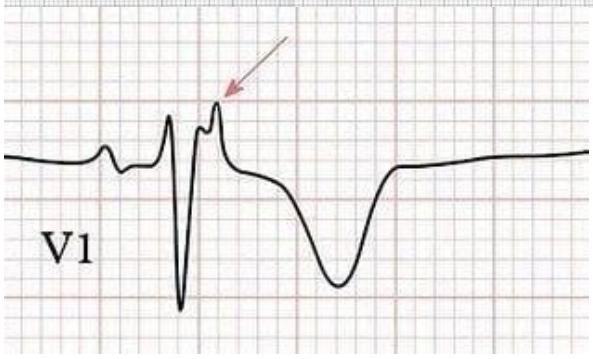
Hypertrophic cardiomyopathy



Source: Hypertrophic Cardiomyopathy (HCM) • LITFL • ECG Library Diagnosis

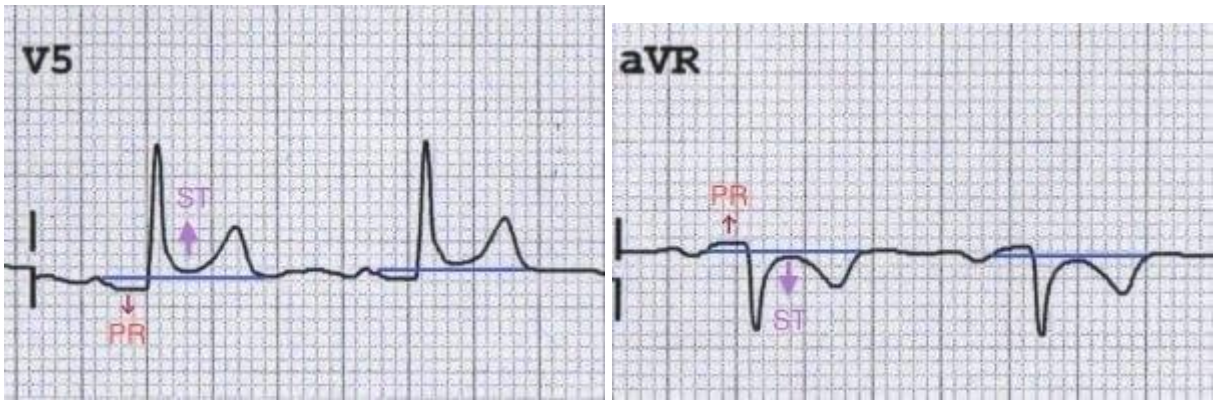
Arrhythmogenic right ventricular cardiomyopathy





Source: Sudden Syncope at Soccer • LITFL • Clinical Cases ECG Exigency

Pericarditis



Source: Pericarditis ECG Changes • LITFL • ECG Library Diagnosis