Syncope (Fainting)

Definition / Supporting Information

Syncope is a transient, but complete, sudden loss of consciousness and postural tone due to a lack of cerebral blood flow (hypoperfusion) causing a reversible disturbance to cerebral function.

- Presyncope is the presence of sensory and postural impairment without actual loss of consciousness.

Causes of syncope can be divided in to:

- Cardiac mechanisms (eg, arrhythmias, structural problems)
- Reflex (neurally mediated) mechanisms (eg, vasovagal, situational, carotid sinus and atypical syncope)
- Orthostatic mechanisms (eg, inadequate venous return)

Syncope in childhood is common, the majority being of reflex origin, with only a minority having a potentially life-threatening cause. Serious, life threatening causes of syncope are generally cardiac in nature. Discriminating benign from serious causes is made primarily by history, physical examination and electrocardiogram (ECG) results.

Keywords / also known as: hypoperfusion, hypotension, loss of consciousness, low blood pressure

Essential History

Ask about:

- Exact circumstances and details surrounding the event
  - Time of day
  - Presence of upper respiratory infection or any other illness
  - Time since last meal or fluid intake
  - Posture during syncope and time spent in this posture before syncope
  - Environment (eg, hot, crowded)
  - Prodromal symptoms:And / or any precipitating events
    - Light-headedness / dizziness
    - Blurred / tunnel vision
    - Nausea
    - Yawning
    - Feeling of being hot (eg, sweating)
    - Cold, clammy skin
    - Hearing changes (eg, sounds seeming distant / muffled / buzzing)

        - Weakness / tremors
        - An aura often occurs without warning
        - Association with exercise
        - Most common precipitating events in vasovagal syncope are:
            - Pain
            - Prolonged standing, especially in warm environments
            - Increased fluid loss or reduced intake
        - In an infant, excessive crying and breath holding
    - Duration of loss of consciousness
        - Usually brief in vasovagal syncope
        - A few seconds to 1 or 2 minutes
        - A seizuremay last longer
            - The postictal state may be characterised by prolonged confusion and fatigue
    - Any headache or prolonged disorientation after syncope
    - Recovery
        - Should be spontaneous, complete and without sequelae
    - Bystander testimony
        - Orthostatic hypotension: symptoms occur within seconds of standing
        - Vasovagal syncope: symptoms characteristically appear after being upright for at least a few minutes
    - The presence of seizure-like movements
        - Generalised tonic-clonic movements may also be seen in any form of syncope
- Medical history
    - Congenital heart disease
    - Kawasaki Disease
        - A history of Kawasaki Disease with coronary artery aneurysms, whether resolved or persisting, increases the lifetime risk of major cardiac events potentially including juvenile onset stenosis leading to myocardial ischaemia
    - Rheumatic Heart disease
    - Known or family history of seizure disorder
    - Endocrine problems, such as diabetes
- Migraine
    - History of flashing lights
    - Severe headache preceding syncope
- Family history
    - Migraine
    - Sudden death or congenital arrhythmias

  - Cardiac disease leading to syncope may be inherited in an autosomal-dominant fashion
    - Marfan's syndrome
    - Hypertrophic cardiomyopathy
    - Prolonged QT syndrome
  - Seizuredisorders, can also be inherited in an autosomal-dominant fashion
- Medications and / or recreational drugs (see Drug Overdose and Poisoning)
  - Tricyclic antidepressants (postural hypotension)
  - Macrolide antibiotics (prolong QT)
  - Antiarrhythmic medications (hypotension)
  - Cocaine (convulsions, hypertension)

'Red Flag' Symptoms and Signs

The following need immediate evaluation for potentially life-threatening causes.

Ask about:

- Straining, crying, or exercise immediately prior to the event
- Chest pain or palpitations
- Occurring without warning (no prodrome)
- Occurring when supine
- Prolonged loss of consciousness
- Drowsiness or disorientation and / or confusion after the event

Look for:

- Evidence of underlying cardiac disease
  - Cardiac murmur may indicate aortic or pulmonary stenosis
  - Hypertrophic cardiomyopathy (if murmur becomes audible only when the patient is upright)
  - Bradycardia
  - Tachycardia
  - Irregular heart rate (see Cardiac Arrhythmias)
  - Hypertension or hypotension
    - Postural drop in blood pressure
- Altered mental status (see Altered Conscious Level)
- Any abnormality on detailed neurological examination

Differential Diagnosis / Conditions

Behavioural causes

- Breath-holding spells; two types typically occur in children aged 6 months to 3 years: (see Non-Convulsive Paroxysmal Disorders)
  - Cyanotic
    - Cyanosis and apnoea are precipitated after a child is upset and begins to cry
    - Stiffening of the body and loss of consciousness may soon follow
  - Pallid or reflex anoxic
    - Pallid breath-holding spells are less common
      - Begin with sudden pain or a noxious stimulus
    - The child suddenly becomes pale and limp and loses consciousness
    - Ordinarily lasts only seconds to minutes
      - The child awakens to full consciousness
- Hyperventilation
  - Benign
  - Frequent among adolescents, especially in the presence of anxiety
  - Associated with numbness and paraesthesiae of the hands and feet
- Non-organic syncope
  - The child is likely to be unusually calm
  - No autonomic effects, such as change in heart rate or blood pressure
  - Episodes tend to be:
    - Recurrent
    - Frequent
    - Occurring in front of an audience
  - Recovery of consciousness often is prolonged, and usually no injury is sustained

Cardiac causes

- Syncope can result from low cardiac output secondary to either a dysrhythmia or a structural problem
- The underlying abnormal rhythm may be either too slow or too fast
- Bradyarrhythmias
  - Usually seen after extensive cardiac surgery in the atria
  - Sinus node dysfunction
  - Atrioventricular (AV) block
    - Congenital AV block
    - Secondary to Lyme's disease
  - Implanted device (eg, pacemaker) malfunction

- Tachyarrhythmias
  - Supraventricular tachycardia
    - Palpitations and dizziness are more common symptoms of supraventricular tachycardia than syncope
    - Wolff-Parkinson-White syndrome
  - Ventricular tachycardia (VT)
  - Prolonged QT syndromes
    - Romano-Ward syndrome
      - Autosomal dominant
    - Jervell and Lange-Nielsen syndrome
      - Autosomal recessive
      - Associated with congenital neural deafness
    - Hypokalaemia or hypocalcaemia
    - Brugada syndrome
      - Acquired or genetic (autosomal dominant)
      - Characteristic ECG finding with accompanying clinical criteria
    - Catecholaminergic polymorphic ventricular tachycardia
      - Inheritance autosomal dominant or autosomal recessive due to two separate genes that can cause the channelopathy
      - Exercise ECG testing is pathognomic
    - Drug-related / induced, including:
      - Tricyclic antidepressants
      - Certain macrolide antibiotics
      - Antiarrhythmic medications
    - Complication of myocarditis
    - Adolescents with tetralogy of Fallot who have undergone surgical repair in infancy
- Implanted device (eg, pacemaker) malfunction
- Structural heart disease
  - Aortic stenosis
  - Hypertrophic cardiomyopathy
    - Syncope with exercise may be an important presenting sign
    - ECG is often abnormal
    - The echocardiogram is diagnostic
  - Dilated cardiomyopathy
  - Tetralogy of Fallot
    - Children with unrepaired tetralogy of Fallot may have syncopal episodes in association with hypercyanotic spells
    - Syncope is often precipitated by:
      - Crying

    - Straining with a bowel movement
    - Awakening from sleep
- Pulmonary hypertension
  - With exertion, children with pulmonary hypertension may experience syncope from an inability to maintain transpulmonary flow
  - Usually there is a history of exertional dyspnoea rather than syncope
- Coronary artery abnormalities
  - Congenital abnormalities
    - Left coronary artery coursing between the aorta and pulmonary artery
    - Anomalous origin of the left coronary artery from the pulmonary artery
  - Acquired abnormalities (eg, aneurysms and/or stenosis) secondary to:
    - Kawasaki Disease
    - Rheumatic heart disease
    - Obesity
  - Syncope typically occurs with exercise
- Cardiac tumours
- Marfan's syndrome
- Cocaine use
  - Can cause acute coronary vasoconstriction and ventricular arrhythmias, with consequent syncope

Postural orthostatic tachycardia syndrome (POTS)

- Diagnosis requires either:
  - Orthostatic heart rate acceleration > 120 bpm **or**
  - Absolute increase ≥ 30 bpm in the absence of significant orthostatic hypotension
- Two forms have been identified, both more common in young women:
  - Peripheral variety (more common) form
    - Persistent tachycardia while patient is upright
      - Associated with fatigue, exercise intolerance, and palpitations
    - Onset may occur after:
      - Viral illness
      - Trauma
      - Surgery
  - β-Hypersensitivity (or central) form often associated with:
    - Migraines (see Headache)
    - Tremor
    - Excessive sweating

Neurological conditions

- Generalised seizures
  - Typically, preceded by prodrome that includes:
    - Tonic-clonic activity
    - Loss of consciousness
  - Often feature a period of confusion and lethargy after recovery
- Atypical seizures
  - Often difficult to differentiate from benign forms of syncope
- Migraine (see Headache)
- Head trauma
- Narcolepsy

Metabolic causes

- Hypoglycaemia
- Dehydration
- Severe anaemia
- Pregnancy

Drug-induced syncope

- Diuretics
- Vasodilators

Investigations

To be undertaken by non-specialist practitioners (eg, General Practitioner (GP) Team), or specialist practitioners (eg, Emergency Department / Paediatric and / or Paediatric Cardiology Team(s)) if there is full recovery:

- Full blood count should be checked if anaemia is suspected
- Serum glucose for hypoglycaemia
- ECG
  - The only test indicated in most patients with a history typical of benign syncope
  - May reveal the presence of AV block or dysrhythmia
  - Abnormally large left ventricular (LV) forces, especially with LV strain
    - Suggest hypertrophic cardiomyopathy
    - May be the only evidence of this condition in a patient with normal findings on physical examination
  - Measure corrected QT interval in all children with syncope or seizures to ensure that prolonged QT syndrome is not missed

    - QTc= QT interval divided by the square root of the preceding R-R interval
        - Normal QTc values for children are 350 ms to 0.46 ms

To be undertaken by specialist practitioners (eg, Paediatric (usually in conjunction with Paediatric Cardiology Team) or Paediatric Cardiology Team) in the context of an abnormal clinical cardiovascular examination, exertional syncope or relevant family history of cardiac disease:

- Echocardiography
    - When suspicion exists based on:
        - History (eg, syncope with exercise)
        - Examination of a structural cardiac or coronary artery lesion

      Usually can demonstrate origin and course of coronary arteries adequately
- Monitors
    - Holter monitor (24-hour ECG monitoring test) used if a cardiac dysrhythmia is strongly suspected because of:
        - Prominent palpitations that occurred before the episode
        - History of cardiac surgery that may predispose a child to abnormal rhythms
    - Event monitor
        - Patients can keep the monitor for 1 month and use it when symptoms are occurring
- Electrophysiologic testing and cardiac catheterisation

    - Must be considered for any patient with:
        - Syncope during active exercise **and**
        - No abnormality on physical examination, ECG or echocardiogram

      Tilt-table testing

    - Creates an orthostatic stress
    - Can provoke symptoms in patients with vasovagal syncope and orthostatic hypotension
    - Indications include:
        - ≥ 3 syncopal episodes during a 12-month period with no evidence of heart disease
        - Syncope during exertion in which heart disease has been ruled out after an exhaustive workup
        - Recurrent syncopal episodes thought to be hysterical in nature
- The diagnosis may be apparent on taking the history
- Recurrent syncopal episodes are unusual and may require more extensive testing

Treatment Approach

To be undertaken by non-specialist practitioners (eg, GP Team):

- For most patients with vasovagal syncope or orthostatic hypotension (that do not meet referral criteria):
  - Reassurance and safety netting
  - Education regarding the cause of the syncope and how to avoid aggravating factors, such as extreme heat or standing still for long periods
  - To avoid injury, patients should be instructed to sit or lie down at the onset of any prodromal symptoms
- For a patient presenting with syncope whom has a history of Kawasaki or Rheumatic Heart Disease, onward referral for further specialist review is required

To be undertaken by specialist practitioners (eg, Paediatric (usually in conjunction with Paediatric Cardiology Team) or Paediatric Cardiology Team):

- The management of cardiac, neurological, metabolic, and behavioural and / or psychiatric syncope depends on the cause
- Isometric exercises
  - 'Tilt training'
    - Controversial, but may be helpful to some patients
    - Patients are instructed to stand with their backs against a wall
      - Initially for short periods
      - Slowly increasing duration to approximately 30 minutes per day
- Volume expansion
  - A reduced frequency of syncope in adolescents with neurocardiogenic syncope was reported after they drank 2 litres of water in the morning
  - Fludrocortisone acetate is a synthetic mineralocorticoid that causes salt retention and expansion of the central blood volume, was ineffective in a small randomised double-blind trial in children
- Other treatments may be suggested after referral to a 'syncope' clinic

When to Refer

Refer urgently to specialist practitioners (eg, Emergency Department / Paediatric and / or Paediatric Cardiology Team(s)) if:

- Any 'red flag' symptoms and signs
- Patient history of cardiac disease
- Family history of sudden death, cardiac disease, or deafness
- Recurrent episodes
- Recumbent episode

- Exertional syncope
- On medications that can alter cardiac conduction

‘Safety Netting’ Advice

- Advise parents or carers to seek urgent medical advice if ‘red flag’ symptoms or signs develop
- Advise parents or carers to capture the event on video (mobile phone) if there is enough time

Patient / Carer Information

Please note: whilst these resources have been developed to a high standard they may not be specific to children.

- Fainting (Web page), Patient
- Fainting – causes (Web page), the NHS website
- Reflex syncope (Web page), STARS (Syncope Trust and Reflex Anoxic Seizures)

Resources

National Clinical Guidance

Transient loss of consciousness (’blackouts’) in over 16s, NICE clinical guideline CG109, National Institute for Health and Care Excellence

Syncope (Guidelines on Diagnosis and Management of) (ESC Clinical Practice Guidelines), The Task Force for the diagnosis and management of syncope of the European Society of Cardiology (ESC)

Suggested Resources

Please note: these resources include links to external websites. These resources may not have national accreditation and therefore PCO UK cannot guarantee the accuracy of the content.

Harris M, Bu’Lock F. Fifteen-minute consultation on limiting investigations in the fainting child. Arch Dis Child Educ Pract Ed 2016;101:26-30 [PubMed]

Salim MA, Di Sessa TG. Effectiveness of fludrocortisone and salt in preventing syncope recurrence in children: a double-blind, placebo-controlled, randomized trial. J Am Coll Cardiol 2005;45:484–488 [PubMed]

Rijnbeek PR, Witsenburg M, Schrama E, Hess J, Kors JA. New normal limits for the paediatric electrocardiogram. Eur Heart J 2001;22:702-11 [PubMed]

Grubb BP. Neurocardiogenic syncope and related disorders of orthostatic intolerance. Circulation 2005;111:2997–3006 [PubMed]

Vasovagal syncope (common faints) (Web page), Royal Brompton & Harefield NHS Foundation Trust

Syncope (Web page), Patient

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