Transient loss of consciousness (syncope)

- Transient.
- Rapid onset.
- Short duration.
- Spontaneous recovery.

- Occurs in 40% of pt's at some point in life i.e. very common so.

References:
1. cks.nice.org.uk
2. London strategic clinical network
3. Patient.co.uk
4. 'Syncope in the paediatric patient: When to be concerned'. Dr Robert Logt Lowel, paediatric cardiologist consultant, Florida.
5. Neurology consultant, Alliance Federation, Feb 2017
6. RCGP lecture, April 2017, Dr Anjum Ganhi, paediatric consultant
7. heartrhythmalliance.org
8. Dr Nicholas Gall, Royal College of Physicians webinar, March 2017
9. Professor Valeria Iodice autonomic unit UCL NHS, webinar Jan 2021
10. Hull and East Riding Prescribing Committee, Prescribing Guideline May 2019.
11. Dr Nicholas Gall, BMI webinar March 2021.
12. London Strategic Clinical Network

Key
- May drive and need not notify the DVLA
- May drive but must notify the DVLA
- Must not drive but need not currently inform the DVLA
- Must not drive and must inform the DVLA

TLoC (single/multiple)

- Cardiovascular (excluding typical vasovagal syncope)
- Unexplained syncope (including syncope without reliable prodrome)
- Cough syncope/ preasyncope
- Vasovagal syncope – typical **or** with reliable prodrome, avoidable trigger or reversible cause

Avoidable trigger which will not occur whilst driving? → Yes / No

Sitting → 1 → Standing

2

Adult

Investigations

- Pulse rhythm.
- Heart sounds.
- Basal creps.
- Leg swelling.
- Lying (not sitting) and standing BP.
- Neurological examination.

- Basically the main aim is to make sure it's not the heart causing LOC as that is the one that ↑ risk of death.

- Cannot drive until fully assessed.
- Shower instead of bath.
- Avoid heavy machinery.

- ECG
- FBC
- UE's
- LFTs
- Calcium

- If LOC more than once every 48 hr period = 24 hr ECG may be beneficial.
- If LOC once a fortnight = a 7 day ECG may be beneficial.
- If LOC less frequently than once in 48 hr period = no benefit in 24 hr ECG.
- If very infrequent = Implantable Loop Recorder (Reveal device).

Child / Adolescent

- Occurs in 15% of 8-18y.
- Unusual < 6y.
- Growth spurt is a dehydrating event.
- You grow a lot more blood vessels which need to be filled with fluid.
- Menstruation can cause fluid loss.
- Brain needs oxygen and sugar.
- If you abrupty interupt either one of these, will cause TLOC.

Investigations

- ECG.

- In all cases, even if you feel it is a simple faint.

Non-cardiac syncope

Orthostatic intolerance

Vasovagal/ Neurocargiogenic/ Simple faint

Posture Provoking factor. Prodrome.

- Basically if it sounds like vasovagal, it is (you don't need all 3 P's).
- Feeling faint.
- Hearing distorted.
- Images brighter or different hue.
- Intensification of symptoms.
- Recover within seconds.
- Can be pale and sweaty for a few min afterwards.

- Lower extremity venous pooling leads to a ⇓ in venous return to the heart.
- In susceptible individuals ⇓ ventricular filling produces a large ⇑ in the ventricular force of contraction similar to that in acute hypertension.
- Some pressure receptors take this the wrong way, and send signals to the brain, saying there severe hypertension occuring.
- This leads to withdrawal of sympathetic activity and vagal activation (vasodilatation, bradycardia and hypotension) i.e. exactly what you dont want.

triggers

- After hot shower.
- Prolonged standing.
- Emotional stress.
- Pain.
- Heat.

- Reassure.
- Avoid trigger if possible.

Orthostatic hypotension

- Dehydration.
- Diuretics.
- Calcium channel blockers.
- Diabetic neuropathy.
- Parkinsons.
- Multiple system atrophy.
- Post prandial.
- Post exercise.
- Anaemia.
- Fever.

- OH and POTS are part of a spectrum of autonomic dysfunction (not failure).

- Basically if it sounds like OH, it is.
- Dizzy on standing up.

- Drop systolic by 20mmHg
  Or
- Drop diastolic by 10mmHg
- Within 3min of standing and no ⇑ in HR.

- The normal adrenergic ⇑ HR and vasoconstriction of the arterioles and veins, in the upright position is absent or inadequate.
- This results in hypotension without a reflex ⇑ HR.
- Similar to vasovagal syncope but without the vagal component (nausea, pallor, diaphoresis and hyperventilation).
- So the prodrome might only consist of lightheadedness.

- See POTS management (right).
- Try conservative i.e. slow down when you are getting up and about, more fluids, compression.
- And possibly fludrocortisone or midodrine.
- If already high BP is a nightmare as these medications will ⇑ BP even further. So refer to 2o care (sometimes use GTN or clonidine patches at night).
- Although you could try midodrine in day as t 1/2 is 4 hrs and losartan at night).

Postural orthostatic tachycardia syndrome (POTS)

- Females > males.
- 15y-50y.
- Can occur post viral infection.

- Either ⇑ in HR by 30bpm or an absolute HR of > 120bpm, within 10 min of standing without orthostatic hypotension (20mmHg drop in systolic BP).
- Measure few times over 10 min e.g. 1 min, 5 min, 10 min.
- It s just a question of seeing that the bp is stable, but the heart rate ⇑ and sustained.

- A disorder of the nerve control of BP and HR, hence, they don't handle gavity well.
- POTS is the final common pathway of different pathophysiological mechanisms, it is not a disease.
- Has multiple possible causes e.g. intravascular volume, hyperadrenergic, anxiety, neural mechanisms.
- ⇓ venous return causes an ⇑ sympathetic discharge and significant tachycardia.
- Hence, heart does not have enough time to fill with blood, so stroke volume is not enough to perfuse brain.
- ⇑ Adrenomedullin (potent vasodilator with diuretic effects) is seen in some patients.
- But since autonomic nerves are all over the body, the symptoms can be all over the body too.

Symptoms

- Lethargy.
- Discolouration (darker) of feet on standing due to venous pooling.
- Nocturia, urgency, retension, ED.
- Cognitive impairment.
- Ehler's danlos/hypermobility i.e. connective tissue problem in joints and blood vessels.
- Nausea, bloating, constipation, abdo pain.
- Splanchic hyperaemia so worse after eating.
- Migraine.
- Heat intolerance, less sweating.
- Coat hanger distribution pain.

- This is GU autonomic dysfunction.
- Anxiety.
- Depression.
- Somatic hypervigilance.
- This is GI autonomic dysfunction.
- This is thermregulation autonomic dysfunction.

Management

Conservative (see left)

- It's not sexy, but other things (if needed) will not work if these measures are not done.
- Don't have to do all at once e.g. eating spoons of salt, compression etc.

- If conservative treatment fails GP can manage if not severe symptoms.
- If severe or unsure of diagnosis, refer to 2o care (note there are 3o care autonomic clinics for very difficult cases).
- They may perform more tests e.g. liquid meal challenge test (to detect splanchnic hyperaemia), modified exercise test.
- GP advice = start simple with conservative, and if fails then simple medications to begin with e.g. bisoprolol, fludrocortisone/midodrine.
- After those medications, more likely you need to refer to 2o care.

- Which medication to use? How do you know if blood vessels empty or too relaxed?
- This can be difficult to tell.
- Can't predict. Have to suck it and see.
- Sometimes using a medication and seeing it's effect (or lack of effect) tells you the abnormal physiology.
- Sometimes need combination of medications (likely pt's you would refer to 2o care).
- The working autonomic system changes every millisecond so be aware the medication will never get the symptoms to zero.

Approach one:
If empty blood vesels = fill it up = salt, fluids, fludrocortisone.
If too relaxed vessels = tighten up = compression, midodrine.
If too fast = slow it down = bisoprolol, ivabradine, pyridostigmine.

Approach two:
Normal/high BP =
Bisoprolol
OR
Propranolol
OR
Clonidine

Low BP =
Fludrocortisone
if fails replace with OR add
Midodrine

Beta blocker:
- Prevent vasodillation and ⇓ HR.

Clonidine:
- ⇓ BP and ⇓HR.

Fludrocortisone

- Mineralocorticoid.
- ⇓ salt loss and ⇑ plasma volume expansion.
- Do not use if high supine BP (use midodrine instead).

- Starting dose, 50-100 mcg OD, ⇑ max 300 mcg OD.
- Sitting and standing BP before each dose titration, at least once weekly until dose and condition stable.
- Stop if BP in either position > 180/100 or is considered clinically significant.

Monitoring:
Baseline =
- LFTs, UEs.

During initiation / titration =
- Standing and sitting BP, once weekly.
- UEs after 1/52, then monthly until dose stable.

Maintenance treatment =
- Standing and sitting BP every 3/12.
- UEs every 3-6/12.

Midodrine

- Alpha 1 receptor agonist, works on alpha adrenergic receptors on arterial and venous vessels, causing vasoconstriction and ⇑ in vascular resistance and BP.

- Last dose at least 4 hours before bedtime, to avoid supine hypertension.

Week 1: 2.5mg three times a day
Week 2: 5mg each morning, 2.5mg afternoon, 2.5mg early evening
Week 3: 5mg each morning, 5mg afternoon, 2.5mg early evening
Week 4: 5mg three times a day

- Stop if BP in either position > 180/100 or is considered clinically significant.

- Caution (increased monitoring) if used with:
- Medications which ⇓ HR.
- Systemic corticosteroid, may ⇑ hypertensive effects.

Monitoring:
Baseline =
- LFTs, UEs.

During initiation / titration =
- Standing and sitting BP, once weekly.
- UEs after 1/52, then monthly until dose stable.

Maintenance treatment =
- Standing and sitting BP every 3/12.
- LFTs, UEs every 3-6/12 (more frequently if dysfunction).

Autonomic failure

- This is towards the end of the spectrum.
- Due to DM, parkinsons, multiple system atrophy etc.

Exercise related

- Usually during recovery after sustained vigorous exercise.
- During the exercise, blood vessel dilatation occurs.
- But HR also ⇑, so BP is maintained.
- When the exercise stops, the venous pooling, cessation of muscle pump action and ⇓ heart rate, causes hypoperfusion of the brain.

Situational

- Breath holding.
- Micturation/defacation.
- Cough.
- Sneezing.
- Visceral pain.
- Reflex Anoxic Seizures (RAS)/ Reflex Asystolic Syncope (RAS)

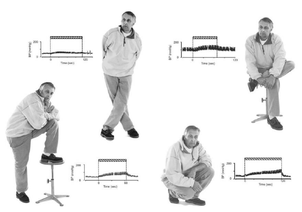
- Reassure.
- Lifestyle changes.

- Seizure which is neither epileptic nor due to cyanotic breath-holding.
- Occurs due to a brief stoppage of the heart through excessive activity of the vagus nerve.
- Any unexpected stimulus, such as pain, shock, fright.
- Eyes to roll up into the head, the complexion to become deathly white, often blue around the mouth and under the eyes, the jaw to clench and the body to stiffen; sometimes the arms and legs jerk.
- Usually < 30 sec, the body relaxes, the heart starts beating (sometimes very slowly initially) and the sufferer is unconscious.
- One or two minutes later the person may regain consciousness but can sometimes be unconscious for over an hour.
- May be very emotional and then fall into a deep sleep for 2-3 hrs and looks extremely pale with dark circles under the eyes.
- RAS attacks may occur several times per day/week /month.

- Place in the recovery position.
- Talk reassuringly as it is known that the individual can sometimes hear but is unable to answer.
- Comfort upon recovery.
- Allow to sleep if necessary.
- It is not necessary to call a doctor.
- However, if the person has had a particularly nasty bump then it may be wise to seek medical advice.

New Cross Childhood Health Course

With breath holding you should differentiate between blue breath holding and white breath holding. With blue breath holding no intervention is needed. With a white breath holding they will turn pale, can have reflex hypoxic seizures, the heart can stop beating! These need referral.



- Imagine a bottle 3/4 of fluids.
- If tie it flat the cap at the top (brain) will have perfusion.
- If stand it straight, the top does not get perfused.
- Take bottle of water to school.
- Finish off jug of water when get home.
- Have at least 1 glass of fluids at meal time and 2 at other times each day.
- Should be no dark urine.

Diet

AVOID:
- Large meals with high carbohydrate content.
- Fasting.
- Alcohol.

INTRODUCE:
- Fluids, fluids, fluids, 2-2.5L/day.
- Powerade.
- Small frequent meals (splanchnic problem in some pt's).
- 10g salt/day if no hypertension.

Environment

AVOID:
- Warm environments, hot showers.

Physical exertion

INTRODUCE:
- Exercise is most important intervention.
- Gradual program of physical reconditioning particularly focusing upon gentle resistance training of the lower extremities, and abdomen in order to strengthen the skeletal muscle pump e.g. rowing is excellent. Also swimming.

Posture

AVOID:
- Sudden head up postural change e.g. waking.
- Avoid bending from waist or stretching up.
- Avoid standing or sitting still very long.

INTRODUCE:
- Stand/sit up slowly.
- Isometric counter pressure-manoeuvres before and during the upright posture e.g. calf activation (clench and unclench calf muscles before getting up). See left.

Compression

INTRODUCE:
- Guidelines state class 2 compression stockings with 30 mm Hg of ankle counter pressure. The more muscle you compress the better the effect
- However, in practice poor compliance and difficult to prescribe.
- So can simply advice OTC flight socks or sports compression stockings instead.
- Abdominal binders has more evidence but poor compliance.

Sleep/Wake

INTRODUCE:
- Raise head of bed, which tells the body that reflex constriction is important.
- Drink 1 pint of very cold water as soon as wake up (some evidence causes vasoconstriction plus it hydrates).

Cardiac

red flags

- Only few premonitory symptoms.
- Occurs during exercise.
- Occurs in the recumbent position.
- Chest pain or palpitations.
- PMH of cardiac disease.
- FHx of sudden cardiac death or heart disease in the young.

- Refer to cardiologist within 24 hrs.

- Note, if occurs AFTER exercise is not concerning.
- See 'Non-cardiac'----> 'Exercise related'.

Obstructive lesions

- Aortic stenosis (AS).
- Pulmonary stenosis (PS).
- Pulmonary hypertension (PHTN).
- HOCM.

Myocardial dysfunction

- Congenital or acquired coronary artery disease.
- Dilated cardiomyopathy.
- Arrhythmogenic RV dysplasia (ARVD).

- Anomalous CA s; Kawasaki s
- Myocardial ischemia or infarction

- Self limited episodes of V-tach can lead to cardiac arrest.

- Adipose tissue or fibrosis replaces myocytes
- V-tach commonly develops in these patients

Arrhythmias

- Long QTc syndrome (torsade de pointes).
- Short QTc.
- Wolff-Parkinson White (SVT).
- ARVD (repeated episodes of VT).
- Brugada syndrome (rare cause of VT, SE asian men; in 90% of cases LOC occurs at rest).

- Syncope in response to loud noise, fright, extreme emotional distress.

Neuropsychiatric

Seizures:
- Also LOC and loss of postural tone.
- Longer and involve convulsive activity.
- There is a post-ictal phase.

Migraine syndromes:
- Similar to syncope but LOC is longer and nausea, headaches and aura are more prominent.

Hysteria/Conversion:
- Common in the presence of an audience
- Lacks hemodynamic changes or injury.

Hyperventilation:
- Usually preceded by emotional stress
- Patient experiences chest tightness, SOB and paresthesias.

Hyperventilation

- Anxious and emotionally distressed.
- Hyperventilation.
- Hypocapneic.
- Tingling can be more down one side.
- Spams.
- Tightness in throat and chest.

- Explain the physiology to reassure nothing serious underlying their symptoms.
- Counselling etc.
- Beta blockers.

Functional seizures (pseudo seizures / non-epileptic seizures)

- Not due to a underlying pathology.
- Underlying stress causes dissociation.
- Up to 20% in secondary care clinics.
- Stop and starts.
- Abnormal movements like side to side.
- Eyes closed.
- Resist to eye opening.
- Prolonged for over 5 min.
- No colour change.
- Breathing pattern normal or hyperventilating.
- Recover quickly.
- Cry during or after seizure.

Metabolic

- Poor hydration or dehydration.
- Hypoglycemia.
- Electrolyte disorders.
- Anorexia nervosa.
- Drugs and toxins (anti seizure meds, sedatives, tranquilizers, anti hypertensives).

Carotid sinus hypersensitivity

- Shaving.
- Tight collar.

REAL PATIENT CASE 4/5/2023
83y male

You had 3 episodes of TLOC. 2-3 time/yr. Do not get prodomal symptoms, feeling lightheaded/dizziness with sweating and then you lose consciousness for a few sec to 1 min.
Occasionally you avoided losing consciousness by sitting or lying flat. Occur either sitting or standing and never lying flat.
This suggests the symptoms are postural related.
No seizure, and you feel tired and tend to sleep afterwards.
Listening to the carotids I could see significant bradycardia and reproduce symptoms of dizziness on the Rt side.
No carotid bruit.
- I strongly suspect you had carotid sinus hypersensitivity on the Rt side and will need carotid sinus massafe and Tilt table testing.

9/8/2023
Tilt Table Test report:
Head-up tilt no evidence of postural drop or postural tachycardia.
Carotid sinus massage on Rt = 13s of cardiac pause, reproduced all symptoms and LOC and reflex anoxic seizure.
Dear cardiolgist I would be grateful if you could consider the man for a permanent pacemaker.

Epilepsy

- Hx is the most important aspect.
- By the end of the Hx you should be able to diagnose or suspect they had a seizure or did not.
- Its broadly split into questions related to pre seizure, seizure and post seizure.

PRESEIZURE:
- Age:
- Extremely unlikely to be primary epilepsy if > 30y.
- Old pt with 1st seizure = think cardiac syncope.

- Situation:
- If LOC occurs while lying down, orthostatic syncope has been ruled out.
- Also rule out vasovagal syncope (neurocardiogenic).
- Syncope more likely after big meal, due to splanchic pooling.
- If occurs on reaching up (e.g. hanging clothes, reaching high shelf, hyperextending neck while shaving), more likely to be carotid sinus hypersensitivity, in people aged >55.

- Dizziness:
- If dizzy, then unlikely to be epileptic seiuzure.

- Palpitations:
- Indicates possible arhythmia.
- Ask them to tap it out, or give them an example.
- Try to get a feel for if its SVT (rapid and regular) or AF((irregular).

- Headache:
- If first time had a headache and LOC,need to rule out SAH.
- If they are having headaches long term, its likely they are having migraines with syncope.

- Aura:
- Feels unwell few min before.
- Feeling of rising from stomach.
- Deja vu or opposite.
- Odd taste or smell.
- Sensory symptoms e.g. in an arm.
- Cant speak.
- Visual symptoms.

SEIZURE:
- Duration:
- Epileptic convulsive seizures do not last more than 2 min.
- Complex partial seizures can last 5-10 min.
- If lost consciousness for seconds, likely syncope.
- If minutes, likely epilepsy. If hours, not epilepsy.

- Synchronised limbs movement:
- Were they jerking or trembling?
- These types of movements occur in syncope, epilepsy and non epilepsy.

- Eyes open:
- All epileptic sezures occur with the eyes open.
- Can close after the actual seizure.
- If eyes closed, then likely non epileptic seizure.
- If eyes roll up, it signifies sycope in most cases, not epilepsy. It just means loss of muscle tone.

- Tongue biting:
- More likely in epilepsy.

- Incontinence.

POST SEIZURE:
- Todd's paresis.

- Body ache:
- Common in convulsive epilepsy.

- Cant speak afterwards.

- Post seizure headache:
- Common in epilepsy.

- Amnesia:
- If amnesia you can say its not syncope. In syncope you do not lose awareness for any length of time.
- Could be epilepsy or non epileptic attack.

- Confused, disorientated for > 15 min:
- Be aware syncope can cause confusion. However, it will be short lived.
- If long duration (>15min) more likely to be epilepsy or dissociateve seiure or non epileptic attack.

- Refer to first seizure clinic or neurologist within 2/52.
- Advice attendence of a witness.
- May perform EEG and MRI.

- It is true that sudden unexpected death due to epilepsy is 2-3x of to normal population, but this is only with convulsive seizures (particularly nocturnal).
- But you cannot even diagnose epilepsy yet.
- Epilepsy has to be diagnosed with at least two seizures.
- You cannot diagnose with one seizure.
- Tell them not to drive for the next 6/12.
- Avoid using heavy machinary.
- Avoid heights.
- Avoid excess alcohol.
- Avoid sleep deprivation.
- Showers rather than baths.
- No swimming.