Seizure Syncope and Sudden Collapse

Dr Peter Kas
MBBS MArch BArch FACEM AFCHSE

Senior Staff Specialist Emergency Department
Royal Prince Alfred Hospital

Founder and Chief Educator **www.resus.com.au**

Case 1

25 yo male with syncope during a lecture.

No chest pain, No SOB.

No PMHx

FHx - Father died suddenly at age 60

Case 2

80 yo woman with syncope in church whilst standing. Woke very quickly. Daughter states had a ‘fit’.

Case 3

60 yo male presents following a syncopal event after going to the bathroom at 4am.

Case 4

A 45 yo male collapses and takes 6 to 7 minutes to wake up. He is a little confused.

Syncope

5% of ED visits

6-10% of admits

Difficult to diagnose

'Syncope' is a **symptom**, not a disease- no test for it.

Syncope- a definition

Sudden brief loss of consciousness

+

Loss of postural tone

+

Spontaneous recovery

Pathophysiology

Sudden decrease or brief loss of cerebral blood flow.

- A CNS trigger results in vasodilatation
  - This increases cardiac contraction
  - Interpreted as hypertension
  - Results in increased parasympathetics and decreased sympathetics and further vasodilatation and bradycardia.

What about pre-syncope?

- Pre-syncope is the impending LOC, without actually occurring.

- Treat is as the same as syncope.
  - Not all studies agree with this approach
  - Best approach as it captures potential misses.

Decide if it's Fit or Faint

FAINT

- Syncope is usually associated with a noxious or precipitating event.
- There may be a prodrome in 2/3 of cases of:
  - sweating, nausea
  - Lightheadedness
  - Dimming of vision
  - Spots before the eyes
  - Giddiness- (not rotational Vertigo)
- The patient wakes up quickly
- May bite their tongue
- Sphincter control maintained

Decide if it is syncope

FIT

- Sudden onset
- Ensure no other injuries
- Wakes up slowly
  - >5min = seizure
- Lateral tongue biting
- Tonic-clonic activity
  - *'convulsive syncope'*
    - Symmetric brief muscular jerks
    - BEWARE

Decided it’s syncope

Is it primary or secondary?

Causes of Syncope

- **Neurally mediated**
  - Vasovagal 18%
  - Situational 5%
    - Cough
    - Micturition/defecation
  - Carotid sinus 1%
- **Psychiatric** 2%
  - No injury usually
- **Orthostatic Hypotension** 8%
- **Medication** 3%
- **Neurologic Disease** 10%
  - TIA
  - Seizure
- **Cardiac**
  - Organic 4%
  - Arrhythmia 14%
- **Unknown** 34%

Causes of Syncope

- **Neurally mediated**
  - Vasovagal 18%
    - ‘don’t feel right’
    - Pallor, nausea
    - Giddiness
    - Surroundings move
    - Sweating
  - Situational 5%
    - Cough
    - Micturition/defecation
  - Carotid sinus 1%
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  - Syncope 2° to neuro cause has 2x risk of fatal/non-fatal stroke than those without syncope
- **Cardiac**
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  - Most important factor in predicting mortality- especially if:
    - CCF, CAD, cong disease, valvular heart disease
  - Mortality from missed cardiac causes is up to 30%
  - Underlying heart disease , irrespective of cause of syncope, is associated with increased risk of death.
  - Syncope + Heart Disease + abnormal ECG = increase risk of death at 1 year
- **Unknown** 34%

Clinical

- Convinced of a faint?
- Is it something else?
  - 13% of thoracic dissection presents with only syncope

- Symptom complexes
  - SOB
  - Headache
  - Chest pain
  - Abdominal pain

Clinical Questions

- **How did it occur- sudden loss of consciousness, prodrome?**
- Was there a change in position?
  - Sitting to standing
  - Or did syncope occur in supine or sitting position?
- Was there head rotation?
  - Carotid sinus stimulation
- Facial pain?
  - Glossopharyngeal neuralgia
- Family History- heart disease or sudden cardiac death?
- Cardiac History?
- Associated Symptoms
  - Palpitations
    - Only significant predictor of cardiac cause in patients without cardiac disease
  - Chest Pain
  - Vertigo
  - Nausea and Vomiting

Clinical Questions

- How did it occur- sudden loss of consciousness, prodrome?
- **Was there a change in position?**
  - Syncope from standing = Neurocardiogenic
  - Sitting to standing = orthostatic hypotension
  - Or did syncope occur in supine or sitting position? = Cardiac
- Was there head rotation?
  - Carotid sinus stimulation
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Cardiac

- Ejection Fraction
  - If less than 30% = increased risk of ventricular arrhythmia

- CCF

- Medications that prolong QT
  - Quinidine
  - Procainaimide
  - Erythromycin and antihystamines
  - Droperidol

- Was it exertional?
- Was it seated or supine syncope?
- Was it sudden?
- Was there chest pain?

Examination

- **Vitals**
  - Orthostatic hypotension
  - BP difference in arms
  - Murmur
- **Focus on the high risk stuff**
  - Cardiac disease
  - CCF
  - Murmur
  - AAA

ECG

- Is there pre-excitation?
  - Short PR interval
    may be WPW

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- Hypertrophy?
  - Cardiomyopathy

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Bradycardia and long QT

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- Bradycardia and long QT
- VT

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- Is there pre-excitation?
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- Bradycardia and long QT
- VT
- Brugada syndrome

BRUGADA SYNDROME

- 5% of patients who experience sudden cardiac death have no demonstrable structural heart disease or obvious cause
  - are classified as having idiopathic ventricular fibrillation

J Cardiovasc Electrophysiol 1993, 4: 356-368.
Am J Cardiol 1997, 79: 3-9.

- The manifestations of the syndrome are caused by episodes of ***polymorphic ventricular tachycardia-ventricular fibrillation.***

- When the episodes terminate spontaneously the patient is said to have had syncopal attacks.

- When the episodes are sustained, full blown cardiac arrest and eventually sudden death occur.

What is it?

- Inherited autosomal dominant disorder. The only mutations thus far linked to the syndrome appear in the gene that encodes for the α subunit of the sodium channel.

- A subgroup of patients with idiopathic ventricular fibrillation
  - manifest a right bundle branch block (RBBB) pattern and
  - ST-segment elevation in leads V 1 to V 3 .
  - Such patients die commonly in their sleep, secondary to ventricular fibrillation.

What characterizes it ?

- Familial history of sudden cardiac death;
- polymorphic VT;
- typical right ventricular conduction delay and ST-segment elevation in V1-V3;
- no evidence of structural heart disease by cardiac catheterization, echocardiography, magnetic resonance imaging, or myocardial biopsy;
- worsening of ST-segment elevation by Class IA or IC drugs;
  - Quinidine, procainamide, flecainide
- demonstration of a genetic defects secondary to a mutation of SCN5A on chromosome 3

ECG Findings

- ST-segment elevation in the right leads.
  - ST-segment elevation is typically down sloping and followed by a negative T wave.
  - No reciprocal ST-segment depression is noted in most cases of the Brugada syndrome.
- Widened S waves in the lateral leads are usually absent, suggesting the absence of a true right bundle branch block.

Prognosis / Treatment

- Very poor prognosis when untreated
- 1/3 of patients with syncopal episodes or resuscitated from near-sudden death develop a new episode of polymorphic ventricular tachycardia within 2 years.
- Prognosis of asymptomatic individuals with typical electrocardiogram is also poor.
  - 1/3 of these individuals present with first polymorphic VT or VF within 2 years of follow-up
- Implantable defibrillator – only treatment
  - Antiarrhythmics (amiodarone or beta-blockers) do not protect against sudden cardiac death.

ECG

- Is there pre-excitation?
  - Short PR interval may be WPW
- Hypertrophy?
  - Cardiomyopathy
- Bradycardia and long QT
- VT
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Risk Stratification

- Our role is to risk stratify
- San Francisco Syncope Rules
- Boston rules

San Francisco Syncope Rule

C -CCF
H -Hematocrit<30%
E -ECG abnormality
S -SOB
S -SBP<90mmHg

Predicts:

- Death
- MI
- Arrhythmia
- PE
- Stroke
- SAH

98% sensitive and 56% specific

Ann Emerg Med 2006 May 47:448-54

Investigations

- ECG
- Other tests as indicated
  - FBE
  - EUC
    - Hyponatraemia?-NO
  - Gluc
    - Hypoglycaemia?
- Imaging?
  - Tailor to what your diagnosis is?
    - Cardiac- admit and echo
    - Neuro- CT
    - AAA-CT etc.

Tilt Table Testing

- For Neurocardiogenic Syncope diagnosis following other evaluations
- Specificity is 90% (false +ve of 10%)
- Sensitivity ? As no gold standard
- No standard protocols
- Difficult to reproduce

INDICATIONS

Unexplained recurrent syncope, or single episode associated with trauma and no organic heart disease.

Unexplained recurrent or single syncope when cardiac cause excluded, but a history of organic heart disease.

Cause of syncope diagnosed but diagnosis of cardiogenic syncope may alter treatment

Implantable Loop Recorders

- Implantable ECG recordings
  - Automatic or activated
  - Used in those with undiagnosed cause of syncope after extensive workups
- Uncertain as to who would benefit
- Complications

Treatment

Education

- Prodrome- action
- Isometrics
  - Increases SBP
  - Avoids syncope in some cases

Circulation 2002

J Am Coll Cardiol 2002

- Increased fluid and salt intake
- “Tilt training”

Treatment

MEDICATIONS

- **Beta Blockers**
  - Diminish activation of LV mechanoreceptors
  - No better than placebo

POST trial 2004

- **Fludrocortisone**
  - Synthetic mineralcorticoid
    - Retention of Na and expansion of blood vol
    - No large studies

- **Midodrine Hydrochloride**
  - α1 receptor agonist and casoconstrictor approved in USA used for neurocardiogenic syncope
  - Significant reduction in syncopal episodes at 5mg tds

Heart 1998

- **Selective serotonin reuptake inhibitors**
  - Regulate sympathetic nervous activity
  - Paroxetine significantly reduced incidence in randomised trial

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Treatment

- Cardiac pacing
  - In most neurocardiogenic syncope a decrease in BP precedes bradycardia
    - Pacing may not be effective
  - May have a role in patients with no prodrome or with asystole
    - Decrease time to loss of consciousness
  - Apart from this select group
    - No difference in syncope with pacing

Vasovagal Pacemaker Study II JAMA 2003

Case 1

25 yo male with syncope during a lecture.

No chest pain, No SOB.

No PMHx

FHx - Father died suddenly at age 60

Thoughts

- LOC whilst seated
  - May indicate arrhythmia
  - Need to find out what the lecture was about
- Need to find out more on FHx
- Needs ECG
- May need ECHO
- DDX
  - Arrhythmia
  - Cardiomyopathy
  - Brugada

Case 2

80 yo woman with syncope in church whilst standing. No chest pain, no SOB.
Woke very quickly.
Daughter states had a ‘fit’.

Thoughts

- Probably vasovagal
- Fit may be syncopal myoclonus
- Needs
  - ECG
  - ?Observation

Case 3

60 yo male presents following a syncopal event following going to the bathroom at 4am.

Thoughts

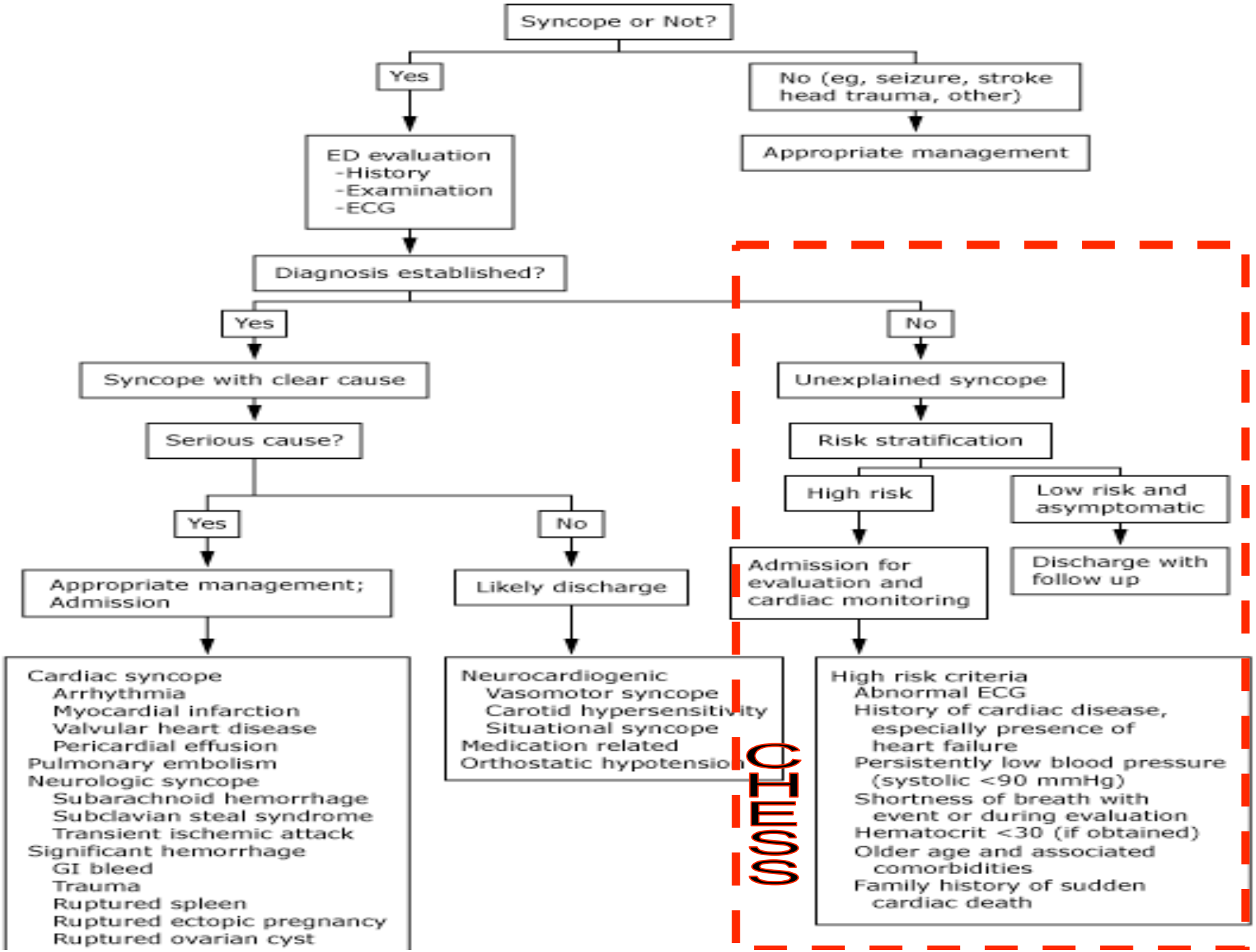
- Situational
  - Micturition / defecation syncope
- What if he fainted before actually using the WC?
  - How does that change things?

Case 4

A 45 yo male collapses and takes 6 to 7 minutes to wake up, and then he is a little confused.

Thoughts

- Probably a Seizure


Syncope or Not?
Yes
No (eg, seizure, stroke head trauma, other)
Appropriate management
ED evaluation
-History
-Examination
-ECG
Diagnosis established?
Yes
No
Syncope with clear cause
Unexplained syncope
Serious cause?
Risk stratification
Yes
No
High risk
Low risk and asymptomatic
Appropriate management; Admission
Likely discharge
Admission for evaluation and cardiac monitoring
Discharge with follow up
Cardiac syncope
Arrhythmia
Myocardial infarction
Valvular heart disease
Pericardial effusion
Pulmonary embolism
Neurologic syncope
Subarachnoid hemorrhage
Subclavian steal syndrome
Transient ischemic attack
Significant hemorrhage
GI bleed
Trauma
Ruptured spleen
Ruptured ectopic pregnancy
Ruptured ovarian cyst
Neurocardiogenic
Vasomotor syncope
Carotid hypersensitivity
Situational syncope
Medication related
Orthostatic hypotension
CHESS
High risk criteria
Abnormal ECG
History of cardiac disease, especially presence of heart failure
Persistently low blood pressure (systolic <90 mmHg)
Shortness of breath with event or during evaluation
Hematocrit <30 (if obtained)
Older age and associated comorbidities
Family history of sudden cardiac death

Seizure Syncope and Sudden Collapse

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Royal Prince Alfred Hospital

Senior Clinical Lecturer Faculty of Medicine
Sydney University

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