Syncope: Diagnostic Criteria of history and initial evaluation

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2018 ESC Guidelines for the diagnosis and management of syncope

The Task Force for the diagnosis and management of syncope of the European Society of Cardiology (ESC)

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<table>
<thead>
<tr>
<th>Condition</th>
<th>Characteristic features that distinguish from syncope</th>
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<tbody>
<tr>
<td>Generalized seizures</td>
<td>See section 8, <em>Table 10.</em></td>
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<tr>
<td>Complex partial seizures, absence epilepsy</td>
<td>No falls, yet unresponsive and later amnesia</td>
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<tr>
<td>PPS or “pseudocoma”</td>
<td>Duration of apparent LOC lasting many minutes to hours; high frequency, up to several times a day</td>
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<tr>
<td>Clinical feature</td>
<td>Syncope</td>
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<tr>
<td><strong>Useful features</strong></td>
<td></td>
</tr>
<tr>
<td>Presence of trigger</td>
<td>Very often</td>
</tr>
<tr>
<td>Nature of trigger</td>
<td>Differs between types: pain, standing, emotions for VVS; specific trigger for situational syncope; standing for OH</td>
</tr>
<tr>
<td>Prodromes</td>
<td>Often presyncope (autonomic activation in reflex syncope, light-headedness in OH, palpitations in cardiac syncope)</td>
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</tbody>
</table>
| Detailed characteristics of myoclonus | • <10, irregular in amplitude, asynchronous, asymmetrical  
• Starts after the onset of LOC | • 20–100, synchronous, symmetrical, hemilateral  
• The onset mostly coincides with LOC  
• Clear long-lasting automatisms as chewing or lip smacking at the mouth |
| Tongue bite | Rare, tip of tongue | Side of tongue (rarely bilateral) |
| Duration of restoration of consciousness | 10–30 seconds | May be many minutes |
| Confusion after attack | No understanding of situation for <10 seconds in most syncope, full alertness and awareness afterwards | Memory deficit, i.e. repeated questions without imprinting for many minutes |
Presentation of patient with probable TLOC
(may include ambulance or referral data)

TLOC present?
(history)

- No TLOC
  Act as needed
- Syncope
- TLOC - non syncopal
  - Epileptic seizure
  - Psychogenic TLOC
  - TLOC, rare causes
    Treat appropriately

Initial syncope evaluation
(H&P exam, ECG, supine
and standing BP)

- Certain or highly likely diagnosis
  (see definition in Table of
  Recommendations)
  Start treatment
- Uncertain diagnosis
  (see Table 5)
  Risk stratification
  (see Table 6)

- High-risk of short-term serious events
  Early evaluation & treatment
- Low-risk but recurrent syncopes
  Ancillary tests followed by treatment
- Low-risk, single or rare recurrences
  Explanation, no further evaluation
Reflex syncope

- Long history of recurrent syncope, in particular occurring before the age of 40 years
- After unpleasant sight, sound, smell, or pain
- Prolonged standing
- During meal
- Being in crowded and/or hot places
- Autonomic activation before syncope: pallor, sweating, and/or nausea/vomiting
- With head rotation or pressure on carotid sinus (as in tumours, shaving, tight collars)
- Absence of heart disease
Syncope due to OH

- While or after standing
- Prolonged standing
- Standing after exertion
- Post-prandial hypotension
- Temporal relationship with start or changes of dosage of vasodepressive drugs or diuretics leading to hypotension
- Presence of autonomic neuropathy or parkinsonism
Cardiac syncope
- During exertion or when supine
- Sudden onset palpitation immediately followed by syncope
- Family history of unexplained sudden death at young age
- Presence of structural heart disease or coronary artery disease
Cardiac syncope
- During exertion or when supine
- Sudden onset palpitation immediately followed by syncope
- Family history of unexplained sudden death at young age
- Presence of structural heart disease or coronary artery disease
- ECG findings suggesting arrhythmic syncope:
  - Bifascicular block (defined as either left or right BBB combined with left anterior or left posterior fascicular block)
  - Other intraventricular conduction abnormalities (QRS duration ≥0.12 s)
  - Mobitz I second-degree AV block and 1° degree AV block with markedly prolonged PR interval
  - Asymptomatic mild inappropriate sinus bradycardia (40–50 b.p.m.) or slow atrial fibrillation (40–50 b.p.m.) in the absence of negatively chronotropic medications
  - Non-sustained VT
  - Pre-excited QRS complexes
  - Long or short QT intervals
  - Early repolarization
  - ST-segment elevation with type 1 morphology in leads V1-V3 (Brugada pattern)
  - Negative T waves in right precordial leads, epsilon waves suggestive of ARVC
  - Left ventricular hypertrophy suggesting hypertrophic cardiomyopathy
SYNCOPAL EVENT

Low-risk

- Associated with prodrome typical of reflex syncope (e.g. light-headedness, feeling of warmth, sweating, nausea, vomiting)\textsuperscript{36,49}
- After sudden unexpected unpleasant sight, sound, smell, or pain\textsuperscript{36,49,50}
- After prolonged standing or crowded, hot places\textsuperscript{36}
- During a meal or postprandial\textsuperscript{51}
- Triggered by cough, defaecation, or micturition\textsuperscript{52}
- With head rotation or pressure on carotid sinus (e.g. tumour, shaving, tight collars)\textsuperscript{53}
- Standing from supine/sitting position\textsuperscript{54}
<table>
<thead>
<tr>
<th>Major</th>
<th></th>
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<tbody>
<tr>
<td>• New onset of chest discomfort, breathlessness, abdominal pain, or headache\textsuperscript{26, 44, 55}</td>
<td></td>
</tr>
<tr>
<td>• Syncope during exertion or when supine\textsuperscript{36}</td>
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<tr>
<td>• Sudden onset palpitation immediately followed by syncope\textsuperscript{36}</td>
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<tr>
<td><strong>Minor</strong> (high-risk only if associated with structural heart disease or abnormal ECG):</td>
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<tr>
<td>• No warning symptoms or short (&lt;10 s) prodrome\textsuperscript{36, 38, 49, 56}</td>
<td></td>
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<tr>
<td>• Family history of SCD at young age\textsuperscript{57}</td>
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<tr>
<td>• Syncope in the sitting position\textsuperscript{54}</td>
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## PAST MEDICAL HISTORY

### Low-risk

- Long history (years) of recurrent syncope with low-risk features with the same characteristics of the current episode\(^{58}\)
- Absence of structural heart disease\(^{27,58}\)

### High-risk

### Major

- Severe structural or coronary artery disease (heart failure, low LVEF or previous myocardial infarction)\(^{26,27,35,55,59}\)
<table>
<thead>
<tr>
<th>Basic</th>
<th>Details</th>
<th>Overall</th>
<th>Development</th>
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<tbody>
<tr>
<td>Listen to the patient and take enough time. Put the patient at ease. Be face-to-face with the patient. Seek unspoken clues. Build with the patient rather than take a history from the patient.</td>
<td>Determine the timelines of symptoms; how did the day progress? Expand the timeline with the story of one or more witnesses. What medications might have played a role? Seek a witness. Obtain a video of an episode.</td>
<td>Build hypotheses, practice pattern recognition, develop illness scripts. Use analytic reasoning to check intuitive thinking.</td>
<td>Learn and invoke circulatory physiology that may contribute to T-LOC. Reflect on the skill set used in each syncope patient, and on what it would take to expand it. Learn to read beat-to-beat heart rate and blood pressure tracings like an ECG.</td>
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Clinical cases

• Case 1: The feverish collapse
• Case 2: The Stag Do collapse
• Case 3: The changing room “fitting” episode
Case 1: Collapse with fever, 34yo Male

Filipino male who has had multiple lifetime collapses. Tendency to head rush whilst standing. Prodromal symptoms of sweatiness, shortness of breath, palpitations, nausea. Typically provoked by warm environments, prolonged standing. Had tooth abscess, fever 38.6, admitted with a extreme dizziness with nausea, sweatiness, lightheadedness.
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On ward, BP 95/60 HR 102bpm, dizzy when standing
Case 1: Collapse with fever, 34yo Male

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On ward, BP 95/60 HR 102bpm, dizzy when standing. At night, mobilising to toilet, sudden collapse with facial injury after taking 3 steps.
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Brugada Syndrome
Filipino male who has had multiple lifetime collapses. Tendency to head rush whilst standing. Prodromal symptoms of sweatiness, shortness of breath, palpitations, nausea. Typically provoked by warm environments, prolonged standing. Had tooth abscess, fever 38.6, admitted with a extreme dizziness with nausea, sweatiness, lightheadedness.

On ward, BP 95/60 HR 102bpm, dizzy when standing. What if no unheralded collapse with that ECG?
<table>
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<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
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<tbody>
<tr>
<td>ICD implantation should be considered in patients with a spontaneous diagnostic type 1 ECG pattern and a history of unexplained syncope(^a) (^{46,353,355,365,366})</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>Instead of an ICD, an ILR should be considered in patients with recurrent episodes of unexplained syncope(^a) who are at low risk of SCD, based on a multiparametric analysis that takes into account the other known risk factors for SCD.</td>
<td>IIa</td>
<td>C</td>
</tr>
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\(^a\)
On balance, this Task Force believes that it is reasonable to consider an ICD in the case of unexplained syncope. New studies published after the 2015 ESC Guidelines for VA and the prevention of SCD showed that non-arrhythmic syncope is frequent in Brugada syndrome and appears to be more benign; thus, ICD should be avoided in patients with non-arrhythmic syncope that is established according to the definition reported in this section. ILR is increasingly used in doubtful cases to exclude a VA as the cause of syncope.
Case 2: The Stag Do Collapse, 31yo man

31yo man who has infrequent episodes of collapses with seizures, reviewed by neurologist over 6 years. Initially 2x year, preceded by short warning prodrome (2 seconds) of feeling unsteady, unable to speak, prior to slumping and observed to shake in arms and legs. Typically triggered by preceding nights alcohol. Recovery from confusion after 20 minutes. Started on lamotrigine, and no episodes of 18 months. Previously seen by ICC clinic, Ajmaline negative, but to rule out cardiac collapses, ILR implanted.

Recently at stag do in a New Forest Lodge, alcohol x 3 ciders night before. Check out at 9am, walking with backpack for 10 minutes, and stood still chatting waiting for others to arrive at meeting point. Felt lightheaded, 3 seconds, said “I don’t feel well” to friends but no recollection of saying this. Collapsed for 3 minutes, but no shaking arm movements on recovery, came round within 3 minutes, but slightly confused for 15 minutes after.
Case 2: The Stag Do Collapse, 31yo man

31yo man who has infrequent episodes of collapses with “seizures”, reviewed by neurologist over 6 years. Initially 2x year, preceded by short warning prodrome (2 seconds) of feeling unsteady, unable to speak, prior to slumping and observed to shake in arms and legs. Typically triggered by preceding nights alcohol. Recovery from confusion after 20 minutes. Started on lamotrigine, and no episodes of 18 months. Previously seen by ICC clinic, Ajmaline negative, but to rule out cardiac collapses, ILR implanted.

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ILR recording at time of collapse in New Forest
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Case 2: The Stag Do Collapse, 31yo man

What is the likely diagnosis?

1) Vasovagal syncope with significant cardioinhibition
Case 2: The Stag Do Collapse, 31yo man

What is the likely diagnosis?

1) Vasovagal syncope with significant cardioinhibition
2) Generalised tonic clonic seizures causing reflex cardioinhibition/asystole
Case 2: The Stag Do Collapse, 31yo man

What is the likely diagnosis?

1) Vasovagal syncope with significant cardioinhibition
2) Generalised tonic clonic seizures causing reflex cardioinhibition/asystole
3) Focal seizures leading to reflex cardioinhibition/asystole
Case 2: The Stag Do Collapse, 31yo man

What is the likely diagnosis?

1) Vasovagal syncope with significant cardioinhibition
2) Generalised tonic clonic seizures causing reflex cardioinhibition/asystole
3) Focal seizures leading to reflex cardioinhibition/asystole
4) Focal seizures leading to reflex cardioinhibition/asystole causing generalized tonic clonic seizures?
Case 2: The Stag Do Collapse, 31yo man

What is next management step?

1) Pacemaker implantation
2) Increase lamotrigine
3) Talk to neurologist
Case 2: The Stag Do Collapse, 31yo man

6 months prior to Stag Do Collapse, had another collapse with 2s warning with clearly described tonic-clonic seizures followed by 25 minute recovery.
Case 2: The Stag Do Collapse, 31yo man

6 months prior to Stag Do Collapse, had another collapse with 2s warning with clearly described tonic-clonic seizures followed by 25 minute recovery.

ILR ON THIS OCCASION SHOWED NO BRADYCARDIA or ARRHYTHMIAS
Case 2: The Stag Do Collapse, 31yo man

What is next management step?

1) Pacemaker implantation  
2) Increase lamotrigine  
3) Talk to neurologist
Sorry for the late reply Boon. I think he does have epilepsy. The aura he had recently was the same as before previous GTC seizures. I think he may have had focal seizure-induced bradycardia (during his aura) leading to secondary syncope. Given previous normal ictal loop recording in Feb 2018 (during a typical GTCS), I think it less likely that primary cardiogenic syncope. That said, there may still be a case for considering pacing. I will increase his lamotrigine and maybe we wait to see if happens again. Do you concur.

PS. Fergus Rugg-Gunn & Diane Holdright wrote up a series of similar cases back in 2004.

Cardiac arrhythmias in focal epilepsy: a prospective long-term study.

Rugg-Gunn FJ, Simister RJ, Squirrell M, Holdright DR, Duncan JS.

Abstract

BACKGROUND:
Patients with epilepsy are at risk of sudden unexpected death. Neurogenic cardiac arrhythmias have been postulated as a cause. Electrocardiograms (ECG) can be monitored by use of an implantable loop recorder for up to 18 months. We aimed to determine the frequency of cardiac arrhythmias in patients with refractory focal seizures over an extended period.

METHODS:
20 patients received an implantable loop recorder at one hospital in the UK. Devices were programmed to record automatically if bradycardia (<40 beats per min) or tachycardia (>140 beats per min) were detected. Additionally, in the event of a seizure, patients and relatives could initiate ECG recording with an external activator device. Data were analysed at regular intervals and correlated with seizure diaries.

FINDINGS:
More than 220000 patient-hours were monitored over 24 months, during which ECGs were captured on implantable loop recorders in 377 seizures. One patient withdrew from the study. In 16 patients, median heart rate during habitual seizures exceeded 100 beats per min. Ictal bradycardia (<40 beats per min) was rare, occurring in eight (2.1%) recorded events, in seven patients. Four patients (21%) had bradycardia or periods of asystole with subsequent permanent pacemaker insertion. Three of these four (16% of total) had potentially fatal asystole.

INTERPRETATION:
Clinical characteristics of patients with peri-ictal cardiac abnormalities are closely similar to those at greatest risk of sudden unexpected death in epilepsy. Asystole might underlie many of these deaths, which would have important implications for the investigation of similar patients and affect present cardiac-pacing policies.
Notably, only a small proportion of seizures for every patient was associated with significant cardiac events, despite identical seizure characteristics. For example, patient 16 had two cardiac events, which were separated by over 60 days and 30 uneventful seizures, and patient 8 had a pronounced asystolic pause 429 days after device implantation. None of these cardiac events would have been identified during a typical period of EEG/ECG telemetry or 24 h ECG monitoring.
Figure 1: ECG recording of automatic activation of implantable loop recorder in patient 9
Every row=15 s epoch. A=automatic activation of implantable loop recorder during ≥1 s of asystole.

Figure 2: ECG recording complex partial seizure associated with 15 s of bradycardia in patient 16
Every row=15 s epoch. A=automatic activation of implantable loop recorder. P=initiation of external activation by witness.
23 yo fit and healthy young man has had frequent childhood episodes of syncope. Always preceded by 2 minutes of prodrome symptoms of dizziness, lightheadedness, rapid recovery, and nauseous afterwards. Triggered by warm environments, prolonged standing.

At gym working out, week of long late work nights. Shortly after showered felt lightheaded, sweaty and nauseous, sat on floor, then LOC with a 40 second shaking movement. Colleagues state that he was “fitting”, before coming round within 3 minutes.
Case 3: The changing room “fitting” episode

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Physical examination normal BP 115/80, no postural drop
Case 3: The changing room “fitting” episode

Question – what would you do next?
23yo man with “fitting” in changing room
32yo man with syncope with GI upset

54 s pause
Case 3: Now what would you do?

Management
1) ILR
2) Pacemaker
3) Reassure and discharge
4) Driving?
Syncope: Diagnostic Criteria of history and initial evaluation

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