EVALUATION OF SYNCOPE

Muhammad Sarfraz

Key Contents

Concept of syncope
Diagnostic work-up of syncope
Test for causes of syncope
Investigation of syncope

Learning Objectives

To understand basic mechanism of syncope
To describe diagnostic plan of syncope
To explain test for syncope
To enlist test for syncope

Key words: Syncope, Carotid Sinus Massage, Orthostatic Stress.


Correspondence Address:
DR. MUHAMMAD SARFRAZ
Assistant Professor of Medicine
Independent Medical College / Independent University Hospital
INTRODUCTION

Syncope is a common problem — it occurs in up to 40% of the general population at least once during a lifetime.1 It may be caused by a benign condition, but it may also be a sign of a serious, life-threatening illness. In recent years, significant progress in the management of syncope has been made. Since the first guidelines were published, two updates have been presented: the 2009 ESC guidelines are the most recent 1,2. However, during the past three years, some important data have been published. The new topics which have been extensively discussed during the past few years include: (i) differential diagnosis of transient loss of consciousness (TLOC); (ii) risk stratification; (iii) diagnostic value of implantable loop recorders (ILR); (iv) role of pacing; and (v) systematic improvements in syncope evaluation such as establishing syncope units or the introduction of interactive decision-making software. This article will summarise the new data published in the past three years, and review some of the 2009 ESC guidelines recommendations.

DIAGNOSTIC WORK-UP SCHEME

Syncope is one of the TLOC forms and is due to global cerebral hypoperfusion sudden in onset with loss of postural tone and complete spontaneous recovery. There are four principal causes of syncope:

a. reflex syncope including the commonest — vaso-vagal faint, followed by carotid sinus syndrome.
b. Orthostatic hypotension.
c. Due to cardiac arrhythmia; and
d. due to structural cardiac disease. This pathophysiological classification is simple, but it does not include information about cardiac rhythm leading to syncope.

Thanks to data derived from ILR, it is now possible to determine the mechanism of syncope and categorise it as being due to bradycardia, tachycardia or to no rhythm abnormalities (presumed hypotension).

The latter classification may best serve for the introduction of a successful mechanism-specific therapy.3 The diagnostic algorithm introduced by the most recent ESC guidelines stresses the value of distinguishing syncope from other causes of TLOC and the need for risk stratification. Careful history taking and other parts of initial evaluation could help to distinguish syncope from other causes of TLOC such as epilepsy, metabolic disorders or neurological abnormalities. It should be stressed that initial evaluation is the most important part of the diagnostic algorithm and includes history taking, physical examination, standard ECG and blood pressure measurements in supine and standing positions. Some subjects aged > 40 years carotid sinus massage should be also performed. After initial evaluation, most reflex syncope and orthostatic hypotension, as well as some cardiac causes, can be definitely diagnosed without the need for further testing.

Differentiation between syncope and other causes of TLOC can be difficult. The best example is epilepsy. Most of the patients diagnosed as cases of epilepsy have in fact reflex syncope4. The differences in symptoms during TLOC in these two conditions may not be easy to appreciate by witnesses; even medical staff may interpret them incorrectly, resulting in misdiagnosis and improper
treatment with anti-epileptic drugs in thousands of patients. In order to distinguish syncope from seizures, Sheldon et al. proposed a point score based on historical factors. This point score based on symptoms alone correctly classified 94% of patients, diagnosing seizures with 94% sensitivity and 94% specificity. The highest likelihood ratio for seizures had a cut tongue followed by head turning and unusual posturing. Another attempt to distinguish syncope from seizures is ECG recording at the time of an attack. The most recent data comes from the REVISE study in which patients with a long-term treatment for misdiagnosed epilepsy received an ILR. Cardiac rhythm abnormalities suggesting syncope rather than epilepsy were recorded at the time of TLOC in 67% of patients, including sinus arrest, atrioventricular block, tachycardia-bradycardia syndrome, and symptomatic sinus bradycardia. Approximately one in eight patients with syncope were misdiagnosed as having epilepsy. These findings are important also because these patients can be offered pacemaker implantation, which improves symptoms in a significant proportion of this population.

RISK STRATIFICATION

When, after initial evaluation, the cause of syncope is unclear, risk stratification should be performed in order to avoid lengthy and ambulatory-based examinations in patients who are at risk of serious complications, including death. This is especially important because the peak of cardiovascular deaths is observed during the first month after presentation, whereas late adverse events are caused by associated cardiovascular diseases rather than by mechanisms of syncope.

The OESIL and EGSYS scores serve to assess the risk of death and, in the case of the EGSYS score, also to predict syncope recurrence. These scores may be used in an emergency department, syncope unit, hospital ward or in an outpatient clinic. The Rose score and San Francisco Syncope Rule have been developed for emergency department usage and help decide whether a patient needs to be hospitalized and what is the short-term risk of serious events. Recently, the performance of the OESIL score and the San Francisco Syncope Rule has been analysed in two systematic reviews which showed good sensitivity of these prediction rules (ranging from 86% to 95%) and relatively poor specificity (ranging from 31% to 52%). Although the sensitivity looks good, still the adverse event rates in the low-risk groups range from 2% to 36% and from 5% to 13%. It seems that the least point is the assessment of ECG, especially when regarded as 'normal' in patients who subsequently developed a serious event due to cardiac arrhythmia (false negative classification). These findings show that prediction scores are useful, but that physicians should not solely rely on these rules and use other available information to assess the risk in individual patients. Further criticism of the prediction rules is presented by the official document of the Canadian Cardiovascular Society. Although the authors listed several parameters which may be used for risk stratification, they state that "existing syncope decision rules do not increase diagnostic specificity or sensitivity, or reduce costs (weak recommendation, very low quality evidence)."

www.indepreview.com
### Some risk stratification scores which can be used in everyday practice.

<table>
<thead>
<tr>
<th>Score</th>
<th>Parameters</th>
<th>Points</th>
<th>Predictive value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OESIL score</td>
<td>Abnormal ECG</td>
<td>+1</td>
<td>1-year mortality</td>
</tr>
<tr>
<td>History of cardiovascular disease</td>
<td></td>
<td>+1</td>
<td>0 point: 0%</td>
</tr>
<tr>
<td>Syncope without prodromes</td>
<td></td>
<td>+1</td>
<td>1 point: 0.6%</td>
</tr>
<tr>
<td>Age &gt; 65 years</td>
<td></td>
<td>+1</td>
<td>2 points: 14%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 points 29%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 points 53%</td>
</tr>
<tr>
<td>EGSYS score</td>
<td>Palpitations before syncope</td>
<td>+4</td>
<td></td>
</tr>
<tr>
<td>Abnormal ECG or cardiac disease</td>
<td></td>
<td>+3</td>
<td></td>
</tr>
<tr>
<td>Syncope during exercise</td>
<td></td>
<td>+3</td>
<td></td>
</tr>
<tr>
<td>Syncope in supine position</td>
<td></td>
<td>+2</td>
<td></td>
</tr>
<tr>
<td>Autonomic’ symptoms preceding</td>
<td></td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>syncope (e.g. nausea or vomiting)</td>
<td></td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>Typical triggering factors</td>
<td></td>
<td>-1</td>
<td></td>
</tr>
</tbody>
</table>

2-year mortality < 3 points: 2%. ≥ 3 points: 21%.

| ROSE score      | B-type natriuretic peptide 300 pg/mL       |        |                      |
| Per rectum — gastrointestinal haemorrhage |                                  |        |                      |
| Anaemia — Hb ≤ 90 g/L                     |                                  |        |                      |
| Chest pain associated with syncope       |                                  |        |                      |
| Q waves in ECG (except lead II)          |                                  |        |                      |
| O2 saturation ≤ 94%                      |                                  |        |                      |

1 point each Need for hospitalization, If any parameter present, hospitalization required.
To summarise this issue, it is fair to say that although syncope prediction rules have several limitations which are inherent when simple risk scores are constructed, they are useful in everyday practice to estimate risk in patients with syncope.

TESTS FOR REVEALING MECHANISM AND CAUSE OF SYNCOPE:

Tilt testing:
There have been no new important data published recently on tilt testing. There has been a steady move since the 1990s away from using tilt testing in almost everybody with obvious or suspected reflex syncope to patients with a problematic diagnosis, the elderly and patients with cardiovascular disorders and syncope.

In patients with suspected reflex syncope, data from history and simple point scores can predict the results of tilt testing, thus obviating the need to perform the test. Abnormal result of tilt testing predicts syncope recurrences in subjects with reflex syncope and no organic heart disease, whereas the prognostic role of the test in patients after myocardial infarction or with other cardiac disorders has not been well established.

The class I indications for tilt testing include:
(i) unexplained single episode in high risk settings;
(ii) recurrent episodes in the absence of organic heart disease; and
(iii) in its presence when cardiac causes of syncope have been excluded; as well as
(iv) when it is of clinical value to demonstrate susceptibility to reflex syncope to the patient. Tilt testing is not recommended for the assessment of efficacy of treatment (class III).

The most frequent mechanism of syncope during positive tilt testing is mixed vasovagal reaction, followed by vasodepressive and cardioinhibitory mechanism. In the latter form, profound bradycardia with asystole is the commonest finding, although atrio-ventricular block as well as junctional rhythm may also occur.

Tilt testing may be also a valuable tool for revealing vasovagal reaction or other reflexes as the cause of TLOC. Patients with other conditions such as misdiagnosed epilepsy, autonomic failure, postural orthostatic tachycardia syndrome, or chronic fatigue syndrome.

Carotid sinus massage
This simple test is used to identify carotid sinus syndrome (CSS) as the cause of clinical syncope or carotid sinus hypersensitivity (CSH) when there is an asystole ≥ 3 s or/and fall in a systolic blood pressure ≥ 50 mm Hg, preferably associated with symptoms. In spite of its simplicity, the test is severely underused in clinical practice. From the practical point of view, it is worth remembering that the test should be performed both while supine and standing (increased sensitivity), the right carotid sinus should be pressed first, the massage should last for 5–10 s, and that continuous blood pressure monitoring is required in order not to miss a vasodilatatory (hypotensive) type of CSS.

Recently, there has been a debate as to whether the above-mentioned cut-off criteria are not too liberal, resulting in over-diagnosis of CSS or
CSH. In an excellent review on this topic, more strict criteria, of asystole ≥ 6 s and drop in the mean blood pressure ≥ 60 mm Hg lasting for ≥ 6 s, have been suggested. These new cut-off values should be now tested in prospective studies. The prevalence of CSS increases with age, and some investigators advocate that the cut-off value of age to perform the test (class I indication) should be increased from 40 years to 50 or even 60 years.

Orthostatic stress.
The active standing test should be performed in all patients who have a history of syncope upon resuming the erect position. The test is diagnostic for orthostatic hypotension when during the first three minutes there is a drop in systolic blood pressure > 20 mm Hg or to < 90 mm Hg, or diastolic blood pressure drops > 10 mm Hg compared to the base line values. These criteria are diagnostic when symptoms are reproduced (class I), and should be regarded as diagnostic when there are no accompanying symptoms (class IIa).

Standard 12-lead ECG.
Abnormal ECG suggests a cardiac cause of syncope. The list of ECG abnormalities is presented in the ESC guidelines. What has slightly changed during the past three years is increased awareness of early repolarisation as a cause of premature unexpected familiar sudden death. Thus, a J point elevation of > 0.1 mV in 2 inferior or lateral leads in a patient with a history of syncope or malignant family history warrants further investigation since it may herald arrhythmic syncope and the risk of ventricular fibrillation. Recent data suggest that the most important ECG features are slurring or notching of the J wave in the presence of horizontal or descending ST segment elevation.

Prolonged ECG monitoring.
Standard 24-hour Holter ECG monitoring is usually not very helpful in establishing the cause of syncope, because in the vast majority of patients symptoms are infrequent and there is only a little chance (1–4%) that syncope will occur during monitoring. Therefore, the ESC guidelines advocate the use of 24-hour ECG monitoring in those who have at least one syncope per week, whereas the US guidelines are stricter and recommend Holter ECG only when syncope occurs daily. In spite of these recommendations, Holter ECG remains the most overused diagnostic tool in syncope evaluation.

External loop recorders are recommended when syncope occurs at least once per month since the average period when a patient is compliant with the device is four weeks.

ECG telemetry is another tool to disclose the mechanism of syncope. It is especially useful in emergency departments while a patient with syncope is evaluated, and also in hospitals when a patient is admitted due to syncope of unknown origin. It has been shown that the optimal period of in-hospital ECG telemetry is three days. It is particularly useful in the elderly with heart failure, and the diagnostic recording can be obtained in as many as 30% of patients, with bradyarrhythmia being responsible for syncope in 63% of subjects and tachyarrhythmia in the remaining 37%.

Implantable loop recorders are the best tools for prolonged cardiac rhythm monitoring. These devices can record and store up to 42 or 48 minutes of ECG over three years of battery life. The implantation procedure may be performed...
on an out-patient basis, is only minimally invasive, and its side effects (infection being the commonest) are very rare. According to the 2009 ESC guidelines, ILR are indicated: (i) in an early phase of evaluation in patients with recurrent syncope of uncertain origin, absence of high risk of serious events, and a high likelihood of recurrence within battery longevity of the device (class I, level B); (ii) high risk patients in whom evaluation did not demonstrate a cause of syncope or lead to a specific Long (> 40 s) asystolic pause (start and end marked by arrows) during tilt testing in a patient with a long history of transient loss of consciousness and diagnosis of seizures not responding to antiepileptic drugs. (iii) To assess the contribution of bradycardia before pacemaker implantation in patients with suspected or certain reflex syncope presenting frequent or traumatic syncopal episodes (class IIa, level B). The diagnostic yield of ILR is variable depending on the examined population, ranging from 33% in the wider patient cohort to 88% in patients with a high probability of arrhythmic syncope.

During the last three years, new data has been published which has further substantiated the role of ILR in syncope evaluation. ILR may also disclose characteristic artifacts due to tonic-clonic movements during TLOC and normal cardiac rhythm, strongly suggesting epilepsy as the cause of TLOC. Apart from tachy- or bradyarrhythmia, ILR may disclose other, often unexpected, causes of syncope such as marked myocardial ischaemia causing hypotension and TLOC.

It has been also shown that extended ILR use gives additional diagnostic value in patients with unexplained syncope. In one study, the estimated cumulative diagnostic rates were 30%, 43%, 52% and 80% at one, two, three and four years, respectively. Thus, when after three years, the end of battery life of ILR is encountered and no syncope occurred during this period, a patient should be implanted with another ILR rather than being withdrawn from further long-term ECG monitoring.

References


27. Lelonek L, Zelazowska M, Pietrucha T.
