

The banner features a blue background with a red and white logo on the left containing the number '44' and a stylized heart. To the right of the logo, the text reads: "The 44<sup>th</sup> Annual International Congress of the EGYPTIAN SOCIETY OF CARDIOLOGY CardioEgy2017". On the far right, there is a graphic of a heart shape containing a cityscape and the dates "20-23 February 2017" and the location "Assiut".  
An aerial photograph of the Assiut University main building, a large, modern, multi-story structure with a central courtyard featuring a large, ornate fountain with multiple water jets.

**Syncope**  
**When to consult an electrophysiologist?**

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## Case

40-year-old male has come to his family physician for complaints of 2 episodes of transient loss of consciousness lasting for a few seconds. He got injured in the last episode. These spells were associated with increased sweating.



## Definition

Syncope is a **Transient loss of consciousness (T-LOC)** due to **transient global cerebral hypoperfusion** characterized by:

- rapid onset,
- short duration,
- and spontaneous complete recovery.



## Conditions incorrectly diagnosed as syncope

- **Disorders with partial or complete (LOC) but without cerebral hypoperfusion:**
  - Epilepsy,
  - Metabolic disorders including hypoglycemia, hypoxia, hyperventilation with hypocapnia,
  - Intoxication,
  - Vertebrobasilar TIA (Transient Ischemic Attack).
  
- **Disorders without impairment of consciousness:**
  - Cataplexy,
  - Drop attacks,
  - Falls,
  - Functional (psychogenic pseudosyncope),
  - TIA of carotid origin.



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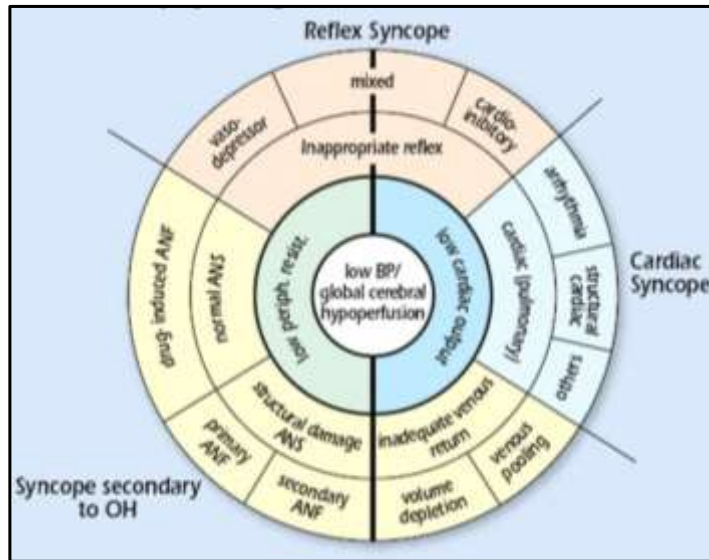
## Classification

<p><b>Reflex (neurally-mediated) syncope</b></p> <p><b>Vasovagal:</b></p> <ul style="list-style-type: none"> <li>- Mediated by emotional distress, fear, pain, instrumentation, blood phobia.</li> <li>- Mediated by orthostatic stress.</li> </ul> <p><b>Situational:</b></p> <ul style="list-style-type: none"> <li>- Cough, sneeze.</li> <li>- Gastrointestinal stimulation (swallow, defaecation, visceral pain).</li> <li>- Micturition (post-micturition).</li> <li>- Post-exercise.</li> <li>- Post-prandial.</li> <li>- Others (e.g., laughter, brass instrument playing, weightlifting).</li> </ul> <p><b>Carotid sinus syncope</b></p> <p><b>Atypical forms</b> (without apparent triggers and/or atypical presentation).</p>	<p><b>Syncope due to orthostatic hypotension</b></p> <p><b>Primary autonomic failure:</b></p> <ul style="list-style-type: none"> <li>- Pure autonomic failure, multiple system atrophy, Parkinson's disease with autonomic failure, Lewy body dementia.</li> </ul> <p><b>Secondary autonomic failure:</b></p> <ul style="list-style-type: none"> <li>- Diabetes, amyloidosis, uraemia, spinal cord injuries.</li> </ul> <p><b>Drug-induced orthostatic hypotension:</b></p> <ul style="list-style-type: none"> <li>- Alcohol, vasodilators, diuretics, phenothiazines, antidepressants.</li> </ul> <p><b>Volume depletion:</b></p> <ul style="list-style-type: none"> <li>- Haemorrhage, diarrhoea, vomiting, etc.</li> </ul>	<p><b>Cardiac syncope (cardiovascular)</b></p> <p><b>Arrhythmia as primary cause:</b></p> <p><b>Bradycardia:</b></p> <ul style="list-style-type: none"> <li>- Sinus node dysfunction (including brady-cardia/tachycardia syndrome).</li> <li>- Atrioventricular conduction system disease.</li> <li>- Implanted device malfunction.</li> </ul> <p><b>Tachycardia:</b></p> <ul style="list-style-type: none"> <li>- Supraventricular.</li> <li>- Ventricular (idiopathic, secondary to structural heart disease or to channelopathies).</li> </ul> <p><b>Drug induced bradycardia and tachyarrhythmias</b></p> <p><b>Structural disease:</b></p> <p><b>Cardiac:</b> cardiac valvular disease; acute myocardial infarction/ischaemia; hypertrophic cardiomyopathy; cardiac masses (atrial myxoma, tumors, etc); pericardial disease/tamponade; congenital anomalies of coronary arteries; prosthetic valves dysfunction.</p> <p><b>Others:</b> pulmonary embolus; acute aortic dissection; pulmonary hypertension.</p>
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## Pathophysiological basis of Classification



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## Frequency of the causes of syncope according to age

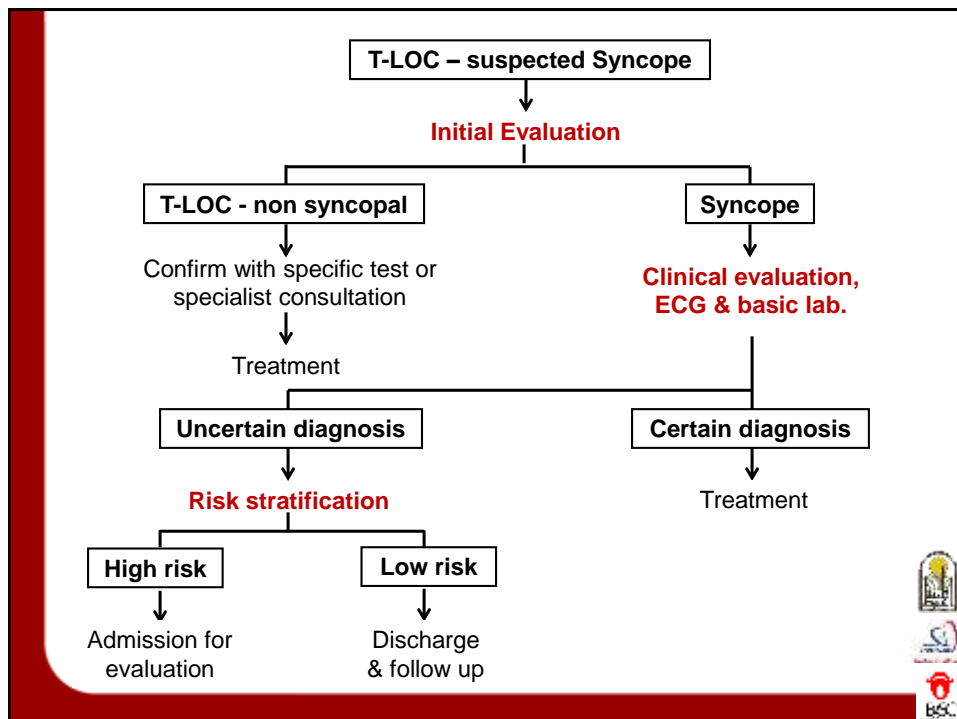
Age	Reflex %	OH %	CV %	Non-Sync. %	Unexplained %	Setting
< 40 yrs	51	2.5	1.1	18	27	ED & CPU
40-60 yrs	37	6	3	19	34	ED & CPU
< 65 years	68.5	0.5	12		19	CD
60/65 yrs	52	3	34		11	CD
	62	8	11		14	GD
	25	8.5	13	12.5	41	ED & CPU
> 75 yrs	36	30	16		9	GD

ED = emergency department  
 CPU = chest pain unit  
 CD = cardiology department  
 GD = geriatric department

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## Initial evaluation should answer three key questions:

- Is it a syncopal episode or not?
  - Was LOC complete?
  - Was LOC transient with rapid onset and short duration?
  - Did the patient recover spontaneously, completely and without sequelae?
  - Did the patient lose postural tone?
- Has the aetiological diagnosis been determined?
- Are there a high risk of cardiovascular events or death?



## Clinical features that can suggest a diagnosis on initial evaluation

### Cardiovascular syncope:

- Presence of definite structural heart disease
- Family history of unexplained sudden death or channelopathy
- During exertion, or supine
- Abnormal ECG

### Sudden

### ECG findings

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- Ni
- Pre-excited QRS complex
- Long or short QT interval
- Early repolarization
- RBBB pattern with ST-elevation in leads V1-V3 (Brugada syndrome)
- Negative T waves in right precordial leads, epsilon waves and ventricular late potentials suggestive of ARVC
- Q waves suggesting myocardial infarction

### Neurally mediated syncope:

- Absence of heart disease
- Long history of recurrent syncope
- After sudden unexpected unpleasant sight, sound, smell or pain
- Prolonged standing or crowded, hot places
- Nausea, vomiting
- During a meal or
- With head rotation, shaving, tight collars
- After exertion

### Syncope due to OH

- After standing up
- Temporal relationship with start or changes of dosage of vasodepressive drugs leading to hypotension
- Prolonged standing especially in crowded, hot places
- Presence of autonomic neuropathy or Parkinsonism
- Standing after exertion



## Risk stratification at initial evaluation

Study	Risk factors	Score	Endpoints	Results (validation cohort)
<b>S. Francisco Syncope Rule<sup>44</sup></b>	-Abnormal ECG -Congestive heart failure -Shortness of breath -Haematocrit <30% -Systolic blood pressure <90 mmHg	No risk = 0 item Risk = ≥1 item	Serious events at 7 days	98% sensitive and 56% specific
<b>Martin et al.<sup>45</sup></b>	-Abnormal ECG -History of ventricular arrhythmia -History of congestive heart failure -Age >45 years	0 to 4 (1 point each item)	1-year severe arrhythmias or arrhythmic death	0% score 0 5% score 1 16% score 2 27% score 3 or 4
<b>OESIL score<sup>41</sup></b>	-Abnormal ECG -History of cardiovascular disease -Lack of prodrome -Age >45 years	0 to 4 (1 point each item)	1-year total mortality	0% score 0 0.6% score 1 14% score 2 29% score 3 53% score 4
<b>EGSYS score<sup>43</sup></b>	-Palpitations before syncope (+4) -Abnormal ECG and/or heart disease (+3) -Syncope during effort (+3) -Syncope while supine (+2) -Autonomic prodrome* (-1) -Predisposing and/or precipitating factors* (-1)	Sum of + and - points	2-year total mortality  Cardiac syncope probability	2% score <3 21% score ≥3  2% score <3 13% score 3 33% score 4 77% score >4



## High risk criteria requiring hospitalization

- Severe structural or coronary artery disease (HF, low EF or prior MI).
- Clinical or ECG features suggesting arrhythmic syncope:
  - Syncope during exercise or supine.
  - Palpitations at the time of syncope.
  - Family history of Sudden cardiac death (SCD).
  - Non-sustained VT.
  - Bifascicular block (LBBB or RBBB combined with left anterior or left posterior fascicular block or other intraventricular conduction abnormalities with QRS duration  $\geq 120$  ms).
  - Inadequate sinus bradycardia ( $< 50$  bpm) or sino-atrial block in absence of negative chronotropic medications or physical training.
  - Pre-excited QRS complex.
  - Prolonged or short QT interval.
  - RBBB pattern with ST-elevation in leads V1-V3 (Brugada pattern).
  - Negative T waves in right precordial leads, epsilon waves and ventricular late potentials suggestive of ARVC.
  - Family history of SCD.
- Important co-morbidities (severe anemia, electrolyte disturbance).



## ESC GL recommendation of ECG monitoring

### • Indications:

- **ECG monitoring** is indicated in patients with clinical or ECG features suggesting arrhythmic syncope.
- **Immediate in-hospital monitoring** (in bed or telemetric) is indicated in high risk patients.
- **Holter monitoring** is indicated in patients with frequent syncope or presyncope ( $\geq 1$  per week).
- **ILR** is indicated in:
  - An early phase of evaluation in patients with recurrent syncope of uncertain origin, absence of high-risk criteria and high likelihood of recurrence within battery longevity of the device.
  - High-risk patients in whom a comprehensive evaluation did not demonstrate a cause of syncope or lead to a specific treatment.
- ILR should be considered to assess the contribution of bradycardia before to consider cardiac pacing in patients with suspected or certain reflex syncope presenting with frequent or traumatic syncopal episodes.
- External loop recorders should be considered in patients who have inter-symptom intervals  $\leq 4$  weeks.

Class	Level
I	B
I	C
I	B
I	B
I	B
IIa	B
IIa	B



- **Diagnostic criteria:**

- ECG monitoring is diagnostic when a correlation between syncope and an arrhythmia (tachy or brady) is detected.
- In the absence of such correlation ECG monitoring is diagnostic when periods Mobitz II or III degree AV block or a ventricular pause > 3 s\* or rapid prolonged paroxysmal SVT or VT are detected. The absence of arrhythmia during syncope excludes arrhythmic syncope.
- ECG documentation of presyncope without any relevant arrhythmia is not an accurate surrogate for syncope.
- Asymptomatic arrhythmias are an accurate surrogate for syncope.
- Sinus bradycardia (in absence of syncope) is not an accurate surrogate for syncope.

\* With possible exception of young trained persons, during sleep, medicated patients or rate-controlled fibrillation.

Class	Level
I	B
I	C
III	C
III	C
III	C



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## ESC GL recommendation of EPS

- **Indications:**

- In patients with ischaemic heart disease, EPS is indicated when initial evaluation suggests an arrhythmic cause of syncope unless there is already an established indication for ICD.
- In patients with BBB, EPS should be considered when non invasive tests failed to make the diagnosis.
- In patients with syncope preceded by sudden and brief palpitations non invasive tests failed to make the diagnosis.
- In patients with Brugada syndrome, ARVC and hypertrophic cardiomyopathy (in selected cases).
- In patients with high-risk occupations requiring to exclude a CV cause (in selected cases).
- EPS is not recommended in patients with normal ECG, no heart disease and no palpitations.

Class	Level
I	B
IIa	B
IIb	B
IIb	C
IIb	C
III	B



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- **Diagnostic criteria:**

- EPS is diagnostic and no additional tests are required in:
  - Sinus bradycardia and prolonged CSNRT (> 525 ms).
  - BBB and either a baseline HV interval of  $\geq 100$  ms, or 2nd or 3rd degree His-Purkinje block.
  - Induction of sustained monomorphic VT in patients with previous MI.
  - Induction of rapid SVT which reproduces hypotensive or spontaneous symptoms.
- An HV interval between 70 & 100 ms should be considered diagnostic.
- Induction of polymorphic VT or VF in patients with Brugada syndrome, ARVC & patients resuscitated from cardiac arrest may be considered diagnostic.
- Induction of polymorphic VT or VF in patients with ischaemic or DCM cannot be considered a diagnostic.

Class	Level
I	B
I	B
I	B
I	B
IIa	B
IIb	B
III	B



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## Conclusion

- Syncope is not uncommon.
- Cardiac syncope increase with age.
- Initial evaluation is important tool in diagnosis.
- Risk stratification assessment of major CV events or SCD is indicated in uncertain syncope.
- ECG monitoring is a procedure for diagnosing intermittent brady- and tachy-arrhythmias.
- EPS may be indicated after failure of non-invasive tests.



*Aim for any case of cardiology*



*Thank you*

