À LUZ DE EVIDÊNCIAS RECENTES, QUANDO DEVO SOLICITAR O TESTE DE INCLINAÇÃO PARA MEU PACIENTE?

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Orthostatic Intolerance Syndromes

Spectrum of symptoms and signals that occur in upright position or exercises.

- Dizziness; blurred vision
- Excessive fatigue
- Nausea; abdominal pain
- Headache
- Warmth; sweating
- Palpitations
- Instability
- Near syncope
- Syncope
Orthostatic Intolerance Syndromes

Syncope

• abrupt, transient, complete loss of consciousness,
• inability to maintain postural tone;
• rapid and spontaneous recovery;
• caused by cerebral hypoperfusion.

Unexplained syncope

• syncope is undetermined after an initial evaluation
  that includes history, physical examination and ECG.

Approach to Syncope

Even if there is no independent gold standard to diagnose syncope, there is strong consensus that the initial evaluation may lead to a diagnosis when the criteria of experts recommendations are met.

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)

Developed with the special contribution of the European Heart Rhythm Association (EHRA)
TLOC – WORK-UP

HYSTORY, PHYSICAL EXAMINATION, ECG, BP (SUPINE AND ORTHOSTATIC)

SYNCOPE
- DEFINIT ETIOLOGY
- SUSPECTED DIAGNOSIS
- UNEXPLAINED
  - TREATMENT
  - CARDIAC: CARDIAC TESTS VVS – TILT TABLE TEST LOOP RECORDER

NON-SYNCOPE
- OTHER TESTS AND OTHER SPECIALISTS
  - ISOLATED NORMAL HEART - OBSERVE RECURRENCE - RISK STRATIFICATION
More Often Factors Associated With Cardiac Syncope

- Older age (>60 y); male.
- Known ischemic or structural or congenital heart disease; previous arrhythmias.
- Brief prodrome (palpitations) or without prodrome.
- During exertion or in the supine position.
- Low number of syncope episodes (1 or 2).
- Abnormal cardiac examination.
- Family history of inheritable conditions or premature SCD (<50 y).
More Often Factors Associated With Non-cardiac, VV Syncope

- Young age; non cardiac disease.
- Standing position or positional change from supine to sitting or standing.
- Prodrome: nausea, vomiting, warmth; palpitations.
- Dehydration, pain, distressful stimulus, medical environment or procedures.
- Situational triggers: cough, laugh, micturition, defecation, deglutition.
- Frequent recurrence and prolonged history of syncope with similar characteristics.
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Syncope - how to approach?

**NEW / REVISED CLINICAL SETTINGS AND TESTS:**
- Tilt testing: concepts of hypotensive susceptibility
- Increased role of prolonged ECG monitoring
- Video recording in suspected syncope
- “Syncope without prodrome, normal ECG and normal heart” (adenosine sensitive syncope)
- Neurological causes: “ictal asystole”

**NEW / REVISED INDICATIONS FOR TREATMENT:**
- Reflex syncope: algorithms for selection of appropriate therapy based on age, severity of syncope and clinical forms
- Reflex syncope: algorithms for selection of best candidates for pacemaker therapy
- Patients at risk of SCD: definition of unexplained syncope and indication for ICD
- Implantable loop recorder as alternative to ICD, in selected cases

**OUT-PATIENT) SYNCOPE MANAGEMENT UNIT:**
- Structure: staff, equipment, and procedures
- Tests and assessments
- Access and referrals
- Role of the Clinical Nurse Specialist
- Outcome and quality indicators

**MANAGEMENT IN EMERGENCY DEPARTMENT:**
- List of low-risk and high-risk features
- Risk stratification flowchart
- Management in ED Observation Unit and/or fast-track to Syncope Unit
- Restricted admission criteria
- Limited usefulness of risk stratification scores

**2018 NEW/REVISED CONCEPTS in management of syncope**
The Value of Tilt Testing and Autonomic Nervous System Assessment


• An investigation into the hormonal changes of upright posture in CSS - most patients lost consciousness on the tilt table.

• Application of the tilt protocol to a group of patients with unexplained syncope after exhaustive investigation - the majority lost consciousness.

• An age-matched control group with no history of syncope was tested - a minority of them lost consciousness.

• **First paper in Lancet 1986 – R. A Kenny and R. Sutton.**
Along the 20 years after its introduction, Syncope has emerged as a subspecialty of arrhythmias and electrophysiology.

Tilt testing contributed to identify mechanisms of OI never studied before.

Efforts were made to establish the best methodology.

2000: ILR (ISSUE Studies) demonstrated that diagnostic accuracy of registering spontaneous events was much more precise than those forced on tilt testing.

But.....ISSUE 3 sub-analysis: CI response to tilting is predictive of spontaneous asystole.
Use of an implantable loop recorder to the diagnostic yield in unexplained syncope.

**Figure 3** Time-Dependent Cumulative Diagnostic Yield of ILR
The Value of Tilt Testing and Autonomic Nervous System Assessment

- Is a noninvasive and low cost test.
- Increases the patient’s confidence - medical witness of the event.
- Identify conditions difficult for most physicians to separate from reflex VVS:

  1. POTS - overlaps with vasovagal syncope (30%) and its management is different.
  2. Orthostatic hypotension – management is different.
  3. Psychogenic pseudo-syncope – management is different.
THE PLACE OF TILT TESTING

Tilt testing continues to have an important role in making diagnoses that are difficult for non-experts and also for experts in syncope, like cases of POTS, orthostatic hypotension, psychogenic pseudosyncope and some cases of clinically uncommon VVS.
Practical Instructions for the 2018 ESC Guidelines for the diagnosis and management of syncope

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Developed with the special contribution of the European Heart Rhythm Association (EHRA)

Michele Brignole* (Chairperson) (Italy), Angel Moya* (Co-chairperson) (Spain)
Reflex syncope
AUTONOMIC EVALUATION
Hemodynamic Parameters
Classical OH

- decrease in systolic BP ≥20 mmHg, diastolic BP ≥10 mmHg, or a decrease in systolic BP to <90 mmHg within 3 min of active standing or head-up tilt.

- Orthostatic HR increase is blunted in neurogenic OH (usually <10 bpm).

- Orthostatic HR increase is preserved, or even enhanced, in OH due to hypovolemia.

- Classical OH may be symptomatic or asymptomatic - depends more on the absolute BP level than the magnitude of the fall and on a key role of cerebral autoregulation.
Tilting Test and OI Syndromes

**Initial OH** – within 15 s of active standing or tilting

- BP decrease of >40 mmHg for systolic BP and/or >20 mmHg for diastolic BP with spontaneously recovery <40 s
- The rate at which BP climbs after fall on standing up has important prognostic consequences: impaired recovery represents a negative prognostic factor in the elderly (cerebral chronic hypoperfusion)

**Delayed OH** - beyond 3 min of tilting or active standing.

- The absence of bradycardia differentiate delayed OH from reflex syncope.
- The decrease in central blood volume caused by delayed OH may induce reflex syncope.
Tilting Test and OI Syndromes

POTS

• Severe orthostatic intolerance and a marked orthostatic HR increase (>30 bpm, or >120 bpm within 10 min of standing or head-up tilt in the absence of OH).

• Is frequently associated with:
  
  spectrum of non-specific symptoms,
  
  headache and chest pain,
  
  chronic fatigue syndrome,
  
  joint hypermobility syndrome.

• The pathophysiology is heterogeneous: deconditioning, immune-mediated processes, excessive venous pooling, or hyperadrenergic state.
Tilt testing has good sensitivity and specificity for patients with true VVS or without a history of syncope. Tilt testing is positive in 51–56% of patients with atypical clinical symptoms suggesting a reflex mechanism, in 30–36% with unexplained syncope after full investigation, and in 45–47% with true cardiac arrhythmic syncope. In these patients, a positive tilt test reveals a susceptibility to orthostatic stress. This hypotensive susceptibility plays a role in causing syncope irrespective of the etiology and mechanism. This concept has practical implications for therapy.

<table>
<thead>
<tr>
<th>Tilt testing: positivity rate</th>
<th>Typical VVS, emotional trigger (Clom)\textsuperscript{126}</th>
</tr>
</thead>
<tbody>
<tr>
<td>92%</td>
<td>Typical VVS, situational trigger (TNG)\textsuperscript{126}</td>
</tr>
<tr>
<td>78%</td>
<td>Typical VVS, miscellaneous (Clom)\textsuperscript{124} (TNG)\textsuperscript{127}</td>
</tr>
<tr>
<td>73%–65%</td>
<td>Likely reflex, atypical (TNG)\textsuperscript{128,129}</td>
</tr>
<tr>
<td>56%–51%</td>
<td>Cardiac syncope (TNG)\textsuperscript{129}</td>
</tr>
<tr>
<td>47%</td>
<td>Likely tachyarrhythmic syncope (Passive)\textsuperscript{130}</td>
</tr>
<tr>
<td>45%</td>
<td>Unexplained syncope (TNG)\textsuperscript{126,127} (Clom)\textsuperscript{126}</td>
</tr>
<tr>
<td>36%–30%</td>
<td>Subjects without syncope (Passive)\textsuperscript{125} (Clom)\textsuperscript{124} (TNG)\textsuperscript{106}</td>
</tr>
<tr>
<td>13%–8%</td>
<td></td>
</tr>
</tbody>
</table>
### Change in Recommendations 2009 vs 2018

**2009**
- Contraindications to CSM
- Tilt testing: indication for syncope
- Tilt testing for educational purposes
- Tilt testing: diagnostic criteria
- Tilt testing for assessing therapy
- Holter for unexplained syncope
- ECG monitoring: presyncope & asymptomatic arrhythmias
- Adenosine trisphosphate test
- EPS-guided pacemaker: prolonged SNRT
- EPS-guided pacemaker: HV >70 ms
- Empiric pacing in bifascicular block
- Therapy of reflex syncope: PCMT
- Therapy of OH: PCMT
- Therapy of OH: abdominal binders
- Therapy of OH: head-up tilt sleeping
- Syncope & SVT/VT: AA drugs

**2018**
- Syncope & AF: catheter ablation
- Expert opinion
- ICD: LVEF >35% and syncope
- Syncope & high risk HCM: ICD
- Syncope & ARVC: ICD
- Psychiatric consultation for PPS
- Expert opinion

### 2018 New Recommendations (only major included)

**Management of syncope in ED (section 4.1.2)**
- Low-risk: discharge from ED
- High-risk: early intensive evaluation in ED, SU versus admission
- Neither high or low: observation in ED or in SU instead of being hospitalized

**Video recording (section 4.2.5):**
- Video recordings of spontaneous events

**ILR indications (section 4.2.4.7):**
- In patients with suspected unproven epilepsy
- In patients with unexplained falls

**ILR indications (section 5.6):**
- In patients with primary cardiomyopathy or inheritable arrhythmogenic disorders who are at low risk of sudden cardiac death, as alternative to ICD
## Tilt testing

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Classa</th>
<th>Levelb</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tilt testing should be considered in patients with suspected reflex syncope, OH, POTS, or PPS.</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>Tilt testing may be considered to educate patients to recognize symptoms and learn physical manoeuvres.</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td><strong>Diagnostic criteria</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reflex syncope, OH, POTS, or PPS should be considered likely if tilt testing reproduces symptoms along with the characteristic circulatory pattern of these conditions.</td>
<td>IIa</td>
<td>B</td>
</tr>
</tbody>
</table>

### Additional advice and clinical perspectives

- A negative tilt table response does not exclude a diagnosis of reflex syncope.
- While sensitivity and specificity are at acceptable levels when measured in patients with VVS and healthy controls, in usual clinical settings of syncope of uncertain origin tilt testing suggests the presence of a hypotensive susceptibility, which may exist not only in reflex syncope but also with other causes of syncope including some forms of cardiac syncope. The concept of hypotensive susceptibility rather than diagnosis has important practical utility, because the presence or absence of hypotensive susceptibility plays a major role in guiding pacemaker therapy in patients affected by reflex syncope and in the management of hypotensive therapies, which are frequently present in the elderly with syncope (see sections 5.1 and 5.2).
- A positive cardioinhibitory response to tilt testing predicts, with high probability, asystolic spontaneous syncope; this finding is relevant for therapeutic implications when cardiac pacing is considered (see section 5.2.6). Conversely, the presence of a positive vasodepressor, a mixed response, or even a negative response does not exclude the presence of asystole during spontaneous syncope.
- Tilt testing may be helpful in separating syncope with abnormal movements from epilepsy.
- Tilt testing may have value in distinguishing syncope from falls.
- Tilt testing may be helpful in separating syncope from PPS. In suspected PPS, the tilt test should preferably be performed together with EEG monitoring; a normal EEG helps to confirm the diagnosis. In the absence of an EEG, a video recording will be helpful in confirming the diagnosis.
- Tilt testing should not be used to assess the efficacy of a drug treatment.

EEG = electroencephalogram; OH = orthostatic hypotension; POTS = postural orthostatic tachycardia syndrome; PPS = psychogenic pseudosyncope; VVS = vasovagal syncope.

*aClass of recommendation.

*bLevel of evidence.
SYNCOPE UNIT – INCOR – since 1990 – dedicated staff

Autonomic Lab; out-patient unit, emergency facility; in-patient facility; monitoring, EP Lab.
Obrigada!
Pacing for reflex syncope: decision pathway

Clinical features

Severe, recurrent unpredictable syncope, age >40 years?

No → Pacing not indicated

Yes

Perform CSM & tilt table test

CI-CSS?

Yes → Implant a DDD PM

No → Implant a DDD PM & counteract hypotensive susceptibility

Asystolic tilt testing?

Yes → Implant a DDD PM & counteract hypotensive susceptibility

No → Implant ILR

Asystole?

Yes & Tilt negative → Implant a DDD PM

Yes & Tilt positive → Implant a DDD PM & counteract hypotensive susceptibility

No → Pacing not indicated

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Tilting Test and OI Syndromes
Tilting Test and OI Syndromes
Tilting Test and OI Syndromes

Example #2 of classical orthostatic hypotension

Example of delayed orthostatic hypotension
Tilting Test and OI Syndromes

Example of psychogenic pseudosyncope

Example of Postural Orthostatic Tachycardia Syndrome