Outpatient workup of syncope

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What is it?

Reversible loss of consciousness and inability to maintain postural tone
• Causes
• Evaluation
Causes of True Syncope

Non-cardiac

- Neurally-Mediated
  - VVS
  - CSS
  - Situational
    - Cough
    - Post-Micturition
  - 20%

Orthostatic

- Drug-Induced
  - 5%
- ANS Failure
  - Primary
  - Secondary
  - 10%
- 15%

Cardiac

Arrhythmia

- Brady
  - SAN Dysfunction
  - AV Block
- Tachy
  - VT
  - SVT
  - 10-20%

Structural Cardio-Pulmonary

- Acute Myocardial Ischemia
- Aortic or mitral Stenosis
- HCM
- Pulmonary Hypertension
- Aortic Dissection
- etc
  - 10-15%

Unexplained Causes = Approximately 1/3
Figure 1: Rates of Syncope According to Age and Sex.

The rates of syncope per 1000 person-years of follow-up increased with age among both men and women. The increase in the incidence rate was steeper starting at the age of 70 years. Syncope rates were similar among men and women.
## Causes of Syncope by Age

### Younger Patient
- Vasovagal
- Situational
- Psychiatric
- Long QT*
- Brugada syndrome*
- WPW syndrome*
- RV dysplasia*
- Hypertrophic cardiomyopathy*
- Catecholaminergic VT
- Other genetic syndromes

### Older Patient
- Cardiac**
  - Mechanical
  - Arrhythmic
- Orthostatic hypotension
- Drug-induced
- Neurally mediated
- Multifactorial

*Underlined: benign
*Rare, not benign
**Not benign
Figure 3: Causes of Syncope by Age

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Evaluation

• What happened?
• How much do I need to worry?
• Additional testing?
• Treatment (or not)
## Diagnostic Assessment: Yields

(N=341\(^1\) to 433\(^2\))

<table>
<thead>
<tr>
<th>Initial Evaluation</th>
<th>Yield (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>History, Physical Exam, ECG, Carotid Massage</td>
<td>38-40</td>
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</table>

<table>
<thead>
<tr>
<th>Other Tests/Procedures</th>
<th>Yield (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Cardiac Monitoring</td>
<td>5-13</td>
</tr>
<tr>
<td>Insertable Loop Recorder (ILR)</td>
<td>43-88(^3)-5</td>
</tr>
<tr>
<td>EP Study</td>
<td>2-15</td>
</tr>
<tr>
<td>Exercise Test</td>
<td>0.5</td>
</tr>
<tr>
<td>EEG</td>
<td>0.3-0.5</td>
</tr>
<tr>
<td>MRI</td>
<td>No data available(^6)</td>
</tr>
</tbody>
</table>
How Not to Evaluate Syncope\textsuperscript{1}

Low Yield, High Cost

- CT scan
- Carotid dopplers
- EEG
- Neurology consult – 0-4\% diagnostic yield\textsuperscript{2,3} (head CT scan, carotid Doppler)
- Psychiatric consultation
- Cardiac enzymes

\textsuperscript{3} Kapoor W. JAMA. 1992;268:2553-2560
History

• What happened?
  • Setting
  • Premonitory symptoms
  • Symptoms after recovery
  • Bystander observations
  • Recent events
Setting

- Activity at time
  - Driving, going to bathroom, blood draw, standing at attention, sitting on plane, sitting at rest, eating, during exercise, post-exercise

- Temperature
  - Hot/cold, comfortable/uncomfortable

- Emotional state
Symptoms

• Onset (sudden or gradual)
• Pain (chest, abdominal)
• Palpitations
• Nausea
• Diaphoresis
• Flushed
• Loss of continence
• Confusion
Bystander Observations

- In distress?
- Flushed/pale
- Confused
- Tonic-clonic movements
Anything else, dear?

- Recent medication changes
- Recent procedures/surgery
- Recent illnesses
- Stressful events
History

• Past Medical History
  • Cardiovascular disease
  • Seizure disorder
  • Prior episodes

• Family History
  • Arrhythmia
  • SCD
  • Premature heart disease
Physical Exam

- Vitals incl orthostatics
- Murmurs, rales, other evidence for heart disease
- Bruits
- Carotid sinus massage
Basic testing

- ECG
- Chem 7, CBC
ECG findings suggesting possible arrhythmic cause

- Persistent sinus bradycardia or slow AF <40 beats per minute or sinus pauses >3 seconds in an awake patient
- Mobitz II second degree AV block
- Third degree (complete) AV block • Alternating left and right bundle branch block
- VT or paroxysmal supraventricular tachycardia with rapid ventricular rate
- Long QT or Brugada pattern
- Ventricular pre-excitation (WPW)
- Pacemaker or implantable cardioverter-defibrillator malfunction with cardiac pauses
Case #1

Beth Israel Deaconess Medical Center
http://ecg.bidmc.harvard.edu
Brugada Syndrome

Male 39 years
Ventricular Pre-excitation (WPW)

Case #97

Beth Israel Deaconess Medical Center
http://ecg.bidmc.harvard.edu
SR+1°AVB+IVCD
3° AVB

Case #268

Beth Israel Deaconess Medical Center
http://ecg.bidmc.harvard.edu
ECG findings suggesting possible structural heart disease

- Bundle branch block/IVCD
- Mobitz I second degree AV block
- Negative T waves in right precordial leads, epsilon waves suggestive of arrhythmogenic right ventricular cardiomyopathy
- Left ventricular hypertrophy with secondary changes suggesting hypertrophic cardiomyopathy
Next steps depend on risk assessment
Reasons to worry

• Suspected/known ‘significant’ heart disease
• ECG abnormalities suggesting potential life-threatening arrhythmic cause
• Syncope during exercise
• Severe injury or accident
• Family history of premature sudden death

Reasons not to worry

- Clearly situational vagal
- Multiple episodes over years
- Orthostatic, e.g. syncope after exertion
Other Tests

- Echocardiogram if indicated
- Ischemia workup if indicated
- Ambulatory monitoring if indicated
- Tilt table testing
Outcome in 60 patients randomized to a primary diagnostic strategy of prolonged cardiac monitoring compared with conventional testing with an external loop recorder and tilt and electrophysiologic testing for investigation of syncope

Rhythm Monitoring Options

- **12-Lead**: 10 Seconds
- **Holter Monitor (non-lead and loop)**: 2 Days
- **ILR**: 7-30 Days, 10-20% yield
  
Holter Monitor?

Almost Never
External Loop Recorder

- Diagnostic Yield—20%
- Non-invasive method of cardiac monitoring
- Most effective in patients with recurrent events that are relatively frequent
- Depending on type, patient must be conscious to activate the unit
- Capturing episodes may be difficult for the very young and very old
- Human error limited diagnostic efficacy in up to 32% of patients

Insertable Loop Recorder (ILR)

- Diagnostic Yield — 43%-88%\(^1-3\)
- Captures an ECG *during* the syncopal episode\(^2\)
- Helpful in patients with infrequent symptoms\(^2\)
- May be useful for the very young, very old, and non-compliant

\(^1\)Krahn A. *Circ.* 1999;99:406.
\(^2\)Krahn A. *Circ.* 2001;104:46.
\(^3\)Krahn A. *Am Heart J.* 1999;137:870.
Cardiac Rhythms During Unexplained Syncope

Composite: N=133 to 7109

- No Recurrence: 36% (31-48%)
- Normal Sinus Rhythm: 31% (17-44%)
- Bradycardia: 16% (11-21%)
- Tachycardia: 6% (2-11%)
- Other: 11%
- Arrhythmia: 22% (13-32%)

Krahn AD. PACE. 2002;25:37-41
Medtronic ILR Replacement Data. FY03, 04. On file.
Syncope-BLOT

- History is most important diagnostic tool
- Benign etiologies are most common
- Pt’s with cardiac disease are at highest risk
- If ECG normal and history and exam point to vagal or orthostatic syncope, treat empirically and follow clinically
- If H&P inconclusive but low risk, consider echo and minimum 2 weeks ambulatory monitoring
- If H&P inconclusive and suggest more menacing etiology, consider referral to cardiology
“When I give a lecture, I accept that people look at their watches, but what I do not tolerate is when they look at it and raise it to their ear to find out if it has stopped.”-Marcel Archard