Syncope Review

Nathaniel Shekem, PA-C
University of Iowa
Department of Emergency Medicine

Objectives

- Define syncope
- Discuss three common causes of syncope
- Discuss an appropriate work up for syncope
- Review “can’t miss” presentations of syncope
- Discuss risk stratification for explained and unexplained syncope
- Review treatments of syncope

Syncope

- Abrupt complete loss of consciousness and postural tone
- Due to transient global cerebral hypoperfusion
- Transient with short duration and complete spontaneous recovery
Epidemiology

- 1-3% of ER visits
- 1-3% of hospital admissions
- 3-37% lifetime prevalence
- First peak 10-30 y/o
- Second peak after 65 y/o

Three Causes of Syncope

- Reflex mediated 20%
- Cardiac 10%
- Orthostatic 10%
- Unknown 40%
Patient arrives after LOC...

- ALL patients get
  - Thorough history
  - Complete physical exam
  - EKG
  - +/- POC glucose
Pathophysiology

10 seconds of complete disruption
35-50% reduction cerebral perfusion

Blood pressure

Heart Rate
Cardiac Output

Reflex Mediated Syncope

- Triggered by inappropriate cardiovascular reflexes that produce hypotension and/or bradycardia
- Young, healthy person that becomes nauseous, sweaty, light-headed with tunnel vision and abdominal pain after prolonged standing exposed to pain, fear, anxiety

Vasovagal Syncope

- Prolonged standing 37%, hot weather 42%, lack of food 23%, fear/anxiety 21%, pain 14%

Reflex Mediated Syncope

- Triggers
  - Vasovagal
  - Carotid sinus syndrome/hypersensitivity
  - Situational
Reflex Mediated Syncope

• Diagnosis
  – Stop with typical history, benign exam, normal EKG, no heart disease or other red flags
  – Tilt table testing (Sns 26-80%, Spc 90%) for vasovagal
  – Outpatient cardiac rhythm monitoring
Reflex Mediated Syncope

- Treatment
  - Reassurance
  - Avoid triggers
  - Counterpressure maneuvers
  - Midodrine
  - Pacemaker
  - Severe recurrent cardioinhibitory reflex syncope

Cardiac Syncope

- Structural cardiopulmonary disease
  - Valvular, cardiomyopathy, congenital, pericardial, MI/ischemia, pericardial, PE, pulm htn, dissection
- Dysrhythmias
  - Tachyarrhythmia, bradyarrhythmia, AV dysfunction, channelopathies

- Most likely to causes syncope
  - Ventricular tachycardia
  - SVT with accessory pathway
  - Sinus bradycardia (less than 35 BPM)
  - Sinus pauses (greater than 3 seconds)
  - Heart block (second or third degree)
  - Atrial fibrillation with slow ventricular response
Cardiac Syncope

- 1 year mortality 18-33%
- Mortality increases with severity of heart disease
  - CHF 1-2, OR 7.7
  - CHF 3-4 13.5
- With dilated cardiomyopathy, 30% of subsequent SCD from presumed arrhythmogenesis

Cardiac Syncope

- History
  - CAD, HF, valvular disease, family history, exertional syncope, supine/sitting syncope, risk factors for cardiovascular disease
  - CP, SOB, palpitations preceding syncope
- Exam
  - HR, BP, palpitations, S3 gallop, JVD/edema, crackles, murmur

EKG in syncope

- Yield is about 5%, but non-invasive, inexpensive and helps risk stratify
- Without typical features of reflex or orthostatic hypotension, an abnormal EKG increases the odds ratio of cardiac arrhythmia OR 23.5
Intraventricular Conduction Delay

- QRS duration > 120 seconds
  - LBBB, RBBB, LAFB, LPFB
  - Left or right ventricular hypertrophy
  - Dilated cardiomyopathy
  - Hyperkalemia
  - Sodium-channel blocker toxicity
  - WPW
  - Brugada
  - ARVD
AV Block: 2nd degree, Mobitz II

AV block: 3rd degree (complete heart block)

Sinus Bradycardia

Sinus Node Dysfunction (Sick Sinus Syndrome)
Other Testing for Cardiac Syncope

- Echocardiogram
  - LV function (EF), cardiac structure, valvular function
- Exercise stress testing with EKG
  - CP or SOB with syncope, exertional syncope
- Cardiac monitoring
  - Telemetry, Holter, ELR, ILR
- Electrophysiological tests
  - Unexplained syncope with prior MI, structural heart disease, impaired LV function, SN/AV/bifascicular block
  - Elicit tachyarrhythmia and find accessory pathways
### Orthostatic Hypotension

- 20% of patients over the age of 75
  - 54—68% institutionalized vs 6% community dwelling
- Occurs in response to sudden postural change
  - Prodromal symptoms similar to reflex mediated symptoms
- Often exacerbated by prolonged standing, exertion, warm temperatures and meals

### Causes of Orthostatic Hypotension

- Hypovolemia
  - Dehydration, blood loss
- Autonomic insufficiency
  - Primary, secondary, prolonged immobilization
- Medications
  - BB/AB, CCB, ACE/ARB, diuretics, nitro/PDEI, psych
- Post-prandial
  - Especially large carbohydrate meal and alcohol

### Orthostatic Vital Signs

- Greater than 20 mm Hg decrease in systolic or 10 mm Hg diastolic pressure within three minutes of standing
- Greater than 30 BPM increase in pulse within 3 minutes of standing (Sns 97% and Spc 98% for large volume loss)
- Neither BP or HR is sensitive for moderate volume loss

### Autonomic Nervous System Testing

- Objective evidence of autonomic failure and predisposition to neurally mediated syncope
- Parasympathetic Nervous System
  - Heart rate variability with deep inspiration and Valsalva
- Sympathetic Cholinergic Function
  - Thermoregulatory sweat response, quantitative sudomotor axon reflex test
- Sympathetic Adrenergic Function
  - Blood pressure response to Valsalva and tilt table test with beat to beat blood pressure measurement
Treatment for Orthostatic Hypotension

- NS bolus
- Increase PO water and salt intake
- Blood transfusion for acute blood loss
- Discontinue offending medication
- Stand up slowly, avoid large meals, avoid excessive heat, waist high support hose
- Midodrine

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**Is it true syncope?**

- Transient LOC with return to baseline neurologic function

**History, examination, investigation of other symptoms, ECG**

**Appropriate management**

- Syncope with other cause
- Syncope cause?

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**Serious cause?**

- High risk, discharge
- Serious cause?
- Admission for evaluation and cardiac monitoring

**High risk**

- Admission for evaluation and cardiac monitoring
- No
- Low risk and discharge

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**Serious discharge?**

- Neurocardiogenic syndrome
- Carotid sinus
- Miscellaneous

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**Risk stratification**

- Low risk and discharge
- High risk
- Admission for evaluation and cardiac monitoring
### Other Syncope “Can’t Miss” Diagnoses

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palpitations before syncope</td>
<td>-4</td>
</tr>
<tr>
<td>Abnormal ECG and heart disease</td>
<td>+3</td>
</tr>
<tr>
<td>Syncope during effort</td>
<td>+3</td>
</tr>
<tr>
<td>Syncope while supine</td>
<td>+2</td>
</tr>
<tr>
<td>Arrhythmia documented</td>
<td>+1</td>
</tr>
<tr>
<td>Pre-existing and unprovoked syncope</td>
<td>-1</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Score</th>
<th>1 Y Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2</td>
<td>2%</td>
</tr>
<tr>
<td>2 - 3</td>
<td>22%</td>
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</table>

<table>
<thead>
<tr>
<th>Total Score</th>
<th>Cardiac Syncope</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5</td>
<td>2%</td>
</tr>
<tr>
<td>5 - 8</td>
<td>13%</td>
</tr>
<tr>
<td>&gt; 8</td>
<td>33%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Syncope Rule</th>
<th>Outcome</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>NPV</th>
<th>PPV</th>
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</thead>
<tbody>
<tr>
<td>Medium Syncope Criteria</td>
<td>30%</td>
<td>51%</td>
<td>98%</td>
<td>95%</td>
<td>8%</td>
</tr>
<tr>
<td>DESL Risk Score</td>
<td>Cardiac Syncope</td>
<td>98%</td>
<td>53%</td>
<td>97%</td>
<td>97%</td>
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<tr>
<td>San Francisco Syncope Rule</td>
<td>30%</td>
<td>51%</td>
<td>98%</td>
<td>95%</td>
<td>8%</td>
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<tr>
<td>ROSE Risk Score</td>
<td>Cardiac Syncope</td>
<td>87.5%</td>
<td>66.5%</td>
<td>98.5%</td>
<td>16.5%</td>
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<tr>
<td>ROSE Score</td>
<td>Cardiac Syncope</td>
<td>95%</td>
<td>61%</td>
<td>99%</td>
<td>33%</td>
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</tbody>
</table>
Syncope Versus Seizure

• Classic seizure
  – Aura, loss of postural tone, tonic-clonic activity, incontinence, and prolonged post-tictal period
• 90% of syncopal episodes are are associated with myoclonic jerks

Differential Diagnosis

• Seizure
• Neurologic
• Hypoglycemia
• Trauma
• Intoxication
• Cataplexy
• Psychiatric

Syncope Versus Seizure Table

<table>
<thead>
<tr>
<th>Clinical Feature</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>LR+</th>
<th>LR-</th>
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<tbody>
<tr>
<td>Cut tongue</td>
<td>45</td>
<td>97</td>
<td>1.5</td>
<td>0.57</td>
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<tr>
<td>Head turning</td>
<td>43</td>
<td>97</td>
<td>1.4</td>
<td>0.55</td>
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<tr>
<td>Unusual posturing</td>
<td>35</td>
<td>97</td>
<td>1.2</td>
<td>0.67</td>
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<tr>
<td>Salivation</td>
<td>24</td>
<td>94</td>
<td>6.4</td>
<td>0.72</td>
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<tr>
<td>Lying on back noted by others</td>
<td>89</td>
<td>80</td>
<td>9.8</td>
<td>0.35</td>
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<tr>
<td>Persisting bending</td>
<td>20</td>
<td>94</td>
<td>4.0</td>
<td>0.72</td>
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<tr>
<td>Predominant precocious</td>
<td>1</td>
<td>90</td>
<td>4.0</td>
<td>0.54</td>
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<tr>
<td>Predominant hallucinations</td>
<td>8</td>
<td>90</td>
<td>4.0</td>
<td>0.94</td>
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<tr>
<td>Posterior occlusion</td>
<td>84</td>
<td>80</td>
<td>3.3</td>
<td>0.06</td>
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</tbody>
</table>
Differential Diagnosis

- Seizure
- Neurologic
- Hypoglycemia
- Trauma
- Intoxication
- Cataplexy
- Psychiatric

Explain It To Your Patients

10 seconds of complete disruption
35-50% reduction cerebral perfusion

Heart Rate
Cardiac Output
Blood pressure

Questions?