Palpitations, Syncope, Chest Pain

Fran Stier, ANP, ACNP-BC
Heart Health Care, LLC

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Medtronics
• Palpitations
• Palpitations & CP
• CP
• Palp. CP and Syncope
• CP & Syncope
Palpitations

- Heart flip-flopping
- Heart fluttering
- Skipping beats
- Pounding esp. while lying on left-side
- Sensation of pulsation in neck
Patient History

- Hypertension
- Thyroid Disease
- Electrolyte Disorder
- Neuropsychiatric disorder
- Sarcoidosis, Amyloidosis
Cardiovascular History

- Ischemic Heart Disease
- Valvular Heart Disease
- Preexcitation/WPW
- Long-QT Syndrome
- Rheumatic heart disease
- Heart Failure/cardiomypathy
Social History

• ETOH
• Caffeine
• Tobacco
• Illicit drug
• Stress
Family History

- CV disease
- Sudden Cardiac death
- Arrhythmias
<table>
<thead>
<tr>
<th>Category</th>
<th>Example Drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>α-Adrenergic agonist</td>
<td>Phenylephrine</td>
</tr>
<tr>
<td>Phenylpropanolamine</td>
<td>Endocrine</td>
</tr>
<tr>
<td>Phenylephrine</td>
<td>Thyroxine</td>
</tr>
<tr>
<td>β-Adrenergic agonist</td>
<td>Anticholinesterase</td>
</tr>
<tr>
<td>Terbutaline</td>
<td>Physostigmine</td>
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<tr>
<td>Isoproterenol</td>
<td>Neostigmine</td>
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<tr>
<td>Albuterol</td>
<td>Antimuscarinic</td>
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<tr>
<td>Methylxanthine</td>
<td>Atropine</td>
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<tr>
<td>Theophylline</td>
<td>Scopolamine</td>
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<tr>
<td>Psychoactive</td>
<td>Illicit</td>
</tr>
<tr>
<td>Phenothiazines</td>
<td>Amphetamine</td>
</tr>
<tr>
<td>Tricyclics</td>
<td>Cocaine</td>
</tr>
</tbody>
</table>

*Partial listing of more commonly associated drugs.*
Risk Stratification
Low Risk

- No Structural Heart Disease
- No history of near-syncope or syncope
- No evidence of myocardial ischemia
- Preserved left ventricular function
Risk Stratification
High Risk

- Structural Heart Disease
- History of syncope
- Left ventricular ejection fraction < 40% or symptomatic heart failure
- CAD
- Conduction system disease
- Long-QT syndrome
- WPW syndrome
Table 6 Evaluation of arrhythmias in patients with palpitations

<table>
<thead>
<tr>
<th>Arrhythmias that generally do not require extensive evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinus bradycardia</td>
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<tr>
<td>Sinus arrhythmia</td>
</tr>
<tr>
<td>Isolated atrial premature beats</td>
</tr>
<tr>
<td>Isolated ventricular premature beats</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Arrhythmias that may require more extensive evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tachy-brady syndrome</td>
</tr>
<tr>
<td>Atrioventricular nodal reentrant tachycardias</td>
</tr>
<tr>
<td>Atrioventricular reciprocating tachycardias</td>
</tr>
<tr>
<td>Nonsustained ventricular tachycardia</td>
</tr>
<tr>
<td>Prognostically important ventricular premature beats (couplets, triplets, multiform, R-on-T beats, very frequent beats)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Arrhythmias that generally require further evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistent atrial or sinus tachycardia</td>
</tr>
<tr>
<td>Preexcitation/Wolff-Parkinson-White syndrome</td>
</tr>
<tr>
<td>Atrial fibrillation/atrial flutter</td>
</tr>
<tr>
<td>Sustained ventricular tachycardia</td>
</tr>
</tbody>
</table>
Evaluation of Arrhythmias

• Benign
  – Sinus Bradycardia
  – Sinus Arrhythmia
  – Isolated atrial premature beats
  – Isolated ventricular premature beats
Evaluation of Arrhythmias

• Arrhythmias that *may* require more extensive evaluation:
  – Tachy-brady syn.
  – AVNRT
  – AV reciprocating tachycardias
  – Nonsustained VT
  – PVCs: couplets, R-on-T, triplets, multiform
Evaluation of Arrhythmias

• Arrhythmias requiring evaluation:
  – Persistent atrial or sinus tachycardia.
  – Preexcitation/ WPW
  – Atrial fibrillation/atrial flutter
  – Sustained VT
What to do with Palpitations?

- Rule-in Low risk
- Rule-out High Risk
Transient Loss of Consciousness (TLOC)
Classification of Transient Loss of Consciousness (TLOC)

Real or Apparent TLOC

Syncope
- Neurally-mediated reflex syndromes
- Orthostatic hypotension
- Cardiac arrhythmias
- Structural cardiovascular disease

Disorders Mimicking Syncope
- With loss of consciousness, i.e., seizure disorders, concussion
- Without loss of consciousness, i.e., psychogenic “pseudo-syncope”

Syncope – A Symptom, Not a Diagnosis

- Self-limited loss of consciousness and postural tone
- Relatively rapid onset
- Variable warning symptoms
- Spontaneous, complete, and usually prompt recovery without medical or surgical intervention

Underlying mechanism is transient global cerebral hypoperfusion.

Causes of True Syncope

**Neurally-Mediated**
1. VVS
2. CSS
3. Situational
   - Cough
   - Post-Micturition

**Orthostatic**
2. Drug-Induced
3. ANS Failure
   - Primary
   - Secondary

**Cardiac Arrhythmia**
3. Brady
   - SN Dysfunction
   - AV Block
3. Tachy
   - VT
   - SVT
3. Long QT Syndrome

**Structural Cardio-Pulmonary**
4. Acute Myocardial Ischemia
4. Aortic Stenosis
4. HCM
4. Pulmonary Hypertension
4. Aortic Dissection

Unexplained Causes = Approximately 1/3

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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

Syncope Mimics

- Acute intoxication (e.g., alcohol)
- Seizures
- Sleep disorders
- Somatization disorder (psychogenic pseudo-syncope)
- Trauma/concussion
- Hypoglycemia
- Hyperventilation

Impact of Syncope: Costs

- Estimated hospital costs exceeded $10 billion US\(^1\)
- Estimated physician office expenses exceeded $470 million\(^2\)
- £104,285 spent on 1,334 patients with syncopal codes (UK) (EaSyAS)\(^3\)
  - Hospital admission: 67% of investigational costs
- Over $7 billion is spent annually in the US to treat falls in older adults\(^4\)

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\(^2\)OutPatientView v. 6.0. Solucient LLC, Evanston IL.
Challenges of Syncope

- Diagnosis
  - Complex

- Quality of life implications
  - Work
  - Mobility (automobiles)
  - Psychological

- Cost
  - Cost/year
  - Cost/diagnosis
A Diagnostic Plan is Essential

- **Initial Examination**
  - Detailed patient history
  - Physical exam
  - ECG
  - Supine and upright blood pressure
- **Monitoring**
  - Holter
  - Event
  - Insertable Loop Recorder (ILR)
- **Cardiac Imaging**
- **Special Investigations**
  - Head-up tilt test
  - Hemodynamics
  - Electrophysiology study

Initial Exam: Detailed Patient History

- Circumstances of recent event
  - Eyewitness account of event
  - Symptoms at onset of event
  - Sequelae
  - Medications

- Circumstances of more remote events

- Concomitant disease, especially cardiac

- Pertinent family history
  - Cardiac disease
  - Sudden death
  - Metabolic disorders

- Past medical history
  - Neurological history
  - Syncope

Initial Exam: Thorough Physical

- **Vital signs**
  - Heart rate
  - Orthostatic blood pressure change

- **Cardiovascular exam: Is heart disease present?**
  - ECG: Long QT, pre-excitation, conduction system disease
  - Echo: LV function, valve status, HCM

- **Neurological exam**

- **Carotid sinus massage**
  - Perform under clinically appropriate conditions preferably during head-up tilt test
  - Monitor both ECG and BP

Carotid Sinus Massage (CSM)

■ Method\(^1\)
  - Massage, 5-10 seconds
  - Don’t occlude
  - Supine and upright posture (on tilt table)

■ Outcome
  - 3 second asystole and/or 50 mmHg fall in systolic BP with reproduction of symptoms = Carotid Sinus Syndrome

■ Absolute contraindications\(^2\)
  - Carotid bruit, known significant carotid arterial disease, previous CVA, MI last 3 months

■ Complications
  - Primarily neurological
  - Less than 0.2\(^{\%}\)^3
  - Usually transient

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\(^1\)Kenny RA. *Heart*. 2000;83:564.
Other Diagnostic Tests

- Ambulatory ECG
  - Holter monitoring
  - Event recorder
    - Intermittent vs. Loop
    - Insertable Loop Recorder (ILR)
- Head-Up Tilt (HUT)
  - Includes drug provocation (NTG, isoproterenol)
  - Carotid Sinus Massage (CSM)
- Adenosine Triphosphate Test (ATP)
- Electrophysiology Study (EPS)

Heart Monitoring Options

## Diagnostic Assessment: Yields
(N=341\(^1\) to 433\(^2\))

<table>
<thead>
<tr>
<th>Evaluation Type</th>
<th>Yield (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Evaluation</strong></td>
<td></td>
</tr>
<tr>
<td>History, Physical Exam, ECG, Cardiac Massage</td>
<td>38-40</td>
</tr>
<tr>
<td><strong>Other Tests/Procedures</strong></td>
<td></td>
</tr>
<tr>
<td>Head-Up Tilt</td>
<td>27</td>
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<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>&lt;2-5</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>

References Available
Neurological Tests: Rarely Diagnostic for Syncope

- EEG, Head CT, Head MRI
- May help diagnose seizure

Head-Up Tilt Test (HUT)

- Protocols vary
- Useful as diagnostic adjunct in atypical syncope cases
- Useful in teaching patients to recognize prodromal symptoms
- Not useful in assessing treatment

Head-Up Tilt Test: ECG Leads and Intra-Arterial Pressure Tracing

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Adenosine Triphosphate (ATP) Test

- Ongoing investigation in the US
- Provokes a short and potent cardioinhibitory vasovagal response

Advantages
- Simple
- Inexpensive
- Correlation with pacing benefit

Seems to identify a unique mechanism of syncope found in patients with:
- Advanced age
- More hypertension
- More ECG abnormalities

Donateo P. *J Am Coll Cardiol*. 2003;41:93-98.
Insertable Loop Recorder (ILR)

Reveal® Plus ILR

Typical Location of the Reveal® Plus ILR

Click once on black screen to play video.
Insertable Loop Recorder (ILR)

The ILR is an implantable patient – and automatically – activated monitoring system that records subcutaneous ECG and is indicated for:

- Patients with clinical syndromes or situations at increased risk of cardiac arrhythmias
- Patients who experience transient symptoms that may suggest a cardiac arrhythmia
Conventional EP Testing in Syncope

- Greater diagnostic value in older patients or those with SHD
- Less diagnostic value in healthy patients without SHD
- Useful diagnostic observations:
  - Inducible monomorphic VT
  - SNRT > 3000 ms or CSNRT > 600 ms
  - Inducible SVT with hypotension
  - HV interval ≥ 100 ms (especially in absence of inducible VT)
  - Pacing induced infra-nodal block

Diagnostic Limitations of EPS

- Difficult to correlate spontaneous events and laboratory findings

- Positive findings\(^1\)
  - Without SHD: 6-17%
  - With SHD: 25-71%

- Less effective in assessing bradyarrhythmias than tachyarrhythmias\(^2\)

- EPS findings must be consistent with clinical history
  - Beware of false positive

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Specific Conditions

- Cardiac arrhythmia
  - Brady/Tachy
  - Long QT syndrome
  - Torsade de pointes
  - Brugada
  - Drug-induced

- Structural cardio-pulmonary

- Neurally-mediated
  - Vasovagal Syncope (VVS)
  - Carotid Sinus Syndrome (CSS)

- Orthostatic
Cardiac Syncope

- Includes cardiac arrhythmias and SHD
- Often life-threatening
- May be warning of critical CV disease
  - Tachy and brady arrhythmias
  - Myocardial ischemia, aortic stenosis, pulmonary hypertension, aortic dissection
- Assess culprit arrhythmia or structural abnormality aggressively
- Initiate treatment promptly

“…cardiac syncope can be a harbinger of sudden death.”

- Survival with and without syncope
- 6-month mortality rate of greater than 10%
- Cardiac syncope doubled the risk of death
- Includes cardiac arrhythmias and SHD

Syncope Due to Structural Cardiovascular Disease: Principle Mechanisms

- **Acute MI/Ishemia**
  - 2° neural reflex bradycardia – Vasodilatation, arrhythmias, low output (rare)

- **Hypertrophic cardiomyopathy**
  - Limited output during exertion (increased obstruction, greater demand), arrhythmias, neural reflex

- **Acute aortic dissection**
  - Neural reflex mechanism, pericardial tamponade

- **Pulmonary embolus/pulmonary hypertension**
  - Neural reflex, inadequate flow with exertion

- **Valvular abnormalities**
  - Aortic stenosis – Limited output, neural reflex dilation in periphery
  - Mitral stenosis, atrial myxoma – Obstruction to adequate flow

Syncope Due to Cardiac Arrhythmias

- **Bradyarrhythmias**
  - Sinus arrest, exit block
  - High grade or acute complete AV block
  - Can be accompanied by vasodilatation (VVS, CSS)

- **Tachyarrhythmias**
  - Atrial fibrillation/flutter with rapid ventricular rate (eg, pre-excitation syndrome)
  - Paroxysmal SVT or VT
  - Torsade de pointes

Treatment of Syncope Due to Tachyarrhythmia

- **Atrial tachyarrhythmias**
  - AVRT due to accessory pathway – Ablate pathway
  - AVNRT – Ablate AV nodal slow pathway
  - Atrial fib – Pacing, linear/focal ablation for paroxysmal AF
  - Atrial flutter – Ablate the IVC-TV isthmus of the re-entrant circuit for ‘typical’ flutter

- **Ventricular tachyarrhythmias**
  - Ventricular tachycardia – ICD or ablation where appropriate
  - Torsade de pointes – Withdraw offending drug or implant ICD (long QT/Brugada/short QT)

- Drug therapy may be an alternative in many cases

Neurally-Mediated Reflex Syncope

- Vasovagal Syncope (VVS)
- Carotid Sinus Syndrome (CSS)
- Situational syncope
  - Post-micturition
  - Cough
  - Swallow
  - Defecation
  - Blood drawing, etc.

Most common form of syncope
- 8% to 37% (mean 18%) of syncope cases

Depends on population sampled
- Young without SHD, ↑ incidence
- Older with SHD, ↓ incidence

VVS vs. CSS

In general:

- VVS patients younger than CSS patients
- Ages range from adolescence to older adults (median 43 years)

VVS Diagnosis

- History and physical exam, ECG and BP
- Head-Up Tilt (HUT) – Protocol:
  - Fast > 2 hours
  - ECG and continuous blood pressure, supine, and upright
  - Tilt to 70°, 20 minutes
  - Isoproterenol/Nitroglycerin if necessary
  - End point – Loss of consciousness

Optimal treatment strategies for VVS are a source of debate.

Treatment goals
- Acute intervention
  - Physical maneuvers, eg, crossing legs or tugging arms
  - Lowering head
  - Lying down

Long-term prevention
- Tilt training
- Education
- Diet, fluids, salt
- Support hose
- Drug therapy
- Pacing

VVS
Tilt Training Protocol

- Objectives
  - Enhance orthostatic tolerance
  - Diminish excessive autonomic reflex activity
  - Reduce syncope susceptibility/recurrences

- Technique
  - Prescribed periods of upright posture against a wall
  - Start with 3-5 min BID
  - Increase by 5 min each week until a duration of 30 min is achieved

Tilt Training: Clinical Outcomes

Treatment of recurrent VVS

Reybrouck, et al.*: Long-term study

- 38 patients performed home tilt training
- After a period of regular tilt training, 82% remained free of syncope during the follow-up period
- However, at the 43-month follow-up, 29 patients had abandoned the therapy
- Conclusion: The abnormal autonomic reflex activity of VVS can be remedied. Compliance may be an issue.

Foglia-Manzillo, et al.*: Short-term study

- 68 patients
  - 35 tilt training
  - 33 no treatment (control)
- Tilt table test conducted after 3 weeks
- 19 (59%) of tilt trained and 18 (60%) of controls had a positive test
- Tilt training was not effective in reducing tilt testing positivity rate
- Poor compliance in the majority of patients with recurrent VVS

VVS
Pharmacologic Treatment

- Fludrocortisone
- Beta-adrenergic blockers
  - Preponderance of clinical evidence suggests minimal benefit\(^1\)
- SSRI (Selective Serotonin Re-Uptake Inhibitor)
  - 1 small controlled trial\(^2\)
- Vasoconstrictors
  - 1 negative controlled trial (etilefrine)\(^3\)
  - 2 positive controlled trials (midodrine)\(^4,5\)

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Midodrine for VVS


Symptom-Free Interval

Months

p < 0.001

Midodrine
Fluid

Role of Pacing as Therapy for Syncope: Summary

- Three earlier studies single blind – Bias?
- Pacemaker implantation may modulate reflex syncope and autonomic responses\(^1\)
- Study results may differ based on pre-implant selection criteria and tilt-testing techniques
- Pacing therapy is effective in some but not all (cardioinhibition vs. vasodepression)
- In five pacing studies, syncope recurred in 33/156 (21%) of paced patients, 72/162 (44%) in non-paced patients (p<0.000)\(^2\)

\(^1\)Kapoor W. *JAMA*. 2003;289:2272-2275.
Carotid Sinus Syndrome (CSS)

- Syncope clearly associated with carotid sinus stimulation is rare (≤1% of syncope)
- CSS may be an important cause of unexplained syncope/falls in older individuals
- Prevalence higher than previously believed
- Carotid Sinus Hypersensitivity (CSH)
  - No symptoms
  - No treatment

CSS
Role of Pacing – Syncope Recurrence Rate

- Class I indication for pacing (AHA and BPEG)
- Limit pacing to CSS that is:
  - Cardioinhibitory
  - Mixed
- DDD/DDI superior to VVI
  - Mean follow-up = 6 months

SAFE PACE
Syncope And Falls in the Elderly – Pacing And Carotid Sinus Evaluation

Objective

• Determine whether cardiac pacing reduces falls in older adults with carotid sinus hypersensitivity

Randomized controlled trial (N=175)

• Adults > 50 years, non-accidental fall, positive CSM
• Pacing (n=87) vs. No Pacing (n=88)

Results

• More than 1/3 of adults over 50 years presented to the Emergency Department because of a fall
• With pacing, falls ↓ 70%
• Syncopal events ↓ 53%
• Injurious events ↓ 70%

Conclusions

• Strong association between non-accidental falls and cardioinhibitory CSH
• These patients usually not referred for cardiac assessment
• Cardiac pacing significantly reduced subsequent falls
• CSH should be considered in all older adults who have non-accidental falls

Orthostatic Hypotension

- **Etiology**
  - Drug-induced (very common)
    - Diuretics
    - Vasodilators
  - Primary autonomic failure
    - Multiple system atrophy
    - Parkinson’s Disease
    - Postural Orthostatic Tachycardia Syndrome (POTS)

- **Secondary autonomic failure**
  - Diabetes
  - Alcohol
  - Amyloid

Treatment Strategies for Orthostatic Intolerance

- Patient education, injury avoidance
- Hydration
  - Fluids, salt, diet
  - Minimize caffeine/alcohol
- Sleeping with head of bed elevated
- Tilt training, leg crossing, arm pull
- Support hose
- Drug therapies
  - Fludrocortisone, midodrine, erythropoietin
- Tachy-Pacing (probably not useful)

Syncope: Diagnostic Testing in Hospital Strongly Recommended

- 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

Conclusion

- Syncope is a common symptom with many causes
- Deserves thorough investigation and appropriate treatment
- A disciplined approach is essential
- ESC guidelines offer current best practices

The Insertable Loop Recorder (ILR) is an implantable patient- and automatically- activated monitoring system that records subcutaneous ECG and is indicated for:

- Patients with clinical syndromes or situations at increased risk of cardiac arrhythmias
- Patients who experience transient symptoms that may suggest a cardiac arrhythmia
Syncope
• Infrequent
• Recurrent
• Unexplained

Other
• Drug refractory epilepsy
• Post-acute MI
• Risk stratification
• Family history of CAD, Diabetes
• Drug titration
• Dilated cardiomyopathy
• Atrial fibrillation
“Newer loop recorders can be implanted under the skin for long-term recording, which may be particularly useful for patients with infrequent symptoms.”

Reveal® Plus System

- High diagnostic yield (43-88%)\(^1,2\)
- Up to 14 months continuous monitoring
- Up to 42 minutes of ECG
- Captures ECG during syncopal episode
- Minimally invasive, leadless, diagnostic and monitoring tool

Implanting Reveal® Plus

- Procedure Room, Cath Lab, or Clinic
- Outpatient procedure
- Sterile technique
- Local anesthetic
Fran’s Syncope Triage
Syncope

Age is a big differential!
Syncope

Age

- Younger < 40
- Older > 60
- Not so Old yet! 40 - 60
Younger < 40

- Most likely vasovagal syndrome (VVS)
- May be arrhythmogenic: accessory pathways, AV reentry, atrial tachycardia, or less common ventricular tachycardia.
- Psychological.
- Seizures.
Older > 60

- Disease is likely: CAD, Carotid, Anemia, valvular.

- Strong likelihood for arrhythmia: heart block, bradycardia, or tachycardia……
  - All rhythms are a possibility!

- Medications including drug-drug interactions.
Not so Old yet
40 - 60

- Combination of the ages
- Hormonal changes
- Stress & fatigue
- Medication
Case Study: GH

- 23 y.o., ♀ w/palpitations, tachycardia, SOB, diaphoresis, near-syncope
- Has 4 children, husband lost job, and all live in a travel trailer.
- What do you think?
Case Study: GH

- Intermittent tachycardia w/chest pain for years.
- Improved on BB initially.
- Improved on Propaferone but now having breakthroughs.
- Event monitor reveals recurrent atrial tachycardia with rates 180-220 and pauses.
Rate 59. Rate varies from 50 to 69. ? arrhythmia. V-rate variation > 10%
PR 169. RSR' in V1 or V2
QRS 96. QT interval short for rate. QTc < 360 mS
QT 343
QTC 340
---Axis---
P Ind.
QRS -1
T 20

- BORDERLINE ECG -
Unconfirmed diagnosis.
Long versus short RP’ SVT

Short RP’

Long RP’

Atrial focus

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Mechanism(s) of SVT

AV node re-entry

AV re-entry

Atrial/ junctional tachycardia
SVT mechanism(s)

AV Node reentry (AVNRT)

Atrio-ventricular reentry (AVRT)

Peter Ott, M.D.
SVT differential diagnosis

- **Short RP’ SVT (80%)**
  - AV node re-entry (dual AV nodal pathways)
  - Atrio-ventricular re-entry (concealed accessory pathway or WPW)

- **Long RP’ SVT**
  - Atrial tachycardia (atrial focus)
  - Atypical AVN re-entry
  - PJRT

Peter Ott, M.D.
Case Study: GH

- Pt sent to EP cardiologist.
- Extensive study revealed atrial tachycardia, no accessory pathways.
- Area identified and ablated.
- Atrial tachycardia was not inducible after ablation.
- No medication needed!
SVT therapy (2)

- **Curative** radiofrequency energy catheter ablation
  - Frequent SVT, refractory to medication
  - Medication not tolerated or not desired
  - In most WPW patients

- Success rate > 90%
- Recurrence 5 - 10%
- Complications < 3 %
GH Comments

• I feel so much better…I have my life back.
• Why did the doctors keep telling me it was just stress and anxiety?
Case Study: ED

- 75 y.o, ♂, fainted while working on camper and next day in shower *before* the water is turned on.
- Hx. CAD, Abnl EKG: LBBB w/LAD, no significant carotid disease.
- What do you think?
- What is your work-up?
Case Study: ED

- This is a High Risk Patient !!!
- Should be admitted….
- Labs & Holter or Event monitor
- Review Medications….Anything NEW ???
- Arrange for ECHO if EF unknown.
- Will probably need a defibrillator !!!!
Case Study: KS

- 34 y.o., ♂, pharmacologist, having episodes of nausea, headache for 24 hrs.
- Faints while changing diaper of his 2 week old baby.
- Second episode the following day while shaving…
- Went to the ED: screening normal.
- Discharged to f/u with PCP.
- What is the work-up?
10:12:55am Fri
HR: 148

KS

Maximum Heart Rate
Case Study: KS

- ECHO normal
- Now watchful waiting....
Send to Cardiology NP
Referral Information

- History: frequency, duration, associated factors….what was the pt. doing?
- PMH, SH, and any Family history for similar events
- 12-Lead EKG
- Physical exam findings
Send to Cardiology NP
Referral Information

• Labs: CBC, CMP, thyroid func.
• Medications: what you tried and current.
• Don’t forget the Herbals and other complimentary or alternative therapies used.
Cardiology Work-up

- May repeat the 12-lead EKG
- Holter, Event monitor, &/or implantable loop recorder.
- Echocardiogram: r/o structural heart disease: HOCM, aortic stenosis, ARVD
- Tilt-table test (HUT).
- Medications: antiarrhythmics, vasoconstrictors, antidepressants
Cardiology Sends to Electrophysiologist

- Results of all findings, plus
- Medications tried and patient response
  - Initially worked, never effective, or worsened the symptoms.
Many patients just want to hear.....

This will not kill you!
Provide Careful Reassurance!
Chest Pain evaluation

Reference

Quick Guide to Rule Out Chest Pain Emergencies

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Risk Stratification

- Age: < 30 yrs, 30-40, 40-60, >60
- History of Pain
- Family History
- Social/Habits
- Associated Symptoms
- Physical Exam
Assessment

• History
• Physical exam
• Diagnostic Tests: EKG, Echocardiogram, possible CT
• Differential signs & symptoms
Physical Exam

• Vital Signs
• Inspect and auscultate heart & lung fields
• Auscultate and palpate peripheral pulses
• EKG
• Echocardiogram
• CT may be needed
Emergent Causes of Chest Pain

• Acute Coronary Syndrome
• Aortic Dissection
• Esophageal Rupture
• Pneumothorax
• Pulmonary Embolism
Causes of Chest pain

- Cardiovascular
- Pulmonary
- Gastrointestinal
- Musculoskeletal
- Neurologic
- Functional or psychiatric
- Misc: diaphragmatic spasms of flutter, mediastinitis or tumors
OFFICE ASSESSMENT

• History
• Risk Stratification
• 12-lead EKG
• Call your NP in Cardiology!
• Send to ED
Questions ????

Thank-you