Hidden Dangers of Syncope

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Learning Objectives

Understand:
1. Difference of Benign and malignant Syncope
2. Possible causes of Syncope
3. Evaluating malignant Syncope
4. Treatment strategies for benign and malignant syncope

Syncope: is defined as the sudden transient loss of consciousness associated with a loss of postural tone caused by a sudden fall in systolic blood pressure to 70 mm HG that interrupts cerebral blood flow for > 8 seconds.

Syncope Facts

- Commonly affects over a million people
- 3% of all ER Visits
- 6% of all hospital visits
- Young and elderly
- May indicate a life threatening condition

Cardiac Anatomy

Cardiac Valves
CASE STUDY

- 51 yr old HF, active duty dentist presents with complaints of fatigue, lack of energy unable to work her normal hours. Reports been lightheaded with ambulation or changing positions especially when doing dental work. Condition has been progressive for the last 4 weeks. She has been getting ready for her physical training test (PT test) but is having a hard time.
- VS 105 / 76 HR 50-76 Irregular, RR 18, T. 98.4. Her weight is 155 pounds, and height is 64 inches. BMI 26
- She takes one a day multivitamin.
- You order an EKG
Clinical Evaluation

History and a Physical examination
HPI: ask about every syncopal episode. Situation prior, symptoms preceding the episode, time and length of the episode, trauma during syncope, and status of the patient on awakening are all relevant information. Your patient can help you by providing detailed account of the circumstances surrounding a syncopal episode.

Physical examination

• Complete physical exam is vital.
• Orthostatic blood pressures are highly recommended at time of visit. Please include in both supine and standing positions. B/p should be measured on both arms including pulse and legs.
• A thorough cardiac exam with special attention to abnormal heart sounds is also performed along with a detailed neurological evaluation.

Evaluation

• Electrocardiogram-EKG
• Cardiology consult
• Echocardiogram
• 24 hour Holter monitor, 2 week event monitor or 30 day event monitor
• Exercise stress test
• Electrophysiology Test-Tilt

What are the Causes?

May be divided into 3 categories
1. Cardiac
   • Abnormal conduction
   • Hypotension or
   • structural defects-blood flow obstruction
   • Vasodilation, acute vascular dissection
2. Non-cardiac
   • Orthostatic hypotension,
   • Reflex syncope (neutrally mediated)
   • Volume depletion
   • Dehydration and
   • Blood loss
   • Neuro-cerebrovascular
   • Carotid sinus hypersensitivity is present when a pause ≥3 s and/or a decrease of systolic pressure ≥50 mm Hg occurs upon stimulation of the carotid sinus. It occurs more frequently in older patients.
III. Situational syncope
Reflex syncope associated with a specific action, such as coughing, laughing, swallowing, micturition, or defecation. These syncope events are closely associated with specific physical functions.
- Postural orthostatic tachycardia syndrome (POTS)
- A clinical syndrome usually that occur with standing

III. Continue
Psychogenic pseudosyncope
A syndrome of apparent but not true loss of consciousness that may occur in the absence of identifiable cardiac, reflex, neurological, or metabolic causes.

Cardiac Causes—Conduction abnormalities
I. Sinus node dysfunction
- Bradycardia (symptomatic) <40 bpm
- Second degree Type II
- Complete AV block (3rd degree) (life threatening)
  - congenital and acquired (old age)
II. Prolong QT Interval (sudden death syndrome)—hx of childhood fainting

Results
- Her echocardiogram revealed normal findings without structural defects and EF 52%
- Stress test response was adequate without ischemia changes or straining changes. She stopped at 9 minutes due to extreme fatigue
- Her tilt test was positive for vasovagal
- EP study revealed a conduction delay of more than 10 seconds
- She had a single lead pacemaker

Active duty Dentist

Pacemaker
First degree AV block

Second Degree AV block Type I

Causes of Second-degree AV block

- Increased vagal tone (well trained athlete)
- Medications that inhibit AV node conduction (amiodarone, beta-blockers, calcium channel blockers, digoxin)
- Myocarditis caused by infections
- Hypoxemia (see more in infants and children)
- Cardiac surgery (valvular repairs, TAVR)
- Myocardial infarction
- Any condition that stimulates vagal tone

Second Degree type II

Causes of Mobitz II

- Anterior MI (due to septal infarction with necrosis of the bundle branches)
- Cardiac fibrosis of the conducting system (Lenegre’s or Lev’s disease)
- Post cardiac surgery (most commonly occurring close to the septum in mitral valve repair)
- Inflammatory conditions (rheumatic fever, myocarditis, Lyme disease) (affecting the mitral valve)
- Autoimmune (SLE, systemic sclerosis)
- Infiltrative myocardial disease (amyloidosis, haemochromatosis, sarcoidosis)
- Hyperkalemia
- Drugs: beta-blockers, calcium channel blockers, digoxin, amiodarone, also Sotalol and Tykosin

Complete Heart Block-3rd Degree
Tachy- arrhythmias

- Supraventricular
  - can cause palpitation rarely syncope
  - Atrial Fibrillation may cause syncope due to sick sinus syndrome (Brady to tachy)
- Ventricular (life threatening)
  - Ventricular tachycardia
  - Ventricular fibrillation

Atrial Fibrillation

Risks for stroke

AF increases the risk for developing thrombus in the Left atrium
Young healthy individuals with lone AF have a low risk for strokes
Stroke risk increases in the elderly and in those individual with the following conditions:
- Congestive heart failure,
- Hypertension,
- Age> 65 years old and doubles after >75,
- Diabetes mellitus, and previous strokes or transient ischemic attacks (TIA)
- CAD / PAD / Carotid -PCI increase risk

Anticoagulation Therapy

Patients in atrial fibrillation and with an increase risk for stroke may require anticoagulation therapy
Medications may include but is not limited to aspirin,
Warfarin / Coumadin which, requires an INR level of 2-3
Pradaxa (Dabigatran) dose at 150 mg po BID
Xarelto (Rivaroxaban) dose at 20, 15, 10 mg po daily
Eliquis (Apixaban) dose at 5 mg po BID or 2.5 mg po BID
Bleeding precautions major SE
Case Study
58 year old AAF, non-smoker, with past history of DM, HTN. She presents to clinic today with complaints of feeling very tired this morning. She is wakin’ appears tired. Her vitals signs include blood pressure of 108 / 76, pulse 146 bpm, (irreg), Resps 20 bpm, Temp 98.4 orally. Her weight is 194 pounds, height is 64 inches. Her BMI is 33.3.
Medications: Norvasc 10 mg po daily, Simvastatin 10 mg po daily, Metformin 500 mg po daily, and dieting
You ordered an EKG

Valvular Heart Disease
- Aortic Valve stenosis
  Congenital Bicuspid valve
  Acquired – aging / calcification
- Mitral Valve Stenosis Rheumatic heart disease

Case Study
- 34 year old AAM, healthy active duty presents with complaints of dizziness and fainting after playing basketball. He recently completed PT testing without a problem.
- His vitals b/p 148 / 88, pulse 78 bpm, RR 16 bpm, Temp 97.6
- No prescribed medications only Vitamins and protein shakes. He enjoys weight lifting.
- His PE unremarkable except cardiac murmur 3/6 LLSB radiates up to clavicles
- You ordered an EKG

Today’s EKG

Hypertrophic Cardiomyopathy
- Thickening of cardiac muscle Obstructing blood flow and cause syncope
- Other cardiac conditions that can cause syncope are: Atrial myxoma, thrombus, Prosthetic valve dysfunction, Coronary artery disease, or spasms, aortic dissection, severe mitral valve prolapsed.
Few people with predominantly interventricular septal hypertrophy in association with anterior motion of the mitral leaflets and subvalvular left ventricular outflow tract obstruction, which leads to a condition denoted as hypertrophic obstructive cardiomyopathy. This condition affects 1 in 500 individuals in the general population.

Marfan Syndrome
Marfan syndrome is an autosomal dominant, connective tissue disorder which affects multiple systems. It is characterized by long bones, or tall and thin, long arms, fingers, toes, flexible joints and scoliosis. The most serious conditions deals with mitral valve prolapse and dilatation of the aortic root. Cardiovascular conditions are the predominant feature of Marfan syndrome which includes proximal ascending aortic dilatation, dilatation of the proximal main pulmonary artery, thickening and prolapse of either or both atrioventricular valves, and mitral annular calcification.

Aortic Dissection in Marfan

Non cardiac
Vasovagal or neurocardiogentic due to exposed to a trigger or stimuli that initiates vasomotor response causing to faint, such as pain, dehydration, post run fever.
Orthostatic hypotension (elderly)
60% of blood in our legs
Metabolic / endocrine such as hypoglycemia, Hypoxemia, Addison's disease (low steroid)
Blood loss (anemia, bleeding, donations)

Neuro / Cerebrovascular
Cerebrovascular accidents (CVAs) / strokes and Transient ischemic attacks (TIAs) rarely cause syncope. However, if bilateral carotid artery disease or vertebrobasilar disease is present, these conditions will cause a disequilibrium or unsteady gait. They affect the back of the brain and may result in sudden loss of stability and fall but consciousness is usually maintained.

MEDICINES
- Many medicines that can cause or contribute to syncope:
  - Alpha blockers
  - Ganglion Blockers
  - L-Dopa
  - Nifedipine
- Nitrates, Diuretics, ACE inhibitors, Beta blockers
- Combination of medicines especially with narcotics, some antidepressants, anticholinergics...
Cardiac Evaluation - TESTS

These tests can help verify the diagnosis.

- Electrocardiogram-EKG
  - Arrhythmias
- Echocardiogram
  - Cardiac structure abnormalities
    - Aortic valve stenosis surface area < 0.8
- 24 hour Holter monitor, 2 week event monitor or 30 day event monitor
- Exercise stress test
- Tilt Test will diagnose Vasovagal cause
- Cardiac Magnetic resonance imaging to evaluate certain familial causes of cardiac syncope may be ordered.

Laboratory

- Renal panel VS CMP
  - Rule out hypoglycemia, hyponatremia, hypomagnesium, electrolytes- renal panel
- CBC panel
  - Anemia, infection, other hematological abnormalities
- TSH panel with T3 and T4 rule out hypothyroidism or hyperthyroidism

TILT table

- Will diagnose vasovagal syncope
- Maybe able to explain the cause such as vasomotor causes. Postural orthostatic Tachycardia Syndrome or POTS

Electrophysiology Study

- Form of cardiac Catheterization
- Venous system leading to the heart and av conduction system for evaluation.
Neurology Consult if not done

- Computed tomography scan of the brain with contrast or
- MRI of the head
- Electroencephalogram
  - Seizure activity
  With Neurology Consult

Management of Syncope

- Depends on the findings
- Cardiac- Brady arrhythmias
  EP evaluation for possible Permanent pacemaker or Automatic Internal Cardiac Defibrillators.
- Ventricular Arrhythmias
- EP study with appropriate ablation or possible Device implantation

Syncope management cont

- Aortic Valve stenosis
- Prosthetic valve replacement
- Mitral valve stenosis –repair or prosthetic valve replacement.
- Hypertrophic cardiomyopathy some ablation may be useful for lethal arrhythmias
  - AICD may be indicated

summary

- Patients with normal resting EKG and no structural heart disease, EP testing diagnostic yield is so low that it is rarely useful. EP studies appear to be justifiable in patient who has a high probability of induction of sustained monomorphic VT -Post MI patients with unexplained syncope
  - Left ventricular ejection fraction < 30%
  - Left ventricular aneurysm
  - Complex ventricular ectopy on Holter monitoring.
- Despite all of these diagnostic modalities in more than 20-30 % of all cases of syncope the causes remain unknown.

Q & A

Thank you all
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