SYNCOPE VERSUS SEIZURES –A COMMON ENIGMA

INTRODUCTION

Achieving the correct final diagnosis with the presenting symptom of transient loss of consciousness can challenge even the most seasoned clinician. Syncope and epileptic seizures reign high on the list of differential diagnoses, followed by narcolepsy, cataplexy, pseudoseizures, and pseudosyncope.

Distinguishing between these top two contenders can be difficult and often the investigation is inconclusive or incorrect. Rather its better to say often investigations are done without reasons and hence many unnecessary tests are done and money wasted.

Research suggests that between 20-40% of patients diagnosed with epilepsy have been misdiagnosed, and syncope is the most common misdiagnosis in epilepsy. Let’s take a closer look into this medical diagnosis conundrum.

SYNCOPE

Syncope is defined as a symptom that presents with an abrupt, transient, complete loss of consciousness, associated with inability to maintain postural tone, with rapid and spontaneous recovery, and that is caused by cerebral hypo perfusion.

The most common causes of syncope include - reflex syncope like vasovagal (looking at blood/injury exposure), cough, micturition or defecation syncopes, orthostatic syncope, cardiac arrythmias, and structural cardiopulmonary disease.

Often syncope is preceded by a prodrome or period of presyncope that may include a constellation of symptoms including lightheadedness, feeling warm or cold, diaphoresis, palpitations, nausea/abdominal discomfort, visual blurring, pallor, or changes in hearing.

Vasovagal syncope can often be triggered by a combination of **dehydration** and upright posture.

But it **can** also have an emotional trigger such as seeing blood ("**fainting** at the sight of blood") –mentioned above.

SEIZURES

Seizures fall into two categories: Epileptic and Non-epileptic.

Epileptic seizures occur spontaneously or unprovoked and are recurrent.

They are further classified as generalized tonic-clonic seizure and the more common, partial complex seizure. Causes of epileptic seizures include brain injury, stroke, brain tumors, and neurological disorders.

Diagnosis (discussed in detail later) is made by abnormal brain activity on an electroencephalogram (EEG). Non-epileptic seizure causes can include fever, infection, electrolyte imbalance, drug/alcohol withdrawal, psychological conditions (also called NEAD – non epileptic attack disorder), and hypoglycemia.

You will expect to find normal brain wave activity on EEG testing in a patient with a non-epileptic seizure. However more than 50% patents of epilepsy can have normal interictal EEG.

THE CONFUSION

Many syncopal events include loss of consciousness as the only symptom.

The diagnostic problem occurs when a patient with syncope also has myoclonic jerks or convulsions. These events are sometimes referred to as seizure-like syncope or *convulsive syncope.* Myoclonic jerks and tonic spasms are the most misleading symptoms in the differential diagnosis between syncope and seizures.

CONVULSIVE SYNCOPE

The underlying pathophysiology of convulsive syncope is as follows: the cardiac syncope causes a variable amount of hemodynamic instability resulting in cerebral hypoperfusion, which triggers the medullary reticular formation and results in myoclonic activity that mimics seizure activity.

The most important points to differentiate should be a stepwise approach as follows.

A] HISTORY

One of the most important clues usually comes from an observant bystander who witnesses the event and is able to report if the person went limp then convulsed (syncope) or if the episode began with convulsions (seizure).

Be alert for other clues, as well.

Identifiable triggers associated with seizures tend to have a longer duration than syncope and are followed by postictal confusion and significant fatigue, although brief periods of confusion have been reported with convulsive syncope.

Other common features of convulsive syncope that are not common in seizures include a period of presyncope with prodrome, pallor, duration less than one minute, and fixed or **upward eye deviation**.

Conversely, common features of a seizure, that are not common in syncope, can include tongue biting, prodromal cry, incontinence, duration often a few minutes, and **lateral eye deviation**.

Accurate diagnosis is often challenged by the patient's amnesia of the events, lack of bystander presence/account, and discordance among clinician opinions.

Hence history is the far most important point to differentiate the two.

FURTHER HISTORY

Evaluation of a patient that presents with transient loss of consciousness can be extensive and often include cardiology and neurology consultations. All patients must have a comprehensive history and physical examination. The detailed history must include:

- Detailed past medical history
- Number, frequency, and duration of episodes
- Time of onset
- Body position when the event occurred

- Provocative factors or associated symptoms preceding the event
- Symptoms following the event
- Witness account, if available
- Medications
- Family history

B] EXAMINATION

The physical examination is the next most important point to differentiate the two, syncope or seizure? This must include:

- Pulse and blood pressure measurements while the patient is *lying, sitting, and standing* to assess for orthostatic hypotension
- Blood pressure in each arm. Inequality suggests aortic dissection or aortic coarctation.
- Respiration rate to assess for hyperventilation as seen with pulmonary and/or psychiatric causes (NEAD).
- Careful auscultation of heart sounds to assess for cardiac murmurs
- Consider careful *carotid massage* (not both together as it will actually cause loss of consciousness) in an older patient.
- Neurological exam

C] BASIC INVESTIGATIONS

Initial evaluation should also include ECG, echocardiogram, and basic laboratory testing to exclude anemia, infection, electrolyte imbalances, or renal and liver dysfunction.

The ECG is a powerful tool in the setting of evaluation of a patient with transient loss of consciousness.

The ECG can help with the assessment for arrythmias (sinus bradycardia, sinus pauses, atrio-ventricular heart blocks, ventricular tachycardia, and bundle branch blocks), intra-ventricular conduction delays, pre-excited QRS complexes, left ventricular hypertrophy, and pacemaker or implantable cardioverter-defibrillator malfunction, as well as others.

An echocardiogram helps assess for structural heart disease including left ventricular dysfunction, hypertrophic cardiomyopathy, significant aortic stenosis, intracardiac tumors, and right ventricular enlargement (suggestive of pulmonary embolism).

This initial evaluation yields a relative certain diagnosis approximately 50% of the time.

THE GOLD STANDARD TO DIFFERENTIATE

The gold standard to differentiate between the two would require video-telemetry with simultaneous EEG and electrocardiographic (ECG) recording with scalp and chest electrodes – a clinical scenario that is rarely fulfilled.

FURTHER INVESTIGATIONS

Based on the yield from the initial investigation, further testing may be warranted depending on results and clinical suspicion.

When the suspicion of epilepsy is high *with the first unprovoked seizure* or *focal neurologic deficits*, a 30-minute interictal EEG and neuroimaging including CT or MRI (should include an epilepsy protocol –gives an idea of the hippocampus-amygdala complex and other areas of epileptogenic origin)

Head-up tilt table testing (HUT), with or without the use of intravenous isoproterenol or sublingual nitroglycerin, is useful in identifying neurocardiogenic syncope, orthostatic hypotension, and autonomic dysfunction.

A positive HUT is demonstrated by loss of consciousness with hypotension with or without bradycardia.

More specifically, bradycardia followed by hypotension is seen in neurocardiogenic syncope, a gradual decrease in heart rate and mean arterial pressure indicate autonomic dysfunction, and a decrease in blood pressure followed by reflex tachycardia indicates orthostatic hypotension. However If a HUT is negative and arrhythmia is strongly suspected, an electrophysiology study (EPS), implantable loop recorder, or ambulatory heart monitor may also be considered.

SUMMARY

When a patient presents with transient loss of consciousness, identifying the accurate underlying diagnosis can be daunting.

But if followed by History, examination and then rational investigations, a diagnosis can be reached.

This task is manageable.

- First documenting an excellent history
- Physical examination – cardiac and neurological
- Then performing the above standard tests
- Finally, collaborating with your colleague consultations from cardiology and neurology.

FAQ

1) How can you tell the difference between a seizure and a syncope?

Identifiable triggers are associated with **syncope and seizures** tend to have a longer duration than **syncope** and are followed by *postictal confusion and significant fatigue*, although brief periods of confusion have been reported with convulsive **syncope**.

2)What's the difference between a seizure and a convulsion?

A convulsion is a general term that people use to describe **uncontrollable muscle contractions**.

Some people may use it interchangeably with the word “seizure,” although a seizure refers to an electrical disturbance in the brain.

Seizures may cause a person to have convulsions, but this is not always the case.

3) What causes convulsive seizures?

Convulsions can occur during certain kinds of epileptic **seizures**, *but one can have **convulsions** even though you don't have **epilepsy**.*

Convulsions can be a **symptom** of a number of conditions, including a sudden fever spike, tetanus, or very low blood sugar.

4) What causes convulsive syncope?

Possible cardiovascular **causes** of **convulsive syncope** include various neurally mediated, vasovagal reactions (including carotid sinus hypersensitivity), bradycardia, and ventricular as well as supra-ventricular tachycardias.

5) Is convulsive syncope a seizure?

A **seizure** resulting from **syncope** is termed **convulsive syncope**, ***seizure*** *activity occurs in up to 20 percent of episodes of* ***syncope***.

Seizures can result from an occult cardiac etiology, and some causes, such as an episodic arrhythmia, can escape elucidation in the ED.

6) How long does convulsive syncope last?

It has been demonstrated that witnessed **convulsive** events were associated with periods of a cardiac asystole lasting up to 40 seconds in duration.

7) How is convulsive syncope diagnosed?

Diagnosing vasovagal syncope often begins with **a physical examination**. During the physical exam, examination of the heart and blood pressure is mandatory.

Massaging the main arteries in neck to see if that causes fainting is a part &parcel of the examination

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8) Can you drive with syncope?

If a person suffers recurrent episodes of loss of consciousness with seizure markers,

12 months' freedom from such episodes must be attained. During which driving is not safe and in some countries (the DVLA takes away the licence as well).

However in *COUGH SYNCOPE* driving must cease for 6 months if a single episode occurs, but increased to 12 months, if multiple attacks.

8) Which drugs may cause syncope?

- Agents that reduce blood pressure (eg, antihypertensive **drugs**, diuretics, nitrates)
- Agents that affect cardiac output (eg, beta blockers, digitalis, antiarrhythmics)
- Agents that prolong the QT interval (eg, tricyclic antidepressants, phenothiazines, Quitiapine, quinidine, amiodarone and many others)

9) Can high or low BP cause syncope?

Data suggest that in some individuals with chronic **hypertension** periodic fluctuations in **blood pressure** that result in sudden drops from hyper- to normotensive levels may be a **cause** of recurrent **syncope**. Low blood pressure, ineffective pumping by the heart because of heart disease (heart failure), or heart valve abnormalities may **cause fainting**

10) Can anemia lead to syncope?

Yes **anemia** (low red blood cell count), leading to lowering of RBC indirectly lowering Oxygen supply to brain can cause syncope.