Evaluating the patient with loss of consciousness

Tahsin Khan, Mark Stecker¹, Mona Stecker¹

SUNY Stony Brook School of Medicine, Stony Brook, NY 11794, *Winthrop University Hospital, Mineola, NY 11501, USA

E-mail: Tahsin Khan - tkhan1031@gmail.com; *Mark Stecker - mstecker@winthrop.org; Mona Stecker - MKStecker@Winthrop.org

*Corresponding author

Received: 11 February 15  Accepted: 18 February 15  Published: 25 May 15

INTRODUCTION

Patients who have had an episode of altered awareness and are subsequently brought to the hospital for evaluation are common, amounting to more than 6% of all emergency room (ER) admissions. One of the key elements in properly evaluating these patients is to perform a good history. The history can come from a number of different sources including the patient, family, and/or others present at the time of the event. In each case, the information provided may be biased by the preconceptions of the person providing the history. Thus, it is critical to understand which aspects of the history are most important and most reliable in distinguishing between the possible diagnoses. For example, it is not uncommon for an observer to state that a patient was unconscious if he/she did not respond to voice. Only further questioning about other characteristics of the patient at that time such as loss of tone or abnormal movements may help sort out the actual events.

It is also common for providers to lump all patients with transient alterations of awareness under the diagnosis of syncope. It is thus essential to clearly define the term syncope. The Merriam-Webster Dictionary defines syncope as “loss of consciousness (LOC) resulting from insufficient blood flow to the brain.” There are various conditions that can be mistaken for syncope and it is important that a correct diagnosis be made because management and care will differ depending on that diagnosis. In this paper we will primarily address the issue of distinguishing a neurological cause versus a cardiac cause for a transient alteration of awareness; but it is important as well to cover the factors that place a patient at high risk for a serious cardiac event.

The differential diagnoses

In order to obtain an optimal history, it is important to be aware of the diagnoses that could potentially cause the patient’s symptoms. Soteriades reviewed data from the Framingham study for all patients with a diagnosis of syncope and was able to determine the eventual cause for syncope. [Table 1] shows the incidence of various etiologies in patients with and without cardiac disease. It is clear that neurologic causes are not common compared with cardiac and vaso-vagal causes of syncope; but they nonetheless form an important subset of all patients with an initial diagnosis of syncope. [Table 2] provides a larger

Table 1: Causes of syncope from Soteriades in patients with and without cardiovascular disease

| Cause   | Cardiovascular disease absent (%) | Cardiovascular disease absent (%) |
|---------|----------------------------------|----------------------------------|
| Cardiac | 4.8                              | 22                               |
| Unknown | 37.5                             | 34                               |
| Stroke/TIA | 2.1                           | 9.5                              |
| Seizure | 4.8                              | 4.9                              |
| Vasovagal | 24.3                        | 12.6                             |
| Orthostatic | 10.3                       | 6.7                              |
| Medication | 6.9                            | 6.7                              |
| Other  | 9.2                              | 3.6                              |

TIA: Transient ischemic attack

This article may be cited as: Khan T, Stecker M, Stecker M. Evaluating the patient with loss of consciousness. Surg Neurol Int 2015;6:S262-5. Available FREE in open access from: http://www.surgicalneurologyint.com/text.asp?2015/6/7/262/157615

Copyright: © 2015 Khan T. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.
list of some conditions that could be associated with an apparent LOC. It is important to realize that the initial determination of LOC is generally made by a lay person without a medical background; and so the differential diagnosis must be extended to include diagnoses that medical personnel would not always associate with unconsciousness.

[Table 3] shows some of the typical symptoms for “LOC.” Witnesses will likely describe an event in their own terms but will often not attend to the preceding or subsequent events that are critical to making the diagnosis. Therefore, follow up questions are very important to create a timeline describing the event in detail. [Table 4] shows some frequently obtained elements of the history in patients with syncope, stroke, transient ischemic attack (TIA), delirium, and seizures. Hoefnagel’s[4] studied some of the factors in the history that helped determine whether a patient had syncope or seizure. These factors are abstracted in Table 5a and 5b; and show the importance of observing whether the patient had pallor/sweating before the event as a predictor for syncope. The observation that the patient was “blue” was strongly predictive of seizure as was disorientation and tongue biting.

Besides the questions shown in Tables 4 and 5, there are other important questions whose answers may be useful in making the diagnosis of vaso-vagal syncope versus other cardiac conditions. These have been addressed by prior studies that try to use elements of the history and physical examination to predict patients presenting with apparent syncope that are at high risk of serious adverse events. One such study led to the creation of the Calgary syncope symptom score.[8] This scale involves asking the seven questions detailed in Table 6 and has been demonstrated to have an overall sensitivity of 87% and specificity of 32% in making the diagnosis of vasovagal syncope. Another set of questions comes from the analyses that led to the Boston syncope rule.[2,3] These investigators asked questions in eight categories and considered the patient at high risk for an adverse outcome (and hence unlikely to be vaso-vagal syncope) if the patient had symptoms or signs in any of the following categories: (i) Signs or symptoms of acute coronary syndrome, (ii) signs of cardiac conduction diseases, (iii) worrisome cardiac history, (iv) valvular heart disease by history or examination, (v) family history of sudden death, (vi) persistent abnormal vital signs, (vii) volume depletion, or (viii) primary central nervous system (CNS) event. This rule was 97% sensitive and 62% specific in finding patients with an adverse outcome of an apparent syncopal event. The San Francisco syncope rule[6,7] uses the

### Table 2: Conditions that could present with loss of consciousness concentrating on neurological causes

| Category | Condition | Comment |
|----------|-----------|---------|
| Cardiac  | Vaso-vagal syncope | Cerebral hypoperfusion, brief LOC |
|          | Arrhythmia | Cerebral hypoperfusion may have prolonged LOC if the period of hypoperfusion is prolonged |
|          | Ischemic or severe valvular disease | |
| Neurologic | TIA | Unless there is brainstem involvement, TIA does not cause LOC. Patient will have focal neurological signs not seen with true syncope |
|          | Stroke | If there is LOC with a stroke there is either bilaterally ischemia or brainstem ischemia |
|          | Seizure | Can have post-ictal confusion, unlike true syncope |
|          | Delirium | Although symptoms fluctuate over time, there is no sudden onset or sudden return to normal |
|          | Dementia | Careful history will show a long-term deterioration as opposed to a sudden syncopal event |
|          | Narcolepsy | Patient reports falling asleep throughout day, paralysis 1-2 min after awakening, daytime sleepiness, and cataplexy (all motor function is lost but patient is aware) |
| Orthostatic | | Occurs with autonomic failure or fluid depletion. Mainly LOC will be with standing. History of prior episodes of near syncope with standing |
| Psychogenic | | |
| Medication | | Episodes may be very prolonged with rapid recovery. Inconsistent symptoms |
| Metabolic | | Any medication that affects blood pressure or the autonomic nervous system may cause syncope |

LOC: Loss of consciousness, TIA: Transient ischemic attack

### Table 3: Symptoms for loss of consciousness used by non-medical providers. All of these need to be interpreted

| Term         | Comment |
|--------------|---------|
| Passed out   | Nonspecific. It is important to create a timeline of events before and after the “passing out” |
| Seized       | Need to determine informants description—were there motor movements and what kind. Convulsive syncope is generally short |
| Stared       | Suggests seizures, TIA or delirium |
| Slumped over | Suggests generalized weakness—possibly due to hypoperfusion |
| Collapsed    | Often used to describe true syncope |
| Sleepy       | More suggestive of delirium |

TIA: Transient ischemic attack
Table 4: Historical elements in patients describing the time around the event of altered consciousness and their prevalence in various diseases

| Historical element        | Result | Diagnosis |
|---------------------------|--------|-----------|
|                           |        | Syncope   | Delirium | TIA   | Stroke | Seizure |
| Duration                  |        | Yes       | No       | Possibly | No     | Yes     |
|                           | Seconds|           |          |        |        |         |
|                           | Minutes| No        | Unlikely | Yes    | No     | Yes     |
|                           | Hours  | No        | Yes      | Possibly | No     | Possibly |
|                           | Days   | No        | Yes      | No      | Yes    | Rare    |
| Consciousness             |        | Complete loss | No       | No       | Rare   | Possibly |
| Twitching                 |        | Minor     | Sometimes| Yes     | No     | Yes     |
|                           |        | Generalized shaking | Sometimes | Rare | No | Yes |
| Staring                   |        | No        | No       | Rare    | Yes    |
| Prodromal symptoms        |        | Yes       | Yes      | No      | No     | Possibly |
|                           | None   | Yes       | No       | Yes     | Yes    | Yes     |
|                           | Pallor | Yes       | No       | No      | Yes    | Yes     |
|                           | Graying of vision | Yes | No | No | Possibly |
|                           | Smell  | No        | No       | No      | No     | Yes     |
|                           | Taste  | No        | No       | No      | No     | Yes     |
|                           | Epigastric distress | No | No | No | Yes |
|                           | Déjà vu | Yes     | No       | No      | Yes    | Yes     |
| Prodromal history         |        | Yes       | Yes      | No      | No     | Possibly |
|                           | Dehydration | Yes | Yes | No      | No     | Possibly |
|                           | Poor nutrition | Yes | Yes | No      | No     | Possibly |
|                           | Viral illness | Yes | Yes | No      | No     | Possibly |
| Postevent symptoms        |        | Yes       | No       | Yes     | No     | Generally brief |
|                           | None   | Yes       | No       | Yes     | No     | Generally brief |
|                           | Focal neurological Examination | No | Possibly mild | No | Yes | Possibly |
|                           | Confusion | Rare | Yes | No | Possibly | Possibly |
| Posture                   |        | Yes       | Yes      | Yes     | Yes    | Yes     |
|                           | Standing | Yes       | Yes      | Yes     | Yes    | Yes     |
|                           | Lying   | Rare      | Yes      | Yes     | Yes    | Yes     |
| State                     |        | Yes       | Yes      | Yes     | Yes    | Yes     |
|                           | Awake   | Yes       | Yes      | Yes     | Yes    | Yes     |
|                           | Asleep  | No        | No       | No      | Yes    | Yes     |
| Other Symptoms            |        | No        | No       | No      | No     | Sometimes |
|                           | Tongue biting | No | No | No | Yes |
|                           | Incontinence | Rare | Rare | No | Possibly | Yes |
| Cardiac symptoms          |        | Yes       | No       | No      | Occasionally | No |
|                           | Angina  | Yes       | No       | No      | Occasionally | No |
|                           | Palpitations | Yes | Yes | No      | No     | Occasionally | No |

Table 5a: Individual symptoms and the risk of seizure versus nonseizure according to Hoefnagels\(^4\)

| Symptoms                      | Likelihood ratio for seizures |
|-------------------------------|------------------------------|
| Blue face                     | 16.9                         |
| Tongue biting                 | 7.3                          |
| Observed disorientation       | 5.0                          |
| Frothing at the mouth         | 4.7                          |
| Aching muscles                | 2.6                          |
| Sleepy                        | 2.0                          |
| Pale face                     | 0.5                          |

Table 5b: The probability of seizure as a function of various combinations of four symptoms according to Hoefnagels\(^4\)

| Oriented | Sweating | Age | Tongue biting | Probability of seizure |
|----------|----------|-----|---------------|------------------------|
| No       | No       | <45 | Yes           | 1.0                    |
| No       | No       | <45 | No            | 0.96                   |
| No       | No       | >45 | No            | 0.72                   |
| Yes      | No       | <45 | No            | 0.15                   |
| Yes      | No       | >45 | No            | 0.01                   |
| Yes      | Yes      | >45 | No            | 0.00                   |
| Yes      | Yes      | <45 | No            | 0.01                   |

mnemonic CHESS to identify patients at high risk for adverse outcomes. C stands for a history of congestive heart failure, H-Hematocrit <30%, E-abnormal ECG, S-shortness of breath, S-triage systolic blood pressure <90 mmHg. Other scores such as the ROSE score and the OESIL score include bradycardia, chest pain, oxygen saturation <94%, age >65, and syncope without a prodrome as risk factors.\(^1\) Age is a very
### Table 6: The calgary syncope score. The total score is the sum of the scores for all positive answers. Vasovagal syncope is diagnosed if the total point score is $\geq -2$. The annotation (none) regarding question 4 indicated that none of the patients remembered being unconscious.

| Question                                                                 | Score | Odds ratio for syncope |
|--------------------------------------------------------------------------|-------|------------------------|
| Is there a history of bifascicular block, Asystole, supraventricular tachycardia, or diabetes | $-5$  | $0.02$                 |
| At the time have bystanders noted you to be blue during your faint?       | $-4$  | $0.15$                 |
| Did your syncope start when you were 35 years of age or older            | $-3$  | $0.04$                 |
| Did you remember anything about being unconscious                         | $-2$  | $0.4$ (none)           |
| Do you have lightheaded spells or faint with prolonged sitting or standing? | $1$   | $3.77$                 |
| Do you sweat or feel warm before a faint                                  | $2$   | $5.23$                 |
| Do you have lightheaded spells or faint with pain in medical settings     | $3$   | $15.38$                |

### Table 7: Useful physical findings in patients presenting with loss of consciousness.

| Finding                                      | Possible implication                                           |
|----------------------------------------------|---------------------------------------------------------------|
| Heart rate-tachycardic or bradycardic        | Arrhythmia, acute illness, GI bleed                          |
| Respiration rate-slow or fast                | Hyper/hypoventilation, pneumothorax, heart failure           |
| Carotid massage-positive                    | Carotid hypersensitivity                                      |
| Blood pressure changes                       | Orthostatic hypotension, drug-induced hypotension, volume depletion |
| Neck vein distention                         | PE, CHF, cardiac pathology                                   |
| Skin pallor                                  | Blood loss, neurocardiogenic cause                            |
| Heart murmur                                 | Cardiac syncope                                               |
| Left ventricular lift, S3 gallop             | Heart failure with cardiac syncope                           |
| Rash                                         | Anaphylaxis causing syncope                                  |
| Abdominal tenderness                         | Blood loss, hypotensive cause of syncope                     |
| Absent/variable pulses                       | Dissecting aneurysm, subclavian steal                        |
| Neurologic findings                          | Seizure, stroke, TIA                                         |

**REFERENCES**

1. Ebell MH. Risk stratification of patients presenting with syncope. Am Fam Physician 2012;85:1047-52.
2. Grossman SA, Bar J, Fischer C, Lipsitz LA, Mottley L, Sands K, et al. Reducing admissions utilizing the Boston Syncope Criteria. J Emerg Med 2012;42:345-52.
3. Grossman SA, Fischer C, Bar JL, Lipsitz LA, Mottley L, Sands K, et al. The yield of head CT in syncope: A pilot study. Intern Emerg Med 2007;2:46-9.
4. Hoefnagels WA, Padberg GW, Overweg J, van der Velde EA, Roos RA. Transient loss of consciousness: The value of the history for distinguishing seizure from syncope. J Neurol 1991;238:39-43.
5. Merriam-Webster. Merriam-Webster’s collegiate dictionary. Springfield, Mass., U.S.A.: Merriam-Webster; 1993.
6. Quinn J, McDermott D, Stiell I, Kohn M, Wells G. Prospective validation of the San Francisco Syncope Rule vs physician judgment and decision making. Ann Emerg Med 2006;47:448-54.
7. Quinn JV, Stiell IG, McDermott DA, Kohn MA, Wells GA. The San Francisco Syncope Rule vs physician judgment and decision making. Am J Emerg Med 2005;23:782-6.
8. Romme JJ, van Dijk N, Boer KR, Bossuyt PM, Wieling W, Reitsma JB. Diagnosing vasovagal syncope based on quantitative history-taking: Validation of the Calgary Syncope Symptom Score. Eur Heart J 2009;30:2888-96.
9. Soteriades ES, Evans JC, Larson MG, Chen MH, Chen L, Benjamin EJ, et al. Incidence and prognosis of syncope. N Engl J Med 2002;347:878-85.

**Summary**

Although there has been much literature dedicated to making the correct diagnosis in a patient who presents with a transient altered level of consciousness, the concept remains difficult and is strongly dependent upon the provider’s skill in obtaining a complete history and physical examination.