Clinical Approach to the Patient with Transient Loss of Consciousness-Focus on Syncope

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Content

- How approach to the patient with T-LOC ?
- Syncope
  - Vasovagal syncope
  - Cardiac syncope
  - Orthostatic syncope
- Review
  - Guidelines for the diagnosis and management of syncope (version 2009)
    (The Task Force for the Diagnosis and Management of Syncope of the European Society of Cardiology (ESC))

Definitions

- Loss of consciousness
  - Awareness vs Arousal
  1. Loss of normal motor control
     - Flaccidity or stiffness
     - Fall
  2. Unresponsiveness
  3. Amnesia
- Collapse: abrupt loss of postural tone, with or without T-LOC
- Epilepsy: an excessive asynchronous discharge of cortical neurons, leading to a clinical event
- Psychogenic blackouts: a cause of apparent T-LOC without evidence of epilepsy or syncope, or other organic disease
- Fall: an event whereby a person comes to rest on the ground or another lower level with or without loss of consciousness

Definitions

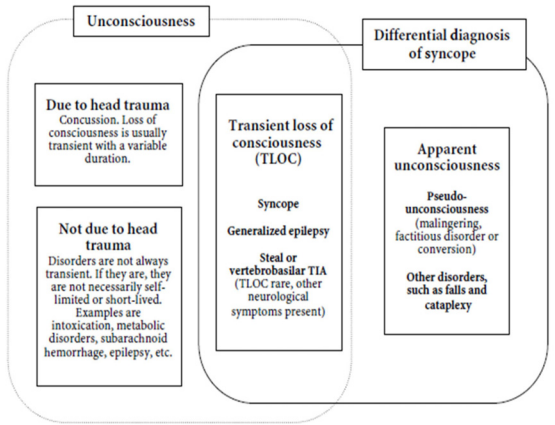
Transient loss of consciousness (T-LOC)

- Four featuring
  1. Transient
  2. With rapid onset
  3. Short duration
  4. Spontaneous recovery

Syncope

- 1-4 in T-LOC

5. Transient global cerebral hypoperfusion

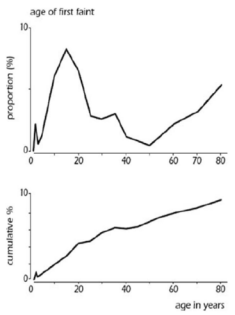


Conditions incorrectly diagnosed as syncope

- Disorders with partial or complete LOC but without global cerebral hypoperfusion
  - Epilepsy
  - Metabolic disorders including hypoglycemia, hypoxia, hyperventilation with hypocapnia
  - Intoxication
  - Vertebrobasilar TIA
- Disorders without impairment of consciousness
  - Cataplexy
  - Drop attacks
  - Falls
  - Functional (psychogenic pseudosyncope)
  - TIA of carotid origin

Epidemiology of syncope

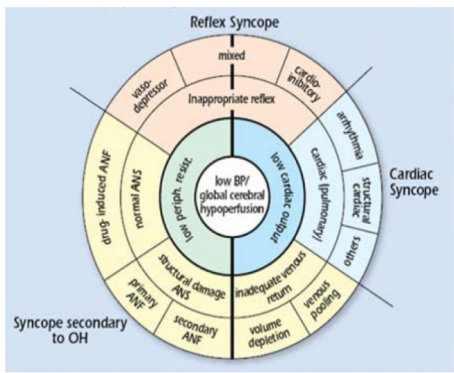
- 1% in emergency department
- 3% of general population/year
  - Increases with age
- 20% of patients
  - recur within 1 year
- Increased mortality related to cardiac co-morbidity



Classification of syncope

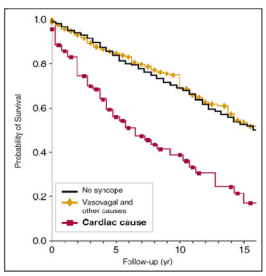
1. Reflex (neurally-mediated) syncope
   - Vasovagal syncope (neurocardiogenic syncope)
     - Emotional stress (fear, pain, instrumentation, blood phobia)
     - Orthostatic stress
   - Situational
     - cough, sneeze, GI stimulation (swallow, defaecation, visceral pain), micturition, post-exercise, post-prandial, laught, brass instrument playing, weightlifting)
   - Carotid sinus syncope
   - Atypical forms (without apprarent triggers and/or atypical presentation)
2. Orthostatic syncope
   - Primary autonomic failure
     - PAF, MSA, Parkinson's disease with autonomic failure, Lewy body dementia
   - Secondary autonomic failure
     - Diabetes, amyloidosis, uraemia, spinal cord injuries
   - Drug-induced autonomic failure
     - Alcohol, vasodilators, diuretics, phenotiazines, antidepressants
   - Volume depletion
     - Hemorrhage, diarrhea, vomiting
3. Cardiac syncope (cardiovascular)
   - Arrhythmia as primary cause
     - Bradycardia
     - Tachycardia
     - Drug induced bradycardia and tachyarrhythmias
   - Structural heart disease

Pathophysiological basis of the Classification



Mortality of Syncope

- Cardiac cause
  - 5 year mortality - 50%
  - 1 year mortality - 30%
- Non-cardiac cause
  - 1 year mortality - <6%
- Unexplained Syncope
  - 1 year mortality - <6%

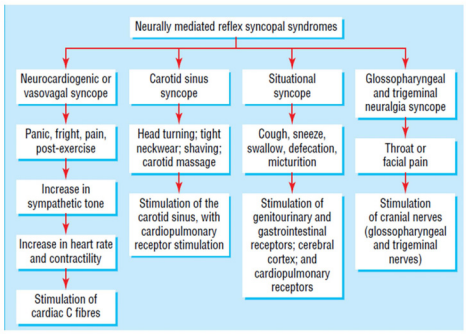


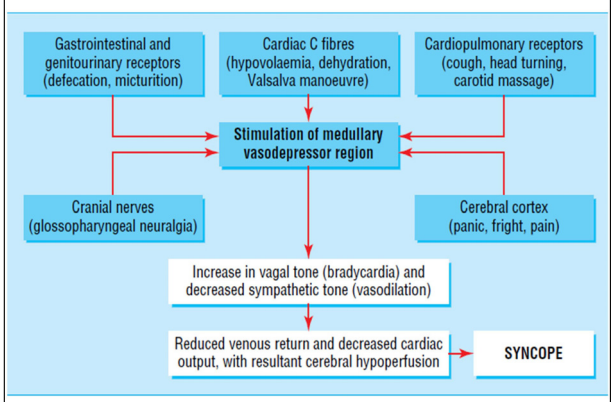
Reflex syncope

증례

- 52세 여자가 내원 1시간 전에 목욕탕(온탕)에서 의식을 잃고 쓰러져서 응급실을 방문하였다. 쓰러지기 전에 발차기를 수차례 시행하였음.
- 35세 남자가 아침에 일어나서 화장실에 소변 보러 갔다가 1분이내로 의식을 잃어서 병원을 방문.
- 25세 여자가 소변을 보다가 약 10초간 의식을 잃어 응급실을 방문하였다. 환자는 최근 2년간 소변 볼때와 대변을 보려고 힘을 줄때 의식을 잃을 것 같은 경험을 3차례 하였다고 한다. 과거에 다른 질병을 앓은 적은 없었다.
- 46세 남자가 목안으로 심한 통증이 있으면서 일시적인 의식소실이 있어서 병원을 방문

Pathophysiology of reflex syncope





Diagnostic criteria for vasovagal syncope based on a quantitative history

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See page 253 for the editorial comment on this article (doi:10.1093/eurheartj/ehi663)

KEYWORDS
Vasovagal; Syncope; Diagnosis; Tilt test; Faint; Point scores; History

Aims Our goal was to develop historical criteria for the diagnosis of vasovagal syncope.
Methods and results We administered a 118-item historical questionnaire to 418 patients with syncope and no apparent structural heart disease. The prevalence of each item was compared between patients with positive tilt tests and those with syncope of other, known causes. The contributions of symptoms to diagnoses were estimated with logistic regression, point scores were developed, and the scores were tested using receiver operator characteristic analysis. The accuracy of the decision rule was assessed with bootstrapping. Data sets were complete for all subjects. The causes of syncope were known in 323 patients and included tilt-positive vasovagal syncope (235 patients) and other diagnoses such as complete heart block and supraventricular tachycardias (88 patients). The point score correctly classified 90% of patients, diagnosing vasovagal syncope with 89% sensitivity and 91% specificity. The decision rule suggested that 68% of an additional 95 patients with syncope of unknown cause and a negative tilt test have vasovagal syncope.
Conclusion A simple point score of historical features distinguishes vasovagal syncope from syncope of other causes with very high sensitivity and specificity.

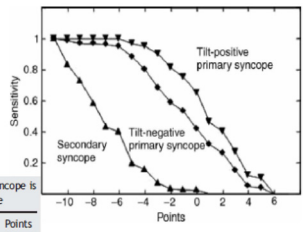


Table 5 Diagnostic questions to determine whether syncope is due to vasovagal syncope or to another cause of syncope

Question	Points (if yes)
Is there a history of at least one of bifascicular block, asystole, supraventricular tachycardia, diabetes?	−5
At times have bystanders noted you to be blue during your faint?	−4
Did your syncope start when you were 35 years of age or older?	−3
Do you remember anything about being unconscious?	−2
Do you have lightheaded spells or faint with prolonged sitting or standing?	1
Do you sweat or feel warm before a faint?	2
Do you have lightheaded spells or faint with pain or in medical settings?	3

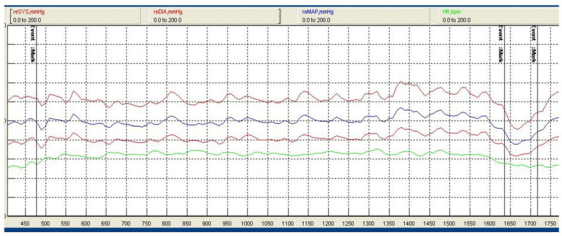
The patient has vasovagal syncope if the point score is ≥−2.

Classification of vasovagal syncope (HUT)

- Type 1 (mixed)
  - Ventricular rate during syncope ≥40 bpm or falls to <40 bpm for <10 s±asystole for <3 s. BP falls prior to heart rate.
- Type 2A (Cardioinhibitory)
  - Ventricular rate during syncope <40 bpm for >10 sec or asystole for >3 s. BP falls prior to heart rate.
- Type 2B (Cardioinhibitory)
  - Ventricular rate at syncope <40 bpm for >10 s or asystole for >3 s. BP falls to <80 mmHg systolic at or after rapid fall in heart rate (as above).
- Type 3 (Vasodepressor)
  - Heart rate does not fall more than 10% from its peak at syncope. Fall in BP precipitates syncope.

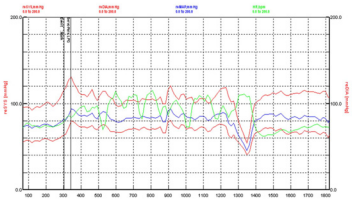
- Exception 1) chronotropic incompetence
- Exception 2) POTS

HUT

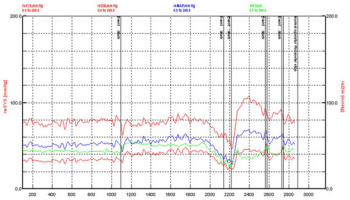


Vasovagal syncope (Vasodepressor type)

Vasodepressor syncope (Type 3)



Cardioinhibitory syncope (Type 2A)



Vote: M/67

1) 2012년 5월에 일시적인 의식소실 (바닷가에서 낚시하다가 줄 당기면서 일시적인 LOC (1분이내))
2) 2013년 5월 5일에 등산 가서 걷는 도중에 어지러운 증상이 있으면서 넘어졌다. 이후 쉬었다가 다시 50m 정도를 걸어 갔을때 비슷하게 어지러운 증상이 있어서 병원을 방문

Lab findings)

1) Brain MRI/Cardiac echo/Holter monitoring/ Coronary MDCT: non-specific
2) ECG: Sinus bradycardia (53bpm)/ right BBB/ QT/QTc: 455/439ms

Vote: 가장 가능성 높은 것은 ?

1) Vasovagal syncope
2) Orthostatic syncope
3) Cardiac syncope

Cardiac syncope

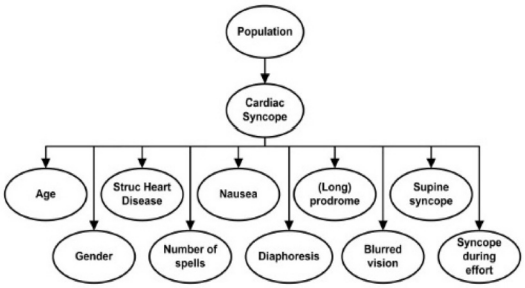
Risk stratification

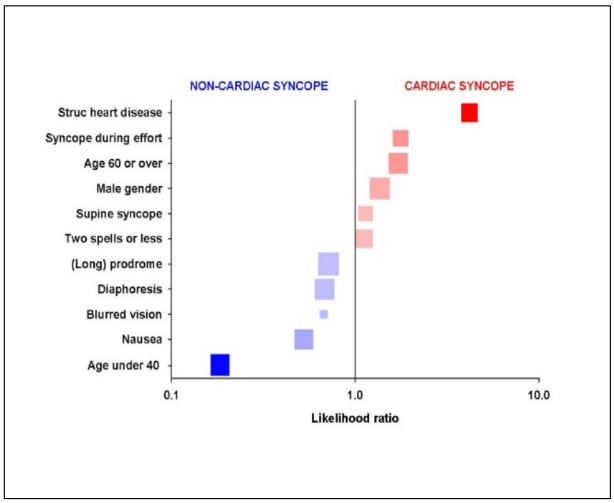
- Short-term high risk criteria which require prompt hospitalization or intensive evaluation

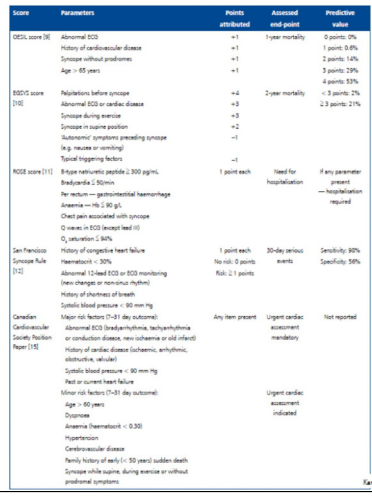
1. Severe structural or coronary artery disease (heart failure, low LVEF, or previous MI)
2. Clinical or ECG features suggesting arrhythmic syncope
   - Syncope during exertion or supine
   - Palpitations at the time of syncope
   - Family history of sudden cardiac death
   - Non-sustained VT
   - Bifascicular-block or other intraventricular conduction abnormalities with QRS duration ≥ 120ms
   - Inadequate sinus bradycardia (<50 bpm) or sinoatrial block in absence of negative chronotropic medications or physical training
   - Pre-excited QRS complex
   - Prolonged or short QT interval
   - RBBB pattern with ST-elevation in leads V1-V3 (Brugada pattern)
   - Negative T waves in right precordial leads, epsilon waves, and ventricular late potentials suggestive of ARVC
3. Important co-morbidities
   - Severe anemia
   - Electrolyte disturbance

Identifying Cardiac Syncope Based on Clinical History: A Literature-Based Model Tested in Four Independent Datasets

Janneke Berecki-Gisolf[1*], Aaron Sheldon[2], Wouter Wieling[3], Nynke van Dijk[4], Giorgio Costantino[5], Raffaello Furlan[6], Win-Kuang Shen[4], Robert Sheldon[1]







Orthostatic syncope

증례

- 67세 남자가 아침에 일어날때 어지러운 증상이 한달전부터 있어서 병원을 방문하였다. 약 2개월전부터 전립선약을 복용하고 있었다.
- 3년전에 파킨슨병으로 진단받고 약물로 치료하는 중이었으며, 1개월전부터 일어날 때 어지럼이 있으면서 잘 주저 앉는 증상이 있어서 방문. 방문 당시에 서는 것은 불가능한 상태였으며, 앉아도 3-5초간 어찔한 느낌이 드는 상태였음.

Symptoms of orthostatic intolerance

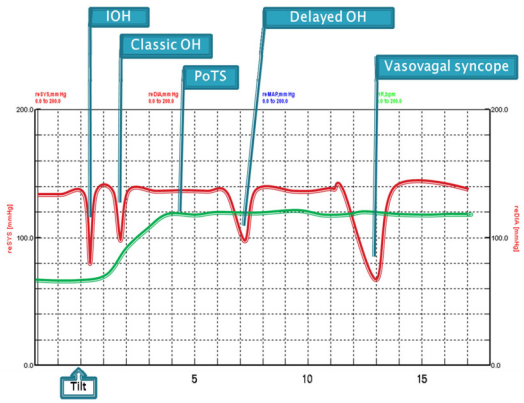
- Syncope
- Dizziness, lightheadness, pre-syncope
- Weakness, fatigue, lethargy
- Palpitations, sweating
- Visual disturbances (including blurring, enhanced brightness, tunnel vision)
- Hearing disturbances (including impaired hearing, crackles, tinnitus)
- Pain in the neck (occipital/paracervical and shoulder region), low back pain, precordial pain

Syndromes of OI which may cause syncope

Classification	Test for diagnosis	Time from standing to symptoms	Pathophysiology	Most frequent symptoms
Initial OH	Beat-to-beat SBP on lying-to-standing test (active standing)	0–30 s	Mismatch between CO and SVR	Lightheadedness/dizziness, visual disturbances a few seconds after standing up, (syncope rare)
Classical OH (classical autonomic failure)	Lying-to-standing test (active standing) or tilt table	30 s–3 min	Impaired increase in SVR in autonomic failure resulting in pooling of blood/or severe volume depletion over-riding reflex adjustments	Dizziness, pre-syncope, fatigue, weakness, palpitations, visual and hearing disturbances (syncope rare)
Delayed (progressive) OH	Lying-to-standing test (active standing) or tilt table	3–20 min	Progressive fall in venous return; low CO, diminished vasoconstriction capacity (failing adaptation reflex),no reflex bradycardia	Prolonged prodrome (dizziness, fatigue, weakness, palpitations, visual and hearing disturbances, hyperhydrosis, low back pain, neck or precordial pain) frequently followed by rapid syncope
Delayed (progressive) OH + reflex syncope	Tilt table	3–45 min	Progressive fall in venous return (as above) followed by vasovagal reaction (active reflex including reflex bradycardia and vasodilation)	Prolonged prodrome (dizziness, fatigue, weakness, palpitations, visual and hearing disturbances, hyperhydrosis, low back pain, neck or precordial pain) always followed by rapid syncope
Reflex syncope (VVS) triggered by standing	Tilt table	3–45 min	Initial normal adaptation reflex followed by rapid fall in venous return and vasovagal reaction (active reflex including reflex bradycardia and vasodilation)	Clear prodrome ('classic') and triggers always followed by syncope
POTS	Tilt table	Variable	Uncertain: severe deconditioning, inadequate venous return or excessive blood venous pooling advocated	Symptomatic marked heart rate increases and instability of blood pressure. No syncope

CO = cardiac output; CSS = carotid sinus syndrome; OH = orthostatic hypotension; POTS = postural orthostatic tachycardia syndrome; SBP = systolic blood pressure; SVR = systemic vascular resi

Syndromes of OI which may cause syncope



Clinical features for initial diagnosis

- Neurally mediated syncope
  - Absence of heart disease
  - Long history of recurrent syncope
  - After sudden unexpected unpleasant sight, sound, smell or pain
  - Prolonged standing or crowded, hot places
  - Nausea, vomiting associated with syncope
  - During a meal or post-prandial
  - With head rotation or pressure on carotid sinus (as in tumors, shaving, tight collars)
  - After exertion
- Orthostatic syncope
  - After standing up
  - Temporal relationship with start or changes of dosage of vasodepressive drugs leading to hypotension
  - Prolonged standing especially in crowded, hot places
  - Presence of autonomic neuropathy or Parkinsonism
  - Standing after exertion
- Cardiovascular syncope
  - Presence of definite structural heart disease
  - Family history of unexplained sudden death or channelpathy
  - During exertion, or supine
  - Abnormal ECG
  - Sudden onset palpitation, immediately followed by syncope
  - ECG findings suggesting arrhythmic syncope

Treatment of Vasovagal syncope

- 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

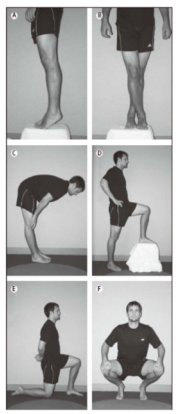
Vote: Reflex syncope의 재발방지에 beta-blocker가 효과가 있다?

1) 효과가 있다

2) 효과가 없다

Recommendations: treatment of reflex syncope

Recommendations	Class[a]	Level[b]
• Explanation of the diagnosis, provision of reassurance, and explanation of risk of recurrence are indicated in all patients	I	C
• Isometric PCMs are indicated in patients with prodrome	I	B
• Cardiac pacing should be considered in patients with dominant cardioinhibitory CSS	IIa	B
• Cardiac pacing should be considered in patients with frequent recurrent reflex syncope, age >=40 years, and documented spontaneous cardioinhibitory response during monitoring	IIa	B
• Midodrine may be indicated in patients with VVS refractory to lifestyle measures	IIb	B
• Tilt training may be useful for education of patients but long-term benefit depends on compliance	IIb	B
• Cardiac pacing may be indicated in patients with tilt-induced cardioinhibitory response with recurrent frequent unpredictable syncope and age >=40 after alternative therapy has failed	IIb	C
• Cardiac pacing is not indicated in the absence of a documented cardioinhibitory reflex	III	C
• β-Adrenergic blocking drugs are not indicated	III	A



실신검사에 기립경사검사가 반드시 필요한가?

Head-up tilt test

- Specificity
  - 90%
- Sensitivity
  - 32%-85%
- Reproducibility
  - 1day to 4 years
    - 62-85% (one report 1day: 35%)
- Nitrates test
  - Sensitivity: 51-81%
  - Specificity: 85-94%
- EEG
  - Sensitivity: 25-56%
  - Specificity: 78-98%

Head-up tilt test

- Indications
  - Unexplained single syncopal episode in high risk settings or recurrent episode without cardiac causes
  - Clinically reflex syncope
  - Discriminate between reflex and OH syncope
  - Differentiating syncope with jerking movement from epilepsy
  - Recurrent unexplained falls
  - Frequent syncope and psychiatric disease
  - Not recommend for assessment of treatment
  - Isoproterenol tilt testing is contraindicated in patients with ischemic heart disease
- Diagnostic criteria
  - Hypotension, bradycardia with production of syncope (without SHD)
    - Reflex syncope, OH
  - Hypotension, bradycardia without production of syncope (without SHD)
    - Reflex syncope
  - SHD, arrhythmia, cardiovascular causes
    - Excluded prior to considering positive tilt test
  - LOC in absence of hypotension, bradycardia
    - Psychogenic pseudosyncope

Head-up tilt testing for diagnosing vasovagal syncope: A meta-analysis

Cinzia Forleo *,[1], Pietro Guida [1], Massimo Iacoviello, Manuela Resta, Francesco Monitillo, Sandro Sorrentino, Stefano Favale

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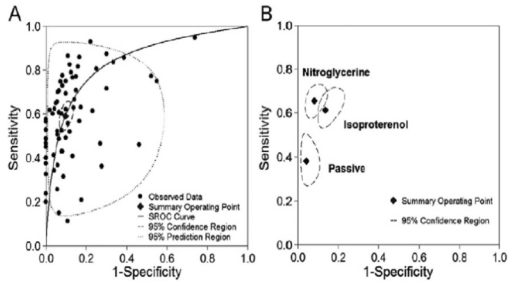
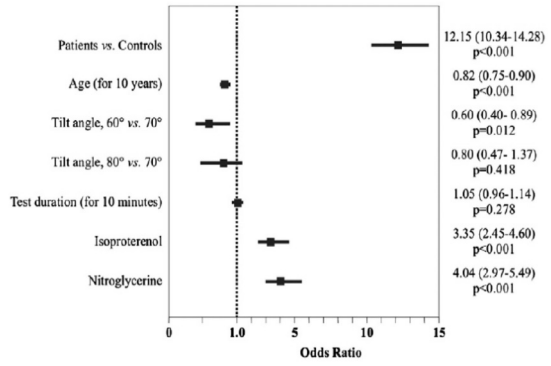
Sensitivity, specificity and diagnostic odds ratios of head-up tilt testing protocols according to tilt phases and pharmacological agents used.

	Sensitivity (%)	Specificity (%)	Diagnostic odds ratio
Passive phase alone	25 (21–30)	99 (97–99)	10.08 (7.59–13.40)
Isoproterenol phase alone	48 (37–59)	88 (81–92)	5.94 (4.33–8.16)
Nitroglycerine phase alone	60 (53–66)	90 (84–93)	11.44 (8.97–14.59)
Overall passive protocols	37 (29–46)	96 (92–98)	10.14 (6.70–15.34)
Overall isoproterenol protocols	61 (52–69)	86 (79–91)	8.33 (6.38–10.86)
Overall nitroglycerine protocols	66 (60–72)	89 (84–92)	14.40 (11.50–18.05)
Overall protocols	59 (53–64)	91 (87–93)	11.28 (9.63–13.22)

Estimates with 95% confidence intervals.



C. Forleo et al. / International Journal of Cardiology 168 (2013) 27–35



, Odds ratios at multivariate analysis and 95% confidence intervals for positive outcomes to head-up tilt testing.

Vote

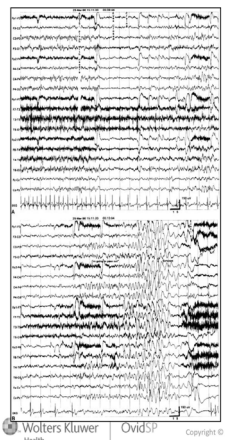
- Convulsive movement의 유무로 syncope과 seizure를 감별할 수 있다.

1) 감별할 수 있다
2) 감별할 수 없다

Syncope vs Seizure

	Syncope	Seizures
유발인자	흔하다	드물다
선행증상	오심, 흐릿함, 열감, 두통, 이명, 상복부 불편감	감각적, 정신적, 체성감각 aura 혹은 운동현상
자세	대개는 서거나 앉아서 (매우 드물게 누워서)	자세와 연관없슴
기억소실	젊은 사람은 서서히, 노인에서는 갑작스런 소실	갑작스런 소실
넘어짐	서서히, flaccid	빠르게, tonic
피부색깔	창백	때때로 말단청색증
안구편향	일시적으로 위 혹은 옆으로 편향	지속적으로 옆으로 편향
요실금	흔함	흔함
혀물기	드물 (위치: 혀끝)	흔함 (위치: 혀의 한쪽부위)
발작	수초동안, 불규칙적이고, 다발적 혹은 전신적	수분동안 규칙적이고 전신적
기간	3-30 초	경련의 종류에 따라 다름: 전신발작은 5분정도
발작후	두통, 비몽사몽(대부분 2시간이상 지속되지 않는다)	혼란, 섬망, 두통

FIG. 2



Electroencephalography in Syncope.
Brenner, Richard

Journal of Clinical Neurophysiology. Neurocardiogenic Syncope. 14(3):197-209, May 1997.

FIG. 2 . One minute epoch demonstrating syncopal episode in a 7-year-old girl following a venipuncture. A: Venipuncture performed at 15:11:05. B: Patient feels as though she is going to pass out at 15:11:27. Syncope occurs at 15:11:34 following burst of delta activity. (continues)

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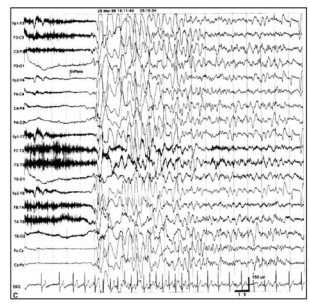
4

FIG. 2



Electroencephalography in Syncope.
Brenner, Richard

Journal of Clinical Neurophysiology. Neurocardiogenic Syncope. 14(3):197-209, May 1997.

FIG. 2 Continued. C: Patient stiffens at 15:11:44 after EEG has flattened. EEG then returns to baseline in reverse sequence.

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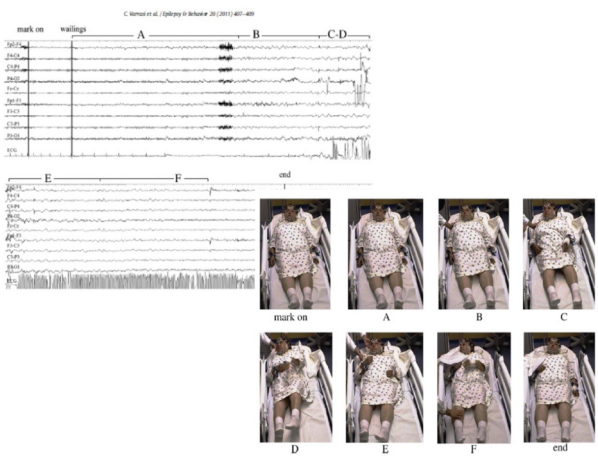
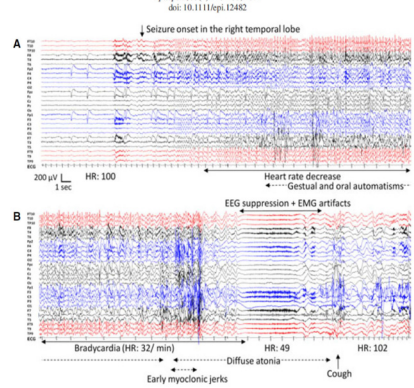
5



Characterization of seizure-induced syncopes: EEG, ECG, and clinical features

*Vi-Huong Nguyen-Michel, *Claude Adam, *Vera Dinkelacker, *Phintip Pichit, †Yasmina Boudali, *Sophie Dupont, *Michel Baulac, and *Vincent Navarro

Epilepsia, 55(1):146–155, 2014
doi: 10.1111/epi.12482



Clinical features of common convulsive events

Clinical feature	Convulsive epileptic seizure	Convulsive syncopic event	Convulsive psychogenic seizure
Position at onset	Upright or recumbent	Usually upright	Upright or recumbent
Precipitating factors	Sleep deprivation/ ETOH	Fear/pain/blood	Anxiety/stress
Aura	May be present if partial onset	Almost always present	May be present
Eyes	GTCS-Upward deviation PS-may demonstrate adversive deviation	Upward deviation ± preceding downbeat nystagmus	May demonstrate eyelid fluttering or forced eye closure
Motor activity	GTCS-tonic and clonic activity PS-may demonstrate complex motor phenomena	Often demonstrates tonic activity or multifocal/generalized myoclonus	Asymmetric movements, complex motor phenomena
Pattern of motor activity	GTCS-standard progression of tonic to clonic activity	Variable pattern of motor activity	Nonstandard progression ± intermittent motor activity
Duration	Usually 30 seconds to 2 minutes	Usually < 30 seconds	May be prolonged
Skin color	Cyanosis	Pallor	Flushing or no change
Tongue biting	Common	Rare	Rare
Incontinence	Common	Rare	Rare
Ictal EEG	Rhythmic electrographic seizure or focal/diffuse slowing	May demonstrate diffuse slowing	No EEG change
Postictal prolactin	Elevated	Elevated	Normal

T-LOC-> Syncope