

Differential Diagnosis of SEIZURE

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Diagnosis of Epilepsy

Seizures

- Caused by abnormally excessive cortical neuronal activity
- Paroxysmal & episodic → suddenly transient behavioral, somatosensory, other sensory, and motor

Convulsion

- Motor seizures

Epilepsy

- Recurrent seizures: >2 unprovoked seizures occurring at least 24 hours apart
- Single seizure with evidence of high tendency for recurrent unprovoked seizures >60%

Epileptic spells

Type of seizures	Premonitory symptoms	Characteristics	Duration	Post spell
Absence	None	Staring, automatisms	<10 sec	None
Focal impaired awareness	Variable aura or brief sensory march	Staring, automatisms evolving motor symptoms	30-180 sec	Common; amnesia, confusion, sleepiness, incontinence
Tonic-clonic	Aura variable	Brief tonic posturing, ensuing clonic mvnt	1-3 min	Requisite; amnesia, confusion, incontinence, tongue biting

Investigation of seizures

- EEG: sens 50%
- Brain imaging: lesional MRI 65%

- What if EEG and MRI are normal??

Paroxysmal events in varying ages

Newborn	Infancy and game age	Adolescents / Adults
Jitteriness Hyperekplexia Benign sleep myoclonus	Breath-holding spells Shuddering attacks Stereotypes Benign paroxysmal torticollis Benign paroxysmal tonic upward gaze Benign paroxysmal vertigo Sleep disorders Masturbation Spasmus nutans Sandifer syndrome Tics	Syncope Sleep disorders Psychogenic non-epileptic seizure (PNES) Tics Migraine

Paroxysmal spells in adults

- Common Paroxysmal Spells in clinical practice
 - **Seizure**
 - **Seizure mimic:**
 - Syncope
 - Neurologic disorder;
 - TIA
 - Migraine
 - Parasomnia
 - Movement disorders
 - Psychogenic non epileptic seizure (PNES)

Misdiagnosis of seizure or epilepsy

- Misdiagnosis rate was 4.6-30%
- Especially in the first episode

- Reasons:
 - Overlapping clinical features
 - Inadequate available history
 - Limitations of investigations

Syncope

- AKA: fainting, passing out
- Loss of consciousness and muscle strength characterized by a fast onset, short duration, and spontaneous recovery.
- Caused by a decrease in blood flow to the brain.
- Warning: lightheadedness, sweating, pale skin, blurred vision, nausea, vomiting, or feeling warm.
- May also be associated with a short episode of **muscle twitching**

Cause of syncope



Cardiac or blood vessels



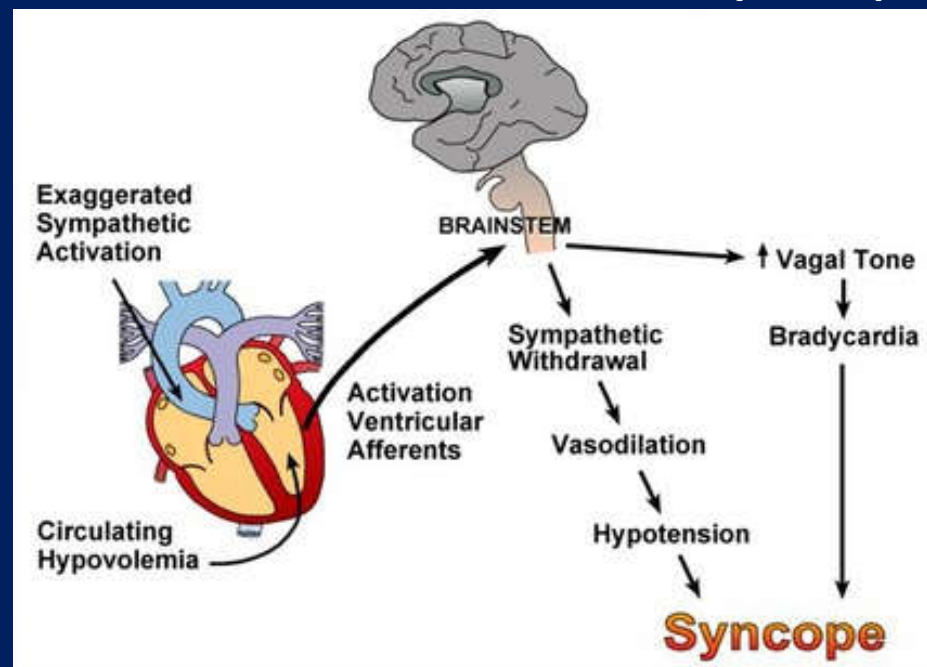
Reflex or neurally mediated syncope (NMS)



Orthostatic hypotension

Vasovagal syncope

- AKA: situational syncope
- May occur in response to any of a variety of triggers; scary, embarrassing or uneasy situations, during blood drawing, or moments of sudden unusually high stress.
- Others: micturition or defecation syncope



Vasovagal syncope

Isolated episode without warning:

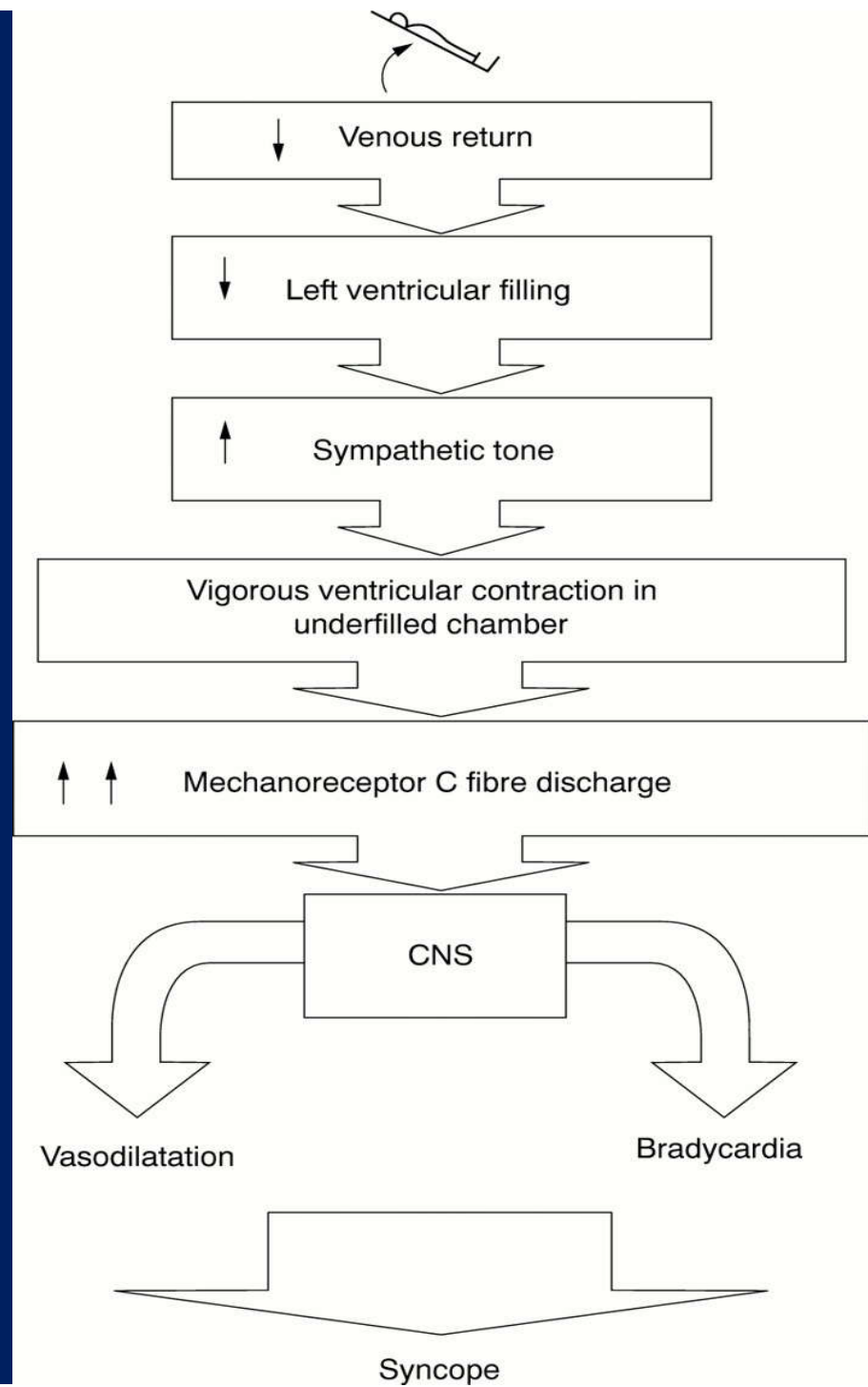
- Adolescents
- Fasting, exercise, heat, alcohol, acute fear, anxiety
- Tilt-table test, generally negative

Recurrent syncope with complex associated symptoms:

- NMS
- Preceding by sleepiness, visual disturbance, lightheadedness, sweating
- Tilt-table test, generally positive

Tilt testing

Neurology 1995;45(suppl 5):15



- Arrhythmia
- Structural heart
- Obstructive cardiac lesion

Cause of syncope



Cardiac or blood vessels



Reflex or neurally mediated syncope (NMS)



Orthostatic hypotension

Orthostatic hypotension

- Common
- Associated with movement from lying or sitting to a standing position, standing up too quickly
- Warning by lightheadedness
- Cause of orthostatic hypotension
 - Dehydration
 - Antihypertensive drugs
 - Neurogenic orthostatic hypotension

Syncope vs Seizure

	Seizure	Syncope
Warning	Some aura	Felt faint, lightheadedness Blurred/darkened vision
Palpitation	Some	Common
LOC	Common	Syncope
Onset	Sudden, any position	Only occurs sitting or standing Avoidable by change in posture
Features	Eyes open, Rigidity Convulses	Eyes closed, Limp Minor twitching
Involuntary mvnt	Typical	Common
Duration	Seconds	Minutes
Recovery	Confused, headache, sleepy, focal deficit (Todd's palsy)	Pale, Sweating, Cold and clammy
Other features	Tongue bite, Loss of bladder control (common)	Loss of bladder control (rare)

Syncope vs Seizure (cont.)

	Seizure	Syncope
EEG	Epileptiform discharge	Slow waves → flattening
Responsive to AEDs	Often	No
Short term mortality	Low	Often

Convulsive syncope



AUSLÖSUNG DER SYNKOPEN

INDUCTION OF SYNCOPE

- 12% of syncope have “myoclonic jerk”
- Multifocal arrhythmic jerks -- proximal and distal muscles
- Caused by **brainstem hypoperfusion** and may be mistaken for epilepsy.

Clinical scenario	Observation Type	Seizure estimate (%)
Healthy subjects		
Blood donor clinic	Chart review	12
Blood donor clinic	Prospective observation	42
Physiology study	Syncope induction and observation	90
Patients with syncope		
Tilt testing	Syncope induction and observation	4.4-8

Convulsive syncope vs Seizure

Characteristic	Convulsive syncope	Epileptic Seizure
Onset of myoclonus	Follows loss of consciousness (after falling)	Immediate (before falling)
Eye deviation	Upward	Lateral
Myoclonus rhythm	Arrhythmic jerks	Rhythmic jerks
Myoclonus pattern	Multifocal jerks briefly involving bilateral proximal and distal m.	Unilateral or asymmetric jerks w/ evolution
Myoclonus duration	1-15 sec	30 sec – 2 min
Urinary incontinence	May occur	Often
Postictal presentation	No confusion	Postictal confusion



Psychogenic Nonepileptic Seizure (PNES)

Psychogenic nonepileptic seizure

- AKA: PNES, Dissociative seizures, non epileptic attack disorder (NEAD)
- Episodes that look like epileptic seizures but are not caused by abnormal cortical electric discharges
- Sudden onset of involuntary movements, alteration of consciousness, or both, without EEG changes

PNES

- Typically:
 - Triggered by emotion (often unaware), intense pain, illness, or exhaustion
- Psychological trauma is almost always part of the adult patient's history.
- A history of sexual or physical abuse: 1/3-1/2

Psychiatric conditions

Psychiatric conditions associated with PNES include

- Depression
- Anxiety
- Somatoform disorder
- Dissociative disorder
- Personality disorder: borderline, narcissistic, historic, and antisocial

Misdiagnosis can lead to

- Dangerous interventions in ER: loading AEDs, being intubated
- Not responding to antiseizure drugs.
- Taking many types of medications for years

PNES vs Epileptic seizure

	Epileptic seizure	PNES
Duration	Usually brief, <1-2 mins	Usually long > 2 mins
Eyes	Opened	Closed
Head	Fixed/unilateral	Side-to-side movements
Limbs	Stereotyped, Synchronized Build, progress	Variable Forward pelvic thrusting
Body (axis)	Straight	Opisthotonus
Body (movement)	No rotation	Intense rotation in bed Rolling side to side
Evolution of seizure	Continuous	Fluctuating
Incontinence	Common	Less common
Autonomic	Cyanosis, tachycardia	Uncommon

Diagnosis

- Are you 100% sure that the events were PNES by listening from the history or even looking at it?
- NO!!
- Video EEG monitoring is a gold standard by recording the brainwave during typical events.
- Up to 30% of patients seen in Epilepsy Monitoring Unit (EMU) are PNES.

Treatment of PNES

NOT THE ANTIPILEPTIC DRUGS!!!

- Cognitive behavioral treatments (CBT)
- Psychodynamic therapy
- Mindfulness-based treatments
- Hypnotherapy
- Group therapies and psychoeducation





Migraine

Migraine vs Epilepsy

- Share common features:
 - Chronic, episodic manifestation, precipitating factors
 - Migralepsy: a rare condition in which a migraine is followed by an epileptic seizure (within an hour).
 - Treatment: some AEDs can treat migraine

- Differentiating is usually accomplished on clinical ground

- EEG is not routinely indicated in migraine



THE ONSET OF MIGRAINE



FIRST WARNING

TWO MINUTES LATER

FOUR MINUTES LATER



SIX MINUTES LATER

EIGHT MINUTES LATER

NORMAL IN THREE MINUTES

VIOLENT HEADACHE FOLLOWS

EVE BENJAMIN 1985

Migraine vs Epilepsy: “Aura”

	Migraine	Epilepsy
Mechanism	Cortical spreading depression	Synchronous neuronal discharge, limited distribution
Duration	5-60 minutes, develop slowly	Brief (<5min)
Typical content	B&W or color; straight lines; slow spread CSD → positive follows by negative phenomena → Central to peripheral	B&W or color, round, simple, variable spread
Occur in isolation	Yes: Acephalic migraine	Yes: focal onset aware SZ (simple partial seizure)
Common symptoms	Visual: most common Sensory: chiero-oral Motor: unilateral weakness	Limbic: abdominal sensation, fear, déjà vu Sensory: paresthesias Motor: twitching
Confusion	Rare	Common



Sleep disorder

Sleep disorder mimic seizure

- Out of sleep: Parasomnia
- During wakefulness: Narcolepsy

Parasomnia

- Sleep disorders that involve abnormal movements, behaviors, emotions, perceptions, and dreams
- occurs while falling asleep, sleeping, between sleep stages, or during arousal from sleep.

Parasomnia

NREM (d/o of arousal)

- Confusional arousal
- Sleep walking
- Sleep terrors

REM

- REM sleep behavioral d/o
- Recurrent isolated sleep paralysis
- Nightmare d/o



Sleep disorder vs Epilepsy

Feature	NFLE	Arousal Disorders	RBD
Age of onset	Variable, 1 st -2 nd dec	1 st dec	> 50 years old
Sleep stage	NREM 1 or 2, sleep-wake transitions	NREM 3	REM sleep
Timing of episodes	Anytime	1 st 1/3 of sleep	Last 1/3 of sleep
Duration	5-60 s	2-30 min	Sec to 2 min
Frequency	Nightly clusters	Sporadic, rare cluster	Sporadic, rare cluster
Onset and offset	Sudden	Gradual	Sudden
Semiology	Highly stereotyped, hypermotor, asymmetric tonic	Not stereotyped (variable complexity)	Not highly stereotyped, vocalization, dream recall
Postictal confusion	Typically absent	Present	Absent
VPSG-EEG	Epileptic d/c in < 50%	SWS arousals, rhythmic delta pattern	REM sleep w/o atonia

Narcolepsy

- Signs and symptoms
 - Excessive daytime sleepiness
 - Cataplexy
 - Hypnagogic hallucinations
 - Sleep paralysis
 - Disrupted nighttime sleep
- Lifelong neurologic disorder of sleepiness
- Onset typically in teenagers

Cataplexy

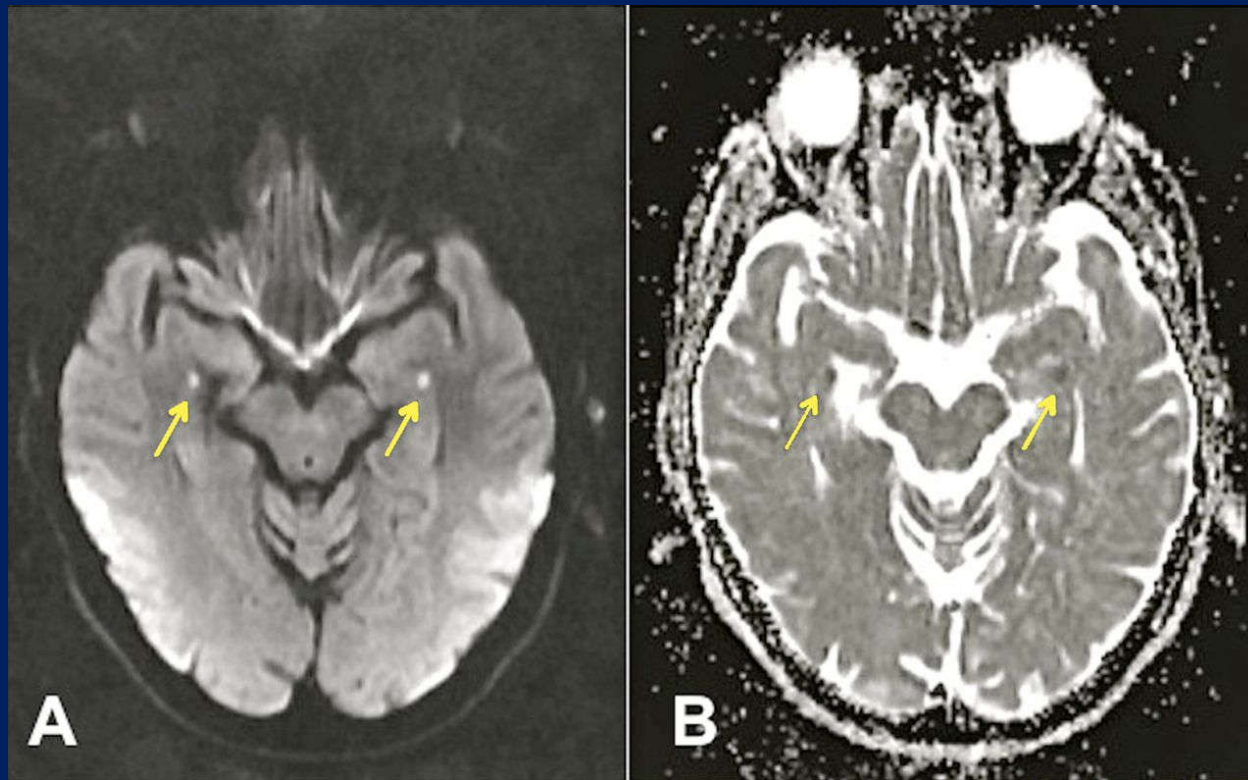
- A sudden and uncontrollable muscle weakness or paralysis
- During the day
- Often triggered by a strong emotion:
 - excitement or laughter.



<https://www.youtube.com/watch?v=VA6FeiGgLF0>

Narcolepsy vs IGE

	Narcolepsy	IGE
Onset	Childhood, 30-40 years	Childhood or adolescence, rarely adult
Pathogenesis	Autoimmune (probable)	Genetic (unknown)
Cardinal symptom	EDS with sleep attack, cataplexy	Seizure (absence, myoclonic, tonic-clonic, atonic, tonic, clonic)
Associated symptoms	Disruption of nocturnal sleep, hypnagogic hallucination, sleep paralysis	
PSG, EEG	SOREMPs, MSLT sleep latency < 8 min, hypersynchronous paroxysmal theta activity	Generalized bilateral, synchronous, symmetrical, EEG discharge (SPK, PSPK), ictal and interictal
Biomarkers	CSF hypocretin-1	None
Brain imaging	Normal	Normal



Transient Global Amnesia (TGA)

TGA vs Transient epileptic amnesia

TGA (Transient Global Amnesia)	TEA (transient Epileptic Amnesia)
Vasculopathies	Middle-aged
Anterograde amnesia	Anterograde amnesia
<24 hr	< 1 hr
New events or recurrent	Recurrent
Cannot learn new information	Cannot learn new information
Retained identity	No retained identity
Anytime of day	Frequently from sleep
EEG normal or non-specific	EEG temporal abnormality

How to approach paroxysmal event?

- Age group?
- State of conscious during the event
 - Awake: SZ, syncope, migraine, PNES, cataplexy
 - Sleep: SZ, arousal disorder, RBD
- Clinical feature
 - LOC/drop attack: SZ, syncope, cataplexy, PNES
 - Blank staring/LOA: SZ, PNES
 - Shaking: SZ, PNES
 - Visual aura: SZ, migraine

Nonepileptic spells

Type of spells	Premonitory symptoms	Characteristics	Duration	Post spell
PNES	Variable	Variable responsiveness, nonstereotyped, unusual mvnt	Often prolonged (>5-10 min)	Variable
Syncope	Lightheaded, dizziness	Falling, eye closure, variable mvnt	1-5 mins	Often none
Migraine	Prolonged, visual, cheiro-oral	“positive”; photopsia, paresthesia	20-60 mins	Headache
TIA	-	“negative”; numb, weak	<60 mins	None
Parasomnia	None	Vocalization, confusion, ambulation	Mins	Amnesia, confusion
Cataplexy	Emotional provocation	Muscle atonia, sleep attack	Secs to mins	None

THANK YOU – 3 times