EANS/UEMS European examination in neurosurgery

Variants of questions with answers (compilation - Vyacheslav S. Botev, Department of Neurosurgery, M.Gorky Donetsk National Medical University)

EPILEPSY MCQs

1. A 43-year-old right-handed man is brought to the ED with acute onset of right-sided facial droop, right arm weakness (graded 2/5), and “halting speech.” According to his wife, the patient complained of a headache. He was cursing at the football game on television, when he started to stutter, make guttural noises, and then seemingly stared blankly and did not respond to her. She noticed that his right arm was shaking rhythmically. Maybe 5 minutes later, the shaking stopped and the patient started to make semipurposeful movements (reaching for objects with his left hand) but still appeared “dazed.” He takes no blood thinners, and his prothrombin time (PT)/partial thromboplastin time (PTT)/International Normalized Ratio (INR) is normal. His serum glucose is 130, his platelets are 220 (normal), and his blood BP is 160/89 currently (with similar readings obtained by EMS in the field). The initial head CT scan is unremarkable. During your interview in the ED, you observe the patient halt purposeful movements and stare blankly, and you witness subtle shaking of the right arm for about 20 seconds. His nurse tells you that he has seemed “spaced out” and sleepy during his brief period in the ED. The next most appropriate step is:
A. Give the patient tissue plasminogen activator (tPA) per standard protocol and arrange for him to be admitted to the Neuro-ICU for monitoring
B. Do a lumbar puncture and send cerebrospinal fluid (CSF) for WBC count, RBC count, glucose, protein, herpes simplex virus-1 (HSV-1) poymerase chain reaction (PCR), HSV-2 PCR, and Gram stain
C. Load the patient with phenytoin and arrange for continuous EEG monitoring in the Neuro-ICU
D. Do an urgent MRI to evaluate for acute cerebral infarction

2. A patient has just been admitted to your ICU who presented to the ED with status epilepticus (SE) and no further history. The seizure semiology was reported as generalized tonic–clonic seizures per EMS and ED staff. The patient’s temperature is 38.0°C, HR 99, BP 140/77, RR 14, and SpO_2 97% on 2 L NC. There are two peripheral IVs in place. Lab tests show no electrolyte abnormalities, normal blood urea nitrogen and creatinine, normal liver function

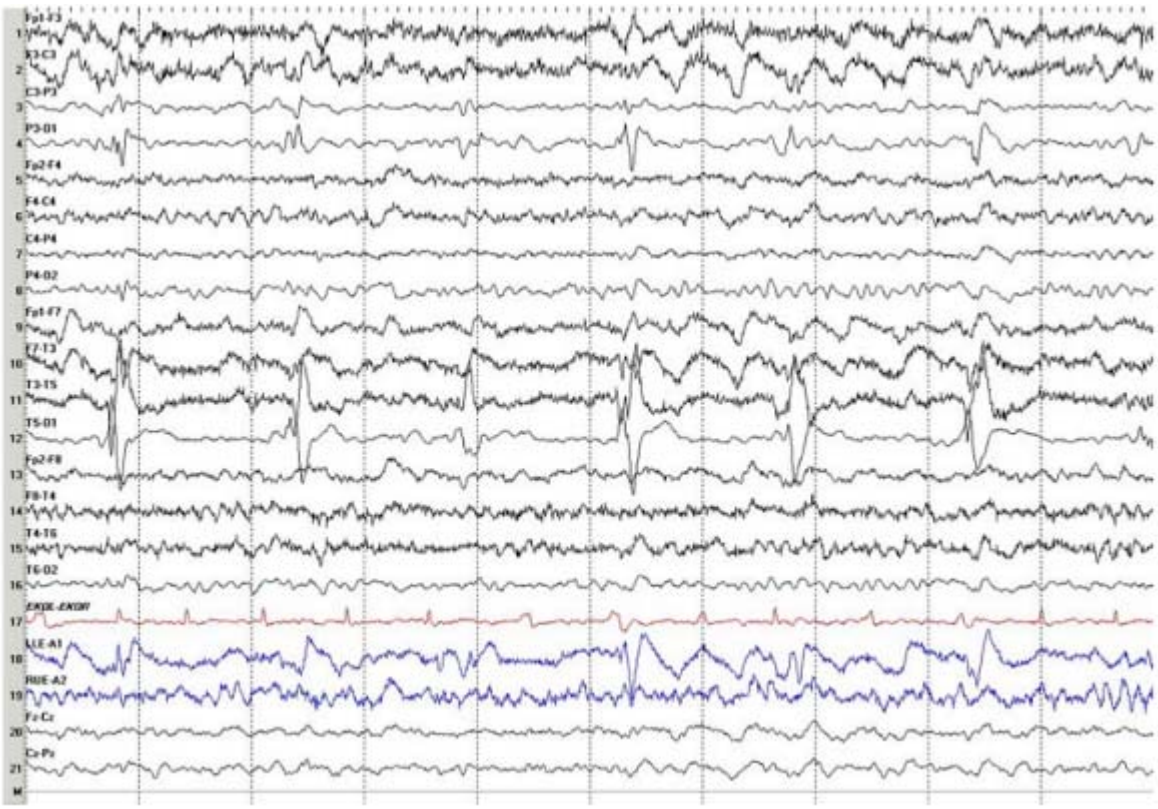
tests, and glucose of 135, and the urine toxicology screen results are pending. The patient received a total of 8 mg of lorazepam IV in the ED and was loaded with fosphenytoin at 20 mg/kg IV (at 150 mg/minute). Owing to continued brief seizure activity, a subsequent dose of fosphenytoin 10 mg/kg was administered; this fosphenytoin finished infusing about 3 minutes ago. The patient now begins to arch his back and assume tonic posturing and ten proceeds over the next 20 seconds to generalized clonic activity. You have ordered lorazepam 2 mg IV×1 STAT. You plan to proceed with which of the following medications?
A. Fosphenytoin 20 mg/kg IV
B. Thiamine 100 mg IV
C. Midazolam 0.4 mg/kg IM
D. Intubate the patient and start an IV propofol infusion

3. A 25-year-old male patient is known to have juvenile absence epilepsy. He takes lamotrigine as an outpatient. He is admitted to the Neuro-ICU with subacute onset of confusion. He is suspected to be in nonconvulsive status epilepticus (NCSE) and hooked up for continuous EEG (cEEG) monitoring. The EEG shows irregular generalized spike and wave activity at 3.0 Hz to 3.5 Hz waxing and waning throughout the entirety of the first 20 minutes the patient is monitored. At this point, the patient is correctly diagnosed as being in absence status epilepticus (SE). Which of the following medications should be avoided?
A. Lorazepam
B. Diazepam
C. Phenytoin
D. Keppra
E. Valproic acid

4. Generalized, 4–6 Hz polyspike-and-wave discharges during photic stimulation are diagnostic of
A. Childhood absence epilepsy (CAE)
B. Juvenile absence epilepsy
C. Juvenile myoclonic epilepsy (JME)
D. Frontal lobe epilepsy with secondary bilateral synchrony

5. A 43-year-old woman presented with a 5-day history of fevers (38.5°C), headache, confusion, and bizarre behavior. Examination is remarkable for slowing of mentation, and the patient appears hypomanic. An EEG done upon

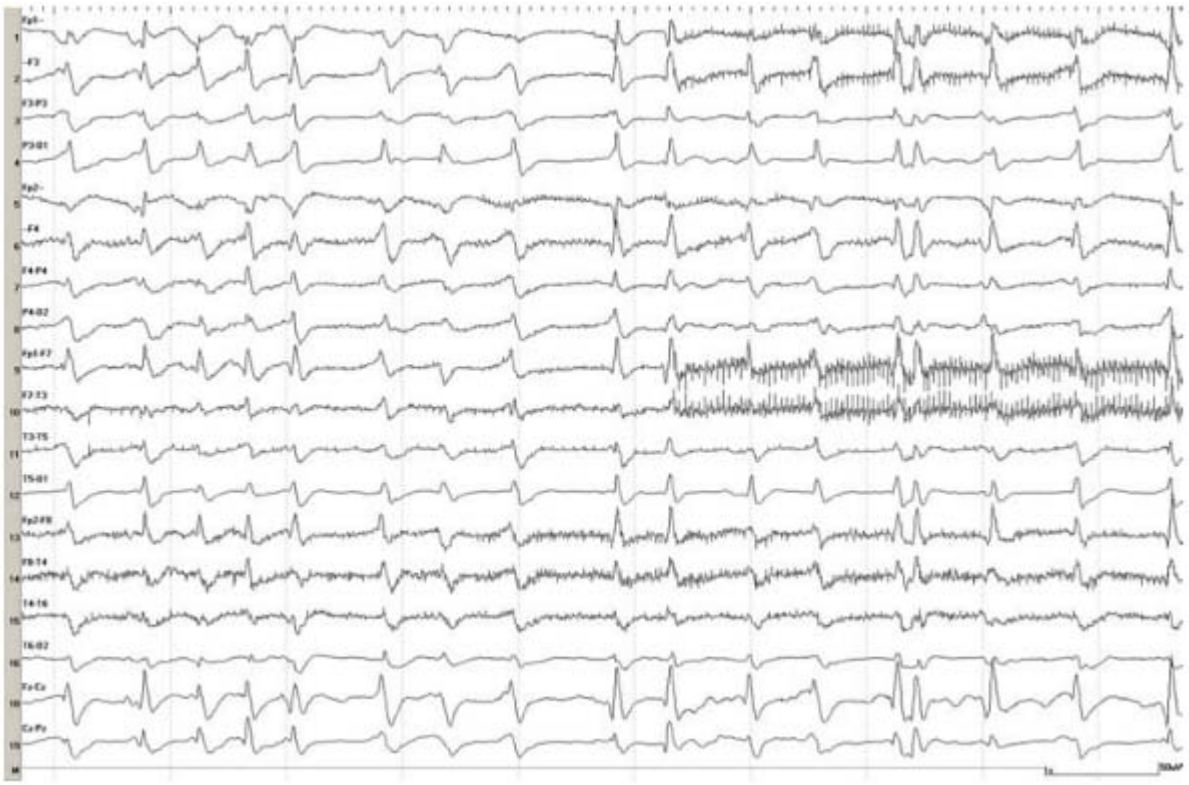
admission is shown below. What is the abnormal pattern shown on this EEG, and is it related to the patient's current presentation?



A. Frequent left temporal spikes; not related to current presentation. Patient likely has a long history of localization-related epilepsy.
B. Periodic lateralized epileptiform discharges (PLEDs) in the left temporal lobe; not related to current presentation. PLEDs are often seen in chronic disorders, and the patient has an acute illness.
C. Frequent left temporal spikes; likely related to current presentation. Patient likely was an acute illness, leading to exacerbation of an underlying epileptic focus in the left temporal lobe.
D. PLEDs in the left temporal lobe; due to current presentation. PLEDs are a manifestation of acute cerebral injury.

6. Nonconvulsive status epilepticus (NCSE) in the ICU setting is:
A. Associated with no significant morbidity or mortality beyond that typically seen with a generalized tonic–clonic seizure lasting 2 minutes
B. Associated with high mortality (>50%) regardless of NCSE duration
C. Associated with low mortality (<10%) regardless of NCSE duration
D. Associated with higher morbidity and mortality with longer NCSE duration

7. The following EEG could be seen in which of these clinical settings?

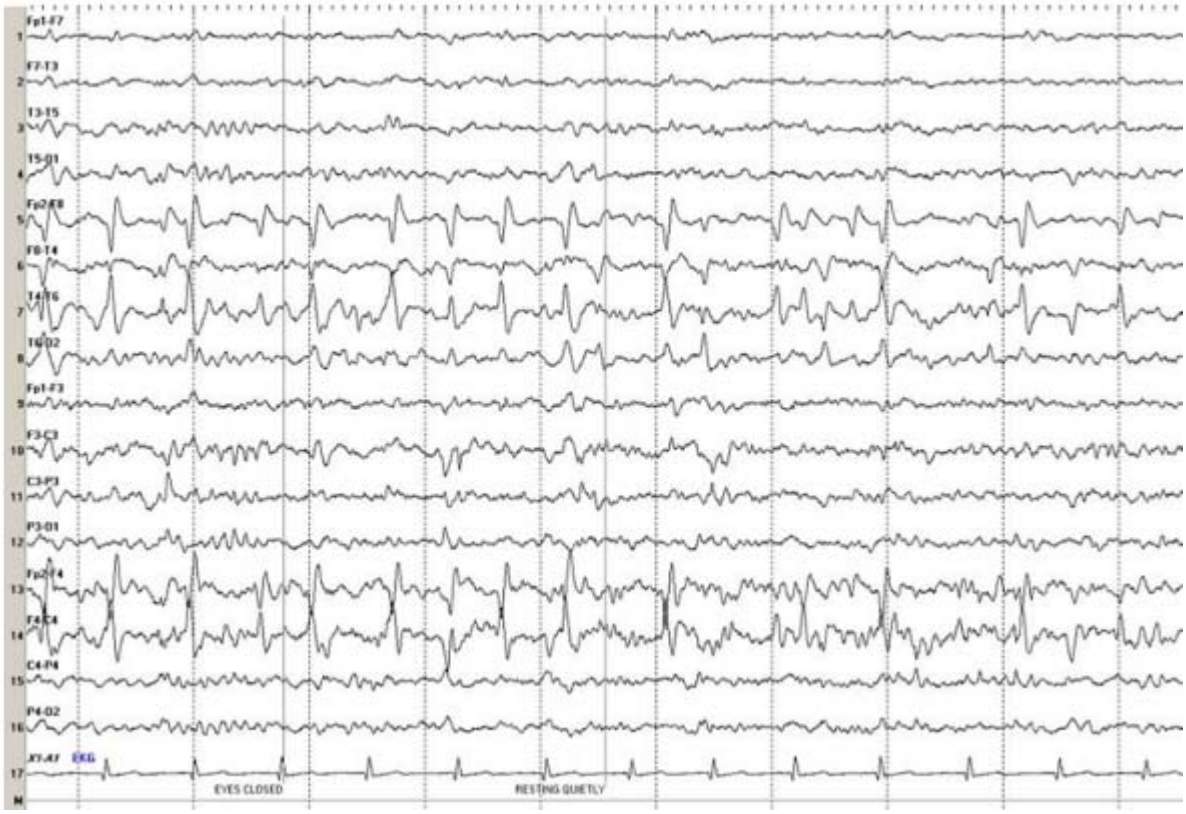


A. After appropriate treatment for convulsive status epilepticus (SE)
B. Lithium toxicity
C. Creutzfeldt–Jakob disease
D. All of the above
E. None of the above

8. The yield of epileptiform abnormalities on EEG can be increased by employing all of the following activation techniques *except*
A. Photic stimulation
B. Hyperventilation (HV)
C. Loud noise
D. Intravenous saline administration

9. Which of the following antiseizure medications is not metabolized by the liver?
A. Zonisamide
B. Levetiracetam
C. Topiramate
D. Lamotrigine
E. Tiagabine

10. A 25-year-old man sustained right frontal head injury in an automobile accident. The patient has been in the Neuro-ICU for 24 hours, and he is being monitored with continuous EEG (cEEG). The following finding was seen on a routine EEG. No clinical changes were seen in the patient during the EEG. What does this EEG show?

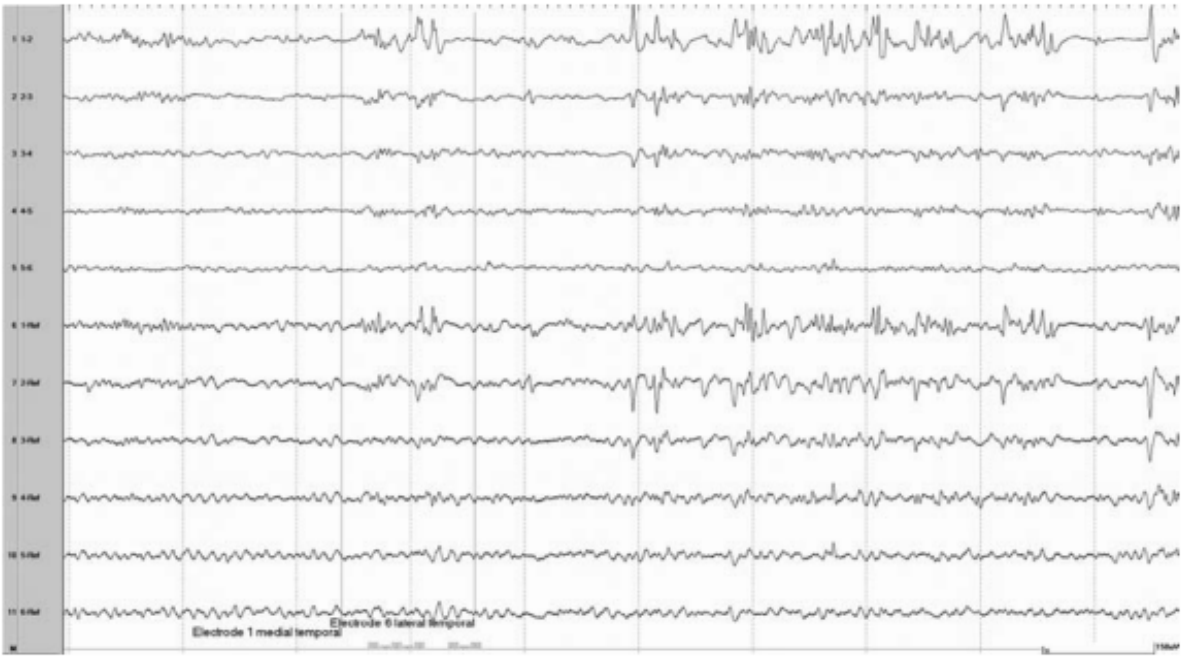


A. Nonconvulsive focal right frontal-temporal seizure
B. Right frontal-temporal breach rhythm
C. Mu rhythm (benign normal variant)
D. Electrode artifact at F4

11. A patient with intractable complex partial seizures due to cortical dysplasia undergoes left temporal lobectomy. He is most likely to develop which of the following problems after surgery?
A. Right superior quadrantanopsia
B. Right inferior quadrantanopsia
C. Right homonymous hemianopsia
D. Right hand weakness
E. Aphasia

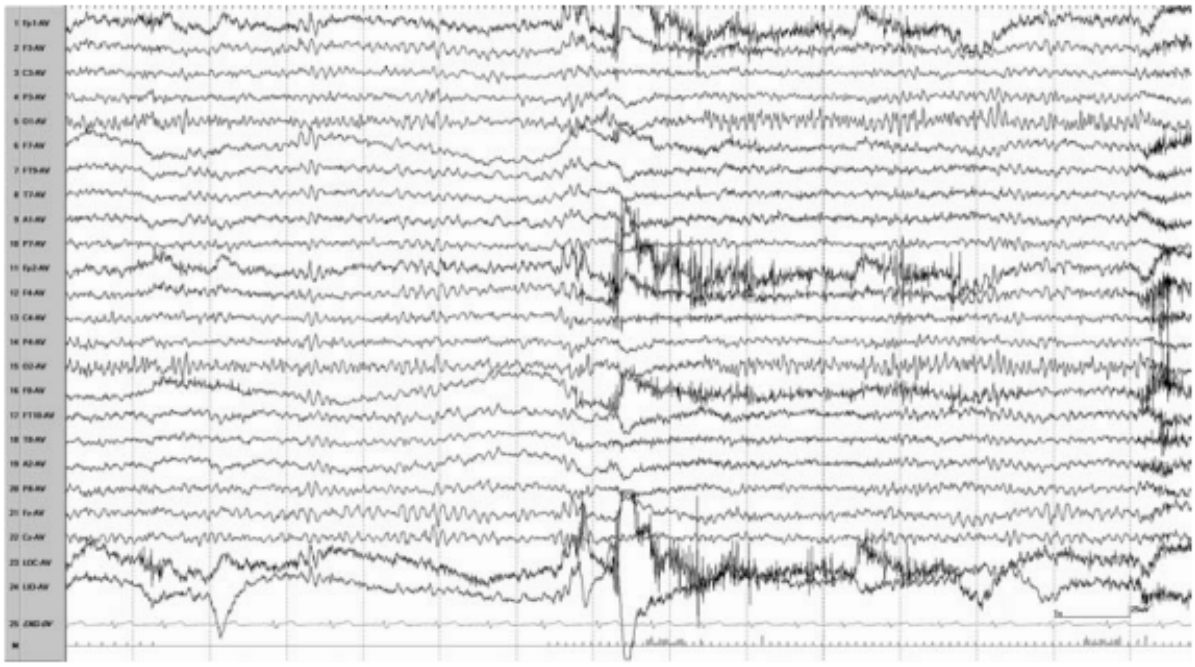
12. A 43-year-old male with intractable epilepsy underwent right temporal lobectomy with electrocorticography (ECoG; sampling rate 1000 Hz, filters: 1–300 Hz) using a 6-contact subdural strip placed subtemporally with electrode 1

medial and electrode 6 lateral. What is the prominent finding on the ECoG shown below?



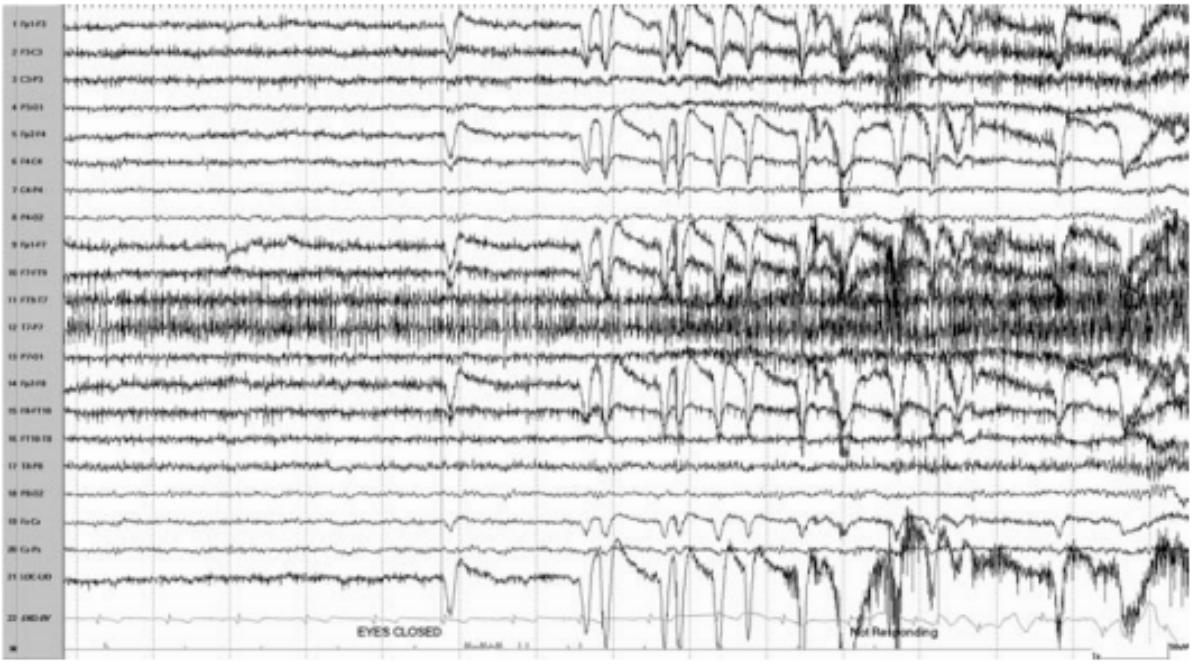
A. Sharply contoured slowing
B. Pulse artifact
C. Mesial temporal spikes
D. Fast ripples

13. A 26-year-old female presented with new-onset seizures characterized by “dizziness, light-headedness, spacing out prior to falling to the flor.” What is most likely finding in the occipital region on her EEG (filter: 1–70 Hz) shown below?



A. Positive occipital sharp transients of sleep (POSTS)
B. Occipital seizure
C. Normal activation response
D. Slow alpha variant

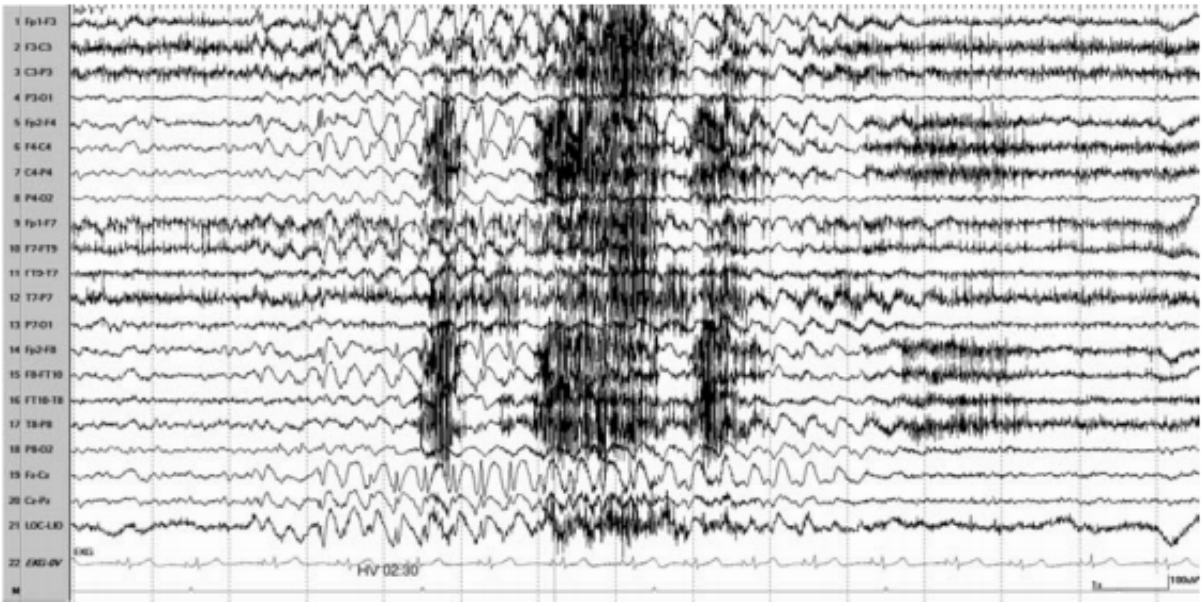
14. A 37-year-old woman has had multiple visits to the emergency department (ED) with generalized convulsions, incontinence, and tongue biting. She had a typical event during photic stimulation lasting 7 minutes, characterized by motionless staring noted by the EEG technologist. The video file was corrupted and could not be reviewed. What is the interpretation of the captured episode considering the EEG (filter: 1–70 Hz) below which depicts the activity 4 minutes into the spell?



A. Recorded event
B. Psychogenic nonepileptic event
C. Scalp EEG negative epileptic seizure
D. Frontal lobe seizure

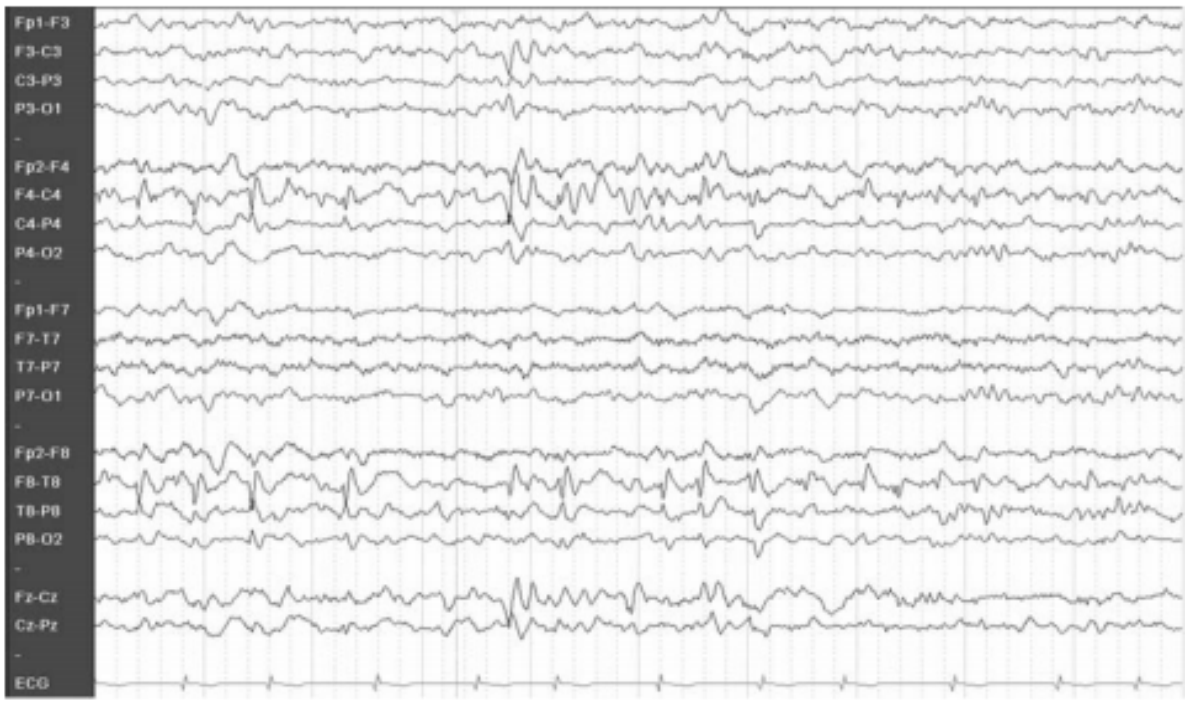
15. All of the following findings having been associated with epilepsy *except*
A. Unilateral temporal intermittent rhythmic delta activity (TIRDA)
B. Bilateral frontal intermittent rhythmic delta activity (FIRDA)
C. Bilateral occipital intermittent rhythmic delta activity (OIRDA)
D. All of the above

16. A 10-year-old, developmentally normal boy has a 4-year history of seizures. Which of the following is true based on the EEG (filter 1–70 Hz)?



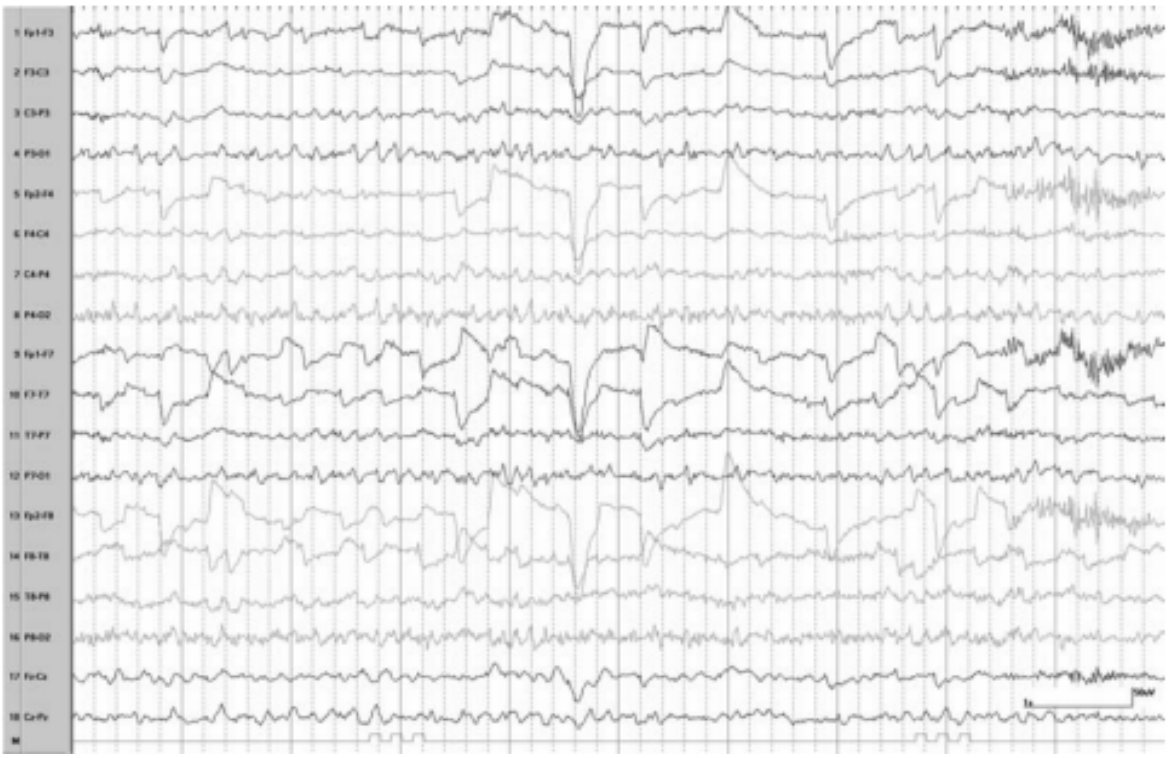
A. The epilepsy syndrome is typically associated with myoclonic jerks
B. There is a high chance of the epilepsy syndrome going into remission
C. The seizure associated with the above EEG pattern does not present with automatisms
D. This is a normal hyperventilation (HV) response not associated with epilepsy

17. The following EEG (filter: 1–70 Hz; sensitivity: 10 µV/mm; solid vertical lines are 1 second apart) is most consistent with which of the following epilepsy syndromes?



A. Autosomal dominant nocturnal frontal lobe epilepsy
B. Mesial temporal sclerosis
C. Benign Rolandic epilepsy (BRE)
D. Cingulate epilepsy

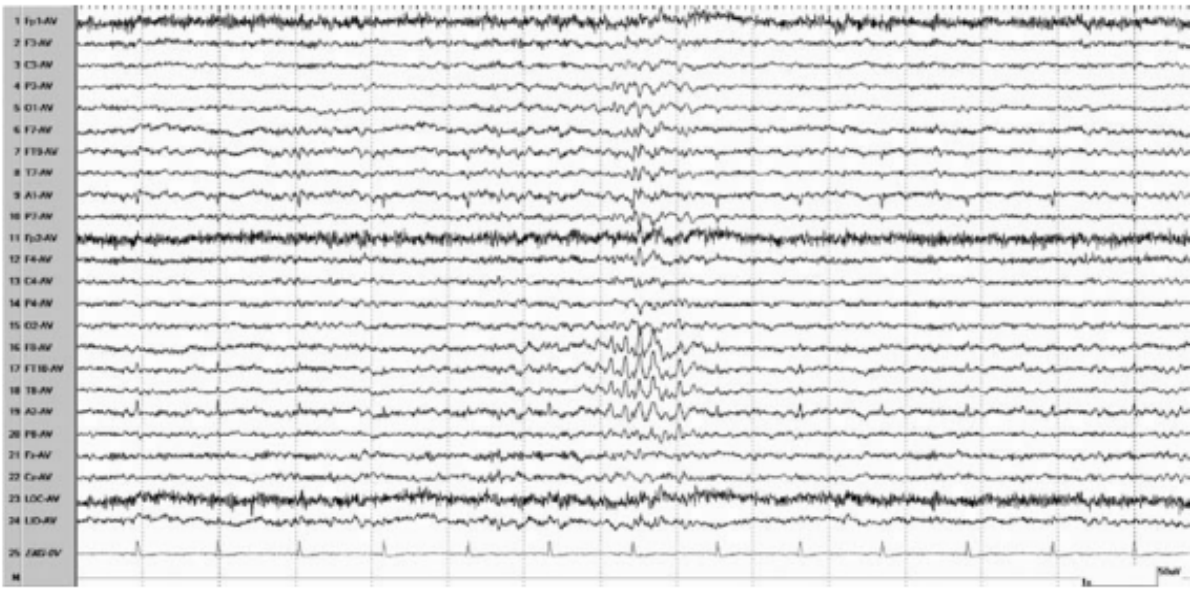
18. An EEG (filter: 1–70 Hz) from a 32-year-old woman with a long history of intractable epilepsy is shown below. Which of the following statements is true regarding the finding shown in the figure?



A. The patient has nystagmus
B. The patient is in REM sleep
C. The patient is reading a book
D. The patient is having a focal seizure involving the bioccipital region

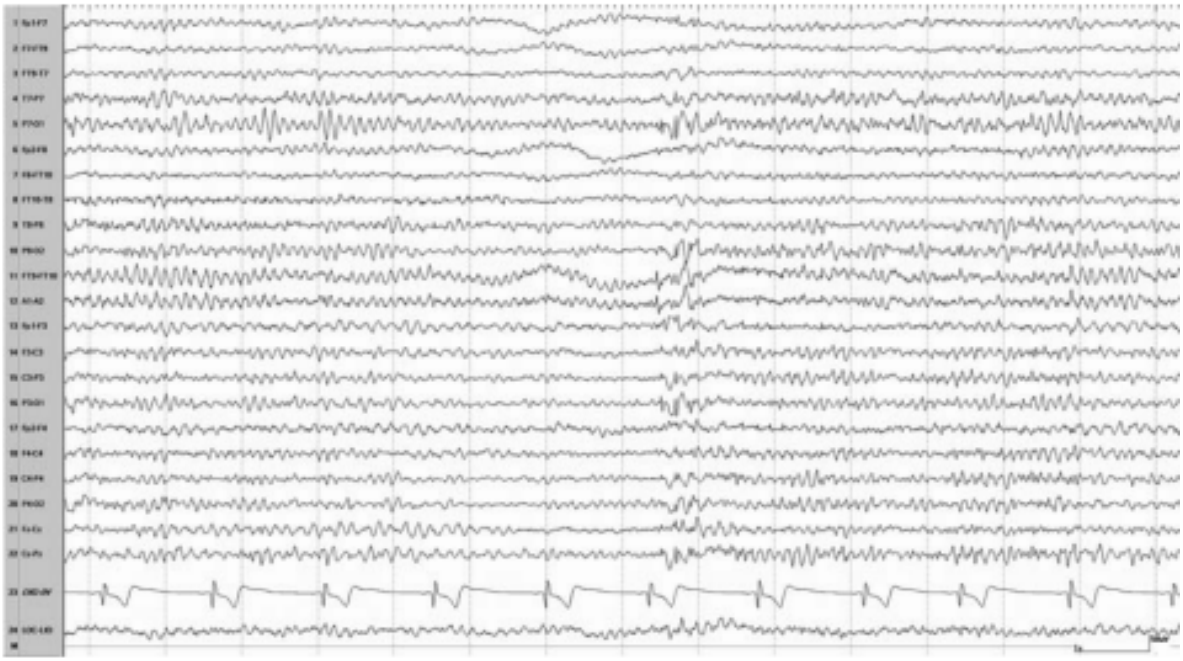
19. What is the chance that the fist routine EEG will be nondiagnostic for epilepsy?
A. 10%
B. 20%
C. 50%
D. 90%

20. A 48-year-old male with a history of seizures has an EEG as shown below. During the recording, the patient is noted to be drowsy by the technologist. What is the best interpretation of his EEG (filter: 1–70 Hz)?



A. Psychomotor seizures
B. Mild encephalopathy
C. Temporal lobe seizures
D. No known disease process

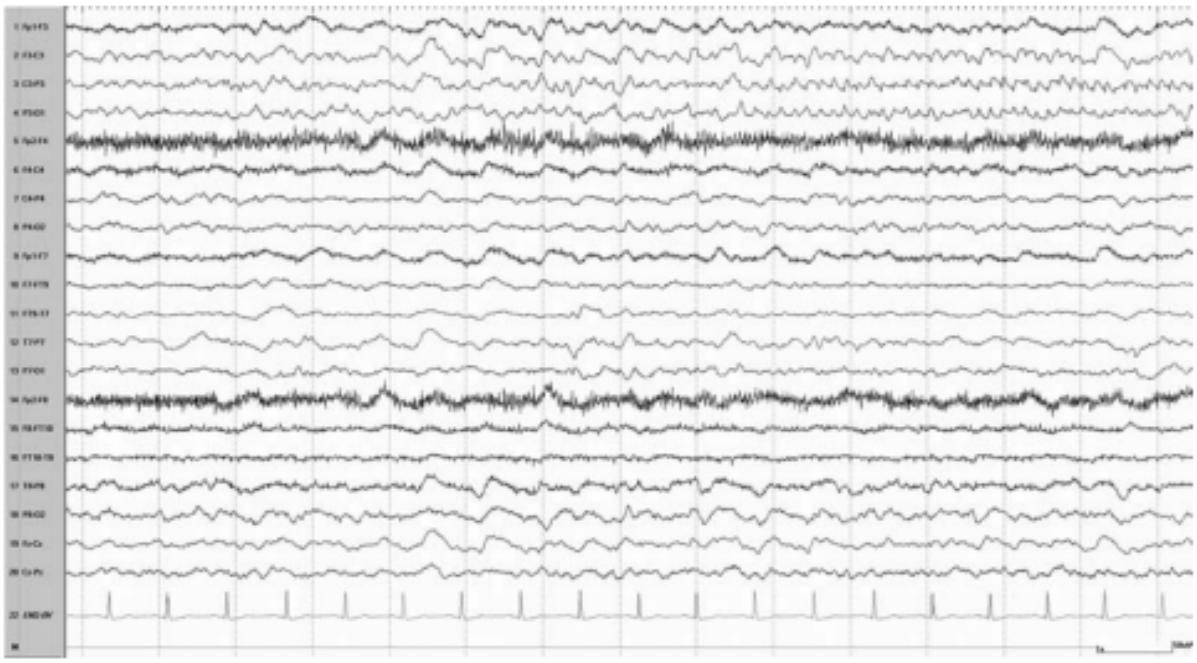
21. A 22-year-old male with a 4-month history of seizures has an EEG shown below (filter: 1–70 Hz). What is the most likely diagnosis?



A. Panayiotopoulos syndrome
B. Normal awake

C. Partial epilepsy
D. Idiopathic generalized epilepsy with bioccipital predominance

22. A 62-year-old female, status post-resection of a left hemispheric glioblastoma, was noted to have altered mental status on postoperative day 1. What is the most prominent finding on her EEG shown below (filter: 1–70 Hz, sensitivity 10 µV/mm)?



A. Periodic lateralized discharges (PLDs)
B. Continuous rhythmic delta activity
C. Breach rhythm
D. Seizure discharge

23.

A. Absence seizure
B. Atonic seizure
C. Complex partial seizure
D. Febrile seizure
E. Myoclonic seizure
F. Pseudoseizure
G. Secondary generalised seizure
H. Simple partial seizure
I. Tonic-clonic seizure
J. Unclassified seizure

The following patients present with altered behaviours associated with a seizure. Select the most appropriate item from the above for each of the following statements.

1. A 23-year-old male starts shouting incomprehensible words and looks apprehensive. He appears to be hyperventilating, then falls on the floor. His muscles stiffen, and then he starts jerking and twitching his arms and legs. On regaining consciousness, he is found to have bitten his tongue and emptied his bladder. He appears perplexed.

2**.** A 26-year-old female with a past psychiatric history of borderline personality disorder is admitted to the psychiatric unit following an overdose. While on the ward, she collapses on the floor and starts jerking her body bilaterally. On regaining consciousness, she apologises to the nurse for her seizure.

3**.** A 20-year-old female complains that she can smell onions, then stares blankly into space. She subsequently loses consciousness but quickly recovers after 4 minutes. She appears perplexed for several minutes after the incident. She has no recollection of the event.

4. A 19-year-old male is working at the check out counter at the local supermarket, but while on duty, he stares blankly into space and does not respond to his customers. After 10 seconds, he continues with his duty with no problems. Apparently, he has had regular lapses in his concentration since he was a small child.

5. A 12-year-old boy was eating dinner with his family. While trying to drink a cup of tea, he suddenly throws the cup backwards without any warning. He could not explain what had happened or why he did it. His past medical history is negative, including that for Tourette's syndrome.

24. Epileptic spikes are characterized by all of the following *except*
A. Their duration is 20–70 ms
B. They are felt to be hypersynchronous events
C. They are usually surface negative
D. They increase in frequency before and after seizures

Answers

1. C. Load the patient with phenytoin and arrange for continuous EEG monitoring in the Neuro-ICU.

This patient presents with a possible acute left hemispheric cerebral infarction. Even though he is within the 3-hour window for tissue plasminogen activator (TPA) administration, TPA is contraindicated if the patient has a seizure with stroke onset as it seems this patient did per history. In addition, this patient appears to be in status epilepticus (SE). Traditionally, SE was considered persistent or repetitive seizures activity lasting at least 30 minutes, without recovery of consciousness between attacks.

This patient appears to be having repetitive complex partial seizures (dazed, staring, right-hand movements) over the past 50 minutes. Although he is not unconscious or comatose, he has not recovered to his baseline level of consciousness. For practical purposes, a patient should be considered to be in SE if a seizure persists for 5 minutes or longer, and the treatment protocol for SE should be initiated. This patient's SE should be treated emergently and should be the first priority of the possible answers. Thus, this patient should be loaded with fosphenytoin, be admitted to the Neuro-ICU, and wave cEEG monitoring for nonconvulsive and clinically silent ongoing seizure activity.

The differential for an acute confusional state (and seizures) does include cerebral infections such as encephalitis. However, the clinical history here is suggestive of an acute left middle cerebral artery (MCA) distribution cerebral infarction with complex partial seizures. An argument could also be made for simply new onset of complex partial SE with Todd's paralysis. An MRI should be obtained to evaluate for acute infarction. The history is rather abrupt for encephalitis, but HSV encephalitis should be considered if the MRI were to show typical T2 and FLAIR (fluid-attenuated inversion recovery) hyperintensities in the temporal lobes (or if the MRI did not show an acute infarction as suspected). The most common cause of SE is a prior history of epilepsy, but approximately half of SE occurs in patients without prior history of seizures. In these patients, the most common cause is stroke, accounting for about 20%.

2. D. Intubate the patient and start an IV propofol infusion.
The management of SE is rather complicated. The treating physician has two concurrent goals in the management of SE: one is to stop all seizure activity as

quickly as possible, and the other is to determine an etiology for the SE. There are different published treatment protocols for SE, which tend to only vary on minor details. All protocols begin with basic life support, sending labs to look for an etiology for the SE, and then the administration of thiamine 100 mg IV and 50 mL of 50% dextrose IV unless an adequate glucose level is known. (Note that this patient's glucose was normal, and in clinical practice, a glucose level can be established rapidly with a fingerstick.)

The following recommendations are per the Columbia University Comprehensive Epilepsy Center Status Epilepticus Adult Treatment Protocol:

Start treatment with lorazepam 4 mg IV×1, and a second identical dose after 5 minutes if seizures persist.* (Diazepam 20 mg per rectum or midazolam 10 mg intranasally, buccally, or IM can be substituted for lorazepam if there is no IV access yet.) The patient should then be loaded with fosphenytoin at 20 mg/kg IV at 150 mg/minute with concurrent blood pressure (BP) and EKG monitoring as hypotension and cardiac arrhythmias can occur. If seizures persist, there are four conventional treatment options, all of which require intubation except for valproate:
1. Midazolam continuous IV (CIV) infusion, load at 0.2 mg/kg (repeat 0.2–0.4 mg/kg boluses every 5 minutes until seizures stop up to maximum loading dose of 2.9 mg/kg); CIV dose range 0.05 to 2.9 mg/kg/hour
2. Propofol CIV infusion; load at 1 to 2 mg/kg (repeat 1–2 mg/kg boluses every 5 minutes until seizures stop up to maximum loading dose of 10 mg/kg); CIV dose range 1 to 15 mg/kg/hour
3. Valproate IV 40 mg/kg over 10 minutes, with subsequent 20 mg/kg dose over 5 minutes if seizures persist
4. Phenobarbital 20 mg/kg IV (run at 50–100 mg/minute)

*Other protocols recommend lorazepam 2 mg IV×1, followed by an identical dose in 2 minutes with continued seizure activity. Additional 2 mg doses are given until the seizure activity stops, respiratory suppression is seen, or 8 to 10 mg have been administered.

3. C. Phenytoin.

The EEG shows irregular generalized spike and wave, or polyspike and wave activity at approximately 3.0 to 3.5 Hz (consistent with absence SE). There are several medications known to exacerbate absence seizures. These include phenytoin, carbamazepine, oxcarbazepine, and tiagabine. Therefore, the patient

should not be given phenytoin. This is a caveat to the treatment of SE. If a patient is known to have childhood or juvenile absence epilepsy, then the treatment regimen protocol should exclude phenytoin. The most appropriate initial drugs in the setting of absence SE are benzodiazepines such as lorazepam or diazepam to break the seizure. It would then be most appropriate to load valproic acid to reach a rapid serum therapeutic range. In the clinical scenario outlined in this question, it is also appropriate to check serum lamotrigine levels to see whether the patient is subtherapeutic on this outpatient medication, as medication noncompliance could be the cause of the absence SE.

4. C. Juvenile myoclonic epilepsy (JME).

The fast spike-and-wave and polyspike-and-wave discharges triggered by photic stimulation raise suspicion and can be considered diagnostic of a primary generalized epilepsy syndrome, such as JME. Due to the high specificity for the diagnosis, it is felt that the interictal activity is sufficient for the diagnosis in the context of appropriate clinical picture. Absence epilepsy is associated with 3 Hz spike-and-wave discharge. Although generalized epileptiform discharges can be due to secondary bilateral synchrony, those occurring during photic stimulation are not usually diagnostic of frontal lobe epilepsy.

5. D. PLEDs in the left temporal lobe; due to current presentation. PLEDs are a manifestation of acute cerebral injury.

The EEG clearly shows PLEDs in the left temporal lobe. These are not just frequent left temporal spikes, given the rhythmicity and periodic nature of the discharges. PLEDs typically recur every 1 to 2 seconds (as seen in this EEG) and consist of a spike or sharp wave that may be followed by a slow wave. Acute stroke is the most common cause of PLEDs, but any acute cerebral injury that could result in seizures can show PLEDs (and PLEDs are commonly seen in association with seizure activity). Herpes simplex virus (HSV) encephalitis is commonly considered when PLEDs are seen in the appropriate clinical context (as in this case), since most patients with HSV encephalitis will develop PLEDs. In summary, PLEDs should be considered a marker of acute cerebral injury, and these discharges are a transient finding, diminishing over days to weeks.

6. D. Associated with higher morbidity and mortality with longer NCSE duration.

In NCSE, seizure duration tends to be the best predictor of mortality. A study of NCSE in the ICU setting demonstrated that if seizure duration was less than 10 hours, 60% of patients returned home and 10% died. However, if NCSE duration was greater than 20 hours, none returned home and 85% died. Thus, rapid recognition and treatment of NCSE in the ICU has important implications for clinical outcome.

7. D. All of the above.

The EEG shows generalized periodic epileptiform discharges (GPEDs). GPEDs are a nonspecific finding that is commonly seen in the ICU in a variety of clinical settings. These include postanoxic coma after convulsive SE, metabolic disorders, Creutzfeldt–Jakob disease, and Hashimoto encephalopathy. Medication toxicity can also result in this EEG pattern, most notably with lithium toxicity (but can also be see with baclofen and cefepime). GPEDs (unlike periodic lateralized epileptiform discharges [PLEDs]) are less commonly associated with seizures.

8. D**.** Intravenous saline administration.

HV has been used to trigger generalized seizures, particularly absence seizures. Similarly, intermittent photic stimulation (IPS) can trigger abnormalities associated with generalized seizures, particularly those associated with photosensitive epilepsies. Startling caused by loud noise can trigger reflex seizures, which may be generalized or focal. Intravenous saline administration has been shown to provoke psychogenic nonepileptic seizures but not epileptiform abnormalities, although the ethical basis of this method is questionable.

9. B. Levetiracetam.

Levetiracetam is not extensively metabolized in humans. The major metabolic pathway is the enzymatic hydrolysis of the acetamide group, which produces the carboxylic acid metabolite (24%) and is not dependent on any of the liver cytochrome P450 isoenzymes. The major metabolite is inactive in animal seizure models. Its plasma half-life in adults is 7±1 hour and is unaffected by either dose or repeated administration. It is eliminated from the systemic circulation by renal excretion as unchanged drug, which represents 66% of the administered dose. The mechanism of excretion is glomerular filtration with

subsequent partial tubular reabsorption. Levetiracetam elimination is correlated with creatinine clearance. Levetiracetam clearance is reduced in patients with impaired renal function. Zonisamide is 70% metabolized by the liver. Topiramite is 30% metabolized by the liver, whereas lamotrigine and tiagabine are more than 90% metabolized by the liver.

10. A. Nonconvulsive focal right frontal-temporal seizures.

This EEG shows a typical nonconvulsive seizure as seen in the ICU setting. The electrographic criteria for seizure activity include clear evolution in frequency, morphology, or location of an ongoing EEG pattern. This particular EEG shows the evolution of approximately 2-Hz right frontal-temporal spikes into 1-Hz spikes on the second half of the EEG. The following 10 to 30 seconds of acquired EEG would be expected to show resolution of the spikes, with possible right frontal–temporal delta–theta slowing.

Thus, this finding is an electrographic seizure (labeled as nonconvulsive based on the clinical history provided). A breach rhythm is from a skull defect (such as craniotomy or burr hole), which results in an increase in voltage and more sharp morphology in the underlying EEG. Faster frequencies are more accentuated with breach than slower frequencies. Mu rhythm is a benign, normal variant typically seen in healthy individuals in the ambulatory setting, consisting of 7- to 11-Hz arciform waveforms over the central head regions. This normal variant is attenuated with movement or thought of movement of the contralateral hand. The EEG abnormalities seen are not limited to the F4 electrode.

11. A. Right superior quadrantanopsia.

The most common complication of temporal lobectomy is a visual field defect due to interruption of fibres from the optic tracts passing over the temporal horn of the lateral ventricles. Superior quadrantanopsia is more common than hemianopsia. Some deficits may improve if the injury does not completely damage the nerves. Language deficits, particularly dysnomia, occur less frequently. Hemiparesis is uncommon (<2%), because the surgery is performed at a distance from the motor fibers of the corticospinal tract. Other neurological problems that can occur include diplopia due to extraocular nerve deficits, and facial paresis.

12. C. Mesial temporal spikes.

The ECoG in the question demonstrates mesial temporal spikes and polyspikes in channel 1 (this is because contact 1 is medial). This activity is mixed with some slowing but does not represent sharply contoured slowing per se. Pulse artifact can be present in ECoG but it is typically rhythmic, occurring at a frequency equal to the heart rate. Fast ripples are high frequency oscillations with a frequency of 250–500 Hz. To evaluate fast ripples, the sampling rate has to be around 2000 Hz with the filters typically set at 50–600 Hz; neither of these was done with the ECoG in the question; so it is not possible to infer the presence of fast ripples.

13. C. Normal activation response.

Among the choices, a normal activation response such as photic driving at a supraharmonic frequency is the most likely possibility (note that the last channel in the EEG named “M” contains photic stimulation information with up ticks corresponding to photic stimuli). The patient is awake as noted by the presence of eye blinks and the posterior dominant rhythm (PDR), so POSTS are not likely. Although the activity in the posterior head region appears rhythmic, there is no clear, robust evolution to suggest an ictal discharge. A slow alpha variant can be seen in patients and presents at a subharmonic frequency, typically half of the PDR. Similarly, there can be a fast alpha variant, which presents at supraharmonic frequency, typically double the PDR. These alpha variants are blocked with eye opening unlike what is seen here.

14. A. Recorded event.

The episode is best interpreted as a recorded event. There is no associated ictal discharge seen on the EEG, which would be expected in a person with motionless staring. Although the spell is suggestive of a nonepileptic event (eg, psychogenic), video correlation is mandatory prior to making this diagnosis. Partial seizures with dyscognitive features (complex partial seizures) rarely present with negative EEG findings on scalp recording. Frontal lobe seizures can present with a wide variety of semiologies. Although motionless staring is typically associated with temporal lobe involvement, orbitofrontal seizures can present with a similar semiology and may not have a scalp ictal EEG correlate but the duration is typically less than 2–3 minutes, far shorter than the episode witnessed by the EEG technologist.

15. B. Bilateral frontal intermittent rhythmic delta activity (FIRDA).

Bilateral FIRDA has not been associated with epilepsy; it is mainly suggestive of encephalopathy. There is growing evidence that unilateral IRDAs as well as generalized IRDA are associated with an increased risk for seizures, especially in critically ill patients. Unilateral TIRDA has been associated with temporal lobe seizures while OIRDA has been associated with absence epilepsy.

16. B. There is a high chance of the epilepsy syndrome going into remission.

This EEG shows typical generalized 3 Hz spike-and-wave activity likely triggered by HV, and possibly associated with an absence seizure. Given the patient is a child and is normal, this EEG is likely to be consistent with childhood absence epilepsy (CAE; age of onset 4–10 years old), which is not typically associated with myoclonic jerks but can prevent with automatisms and eye flutter. There is a high chance of the CAE going into remission. Although there is a wide spectrum of normal HV response variants, including synchronous notched delta activity, the presence of spike-wave discharges makes this EEG abnormal.

17. C. Benign Rolandic epilepsy (BRE).

The EEG in the question shows centrotemporal spikes which are seen in BRE. Autosomal dominant nocturnal frontal lobe epilepsy and cingulate epilepsy typically present with frontal spikes or a normal EEG. Mesial temporal sclerosis would typically present with temporal spikes.

18. C. The patient is reading a book.

The figure in the question shows lambda waves, which are positive waves in the bilateral occipital region. Careful inspection shows lateral eye movements preceded by lateral rectus spikes, most prominently in the Fp1-F7/F7-T7 and Fp2-F8/F8-T8 channels. These 2 findings suggest that the patient is mostly reading or scanning rather that having nystagmus. The patient is clearly awake. The lambda waves in the occipital region are discrete, not sustained or evolving like in a focal seizure.

19. C. 50%.

A few studies have looked into the sensitivity of a single routine EEG in capturing an ictal or interictal epileptiform activity. It is generally accepted that the fist routine EEG may be nondiagnostic for epilepsy 30% to 55% of the time.

20. D. No known disease process.

The EEG shows rhythmic mid-temporal theta bursts of drowsiness (RMTD), which was previously known as psychomotor variant. Although historically it was associated with psychomotor seizures, this has not been proven and the pattern is now felt to be of unclear significance. Intermittent theta slowing has been associated with mild cerebral dysfunction, but in the setting of drowsiness, this can be a normal finding. Polymorphic theta activity can rarely be seen in temporal lobe seizures, but this is a nonspecific finding and the diagnosis cannot be made based on just that.

21. C. Partial epilepsy.

The EEG shows occipital interictal epileptiform discharges (IEDs). Therefore, partial (localization-related, focal) epilepsy with occipital potential epileptogenicity is the most likely diagnosis. Panayiotopoulos syndrome, the early onset form of benign occipital epilepsy of childhood, could present with occipital discharges but typically presents at an average age of 5 years (typical range: 2–12 years). Although the background otherwise looks normal, the presence of interictal discharges makes a normal awake study incorrect. Idiopathic generalized epilepsy syndromes can present with bioccipital predominance; this is typically seen in children and not in adults, in whom a more anterior predominance is noted.

22. D. Seizure discharge.

In the EEG shown in the question, there is left parasagittal activity that evolves in frequency, morphology, and distribution consistent with a seizure (ie, ictal) discharge. There are no periodic discharges to suggest PLDs. In addition, there is brief intermittent (not continuous) rhythmic delta activity. Although the patient has a skull defect, breach rhythm is not noted in the EEG.

23.

1. I. Tonic-clonic seizures.

A tonic-clonic seizure is also known as a grand mal seizure. It is characterised by a sudden onset, loss of consciousness, and stiffening of limbs followed by jerking of limbs. It is associated with urinary incontinence and tongue biting. Confusion is usually seen afterwards.

2. F. Pseudoseizure.

Pseudoseizures may occur as part of a dissociative disorder. Features include a high frequency of attacks (usually in the presence of others), an atypical pattern to the seizure (such as a gradual onset, rigidity with random struggling, talking, or screaming during the attack), and individuals rarely pass urine or bite their tongue. They are often precipitated by emotional disturbance. The EEG is normal during the attack and prolactin is not raised after the attack (normally raised after a true seizure).

3. C. Complex partial seizures.

Complex partial seizures have a focal onset, which usually manifest as an aura, and progress to loss of consciousness. They may also have automatic movements during the seizures in which the individual loses touch with the surrounding. Postictal confusion is common.

4. A. Absence seizures.

An absence seizure is also known as a petit mal seizure. Characteristically the individual stops talking mid-sentence for a few seconds but then continues from where he or she has left off. The EEG shows characteristic ‘three per second spikes'.

5. E. Myoclonic seizures.

Myoclonic seizures are characterised by the presence of brief, involuntary twitching of a muscle or group of muscles. Patients with this condition may be thrown suddenly to the floor or there may be a violent jerk of one of the limbs.

Notes

•Epilepsy is a common neurological condition characterised by the presence of unprovoked epileptic seizures or fits. These seizures can be broadly classified as:
–Generalised (originating from both hemisphere) or partial (one hemisphere).
–Complex (loss of consciousness) or simple (no loss of consciousness).

•Simple partial seizures can present in a number of ways depending on the origin of the seizure, but consciousness is always retained. Common presentations of temporal lobe epilepsy are altered perceptions (e.g. hallucinations, déjà vu), autonomic effects (e.g. vertigo, dizziness), cognitive abnormalities (e.g. speech disturbances), and affective changes (e.g. anxiety).

•Partial seizures may occasionally spread to both hemispheres, and can lead to secondary generalised seizures.

•Atonic seizures are associated with loss of tone and are also known as ‘drop attacks’.

•Febrile seizures present with generalised convulsions resulting from raised body temperature, and occur during a fever in young children. They may predispose to future epilepsy.

•Psychiatric symptoms occur more commonly in epilepsy compared to the general population, including an increased risk of anxiety disorders, depression, suicide, and psychotic disorders.

24. D. They increase in frequency before and after seizures.

A spike is a transient with a pointed peak, clearly distinguishable from the background activity. Its main component is generally negative, duration is 20–70 ms, and the amplitude is variable. Spikes are felt to be hypersynchronous events caused by excessive simultaneous neuronal discharge. It has been shown that the spikes increase in frequency after a seizure either during wakefulness or sleep, but there is no apparent increase prior to a seizure. Generally, drug levels have little inflence on the rate of spikes.