Neurology Board Review Questions

Traumatic Brain Injury: Rehabilitation Neurology

Anthony J.W. Chen, MD

QUESTIONS

Questions 1–3 refer to the following case.

A 45-year-old former bank executive presents to a neurologist after being discharged from a subacute inpatient facility 6 months after he received a severe closed head injury in a motor vehicle accident. He is able to ambulate independently but continues to have residual difficulties with functional use of his right hand, distractibility, disorganization, and poor long-term memory as well as irritability and anger outbursts. The patient’s anger outbursts are occasionally violent and can seem unprovoked, but they tend to be triggered by episodes where others point out information that he was told but cannot remember.

1. The patient is reportedly less likely to have severe behavioral outbursts since he was prescribed β blockers and neuroleptics. He is also taking an antiepileptic medication, a cholinesterase inhibitor, and a serotonin-norepinephrine reuptake inhibitor. According to family members, his recovery course seems to have reached a plateau. The family asks why he seemed to become more disorganized 2 months ago, showing reduced initiation and follow-through in his actions, with no signs of improvement since then. Which combination of the patient’s current medications would be most concerning for contributing to these symptoms?

(A) Antiepileptic and serotonin-norepinephrine reuptake inhibitor
(B) Neuroleptic and β blocker
(C) Neuroleptic and cholinesterase inhibitor
(D) Serotonin-norepinephrine reuptake inhibitor and cholinesterase inhibitor

2. The patient’s primary care physician is asked to fill out disability paperwork that includes documentation of evidence of the diagnosis. She asks for the neurologist’s input on explaining how the patient’s magnetic resonance imaging (MRI) findings, described simply as showing no focal strokes or contusions, may be related to the diagnosis of traumatic brain injury (TBI). When reviewing the patient’s current MRI images, which of the following findings is most likely to be related to the diagnosis of TBI?

(A) Dark areas on gradient echo sequences in subcortical white matter
(B) Edema and swelling
(C) Linear T2 hyperintense white matter lesions that extend radially from the ventricles and are most apparent with contrast
(D) Multifocal cystic lesions in both hemispheres, most apparent on T2-weighted imaging

3. The patient improves and makes an attempt to return to working after 1 year. The patient performs relatively well with a limited work schedule and activities tailored to his current abilities, although he is no longer managing in an executive role. However, 2 months into work the patient seems to be declining rather than improving, with his performance worsening over the course of several weeks. Colleagues describe him as slowing down, showing poor concentration, and not keeping up with his limited list of tasks. As part of the evaluation, the neurologist orders a routine complete blood count and chemistries, a computed tomography scan, and electroencephalography. Which of the following potential causes of decline would require additional evaluation?

(A) Depression
(B) Hydrocephalus
(C) Hyponatremia
(D) Orbitofrontal contusions
(E) Subdural hematoma

Dr. Chen is an assistant professor, Department of Neurology, University of California, San Francisco and Veterans Administration Medical Center, San Francisco, CA.
Questions 4 and 5 refer to the following case.

A 25-year-old computer programmer is referred for neurologic consultation 3 months after he sustained a moderately severe closed head injury after falling off a bicycle. After improving over the prior 3 months, the patient has made an attempt to return to working. However, he complains that he is unable to sustain his work even half time. His primary difficulty is that he feels “foggy” and unable to maintain concentration after 2 hours of work, and this is particularly a problem after meetings.

4. The neurologist’s interview and evaluation would attempt to rule out which of the following as potentially reversible contributors to his symptoms?
(A) Antiepileptic medications
(B) Cerebral edema
(C) Diffuse axonal injury
(D) Muscular fatigue

5. Even with improvement in his fatigue, the patient continues to have residual cognitive dysfunction that prevents him from reaching his goal of returning to work. The patient is working with a rehabilitation therapist to learn strategies for improving his daily functioning given deficits in long-term memory. However, the therapist is concerned that poor attention contributes not only to the patient’s memory deficits, but also reduces the benefits of the rehabilitation sessions. He also notes that the patient is anxious and easily frustrated during sessions. The therapist asks whether any pharmacotherapy options might contribute to therapy goals at this chronic stage of recovery. The neurologist suggests a cholinesterase inhibitor with the goal of augmenting attention and learning during therapy sessions. What potential medication side effects might actually impede participation?
(A) Hypersomnia
(B) Nausea and diarrhea
(C) Oliguria
(D) Racing heart rate

ANSWERS
1. The correct answer is (B), neuroleptic and β blocker. Neuroleptics and β blockers work as antagonists to dopamine and norepinephrine, both of which are neuromodulators important for attention and executive control functions. The described symptoms are suggestive of frontal-subcortical dysfunction, which may be caused by or exacerbated by these agents and worsened by the combination of multiple antagonists. Antiepileptic medications may also contribute to cognitive slowing but should not interact with serotonin-norepinephrine reuptake inhibitors to worsen these side effects. Serotonin-norepinephrine reuptake inhibitors and cholinesterase inhibitors may actually augment cognitive functioning and should not exacerbate the negative effects of neuroleptics.

2. The correct answer is (A), dark areas on gradient echo sequences in subcortical white matter. No MRI findings are specific for a diagnosis of TBI. However, dark areas on gradient echo sequences (“bloom artifacts”) are suggestive of iron deposition from microhemorrhages, consistent with a history of closed head injury from inertial forces generated during a motor vehicle incident. Edema and swelling should not be present at this chronic phase. Although areas of infarction or hemorrhage may occur with TBI, multifocal cystic lesions are uncommon and more suggestive of other disseminated etiologies. White matter lesions may also occur with TBI; however, these should not track along venules nor enhance brightly with contrast.

3. The correct answer is (A), depression. The differential diagnosis of late progressive decline includes hydrocephalus, subdural hematoma, depression, and hyponatremia (including through lowering seizure threshold) as well as other possible causes. Orbitofrontal contusions may contribute to functional deficits but should not directly contribute to a late decline. Subdural hematoma, hydrocephalus, and hyponatremia should be reasonably well evaluated with the requested diagnostic tests. Depression is a major cause of dysfunction or decline after TBI, and clinicians need to be particularly vigilant for reactive contributions to depression in the context of major life changes that highlight current disability and challenge coping abilities. The patient should be evaluated via interview and depression inventories, with more in-depth evaluation and management coordinated with mental health specialists.

4. The correct answer is (A), antiepileptic medications. Fatigue of central origin is one of the most common causes of disability after TBI, resulting in difficulty sustaining goal-directed efforts. Medications are one of the first potential contributors that should be evaluated, and antiepileptic drugs may contribute to symptoms of fatigue. Muscular fatigue may also occur
but must be distinguished from central fatigue. Cerebral edema is highly unlikely at this chronic stage of recovery. The occurrence of diffuse axonal injury may contribute to the etiology of fatigue, but this is not a reversible target for symptom management.

5. The correct answer is (B), nausea and diarrhea.

Nausea and diarrhea are among the most common side effects of cholinesterase inhibitors. Insomnia, and not hypersomnia, is also a common side effect. Although not commonly a problem, slowing of heart rate, and not tachycardia, may also occur. Similarly, increased frequency of urination, not reduced urination, may occur.

Copyright 2014 by Turner White Communications Inc., Wayne, PA. All rights reserved.