Stroke: Review Questions

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QUESTIONS

Choose the single best answer for each question.

1. **A 65-year-old right-handed man presents to the emergency department (ED) for evaluation of a possible transient ischemic attack. He reports right arm weakness and unsteady walking. The patient also states that he had difficulty speaking for 10 minutes on the previous day. A computed tomography (CT) angiogram reveals 60% and 80% stenosis of the right internal carotid artery and left middle cerebral artery, respectively. He takes no medications. In addition to assessing relevant risk factors, which intervention is most appropriate at this time?**
   (A) Initiate aspirin
   (B) Initiate aspirin-dipyridamole and refer for carotid endarterectomy (CEA)
   (C) Initiate clopidogrel and refer for intracranial angioplasty and stenting
   (D) Initiate warfarin
   (E) Refer for intracranial angioplasty and stenting

2. **A 75-year-old woman presents to the ED with abrupt onset of left-sided weakness that began 1 hour ago. Assuming all imaging tests are immediately available and there are no contraindications to the following imaging modalities, which test should initially be performed in routine clinical care?**
   (A) CT angiogram of the head and neck
   (B) CT scan of the head without contrast
   (C) Magnetic resonance image (MRI) of the brain
   (D) MRI of the brain and magnetic resonance angiogram (MRA) of the head and neck

3. **A 57-year-old woman presents to the ED 45 minutes after the onset of severe expressive aphasia, right hemiparesis, and hemisensory loss. Her National Institutes of Health Stroke Scale (NIHSS) score is 16. Past medical history is significant for coronary artery disease, coronary angioplasty and stent placement 4 years ago, and surgery on her left foot 5 days ago. On initial presentation, the patient's blood pressure was 190/100 mm Hg and is now 170/90 mm Hg. The patient reports taking aspirin and clopidogrel for coronary artery disease. Emergent laboratory studies, electrocardiogram, and CT scan of the head performed over the next half hour are normal. After the initial evaluation and testing, the patient's symptoms improve to a NIHSS score of 3. Which of the following is a contraindication to this patient receiving intravenous (IV) recombinant tissue plasminogen activator (rt-PA)?**
   (A) Current use of aspirin and clopidogrel
   (B) Fluctuating blood pressure readings between 190/110 and 170/90 mm Hg
   (C) NIHSS score of 3
   (D) Rapidly resolving symptoms
   (E) Recent minor surgery

Questions 4 and 5 refer to the following case.

A 50-year-old woman with no past history of venous or arterial thrombosis presents to the ED with acute-onset left hemiparesis. The patient takes lisinopril for hypertension and a daily multivitamin. Brain MRI confirms an infarct in the right frontal lobe. MRA of the head and neck is normal. Cardiac rhythm on Holter monitor is also normal. Hypercoagulability studies are unremarkable. The patient is scheduled for echocardiography.

4. **For an accurate diagnosis, which of the following stroke-associated cardiac conditions requires transesophageal echocardiography (TEE) rather than transthoracic echocardiography (TTE)?**
   (A) Dilated cardiomyopathy

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Figure. Noncontrast computed tomography scan of the head performed in the patient described in question 6 showing an acute intracerebral hemorrhage in the posterior limb of the left internal capsule adjacent to the thalamus and bordered by edema.

(B) Interatrial shunt
(C) Left atrial thrombus
(D) Left ventricular thrombus
(E) Valvular vegetation

5. **A small patent foramen ovale (PFO) is discovered on echocardiography. Minimal right to left shunting is seen only on Valsalva maneuver. Which of the following is the most appropriate treatment for this patient?**
   (A) Initiate aspirin 325 mg/day
   (B) Initiate warfarin with a target international normalized ratio (INR) of 1.5 to 2.5
   (C) Initiate warfarin with a target INR of 1.5 to 2.5 and aspirin 81 mg/day
   (D) Initiate warfarin with a target INR of 1.5 to 2.5 and refer for PFO closure
   (E) Initiate warfarin with a target INR of 2 to 3

6. **A 66-year-old man with a history of atrial fibrillation presents to the ED with acute onset of right-sided weakness and sensory loss that occurred 25 minutes prior to presentation. He is alert and swallows normally. Blood pressure is 195/120 mm Hg, and heart rate is irregular at approximately 90 bpm. Serum glucose level is 358 mg/dL. Prothrombin time is elevated beyond therapeutic range. The patient currently takes warfarin. Emergent noncontrast CT scan of the head is performed (Figure). All of the following are indicated in the management of this patient EXCEPT**
   (A) Fresh frozen plasma
   (B) Insulin
   (C) IV labetalol
   (D) IV vitamin K
   (E) Phenytoin

ANSWERS AND EXPLANATIONS

1. **(A) Initiate aspirin.** The best treatment for this patient at this time is optimal medical therapy with an antiplatelet medication such as aspirin. Antiplatelet agents (eg, aspirin, aspirin-dipyridamole, clopidogrel) are recommended as initial therapy for reducing the risk of ischemic stroke after a transient ischemic attack.[1] Selection of an appropriate agent is based on the patient's risk factors, tolerance, and other clinical features. Warfarin, an anticoagulant, is not preferred for the treatment of intracranial stenosis and is associated with higher rates of death and major hemorrhage when compared with antiplatelet agents such as aspirin.[2] Patients with severe carotid artery stenosis (70%–90%) should undergo CEA.[1] In patients with moderate carotid artery stenosis (50%–69%), CEA is considered based on the patient's age, gender, and comorbidities and the severity of initial symptoms.[1] The patient's symptoms (ie, language and right body motor function) are localized within the territory of the left middle cerebral artery. This patient's right internal carotid artery lesion is considered asymptomatic, the degree of stenosis is moderate, and he has not been on optimal medical therapy, so CEA is not recommended. In general, interventions such as endarterectomy or angioplasty and stenting are indicated when a patient has symptoms while on optimal medical therapy that correlate with the vascular lesion in question.[1]

2. **(B) CT of the head without contrast.** The initial goal of imaging in the evaluation of acute stroke is to determine whether a hemorrhage is present. Noncontrast CT of the head is quick and accurate in identifying most cases of intracranial hemorrhage.[3] If hemorrhage is identified, aggressive blood pressure control and reversal of anticoagulation take precedence over more detailed brain and angiographic imaging. If no hemorrhage is present, further imaging is warranted.[3] Angiographic imaging (CT angiogram or MRA) is useful in screening for large vessel pathology, and brain magnetic resonance imaging provides high-resolution images that are sensitive to chronic vascular lesions. Both of these studies would be appropriate if CT of the head shows no hemorrhage.

3. **(D) Rapidly resolving symptoms.** Rapidly resolving symptoms are suggestive of transient ischemic attack, and therefore the use of rt-PA is generally deferred. As there is no absolute NIHSS score threshold for the use of rt-PA, clinical judgment is used to weigh risks and benefits of administering rt-PA. A NIHSS score of 3 is not an absolute contraindication to using rt-PA. It could represent a patient with severe aphasia and mild arm weakness (a significantly disabling condition) or a patient with minor facial droop, mild dysmetria of the nondominant arm, and sensory inattention (a minimally disabling condition). Although blood pressure should generally be managed to stay below 185/110 mm Hg, an initial untreated blood pressure over 185/110 mm Hg is not a contraindication to rt-PA therapy. Although recent use of antiplatelet medications may increase the risk of hemorrhage, rt-PA can be given concomitantly. Recent minor surgery, especially at a compressible site, is not a contraindication to rt-PA therapy.

4. **(C) Left atrial thrombus.** Dilated cardiomyopathy, valvular vegetations, and left ventricular thrombi are sufficiently visualized on TTE, although TEE may increase the diagnostic sensitivity for valvular vegetations. Agitated saline injection can reveal an interatrial shunt on TTE; however, TEE is required to differentiate an interatrial shunt from a PFO.[4]

5. **(A) Initiate aspirin 325 mg/day.** A multicenter study comparing aspirin and warfarin for treatment of stroke patients with PFO found no difference in stroke risk between treatment groups but found a significantly higher rate of hemorrhage in the warfarin-treated group.[5] PFO closure would not be recommended in a patient with a first stroke who has not yet been treated with an antithrombotic medication.

6. **(E) Phenytoin.** Use of antiepileptic medications such as phenytoin is indicated for treatment of seizures that commonly occur after a lobar hemorrhage or brief prophylaxis in patients with lobar hemorrhage. Since this patient's hemorrhage is not lobar, it would be more appropriate to defer treatment with antiepileptic medications unless seizure activity occurs.[6] In the acute phase of treating intracerebral hemorrhage, as in this case, the goal is to prevent expansion of hematoma. Use of medications (eg, labetalol) to counteract severe hypertension as well as medications to reverse anticoagulation (eg, vitamin K, fresh frozen plasma) are all appropriate steps that may limit hematoma expansion. Hyperglycemia in the first 24 hours after intracerebral hemorrhage is associated with poor outcomes; thus, early management of hyperglycemia (ie, use of insulin) is indicated.

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