Leg Weakness in the Emergency Department: Review Questions

Matthew Brandon Maas, MD
Joseph Safdieh, MD

QUESTIONS

Choose the single best answer for each question.

Questions 1 and 2 refer to the following case.

A 62-year-old man presents to the emergency department (ED) for evaluation of leg weakness that started 4 hours prior to arrival. The patient states that his right leg suddenly became weak while walking and he had great difficulty being helped to a chair. He delayed seeking medical help, hoping that symptoms would improve, but they have not. Past medical history is significant for a heart attack 3 years ago, hypertension, hyperlipidemia, type 2 diabetes mellitus, and chronic neck and low back pain for the past 5 years. He has not taken any medications for the past month due to financial hardship. On examination, the patient is profoundly weak with all movements of the right leg, has mild weakness in the right arm, and has sensory loss over the entire right leg. Coordination and gait seem to be limited by his weakness. An electrocardiogram shows normal sinus rhythm.

1. **What is this patient's most likely diagnosis?**
   (A) Acute C6-C7 disk herniation
   (B) Acute compression fracture of the L2 vertebral body
   (C) Acute left anterior cerebral artery (ACA) stroke
   (D) Acute left middle cerebral artery stroke

2. **Noncontrast computed tomography (CT) of the head performed within 30 minutes of arrival in the ED reveals no acute findings. Assuming that the patient's reported medical history is complete and accurate, what is the most appropriate treatment?**
   (A) Aspirin 325 mg
   (B) Intravenous (IV) ketorolac 30 mg
   (C) IV alteplase 0.9 mg/kg as 10% dose bolus then infusion
   (D) IV heparin drip with weight-based dosing to the therapeutic partial thromboplastin time goal
   (E) Placement of a rigid cervical neck stabilization collar

3. **A 43-year-old woman presents to the ED for evaluation of weakness in both legs. She has an 18-year history of multiple sclerosis (MS), and she has had several clinical relapses. Glatiramer is her only medication. A relapse 2 years ago caused profound weakness in her legs, but after months of physical therapy, she was able to ambulate steadily with a walker. She now describes worsening weakness in her legs over the last 24 hours similar to that experienced during the relapse 2 years ago. She has new urinary incontinence, describes feeling feverish overnight, and is preoccupied with an intense ache in her left flank that has been present for the last 2 days. Magnetic resonance imaging (MRI) of the spine with and without contrast is performed (Figure). How should this patient be treated?**
   (A) Antibiotics for treatment of a urinary tract infection (UTI)
   (B) Antibiotics for treatment of a UTI and concurrent IV methylprednisolone 250 mg every 6 hours for 3 days
   (C) Change from glatiramer to high-dose interferon beta-1a
   (D) IV methylprednisolone 250 mg every 6 hours for 3 days

Questions 4 and 5 refer to the following case.

A 62-year-old man presents to the ED for evaluation of a 1-day history of leg weakness. He reports weakness in both legs while walking, and he now needs help standing up from a seated position. Past medical history is significant for a heart attack 3 years ago, hypertension, hyperlipidemia, type 2 diabetes mellitus, and lung cancer. An evaluation 3 months ago revealed no evidence of metastatic disease. He reports chronic neck and low back pain for the past 5 years. The patient also

Dr. Maas is a chief resident, and Dr. Safdieh is an assistant professor of neurology; both are at the Department of Neurology and Neuroscience, Weill Medical College of Cornell University, New York, NY.

Figure. (**A**) Noncontrast T2-weighted magnetic resonance image (MRI) and (**B**) T1-weighted postcontrast MRI of the thoracic spine of the patient described in question 3.

describes increasing pain in his mid-back over the past few weeks, which is not relieved by pain medication. On examination, the patient is profoundly weak with all movements of both legs but has no weakness in his arms. He has diminished sensation from the level of the umbilicus down. Reflexes are brisk in the legs and Babinski's sign is present in both feet. Coordination and gait seem to be limited by his weakness.

4. **What is this patient's most likely diagnosis?**
   (A) Acute C6-C7 disk herniation
   (B) L2 vertebral body metastatic lesion causing epidural cauda equina compression
   (C) Transverse myelitis at the T9 level of the spinal cord
   (D) T10 vertebral body metastatic lesion causing epidural spinal cord compression

5. **What is the most appropriate next step in this patient's management?**
   (A) CT of the spine with and without contrast
   (B) IV dexamethasone 24 mg
   (C) MRI of the spine with and without contrast
   (D) Neurosurgical consultation for immediate surgical management

6. **A 62-year-old man presents to the ED for evaluation of right leg weakness. Two hours prior to arrival, the patient fell asleep in a chair with his legs crossed while watching television. When the patient awoke, he realized that his right leg had become weak. He tried walking, but it was difficult, and he had to be helped back to his chair by his wife. After 15 minutes, symptoms had not improved. He denies any pain accompanying these symptoms. Past medical history is significant for a heart attack 3 years ago, hypertension, hyperlipidemia, type 2 diabetes mellitus, low back pain for the past 5 years due to degenerative disk disease, and sciatica in the right lower extremity. He has not taken any medications for the past month due to financial hardship. On examination, he has complete inability to dorsiflex or evert the right foot but normal strength elsewhere. He has slight sensory loss over the dorsum of the right foot. Gait is affected by a right foot drop. What is the patient's most likely diagnosis?**
   (A) Flare of right lower extremity sciatica
   (B) L5 vertebral body compression fracture
   (C) Lacunar infarct in the left internal capsule
   (D) Pressure palsy (neurapraxia) of the right peroneal nerve

ANSWERS AND EXPLANATIONS

1. **(C) Acute left ACA stroke.** Although the patient's complaints are focused on leg weakness, the physical examination also reveals weakness in the right arm. The involvement of both the arm and leg would not be explained by a process in the lumbar spine, and lateralized involvement to the right would not be explained by a cervical disk herniation. ACA strokes affect motor and sensory function in the leg much more profoundly as compared with the rest of the body. On the homunculus (the topographical representation of motor function in the cerebral cortex), the portion associated with the lower extremity is located in the medial aspect of the cerebral hemispheres in the region supplied by the ACA. In contrast, left middle cerebral artery strokes produce more uniform hemiparesis, affecting both the motor cortex as well as deep brain structures, and impairment of language and visual fields is also seen in conjunction with hemiparesis and sensory loss.

2. **(A) Aspirin 325 mg.** The primary goal of using CT of the head for evaluation of acute stroke is to exclude hemorrhage as the etiology. CT of the head has low sensitivity (approximately 50%) within the first 12 hours of onset of ischemic stroke.[1] Antiplatelet agents (eg, aspirin) are the standard treatment for ischemic stroke. Use of anticoagulant agents, such as heparin and warfarin, is restricted to cases of stroke due to cardioembolism (atrial fibrillation, prosthetic valves, ischemic cardiomyopathy), for which the evidence has shown a favorable risk-benefit outcome. There are no clear indicators of such a process in this case. Use of IV thrombolytic agents, such as alteplase (a tissue plasminogen activator), is restricted to within 3 hours of symptom onset.[2] Risk for hemorrhagic complications outweighs expected benefit in this patient (earliest possible treatment would be at 4.5 hr after symptom onset).

3. **(A) Antibiotics for treatment of a UTI.** The patient's history indicates a UTI, possibly pyelonephritis. The T2-weighted MRI of the thoracic spine shows a spinal cord lesion, and the lack of contrast enhancement on the T1-weighted postcontrast MRI indicates that the lesion is not active (Figure). Segmental thinning of the cord is also demonstrated, indicating the chronic nature of the lesion. Overall, this is consistent with the history of prior transverse myelitis. Recrudescence is a well-recognized phenomenon in patients with chronic brain lesions and especially in MS. The classic picture of neurologic recrudescence is mild-to-moderate worsening of prior or chronic symptoms in the context of a febrile illness. UTIs are the most common infections in patients with MS. One study found that 35% of MS patients admitted with exacerbations had an acute bacterial infection, and 86% of these were UTIs.[3] Most MS patients with UTI return to baseline function with treatment of the underlying infection with antibiotics. Concurrent administration of corticosteroids can impair treatment of infections; however, a course of corticosteroids could be considered if symptoms persisted after an adequate course of antibiotic treatment. Adjusting medications intended to reduce the rate of relapse (glatiramer and interferon beta-1a) would not be indicated in this case.

4. **(D) T10 vertebral body metastatic lesion causing epidural spinal cord compression.** Bilateral leg involvement without arm symptoms indicates a spinal lesion below the level of the cervical spine. Upper motor neuron signs (ie, hyperreflexia and Babinski's sign) as well as a sensory deficit up to the umbilicus indicate a lesion in the thoracic spinal cord. A lesion in the lumbar spine affecting the cauda equina (which begins at the L1 level) would be expected to produce lower motor neuron deficits (ie, hyporeflexia) and sensory loss confined to the legs. Vertebral metastasis with spinal cord compression is a common initial herald of metastatic disease; the thoracic spine is the most common location of such lesions.[4,5]

5. **(B) IV dexamethasone 24 mg.** Treatment with high-dose corticosteroids is a mainstay of treatment for spinal cord compression and should be given as quickly as possible to prevent rapid deterioration, as seen in a subset of patients. Corticosteroids are given alone or in conjunction with other treatments, such as surgery or radiotherapy. Further imaging and surgical evaluation can take place once corticosteroids are given.

6. **(D) Pressure palsy (neurapraxia) of the right peroneal nerve.** Weakness that is profound and discretely localized is the hallmark of a peripheral (lower motor neuron) process. Despite this patient's multiple vascular risk factors, central nervous system lesions uncommonly affect only 1 limb and would be expected to produce more graded weakness in several limb muscle groups that do not conform to a specific peripheral nerve distribution. Peroneal neuropathies are common and are often seen from neurapraxia (compression damage) due to impingement of the peroneal nerve at the neck of the fibula, where it is most exposed. Prolonged leg crossing is one such mechanism. Sciatica can also cause foot drop, but it is accompanied by significant pain and often more diffuse weakness and sensory loss. Similarly, although an L5 radiculopathy could cause a similar pattern of weakness, an L5 compression fracture would be acutely painful.

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