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Myasthenia mimicking vertebrobasilar stroke

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Abstract The advent of thrombolysis has offered a remarkable opportunity for treatment of acute ischemic stroke. Other therapies involving neuro-protection may be forthcoming. These treatments, however, are not without risk, making accurate diagnosis of stroke all the more important. Several conditions may mimic stroke in the emergency department, with myasthenia being an uncommon stroke mimic. We present two cases of myasthenia presenting as posterior circulation stroke. In one case, the tempo suggested basilar thrombosis. Treatment decisions regarding thrombolysis for stroke must be made rapidly. Stroke mimics continue to present a diagnostic challenge, myasthenia included. Accurate diagnosis is essential to avoid unnecessary hazard, as well as to implement effective treatment for the appropriate diagnosis.

Key words myasthenia · stroke

Introduction

As effective treatments for the acute management of stroke become available, rapid and accurate diagnosis of stroke has become extremely important. Several landmark studies have been performed, leading to the first approved drug for acute stroke management [10, 12]. Many more acute stroke trials are forthcoming. It is well known that several medical conditions may mimic stroke [6, 7]; however, myasthenia mimicking stroke appears to be uncommon. We present here two cases of myasthenia presenting as posterior circulation stroke, one case suggesting basilar thrombosis.

Case 1

A 66-year-old left-handed black woman was evaluated in the emergency department for the acute onset of dysarthria and possible bilateral leg weakness. One week prior to admission, she developed a left facial palsy, gait difficulty and vague "dizziness". The symptoms improved over several days. She was evaluated at another hospital where CT of the brain was negative. She was diagnosed as a "TIA" or minor stroke, started on aspirin, and sent home. On the day of her admission to our facility, she woke up with severe dysarthria and bilateral leg weakness. Her past medical history was significant only for hypertension.

Initial neurological examination revealed a normal mental status. Her cranial nerve examination revealed a mild left gaze palsy, mild right ptosis with equal and reactive pupils, skew deviation with right eye hypertropia, a moderate left lower motor neuron facial palsy and moderate dysarthria. Her reflexes were brisk, with the remainder of the neurological examination, including motor function and plantar responses being normal. During the subsequent 24 hours, she developed bilateral ptosis with the appearance of a right pupillary sparing third nerve palsy, as well as severe dysarthria. There was bilateral weakness: left (3–/5) greater than the right (3+/5) and proximally greater than distally. Based on the clinical suspicion of pontine and midbrain infarction with progressing deficits, a diagnosis of possible basilar thrombosis was made, and she was treated with intra-

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venous heparin. Within another 24 hours, she became increasingly quadriparetic with proximal arm weakness of 3/5 bilaterally, and proximal leg weakness of 2/5 bilaterally. She developed severe aspiration pneumonia and required intubation and mechanical ventilation.

Initial CT, done approximately 10 hours from symptom onset, was unremarkable. MRI with diffusion weighted imaging done 24 hours from onset showed no clear sign of infarction. Chest radiography suggested an anterior mediastinal mass. This was confirmed on chest CT, and was interpreted as a probable thymoma. Her negative brain imaging and chest CT findings prompted consideration of myasthenia. Repetitive nerve stimulation studies were performed on the right spinal accessory nerve and trapezius muscle. Appropriate immobilization of the right upper extremity was employed to diminish movement artifact. The surface skin temperature was recorded at 34 degrees Celsius. An initial train of 10 supramaximal stimuli was performed at 2 Hz. This resulted in a decremental response of 8.1/24.3 % (measured at potentials 4/10 respectively). A second train performed at 3 Hz resulted in a more profound decremental response of 25.2/43.7 % (potentials 4/10). These results were interpreted as highly suggestive of a disturbance of neuromuscular transmission. Acetylcholine receptor antibodies were negative. She was then treated with plasmapheresis over five days. On the fifth day, her ptosis and ocular motility disturbance had dramatically improved, with only mild weakness of adduction of the right eye. She was able to breathe spontaneously, and her power improved to minimal proximal arm weakness and better than anti-gravity strength in her legs. Repeat MRI of her brain was normal. She was started on pyridostigmine and azathioprine and transferred to rehabilitation. A thymectomy was planned for the near future, after clinical stability was documented.

Case 2

This 58-year-old right handed black woman presented to the emergency ward with the acute onset of blurred vision, slurred speech and difficulty in walking. On the day of admission, she awoke with these symptoms, along with mild right-sided weakness and nausea. She denied any prior history of visual problems, weakness or fatigability. Her past medical history is significant for type II diabetes, hypertension, and heart palpitations.

Initial physical evaluation revealed an obese woman with a normal mental status and mild to moderate dysarthria. She had bilateral ptosis with no other significant cranial nerve abnormality. She also had mild, diffuse right-sided weakness affecting arm and leg, but with mild hip flexor weakness bilaterally, right greater than left, with no sensory abnormality. Her gait was mildly broad based with what appeared to be mild ataxia. No significant reflex asymmetry or extensor plantar response was noted.

The patient was heparinized and a stroke investigation instituted promptly, with the presumed diagnosis of vertebrobasilar ischemia. Brain CT was performed within six hours of presentation; MRI and MRA were performed within 72 hours, although diffusion weighted imaging was not available at the time. All were unremarkable for an infarct or other abnormality to explain her symptoms. At this point the differential diagnosis was broadened and other possible diagnoses were entertained. Repetitive nerve stimulation studies were performed of the right spinal accessory nerve and trapezius muscle. Appropriate immobilization of the right upper extremity was employed to diminish movement artifact. The surface skin temperature was recorded at 34 degrees Celsius. A train of 9 supramaximal stimuli was performed at 2 Hz. This resulted in a decremental response of 9/16 % (measured at potentials 4/9 respectively). A second train of 9 stimuli were delivered at 2 Hz immediately following 10 seconds of maximal voluntary contraction of the right trapezius muscle. This resulted in a repair of the decremental response (0/4 % measured at potentials 4/9 respectively). These results were interpreted as highly suggestive of a disturbance of neuromuscular transmission. Acetylcholine receptor antibodies were negative. Chest CT was normal.

The patient was started on pyridostigmine with remarkable improvement in her ptosis, dysarthria and gait. The patient was sent home with marked improvement. Her subsequent neurological examinations have been completely normal.

Discussion

Myasthenia gravis is the most common disorder affecting neuromuscular transmission. [4] Earlier studies have suggested that this disease usually occurs in younger age groups. More recent studies, however, suggest that of all patients with myasthenia, 59 percent are elderly [1, 9]. This age category clearly includes the population most at risk for cerebrovascular disease, mandating clinical vigilance to discriminate the two disorders.

Many conditions have been found to mimic stroke, with the converse also being true. In one study of 78 patients with stroke mimics, one was found to have myasthenia [7]. Another study, testing the accuracy of emergency physicians to diagnose stroke, evaluated 351 ischemic strokes [6]. Of the 351 stroke patients evaluated, 19 were misdiagnosed. None of the misdiagnosed patients suffered from myasthenia. These studies suggest that myasthenia mimicking stroke is unusual.

Common symptoms of myasthenia include ophthalmoplegia, dysarthria and dysphagia. Bilateral facial

weakness is also common, although unilateral facial weakness, as seen in our first patient is uncommon [4, 8]. When these symptoms are of relatively sudden onset, and include lateralized limb weakness, stroke would most certainly be high on the list of differential diagnoses. The symptoms of myasthenia frequently fluctuate. Hence, the fairly rapid onset, acutely fluctuating symptoms and signs in our first case suggested the possibility of basilar thrombosis. The ocular motility disturbances and ptosis suggested the possibility of posterior circulation ischemia. In the first case, the minor spell one week prior to presentation was consistent with mild cerebral ischemia or a transient ischemic attack, and tended to support the diagnosis of vertebrobasilar occlusive disease. Our second case also presented with symptoms referable to posterior circulation ischemia. In retrospect, her mildly "broad-based" gait, thought to reflect ataxia, was probably the "waddling" gait associated with proximal leg weakness. In any case, the presentation of both of our cases could be considered unusual [8]. Myasthenia frequently presents with fluctuating weakness, which varies in the course of a single day, sometimes within minutes, and often varies from day-to-day or over longer periods. It is rare for myasthenia to present so acutely and to lead to a crisis in short order. Often, the history may reveal previous transient symptoms, but this was not elicited in our second case. Acetylcholine receptor antibodies were negative in both of our cases. While the specificity of the antibody test may be more than 99.9 %, sensitivity has been reported to be 88 % because of false negative tests [11]. A negative test, therefore, does not rule out a diagnosis of myasthenia.

Two previous cases of myasthenia mimicking stroke have been reported [5]. One patient had a two-week history of progressive dysarthria and dysphagia, but was found on examination to have jaw closure weakness, bilateral facial palsies, neck flexor weakness, and diminished upward gaze. There was also fatigable weakness. An edrophonium test, EMG and acetylcholine receptor antibodies were all consistent with myasthenia. The second case originally presented with dysarthria, and later developed ptosis, dysphagia, diplopia and generalized weakness. An edrophonium test was positive, as were acetylcholine receptor antibodies, but EMG was inconclusive. Both of these cases had head CT findings suggestive of stroke. In the first case the stroke was of indeterminate age, and in the second case the age of the lesion was not commented on. The positive brain imaging in each case was thought to have influenced clinical judgment excessively, swaying the diagnosis incorrectly towards cerebral ischemia. In our two cases, the clinical presentations suggested stroke, but the strikingly *normal* brain MRIs, in addition to the abnormal chest CT in our first patient forced us to reconsider the diagnoses. Recent studies of MRI with diffusion weighted imaging suggest the utility of this imaging modality in confirming the diagnosis of acute stroke [3].

Stroke mimics will continue to present a diagnostic challenge, particularly in the emergency department where rapid decisions regarding thrombolytic treatment must be made. Recently, the dismal prognosis of basilar thrombosis has been modified by treatment with intra-arterial thrombolysis [2]. Clearly, accurate diagnosis is essential in such cases, both to avoid unnecessary hazard, and to plan effective treatment for the appropriate diagnosis, myasthenia being a case in point.

References

1. Antonini G, Morino S, Gragnani F, Fiorelli M (1996) Myasthenia gravis in the elderly: a hospital based study. Acta Neurol Scand; 93: 260–262
2. Egan R, Clark W, Lutsep H, et al. (1999) Efficacy of intraarterial thrombolysis of basilar artery stroke. J Stroke Cerebro Dis; 8: 22–27
3. Hacke W, Warach S (2000) Diffusion-weighted MRI as an evolving standard of care in acute stroke. Neurology; 54: 1548–1549
4. Hopkins LC (1994) Clinical features of Myasthenia Gravis. Neurol Clin; 12: 243–261
5. Kleiner-Fishman G, Kott HS (1998) Myasthenia Gravis mimicking stroke in elderly patients. Mayo Clin Proc; 73: 1077–1078
6. Kothari RU, Brott TG, Broderick JP (1995) Emergency physicians: accuracy in the diagnosis of stroke. Stroke; 26: 2238–2241
7. Libman RB, Wirkowski E, Alvir J, Rao H (1995) Conditions that mimic stroke in the emergency department. Arch Neurol; 52: 1119–1122
8. Penn AS, Rowland LP Disorders of the neuromuscular junction. In: Rowland LP, ed. Merritt's Textbook of Neurology. Media: Williams & Wilkins, 1995: 756–757
9. Schon F, Drayson M, Thompson RA (1996) Myasthenia gravis and elderly people. Age Ageing; 25: 56–58
10. Sherman DG, Atkinson RP, Chippendale T, et al. (2000) Intravenous Ancrod for treatment of acute ischemic stroke: the STAT study: a randomized controlled trial. Stroke treatment with Ancrod trial. JAMA; 283 [18]: 2395–2403
11. Somnier FE (1993) Clinical implementation of anti-acetylcholine receptor antibodies. J Neurol Neurosurg Psychiatry; 56: 496–504
12. The National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group (1995) Tissue Plasminogen Activator for Acute Ischemic Stroke. N Engl J Med 24: 1581–1587