Orthostatic Hypotension - Unusual Presentation of Multiple Sclerosis

Cheng-Chang Lien, Ta-Fu Chen, Ming-Jang Chiu

Department of Neurology, National Taiwan University Hospital, Taipei, Taiwan

Abstract - Autonomic disorders, such as bowel, bladder, and sexual dysfunction in multiple sclerosis, are common. Abnormal cardiovascular reflex has been noted in this disorder, but orthostatic hypotension as an initial manifestation has been rarely mentioned. We report a 23-year-old woman who developed marked orthostatic hypotension and then pyramidal and cerebellar signs in the succeeding months. Multiple sclerosis was diagnosed by subsequent clinical course and neurological findings. The patient received steroid therapy with improvement. Brain magnetic resonance imaging revealed plaque lesion in the brainstem. The relevance of lesion localization and mechanism of the orthostatic hypotension are also discussed.

Key Words : Autonomic dysfunction, Multiple sclerosis, Orthostatic hypotension

Acta Neurol Taiwan 1998;7:293-296

INTRODUCTION

Autonomic disorders, such as bowel, bladder, and sexual dysfunction in multiple sclerosis, are common [1-5]. Several investigators had investigated cardiovascular dysfunction in multiple sclerosis and detected this dysfunction in up to one third of the patients[6-14]. Orthostatic hypotension was also reported in a patient with multiple sclerosis[15]. The maintenance of adequate upright blood pressure requires both an intact baroreceptor-mediated feedback loop and effective circulating blood volume[16,17]. In the brainstem, the nucleus of the tractus solitarius in the dorsomedial medulla plays an important role as a vasomotor center for blood pressure maintenance. Therefore, orthostatic hypotension in a case of multiple sclerosis with dorsal medulla lesion is reasonable. However, orthostatic hypotension as the initial presentation in multiple sclerosis is unusual.

CASE REPORT

A 23-year-old woman developed transient dizziness, blackout and near-syncope in August 1997. She complained of fatigue, soreness and nausea several days before she came to our hospital. She had no remarkable medical history, such as heart disease or diabetes mellitus. The patient did not smoke or drink. There was no family history of any heart or autonomic disorders.

On admission, she was immediately transferred into intensive care unit for close observation due to severe bradycardia with heart rate as low as 35 beats/min. Her blood pressure dropped markedly while standing up, and she felt "passed out". Physical examination showed slow and rhythmic heart beats. There was no murmur. Her heartbeats would increase from a baseline of 50 beats/min to 98 beats/min after atropine injection. A 24-hour Holter EKG revealed sinus bradycardia

Received August 17, 1998. Revised August 26, 1998. Accepted December 6, 1998.
Correspondence : Ta-Fu Chen. Department of Neurology, National Taiwan University Hospital, 7 Chung-Shan South Road, Taipei, Taiwan.
Fax : 886-2-23951001 ; Email: chentf@ ms4.hinet.net

Table 1 *Obvious blood pressure and blood flow velocity drop with compensatory tachycardia*

	BP(mmHg)	PR(/min)	Max BFV	Min BFV	Mean BFV
Supine	136/94	64	82	50	71.3
Sitting					
1 min	100/80	96	74	30	59.3
2 min	100/80	120	57	29	47.6
5 min	110/78	132	53	29	45
Standing					
1 min	90/-	144	55	30	46.6
2 min	70/-	144	40	15	31.6
5 min	Not detectable	162	38	13	29.6
10 min	Patient syncopic				
Lying again					
1 min	108/70	84	94	43	77
5 min	110/72	78	94	51	79

BP : Blood pressure, PR:Pulse rate
Max BFV : Maximal blood flow velocity detected at left middle artery
Mini BFV : Minimal blood flow velocity detected at left middle artery
Mean BFV : Mean blood flow velocity detected at left middle artery

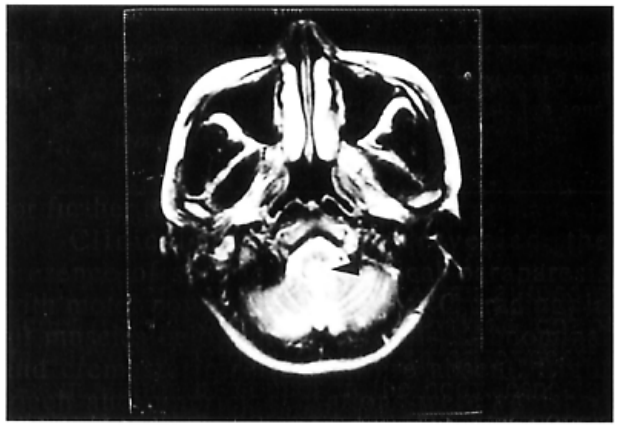

Fig. 1 The brain MRI after the first attack (axial view): a vague high signal intensity lesion (arrow) on T2 weight image at the dorsal aspect of the medulla near the floor of the lower 4th ventricle.

without a conduction block. The cell blood count and biochemistry routines were normal. During a syncope study, an obvious drop of blood pressure and slowing of blood flow velocity of middle cerebral artery with compensatory tachycardia were observed (Table 1). These findings indicated vasomotor (vessodepressor) syncope. She was then given a neurological system work-up. The neurological examination revealed no deficit of function in other neurological system.

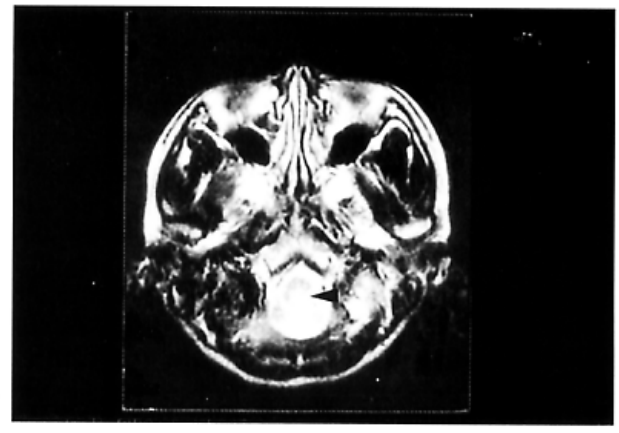

Fig. 2a The brain MRI after the second attack (axial view): a more demarcated lesion (arrow) in the same area.

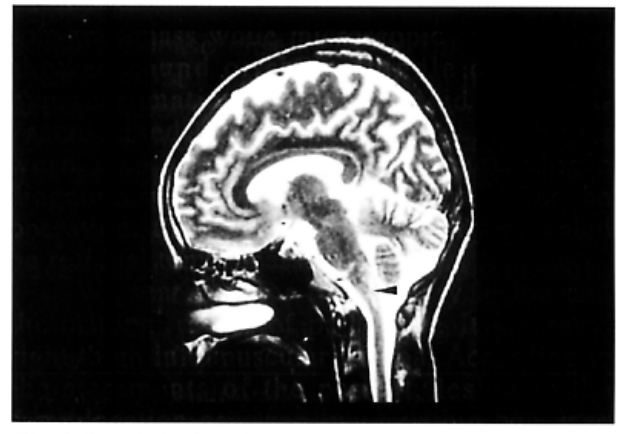

Fig. 2b Same lesion (arrow) in sagittal view

Electrophysiological examinations, such as nerve conduction study and quantitative sensation test, showed no evidence of peripheral neuropathy. Her R-R interval variance and sympathetic skin response were also normal. Orthostatic hypotension due to central origin was impressed.

The patient's syncope attacks decreased one week after admission; however, rotatory nystagmus with a quick phase to the right side appeared. She had neither hearing impairment nor dysmetric limb movement. She would, nevertheless, fall to the left side on tandem gait. Electronystamogrphy study showed saccadic pursuit and spontaneous unidirectional horizontal-rotatory spontaneous nystagmus; and canal paresis on the left side was noted in Caloric test. This implied left vestibulopathy as wellas cerebellar

dysfunction. The evoked potential tests revealed no impairments in somatosensory, visual and auditory functions. Brain magnetic resonance imaging showed a possible lesion in the dorsal medulla area (Fig.1). When her orthostatic hypotension and nystagmus alleviated, she was discharged.

She visited our clinics again due to diplopia and progressive numbness over her left upper limb about four weeks after the first attack. The neurological examination also revealed mild left hemiparesis and hypesthesia over her face with onion skin distribution. In addition, a bidirectional nystagmus that was different from the previous one appeared. This time, the somatosensory-evoked potential showed mildly prolonged scalp latency and increased central conduction time from the left median nerve stimulation as compared with the previously similar study. Another imaging study was also made. The second brain magnetic resonance imaging showed a demarcated lesion with increased signal intensity at the dorsal aspect of the medulla near the floor of the lower 4th ventricle (Fig. 2a, 2b). She received high dose steroid therapy and her left hemiparesis and hemiparesthesia improved. She is still followed up in our outpatient department and has no further attack after steroid tapering.

DISCUSSION

A diagnosis of multiple sclerosis is always a challenging task for neurologists. It depends on symptoms and signs involving multiple systems with clinical characteristic of relapses and remissions. In our case, she had her first attack when she was in herearly twenties. The clinical manifestation, such as orthostatic hypotension, vertigo, hemiparesis and hemiparesthesia, appeared sequentially and subsided gradually. She got marked improvement after steroid treatment. It is compatible with the description of diagnostic criteria of clinical definite multiple sclerosis proposed by Schumacher et al [18]. There are also further paraclinical evidence: prolonged central conduction velocity in somatosensory-evoked potential study and possible inflammatory lesion at the posterior medullar area on magnetic resonance imaging. It fulfills the diagnosis of a clinically definite multiple sclerosis according to Poser et al ' s operative diagnostic criteria [19].

Impairment of the autonomic nervous system is common in patients with multiple sclerosis. Bladder, bowel, sexual and sweating dysfunction are well documented [1-5]. In the last decades, the study of autonomic dysfunction in multiple sclerosis has been focused on the abnormal cardiovascular reflexes [6-14]. Various autonomic tests, such as R-R interval variation, blood pressure and heart rate response to deep breathing, Valsalva maneuver, posture change and exercise, had been developed. Abnormalities of one or more tests were noted in about one third of the patients. In those studies, orthostatic hypotension was reported in 7% of the multiple sclerosis patients without other obvious clinical manifestation [3]. In the literature,there was only one case report of multiple sclerosis with orthostatic hypotension as the major manifestation [15]. In our case, the patient had orthostatic hypotension as the initial symptom. It was an unusual clinical experience. We also used transcranial Doppler sonography to determine the cerebral circulation during posture change. It was a newly developed technique to show the cerebral dysfunction in orthostatic hypotension [20]. In our patient, an obvious drop in the mean flow velocity of the middle cerebral artery as well as in the blood pressure was shown (Table 1).

Localization of demyelinating plaques in multiple sclerosis patients with autonomic dysfunction is still a perplexing work. It has been suggested that the lesions may involve the autonomic centers in the hypothalamus or medulla, or just interfere with the descending autonomic tracts during their course in the brainstem or spinal cord [3,14]. However, there is no definite study to demonstrate the correlation of autonomic dysfunction with plaques in the mentioned areas from image findings. Vasomotor regulation is mediated through afferent sensory fibers from carotid baroceptors running through the glossopharyngeal and vagus nerves ascending to the vasomotor centers in the medulla. The

sympathetic efferent pathway from the medullary centers to the brainstem can increase the heart rate and peripheral vessel resistance. Of these pathways, nucleus and tractus solitarius in the dorsomedial medulla, play an important role as vasomotor center for blood pressure maintenance [16,17]. In this case, the brain magnetic resonance imaging study disclosed a plaque lesion at the dorsal aspect of the medulla near the floor of the lower 4th ventricle. It is compatible with the anatomic site of vasomotor center discussed previously and may account for the unusual initial clinical manifestation.

REFERENCES

1. Hause SL. Multiple sclerosis and other demyelinating disease. In:Isselbacher KJ, Braunwald E, Wilson JD, Martin JB, Fauci AS, Kasper DL, editors. Harrison's Principles of Internal Medicine, 13th edition. McGraw - Hill, 1994:2287-94.
2. Adam RD, Victor M, Ropper AH. Multiple sclerosis and allied demyelinative disease. In: Principles of Neurology, 6th edition. McGraw-Hill,1997:903-21.
3. Noronaha MJ, Vas CJ, Aziz H. Autonomic dysfunction (sweating response) in multiple sclerosis. J Neurol Neurosurg Psychiatry. 1968;31:19-22.
4. Vas CJ. Sexual impotence and some autonomic disturbance in men with multiple sclerosis. Acta Neurol Scand.1969;45:166-82.
5. Cartldge NE. Autonomic function in multiple sclerosis. Brain. 1972;95:661-4
6. Mutani RS, Clemente AA, Monaco F. Assessment of autonomic disturbances in multiple sclerosis by measurement of heart rate response to deep breathing and to standing. Ital J Neurol Sci. 1986;2:111-4.
7. Neubauer B, Gundersen HJG. Analysis of heart rate variations in patients with multiple sclerosis. J Neurol Neurosurg Psychiatry. 1978;41:417-9.
8. Thomaides TN, Zoukos Y, Chaudhuri KR, Mathias CJ. Physiological assessment of aspects of autonomic function in patients with secondary progressive multiple sclerosis. J Neurol. 1993;240:139-43.
9. Nordenbo AM, Boesen F, Andersen EB. Cardiovascular autonomic function in multiple sclerosis. J Auton Nerv Syst. 1989;26:77-84.
10. Pentland B, Ewing DJ. Cardiovascular reflexes in multiple sclerosis. Eur Neurol 1987;26:46-50.
11. Senaratne MPJ, Carroll D, Warren KG, Kappagode T. Evidence for cardiovascular autonomic nerve dysfunction in multiple sclerosis. J Neurol Neurosurg Psychiatry. 1984;47:947-52.
12. Sterman AB, Coyle PK, Panasci DJ, Grimson R. Disseminated abnormalities of cardiovascular autonomic functions in multiple sclerosis. Neurology.1985;35:1665-8.
13. Anema JR, Heijenbrok MW, Faes TJC, Heimans JJ, Lanting P, Polman CH. Cardiovascular autonomic function in multiple sclerosis. J Neurol Sci. 1991;104:129-34.
14. Vita G, Fazio MC, Milone S, Blandino A, Salvi L, Messina C. Cardiovascular autonomic dysfunction in multiple sclerosis is likely related to brainstem lesion. J Neurol Sci.1993;120:82-6.
15. Sakakibara R. Mori M. Fukutake T. Kita K. Hattori T. Orthostatic hypotension in a case with multiple sclerosis. Clin Auton Res. 1997;7(3):163-5.
16. Schatz IJ. Orthostatic hypotension- I. Functional and neurogenic causes.Arch Intern Med.1984;144:773-7.
17. Freeman R, Miyawaki E. The treatment of autonomic dysfunction. J Clin Neurophysiol. 1993;(10) 1:61-7.
18. Schumacher GA, Beebe GW, Kibler RF, Kurland LT, Kurtzke JF, Mc Dowell F, Nagler B, Sibley WA, Tourtellotte WW, Willmon TL. Problems in experimental trials of therapy in multiple sclerosis. Ann NY Acad Sci. 1965;122:552-68.
19. Poser CN, Paty DW, Scheinberg L, McDonald WI, Davis FA, Ebers GC, et al. New diagnostic criteria for multiple sclerosis : Guidelines for research protocols. Ann Neurol. 1983;13:227-31.
20. Daffertshofer M, Hennerici M. Cerebrovascular regulation and vasoneuronal coupling. J Clin Ultrasound.1995;23:125-38.