Progressive Myelopathy in a Patient with Pediatric Onset Neuromyelitis Optica Spectrum Disorder: A Case Report and a Mini Review

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Abstract

Purpose: Neuromyelitis optica is an autoimmune disease characterized mainly by the involvement of the spinal cord and optic nerve. Clinical studies have identified the disease progression as the most important red flag. Previous researches showed that only 2% of patients with neuromyelitis optica experience a progressive course. On the other hand, neuromyelitis optica is rarely occurred in children. In the present study a case of neuromyelitis optica was reported in a female who suffered from progressive myelopathy in the course of the disease.

Case Report: The patient was a 30-year-old woman who has been affected to the disease at the age of 10 manifesting the quadriparesis. The patient also manifested optic neuritis twice. The disease became progressive at the age of 27. According to the results of the magnetic resonance imaging on spinal cord, severe atrophy was observed in the cervical and thoracic spine cord. The patient's anti-aquaporin 4 antibody was positive.

Conclusion: Neuromyelitis optica is an astrocytopathy disease characterized by debilitating attacks. A very small percentage of patients may suffer a progressive course. According to the reported cases, this progressive course may be completely variable symptomatically, including progressive myelopathy, progressive vision impairments, and progressive cognitive impairment.

Keywords: Progressive Myelopathy, Pediatric Onset, Neuromyelitis Optica Spectrum Disorder

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INTRODUCTION

Neuromyelitis Optica Spectrum Disorder (NMOSD) is an autoimmune disease characterized mainly by spinal cord and optic nerve involvement. In 2015, new criteria were developed to diagnose the disease, which, in addition to providing a new classification, they emphasized on the differential diagnosis of the disease [(1)]. Paying attention to some red flags mentioned in that study exerts more precision on the diagnosis of the disease and, in case of any, other differential diagnoses will be considered. Clinical studies identified, the disease progressive course as the most important red flag [(1)]. Prior researches showed that only 2% of patients with NMOSD are involved in a

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progressive course [2]. On the other hand, the number of children suffering from NMOSD are rare [3]. In the current study, NMOSD was reported in a female who suffered from progressive myelopathy in the course of disease. The disease has been started in childhood. In the following, the specifications related to this case were compared with those of other reported cases.

CASE PRESENTATION

The patient suffered from weakness in the four limbs healed without any medical intervention when she was 10 years old. The patient did not do any follow-up. Three years later, the patient suffered from left eye optic neuritis, treated with administration of 1 gram/ day of methylprednisolone for five days. At that time, the patient was diagnosed with Multiple Sclerosis (MS) and accordingly she was treated with taking *Avonex*. Two years later, she developed optic neuritis in her right eye, improved by corticosteroid injection, then her medication regime changed to taking 50 mg of azathioprine once a day. From the past three years, she developed progressive weakness in the four limbs. Therefore, the administration of *Azathioprin* was discontinued for her and she underwent a treatment with a dose of 20 mg of *Novantrone* for three cycles at 3-month intervals. However, the patient's condition worsened, and the progressive course of disease continued. At this time, she was referred to MS clinic of Sina Hospital for further examinations. The results of ophthalmoscopic examination showed that, a bilateral optic atrophy was evident. The right visual acuity was equal to 8/10 and for the left one was equal to 7/10. The strength of the upper extremities were equal to 3/5 and the lower extremities were equal to 1/5. The patient had bilateral Babinski. The results of other examinations performed on the patient were normal. The Magnetic Resonance Imaging (MRI) of the brain showed scattered non-specific lesions in the subcortical area (Fig. 1). The results of cervical MRI showed signal changes in the cervical and thoracic cord with severe atrophy from C7 to T7 (Fig. 1). The results of biochemical, vasculitis, and human immunodeficiency virus (HIV) tests were negative. Despite the progressive course of the disease, and due to the severe atrophy observed in the cord and the double history of optic neuritis, anti- aquaporin antibody was demanded which was reported to be positive.

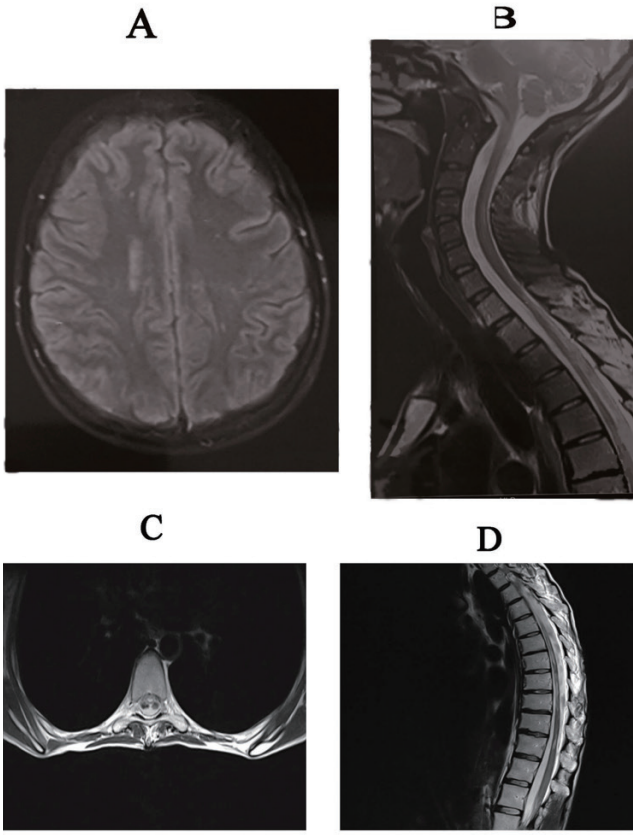

Figure 1. (A) Brain MRI showed scattered non-specific lesions in the subcortical area. (B, C & D). Spinal cord MRI showed signal changes in the cervical and thoracic cord with severe atrophy from C7 to T7.

DISCUSSION

As noted earlier, the progressive course is rarely occurred in patients with NMOSD, and the results of one study showed that, it accounts for a maximum of 2 % of reported cases[2]. Actually, NMOSD is considered as a relapsing disease. Of course, any recurrence may lead to serious disabilities in patients. Although the disease is very similar to MS disease in terms of clinical manifestations, the pathogenesis of the disease is completely different from MS disease. MS is a demyelinating disease with different kinds of courses. Relapsing-remitting has been found as its most common form. Nevertheless, this form also becomes secondary progressive over a long period of time. About 10 to 20% of patients suffer from a

Table 1: Demographic, clinical and radiological characteristics of reported cases.

References	Age of diagnosis	Sex	Presenting symptom	The progressive symptom	History of optic neuritis	anti-aquaporin antibody	Spinal MRI	Brain MRI at presentation
Okai et al.2006	53	F	Quadriparesis	progressive quadriparesis	-	+	LETM	Nonspecific white matter lesions
Okai et al.	38	F	Paraparesia and paresthesia	progressive quadriparesis	-	+	LETM	-
Okai et al.	41	F	quadriparesis, dysesthesia	Progressive quadriparesis	Bilateral ON	+	LETM	diffuse white matter lesions
Okai et al.	44	F	leg weakness, and numbness in both hands	Progressive quadriparesis	-	+	LETM	Few punctuate lesions
Okai et al.	45	F	T6 sensory Level	Progressive quadriparesis	Bilateral ON	+	LETM	-
Wingerchuk, et al. 2007	38	M	N/A	Progressive extremities weakness	N/A	+	N/A	N/A
Wingerchuk, et al. 2007	30	F	N/A	Progressive extremities weakness	N/A	+	N/A	N/A
Jun-Soon Kim,et al	51	F	nausea, vomiting, and hiccup	worsening quadriparesis	-	+	LETM	N/A
Melissa Cortez, Dean Wingerchuk (2013)	30	N/A	N/A	Progressive extremities weakness and visual impairment progression	N/A	+	N/A	N/A
Melissa Cortez, Dean Wingerchuk (2013)	38	N/A	N/A	Progressive extremities weakness and visual impairment progression	N/A	+	N/A	N/A
Warabi, et al. 2015	74	F	the left leg weakness	progressively worsened extremities weakness , and cognitive impairment	+	+	LETM	left ON enhancement, extensive cerebral white matter lesions and marked progression of cerebral atrophy
Warabi, et al. 2015	54	F	ON	Progressive tetraparesi	+	+	LETM	diffuse bilateral white matter lesions and brain atrophy
This case, 2019	30	F	Quadriparesis	worsening quadriparesis	+	+	LETM	Nonspecific white matter lesions

F: female, LETM: longitudinally extensive transverse myelitis, M: male, MRI: magnetic resonance imaging, N/A: not available, ON: optic neuritis, +: positive, -: negative

progressive disease which is known as primary progressive MS [4]. In contrast, NMOSD is generally a relapsing-remitting disease, which its progressive form is very rare. According to the definition, the progressive cases of the disease develop without any attack at least during a year [5].

According to the previous assessments, 13 cases were found who suffered from a progressive course during the disease [6-8]. One case developed a progressive course from the very beginning [7]. The data related to the 4 cases were insufficient (Table 1).

Table 1 shows that the average age of these patients is 43.53 years old, ranging from 30 to 74 years old. The reported case of the present study is considered to be important since the disease has been started in childhood unlike all other reported cases. In fact, the reported case was the first progressive case that had the onset of the disease in childhood. Although, in general, the incidence of the disease is limited in children, but this outcome will not be far from the mind.

The proportion of involvement in women compared to men in cases where data were available was found to be 10 to 1. Progressive symptoms in the reported cases were quite diverse, including progressive myelopathy, progressive vision impairment, and progressive cognitive impairment.

The results of MRI related to all reported cases showed spinal cord involvement as longitudinal extensive transverse myelitis (LETM) or extensive and long-term atrophy. However, the results of MRI on the patients' brain at the onset of the disease showed a completely different pattern ranging from normal to large lesions. The presence of optic neuritis in these patients was considered as another important point. Six cases were found to have a history of optic neuritis.

Antibody status was found to be positive in all cases. The lack of recognition of other progressive cases in the seronegative NMOSD may be considered as one possible reason leading to positive antibodies in a significant percentage of patients. In fact, since the progressive course of this disease is quite rarely occurred, if the antibody was negative, seronegative cases would possibly be diagnosed as patients with MS.

CONCLUSION

Neuromyelitis optica is an astrocytopathy disease characterized by debilitating attacks. A very small percentage of patients may suffer from a progressive course. This progressive course may be completely variable, including progressive myelopathy, progressive vision impairments, and progressive cognitive impairments.

REFERENCE

1. Wingerchuk DM, Banwell B, Bennett JL, et al. International Panel for NMO Diagnosis. International consensus diagnostic criteria for neuromyelitis optica spectrum disorders. Neurology 2015; 85: 177–189.
2. Wingerchuk DM, Pittock SJ, Lucchinetti CF, Lennon VA, Weinshenker BG. A secondary progressive clinical course is uncommon in neuromyelitis optica. Neurology 2007;68:603–605.
3. Baghbanian SM, Asgari N, Sahraian MA, Moghadasi AN. A comparison of pediatric and adult neuromyelitis optica spectrum disorders: A review of clinical manifestation, diagnosis, and treatment. J Neurol Sci 2018; 388:222-231.
4. Klineova S, Lublin FD. Clinical Course of Multiple Sclerosis. Cold Spring Harb Perspect Med 2018; 8(9).
5. Cortez M, Wingerchuk D. Incidence and Clinical Characteristics of Secondary Progressive Neuromyelitis Optica (P02.149) 2013; 80 (7 Supplement).
6. Okai AF, Muppidi S, Bagla R, Leist TP. Progressive n ecrotizing myelopathy: part of the spectrum of neuro myelitis optica? Neurol Res 2006; 28(3):354-9.
7. Kim JS, Park YH, Kim SM, Kim SH, Park KS, Sung JJ, Lee KW. A case of chronic progressive myelopath. Mult Scler 2010; 16(10):1255-7.
8. Warabi Y, Takahashi T, Isozaki E. Progressive cereb ral atrophy in neuromyelitis optica. Mult Scler 2015; 21(14):1872-5.