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Retrospective Diagnosis of AQP4 Antibody Positive Neuromyelitis Optica Spectrum Disorders

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Abstract

Objective Identify the clinical features of AQP4 antibody positive NMOSD, and summarize the diagnostic experience.Materials and MethodsThe clinical data of three patients were collected in our hospital between January 2020 and December 2021 , including basic information, clinical characteristics, spinal cord imaging features, laboratory results, treatment and effects. Results Three patients were all females with the median age of 55 years old. Clinical features manifested as limb sensorimotor disturbances. MRI showed segmental lesions in the spinal cord. Serum AQP4 antibody was positive.Autoimmune antibodies were positive in some patients. Glucocorticoid therapy was effective. ConclusionsNMOSD is an inflammatory demyelinating disorder of the central nervous system that primarily affects the optic nerve and spinal cord, possibly associated with systemic autoimmune disease. Serum AQP4 antibody and autoimmune antibodies should be detected. Early diagnosis and treatment can improve prognosis.

Keywords

Neuromyelitis Optica Spectrum Disorders; AQP4 Antibody; Diagnosis.

1. Introduction

In recent years, with the development of imaging technology and basic research, more and more NMOSD(neuromyelitis optica spectrum disorders) patients have been identified [1].NMOSD is a group of autoimmune-mediated inflammatory demyelinating diseases of the central nervous system, mainly involving the optic nerve and spinal cord. Spinal cord injury reduces quality of life.By analyzing the clinical characteristics of AQP4 antibody-positive NMOSD, early diagnosis and treatment can be made, and the prognosis can be improved.

2. Materials and Methods

2.1. Case Data

The clinical data of three patients in our hospital between January 2020 and December 2021.

2.2. Methods

The basic information, clinical characteristics, spinal cord imaging features, laboratory results, treatment and effects were collected. Diagnostic reference refers to the adult NMOSD diagnostic criteria (IPND, 2015) [1]

3. Results

3.1. Basic Information and Clinical Characteristics

Three patients were female with the median age of 55 years old, minimum age of onset was 45 yearsold, maximum age of onset was 64 yearsold.The disease course was more than 10 days to

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10 years. The patients had limb weakness, hypertensive tendon reflex, and positive Babinskisign. They also had optic neuritis, or Sjögren's syndrome, or rheumatoid arthritis. See Table 1.

3.2. Spinal Cord Imaging Features and Lab Results

MRI (Magnetic Resonance Imaging) showed cervical or thoracic spinal cord injury. Imaging features included segmental distribution with fewer or more than 3 vertebral segments, edema in the acute phase and atrophy in the chronic phase, long T2 signal and STIR high signal. Serum AQP4 antibody was positive. Autoimmune antibodies were positive in some patients. Three patients had optic neuritis or Sjögren's syndrome or rheumatoid arthritis.See Table 2 and Figure A1\2,B1\2,C1\2.

3.3. Treatment and Effects

All patients received intravenous methylprednisolone (IVMP) during the acute phase. After symptoms improved, glucocorticoids were gradually reduced. Some patients use gamma globulin in the acute phase. Some patients use azathioprine or mycophenolate mofetil in the remission phase.

Table 1. Basic information and clinical characteristics

	Case A	Case B	Case C
Gender	female	female	female
First onset	57 years old	45 years old	64 years old
Disease course	more than 10 days	10 years	1 month
Weakness	Right lower limb	Both lower limb	Bilateral limb
Tendon reflex	hypertensive	hypertensive	hypertensive
Babinskisign	positive	positive	positive
Comorbidities	Optic Neuritis	Sjögren's syndrome	Rheumatoid Arthritis

Table 2. Spinal cord imaging features and lab results

		Case A	Case B	Case C
Spinal cord MRI Signal	position Levelof vertebralbodies	Thoracic2-3	Thoracic4-10	Cervical spinal cord Upper thoracic cord
	shape	Long strip	Cord clear edge slender spinal cord	Patchy unclear boundaries
	characteristics	longT1 long T2	long T1 long T2 high on STIR	equalT1 long T2 high on STIR
Serum AQP4 antibody		Positive	Positive	Positive
Autoimmune Antibodies		Negative	Anti-SSA antibody positive Anti-SSB antibody positive Anti-Ro-52antibody positive	Antinuclear antibody positive

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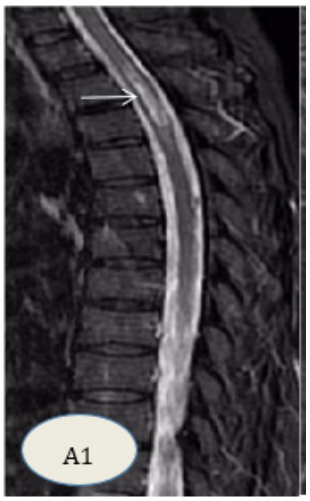

Figure 1. (A1), Long strip STIR high signal of thoracic spinal cord in case A

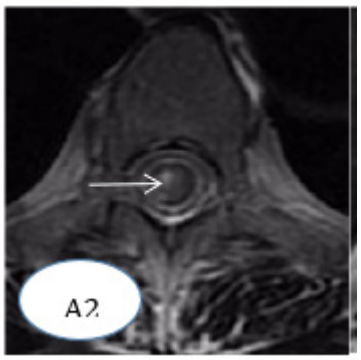

Figure 1. (A2), STIR high signal of thoracic spinal cord cross-section in case A

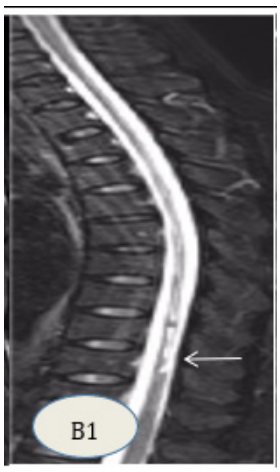

Figure 2. (B1), Cord STIR high signal of thoracic spinal cord, clear edge, slender spinal cord in case B

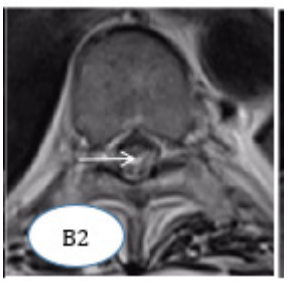

Figure 2. (B2), STIR high signal of thoracic spinal cord cross-section in case B

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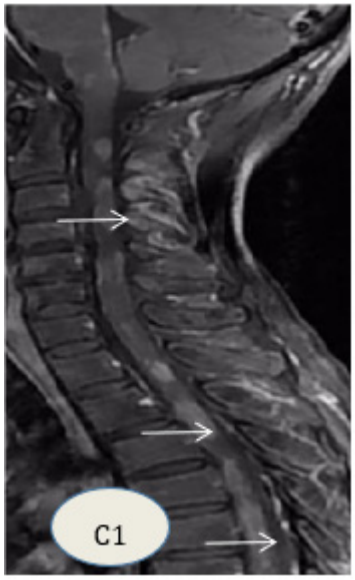

Figure 3. (C1), Patchy equal T1signal, unclear boundaries, no enhancement in case C

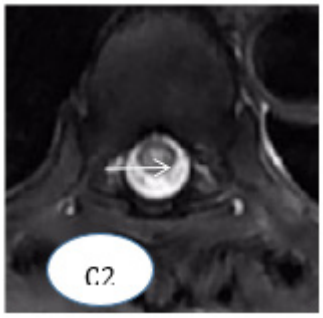

Figure 3. (C2), STIR high signal of thoracic spinal cord cross-section in case C

4. Conclusion

4.1. NMOSD and Age

NMOSD is more common in young and middle-agedandmore common in women.Late-onset NMOSD is more common after age 50 with long-segment spinal cord injury[2]. The three patients were female with the median age of 55 years old, minimum age of onset was 45 yearsold, maximum age of onset was 64 yearsold. If the patient is over the age of 50 years old, NMOSD cannot be ignored.

4.2. NMOSD and Myelitis

Myelitis can occur in MS(multiple sclerosis) and NMOSD. Short-segment spinal cord lesions involving less than 3 vertebral segments are more common in MS[3]. Long-segment spinal cord lesions involving more than 3 vertebral segments are more common in NMOSD[4]. In case A, the spinal cord lesion was short segment . In case B and case C ,the spinal cord lesions were long segments .

It is worth noting that NMOSD is common in Asian populations. Spinal cord lesions in NMOSD can also be short-segmented. Diagnosis based on imaging features alone can easily lead to misdiagnosis. Serum AQP4 antibody of the three patients were all positive. These patients were all diagnosed with NMOSD.

Diagnosis is important for prevention.During the remission period, some drugs can prevent the recurrence of MS, such as beta interferon, fingolimod, natalizumab, alemtuzumab, etc. However, it may cause the disease to worsen if used in NMOSD[4]. In all patients, Glucocorticoid therapy was effective in the acute phase. Some of them received immunosuppressive therapy.

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4.3. NMOSD and Optic Neuritis

NMOSD is an inflammatory demyelinating disorder of the central nervous system that primarily affects the optic nerve and spinal cord. DON(Demyelinating optic neuritis) is an inflammatory demyelinating disease of the optic nerve. DON can cause visual impairment and affect quality of life. With the study of clinical diagnostic markers, DON was classified into IDON, MS-ON, NMO-ON, NMOSD-ON, MOG-ON, CRION and so on[5]. In order to clarify the DON classification early, it is necessary to perfect the CNS imaging and laboratory tests early. It is important to take appropriate immunotherapy for reducing DON recurrence rate and the burden on families and society.

4.4. NMOSD and Systemic Autoimmune Disease

According to research, AQP4 is mainly expressed in the optic nerve and spinal cord. AQP5 is mainly expressed in saliva. AQP4 shares structural homology with AQP5, 50% of protein sequences are identical[6]. AQP4 antibodies can be found in NMOSDs patients and NMOSDs patients with SS. AQP4 antibodies were negative in patients with SS without neuropsychiatric disease[7]. In case2, serum AQP4 antibody positive, anti-SSA antibody positive, anti-SSB antibody positive, anti-Ro-52 antibody positive. The patient was diagnosed as NMOSD concurrent with SS, not only given glucocorticoid therapy, but also given immunosuppressive therapy.

5. Closing Remarks

With the development of imaging technology and laboratory research[8], more NMOSD were diagnosed, especially late-onset NMOSD. Occurrence and early diagnosis of myelitis and optic neuritis should not be ignored. Imaging of the central nervous system and detection of serum AQP4 antibodies should be completed as soon as possible. NMOSD is often associated with other immune system diseases. It is necessary to detect autoimmune antibodies. Administration of glucocorticoids and immunosuppressive therapy is important for reducing disability and preventing recurrence[9]. This time, the number of selected patients is small, the follow-up time was not long enough, the effect of treatment remains to be further observed.

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