Caspian Journal of Neurological Sciences
"Caspian J Neurol Sci"
Journal Homepage: http://cjns.gums.ac.ir

Case Report: Tumefactive Brain Lesions in Patients with Neuromyelitis Optica Spectrum Disorder

Navid Manouchehri[1,2], Nasim Nehzat[1], Omid Mirmosayeb[1,3], Vahid Shaygannejad[1,2*], Mahdi Barzegar[1,3]

1. Isfahan Neuroscience Research Center, Isfahan University of Medical Sciences, Isfahan, Iran
2. Department of Neurology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran
3. Student Research Committee, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Use your device to scan and read the article online

Citation Manouchehri N, Nehzat N, Mirmosayeb O, Shaygannejad V, Barzegar M. Tumefactive Brain Lesions in Patients with Neuromyelitis Optica Spectrum Disorder. Caspian J Neurol Sci. 2019; 5(2):96-100. https://doi.org/10.29252/CJNS.5.17.96

Running Title Tumefactive Lesions & NMOSD

https://doi.org/10.29252/CJNS.5.17.96

Article info:
Received: 19 Jan 2019
First Revision: 22 Feb 2019
Accepted: 27 Feb 2019
Published: 01 Apr 2019

ABSTRACT

Background: Neuromyelitis Optica Spectrum Disorder (NMOSD) is an autoimmune neurological disorder that is characterized by optic neuritis and longitudinally-extended transverse myelitis lesions in spinal segments. Magnetic Resonance Imaging (MRI) findings are part of the diagnostic process in NMOSD patients, and abnormal lesion patterns may cause deviation from a correct diagnosis.

Clinical Presentation and Intervention: A 43-year-old female patient with abrupt cognitive loss, motor dysfunction and tumefactive spread of the demyelinating lesions in her brain presented to the Neurology Clinic of Kashani Hospital. Anti Aquaporine 4(AQP-4) antibody was observed, and the patient responded well to the NMOSD treatment.

Conclusion: NMOSD can be considered a differential diagnosis during an episode of Fulminant Demyelinating Disorder (FDD) with the tumefactive spread of the lesions.

Keywords: Neuromyelitis optica, Magnetic resonance imaging, Brain

Highlights

- Brain lesions in NMOSD are rare, but should consideration for diagnosis.
- NMOSD should be a differential diagnosis for patients with tumefactive brain lesions

*** Corresponding Author:**
Vahid Shaygannejad
Address: *Isfahan Neuroscience Research Center, Isfahan University of Medical Sciences, Isfahan, Iran*
Tel: *+98 (913) 3133550*
E-mail: *shaygannejad@med.mui.ac.ir*

Introduction

NMOSD refers to the autoimmune demyelination of the central nervous system secondary to the sensitization of the immune system towards endogenous AQP-4 proteins (IgG class, also known as NMO-IgG) at some point in the course of the disease [1]. The most common MRI findings in these patients include the clinical characteristics of optic neuritis and longitudinally-extended transverse myelitis lesions involving several neighboring spinal segments [1-2]. Although these findings are frequent in NMOSD patients, other forms of MRI findings have also been observed, many of which overlap with other demyelinating diseases such as Acute Disseminated Encephalomyelitis (ADEM) and Multiple Sclerosis (MS) [2].

Global brain involvement is uncommon in NMOSD patients, and a small subpopulation of the patients may present with non-specific brain lesions. Hypothalamic, medullary and brain stem lesions involving the area postrema have also been observed in NMOSD patients. Other MRI findings in demyelinating disease including tumefactive presentations in FDDs were rarely reported in NMOSD patients, which presents a challenge for prompt diagnosis after the emergence of initial symptoms [3-4]. The present case report involves an NMOSD patient with FDD and the tumefactive spread of lesions in the brain with acute and severe onset and progression of the disease.

Case Presentation

After being examined and treated for three months owing to several neurological symptoms without any clear diagnosis or improvements, a 43-year old female patient presented to the Neurology Clinic of Kashani Hospital affiliated to Isfahan University of Medical Sciences, Isfahan, Iran. She had suffered an abrupt loss of cognitive abilities three month before presenting to the clinic followed by the loss of movement in both her legs and right arm and right-sided paresthesia and urinary incontinence.

She had been hospitalized then for these symptoms and undergone a battery of general and neurological assessments. These clinical data were extracted from the assessments and her medical records. Upon admission, she was confused, agitated and hostile towards others and unable to make proper sentences while screaming. She was, however, able to respond to yes/no questions using head gestures, although she could not recognize her family members and her surroundings, and could not walk as she was wheelchair-dependent.

Her examinations in this center found her systemic exams to be within the normal range, and her cranial nerve exams and bilateral funduscopic assessments to be also normal. The motor function of her left hand was normal, although her right hand and both legs had a diminished muscle strength with only a twitching capability. An increase was also observed in deep tendon reflexes of bilateral patellar tendons and right biceps tendon. Moreover, bilateral Babinski sign was observed.

In addition, her cognitive symptoms had been persistent since her primary hospitalization three months before, and her motor and sensory symptoms had gradually deteriorated over the course of her disease. The patient's neurologic assessments at that time including MRI had revealed a large change in the confluent white matter signal in bilateral frontal lobes, right temporal lobe, deep periventricular white matter and the body of corpus callosum (Figure 1).

No spinal lesions had been reported, and she had been primarily assessed for intracranial neoplasm, and undergone a course of methyl prednisolone pulse therapy (5 g) for her symptoms and the stereotactic biopsy of her brain tissue to confirm the diagnosis. The microscopic results of brain biopsy showed a predominantly normal brain tissue with small pieces of glial tissue, although atypical tissues and mitosis were absent in the specimen. Further immunohistochemistry studies also were negative for cytokeratin.

Routine laboratory data were normal, the complete vasculitis panel was negative, and cerebrospinal fluid analysis showed no abnormal cytology, immunoglobulin levels and oligo-clonal bands. Given a suspicion of demyelinating lesions, anti-myelin oligodendrocyte glycoprotein (anti-MOG) was found to be negative and anti-AQP-4 (NMO-IgG) antibodies positive. NMO-IgG was rechecked in two other laboratories, and yielded positive results, confirming the diagnosis of NMOSD. The patient underwent three rounds of corticosteroid pulse therapy (Prednisolone, 1g/day for five days) and plasma exchange.

The treatment caused her encephalopathy-associated symptoms, including cognitive functions, to dramatically improve, and she was enabled to speak and regained her motor functions. Her treatment continued with oral prednisone (50mg/day) and cyclophosphamide (1g/month for six months). After a six-month follow-up, she experienced no other mental symptoms, no longer required a wheelchair and could ambulate without assistance, and her urinary incontinence was improved within weeks after the initiation of treatment.

Caspian Journal of Neurological Sciences

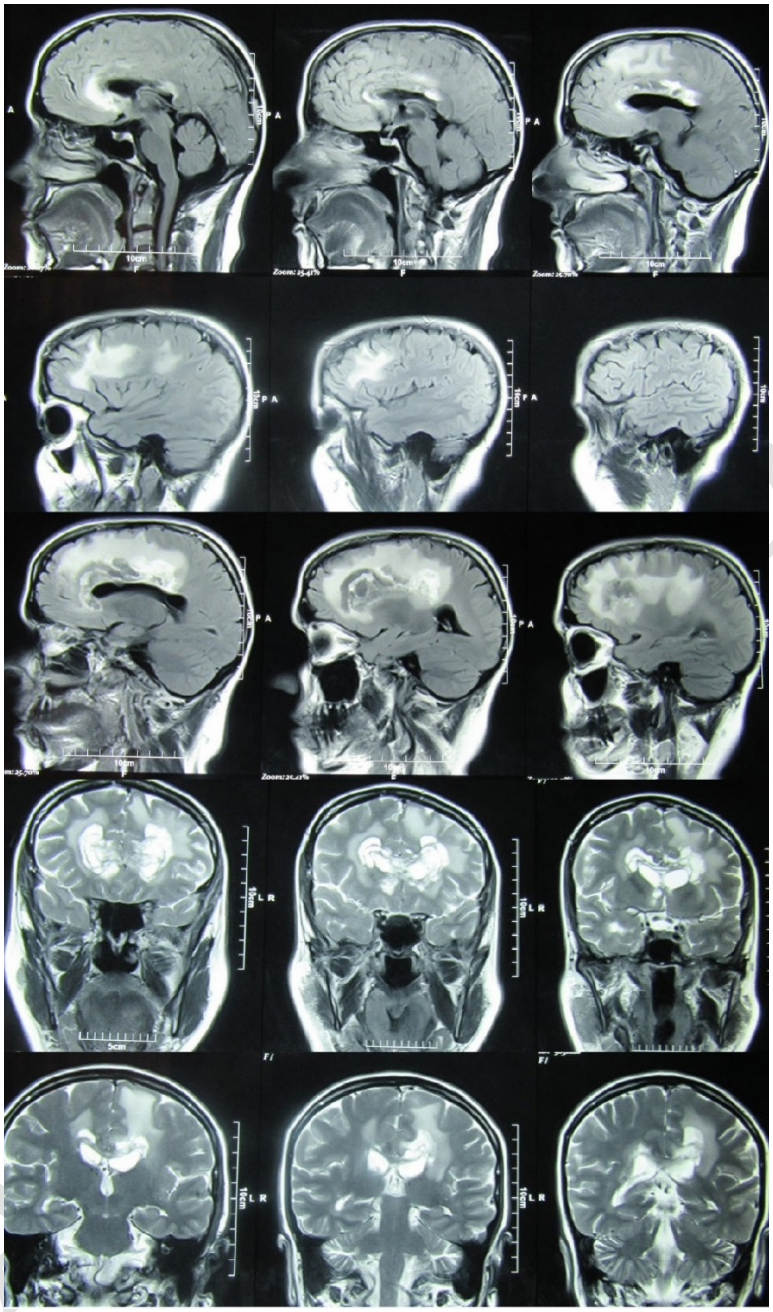

Figure 1. a: Sagittal (FLAIR); and b: Coronal (T2-weighted) slices of MRI, showing bilateral periventricular tumoeffective lesions with marked vasogenic edema involving corpus callosum, more prominent in left hemisphere. Cervical cord and other parts of the brain are unremarkable.

Discussion

A case of NMOSD was reported with rapidly progressive neurologic symptoms and bizarre MRI findings, mimicking an FDD, which is associated with conditions such as Acute Disseminated Encephalomyelitis (ADEM), acute hemorrhagic leukoencephalitis and MS variants such as Balo concentric sclerosis, Marburg variant and tumefactive MS [3].

NMOSD-associated lesions mainly involve optic nerves and the spinal column, and cause a pattern of unilateral or bilateral optic neuritis and longitudinally-extended transvers myelitis that spares most of brain tissues [4]. The MRI findings in NMOSD patients are common and can be used as a diagnostic criterion for the disease. The clinical presentation of the disease is only correlated with the site of the involved structures, and varies from visual disturbances and spinal cord-as-

sociated symptoms to less frequent presentations such as intractable vomiting, hiccups and brainstem dysfunction, i.e. area postrema syndrome [1, 3].

Cognitive decline and encephalitis secondary to global brain lesions are not commonly observed, and their presence along with a global demyelination of brain tissues, which resembles an edematous confluent mass, could pervert diagnosis during early workup [5]. Research suggests peri-ependymal, linear corpus callosum and periaqueductal distribution of the lesions in NMOSD patients with brain involvement [6]; nevertheless, the lesions' distribution, in which AQP4 is highly expressed, overlaps with other demyelinating disorders, rendering the brain MRI of NMOSD patients complicated and requiring certain criteria for diagnosis and analysis.

Tackley et al. differentiated NMOSD from MS based on MRI findings. They found that excluding specific MS-associated lesion patterns in the brain, such as cortical, Dawson's finger and U-fiber lesions, combined with the presence of LETM lesions in the spinal cord helps with the correct diagnosis of NMOSD [4]. The involvement of the thalamic region was also reported in both MS and NMOSD patients. Thalamic lesions exacerbate pathologic impairment in MS patients compared to NMOSD patients [7]. Hypothalamic lesions, especially bilateral ones, have also been shown to be correlated with NMOSD compared to MS or ADEM [8].

Bright spotty lesions, as a characteristic finding in NMOSD cases compared to MS brain lesions, can effectively differentiate NMOSD patients along with using AQP4 seropositive results [9]. Assessing NMOSD patients has demonstrated that AQP4-negative serology is associated with a higher frequency of brain lesions and the involvement of infratentorial structures and patterns similar to MS-associated demyelination [10]. Tumefactive presentation of the lesions is, however, more commonly observed in AQP-4 seropositive cases. Cognitive decline is common in the face of tumefactive lesions [2].

Tumefactive lesions have rarely been reported in NMO patients. Roy et al. reported a case of recurrent aquaporin-4 positive NMOSD with tumefaction, incomplete ring enhancement, LETM lesions in MRI and recurrent episodes of paraparesis [11]. Tumefaction with incomplete ring enhancement can occur in NMO, although it is more common in MS. Dhakar et al. reported an African-American patient with large tumefactive lesions and peri-ependymal lesions preceding the onset of transvers myelitis without a significant gadolinium enhancement. ADEM was first diagnosed, followed by confirming the diagnosis of sero-positive NMOSD through performing more evaluations [12]. This study showed that tumefactive lesions can be misdiagnosed as ADEM and vice versa in NMOSD patients.

The study patient was AQP-4 seropositive, and her MRI was consistent with a brain mass or tumefactive demyelinating disorder. The negative brain tissue biopsy for neoplastic growth and positive AQP-4 antibodies suggested NMOSD. The response to the treatment confirmed the diagnosis, and showed that NMOSD should be considered a differential diagnosis during an episode of FDD with the tumefactive spread of the lesions.

Ethical Considerations

Compliance with ethical guidelines

An informed consent was taken from patient before enrollment.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors contributions

Conceptualization: Omid Mirmosayeb, NS; Methodology: All authors; Investigation: Navid Manouchehri, Mahdi Barzegar, Omid Mirmosayeb; Writing original Draft: Navid Manouchehri, Mahdi Barzegar, Omid Mirmosayeb; Writing review and editing: Vahid Shayganejad, NZ; Supervision: Vahid Shayganejad.

Conflict of interest

There was no conflict of interest.

Acknowledgements

The authors thank the patient for her collaboration.

References

[1] Wingerchuk DM, Banwell B, Bennett JL, Cabre P, Carroll W, Chitnis T, et al. International consensus diagnostic criteria for neuromyelitis optica spectrum disorders. Neurology 2015;85(2):177-89. [DOI:10.1212/WNL.0000000000001729] [PMID] [PMCID]

[2] Dutra BG, da Rocha AJ, Nunes RH, Maia ACM. Neuromyelitis optica spectrum disorders: Spectrum of MR imaging findings and their differential diagnosis. Radiographics 2018;38(1):169-93. [DOI:10.1148/rg.2018184002] [PMID]

[3] Rahmlow MR, Kantarci O. Fulminant demyelinating diseases. Neurohospitalist 2013;3(2):81-91. [DOI:10.1177/1941874412466873] [PMID] [PMCID]

[4] Tackley G, Kuker W, Palace J. Magnetic resonance imaging in neuromyelitis optica. Mult Scler 2014;20(9):1153-64. [DOI:10.1177/1352458514531087] [PMID]

[5] Matthews L, Kolind S, Brazier A, Leite MI, Brooks J, Traboulsee A, et al. Imaging surrogates of disease activity in neuromyelitis optica allow distinction from Multiple Sclerosis. PLoS One 2015;10(9):e0137715. [DOI:10.1371/journal.pone.0137715] [PMID] [PMCID]

[6] Liao M-F, Chang K-H, Lyu R-K, Huang C-C, Chang H-S, Wu Y-R, et al. Comparison between the cranial magnetic resonance imaging features of neuromyelitis optica spectrum disorder versus Multiple Sclerosis in Taiwanese patients. BMC Neurol 2014;14(1):218. [DOI:10.1186/s12883-014-0218-8] [PMID] [PMCID]

[7] Liu Y, Duan Y, Huang J, Ren Z, Ye J, Dong H, et al. Multimodal quantitative MR imaging of the thalamus in Multiple Sclerosis and neuromyelitis optica. Radiology 2015;277(3):784-92. [DOI:10.1148/radiol.2015142786] [PMID]

[8] Zhang L, Wu A, Zhang B, Chen S, Men X, Lin Y, et al. Comparison of deep gray matter lesions on magnetic resonance imaging among adults with Acute Disseminated Encephalomyelitis, Multiple Sclerosis, and neuromyelitis optica. Mult Scler 2014;20(4):418-23. [DOI:10.1177/1352458513499420] [PMID]

[9] Yonezu T, Ito S, Mori M, Ogawa Y, Makino T, Uzawa A, et al. "Bright spotty lesions" on spinal magnetic resonance imaging differentiate neuromyelitis optica from Multiple Sclerosis. Mult Scler 2014;20(3):331-7. [DOI:10.1177/1352458513495581] [PMID]

[10] Fan M, Fu Y, Su L, Shen Y, Wood K, Yang L, et al. Comparison of brain and spinal cord magnetic resonance imaging features in neuromyelitis optica spectrum disorders patients with or without aquaporin-4 antibody. Mult Scler Relat Disord 2017;13:58-66. [DOI:10.1016/j.msard.2017.02.003] [PMID]

[11] Roy U, Saini DS, Pan K, Pandit A, Ganguly G, Panwar A. Neuromyelitis optica spectrum disorder with tumefactive demyelination mimicking Multiple Sclerosis: a rare case. Front Neurol 2016; 11;7:73. [DOI:10.3389/fneur.2016.00073]

[12] Dhakar MB, Sivakumar S, Seraji-Bozorgzad N, Khan O, Bhattacharya P. Brain MRI Lesions in Neuromyelitis Optica Spectrum Disorders. Austin J Clin Neurol 2015;2(7): 1064