Received: 15 March 2023 | Revised: 24 April 2023 | Accepted: 29 May 2023

DOI: 10.1002/ccr3.7556

CASE REPORT

Clinical Case Reports Open Access WILEY

Neuromyelitis optica spectrum disorder in a patient with ankylosing spondylitis: A case report

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Key Clinical Message

Neuromyelitis optica spectrum disorder is an autoimmune disease which tends to have other coexisting autoimmune or connective tissue diseases. However, coexisting with ankylosing spondylitis is rare. Here, we report a 57-year-old man with concomitant autoantibodies against aquaporin 4-positive neuromyelitis optica spectrum disorder and HLA-B27-positive ankylosing spondylitis.

KEYWORDS

ankylosing spondylitis, neuromyelitis optica

1 | INTRODUCTION

Neuromyelitis optica spectrum disorder (NMOSD) is an autoimmune inflammatory disorder of the central nervous system (CNS), characterized by severe, immune-mediated demyelination and axonal damage predominantly targeting optic nerves and spinal cord.[1,2] NMO is caused by a pathogenic serum IgG antibody against the water channel aquaporin 4 (AQP4) in the majority of patients, and AQP4 presence is highly specific for NMOSD. Ankylosing spondylitis (AS) is an autoimmune disease mediated by immune complexes and associated with other autoimmune disorders and human leukocyte antigen B27 (HLA-B27).[3–5] Coexistence of NMOSD with other autoimmune disorders such as systemic lupus erythematosus and Sjogren syndrome has been reported. However, co-occurrence of NMOSD and AS is rarely identified. It is well known that pathogenesis of both diseases involves a combination of autoimmune and environmental factors including infectious agents.[6] Here, we report a 57-year-old man with concomitant AQP4-positive NMOSD and HLA-B27-positive AS.

2 | CASE DESCRIPTION

A 57-year-old man was admitted to our hospital with a progression lower limb weakness and paresthesia. He had been diagnosed with HLA-B27 AS with characteristic chronic morning stiffness, low back pain, sacroiliac joint inflammation, and loss of lordosis without skin rash. He had taken only Indomethacin. He had suffered from lower limb weakness for 1 year and received methylprednisolone in other hospital in past year and partially improved, but he referred with worsening left lower limb weakness and paresthesia that progressed to the right lower limb during last 2 days. Also, the patient complained of perineum numbness and constipation. Neuro-ophthalmological examinations were normal, and no signs of meningeal irritation were observed. On

examination, his extremities' strength was 4/5 in right lower limb, 2/5 in left lower limb, and 5/5 in upper limbs. Deep tandem reflexes of lower extremities were three plus, and in upper limbs was two plus. Plantar reflex on both sides was up ongoing. He had impaired sense of position but did not have sensory level. Brain MRI was normal, and spinal MRI requested and showed incomplete fusion in lumbar vertebrae which caused loss of lordosis. Also, long lesion with patchy enhancement was seen in the thoracic cord from cervicothoracic junction to T12 (Figure 1). According to imaging, serum NMO-antibody requested, which was reported positive and anti-nuclear antibody (ANA), autoimmune vasculitis profile (cANCA, pANCA) was negative (Table 1). Based on clinical imaging and positive AQP-4, NMOSD coexisting with AS was the presumed diagnosis. The patient underwent treatment with intravenous Methylprednisolone (1 g/day for 7 days), Plasmapheresis (1.5 L/day for 6 day), and Rituximab (1 g), which leaded to a significant improvement in his symptoms. His lower limb power improved to 3/5 in left and 4/5 in right.

3 | DISCUSSION

Neuromyelitis optica (NMO) is a CNS inflammatory disease that key pathogenesis is the production of autoantibodies against AQP-4 channels expressed on astrocytes, leading to complement-mediated damage, with ensuing demyelination and predominantly affects the optic nerve

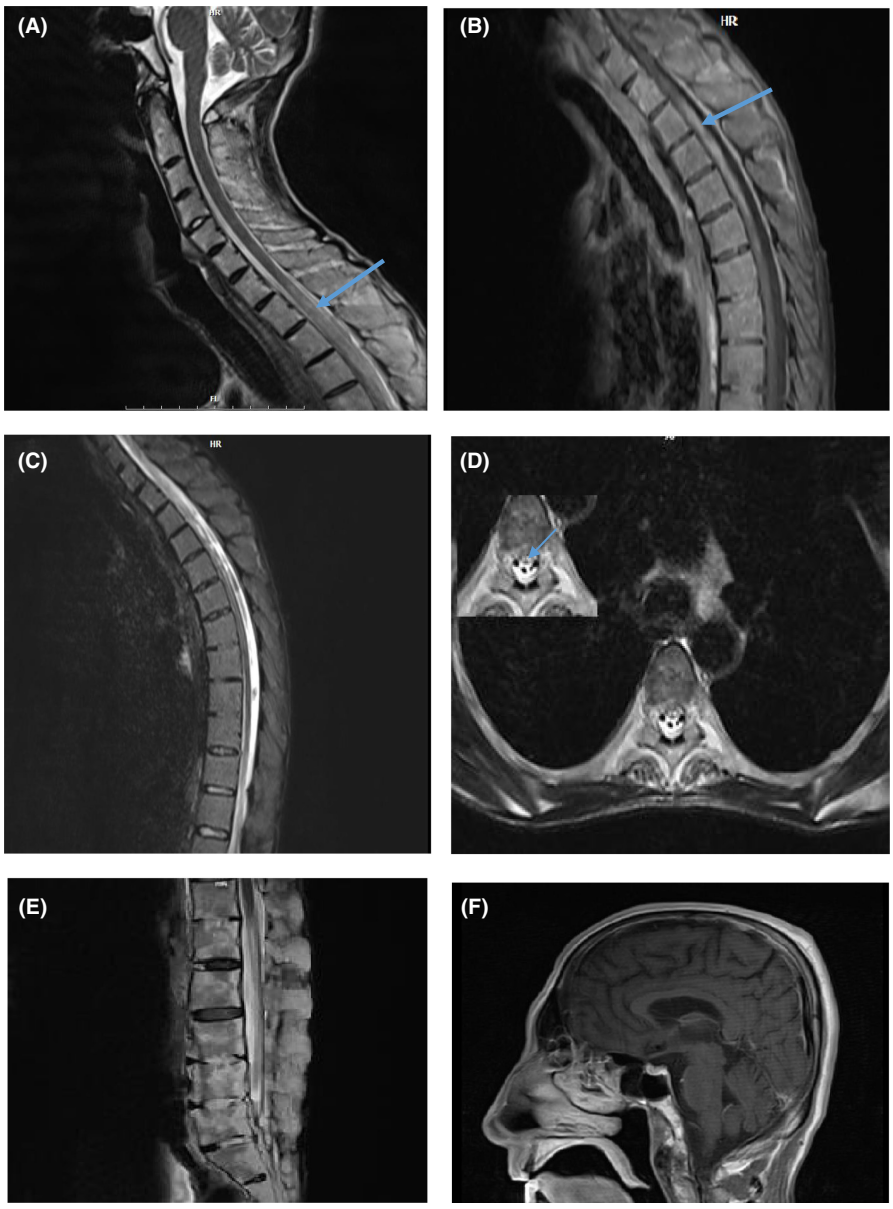

FIGURE 1 (A) Sagittal view cervical MRI without GAD (T2) (B) Sagittal view thoracic MRI with gadolinium (T1) demonstrates long lesion with enhancement in the thoracic cord from cervicothoracic junction to T12. (C) Sagittal view thoracic MRI (STIR) with gadolinium (D) Axial view thoracic MRI demonstrates "Owle eye "sign in central cord. (E) Sagittal view lumbar MRI (T1) showed incomplete fusion in lumbar vertebrae, which caused loss of lordosis. (F) Axial view brain MRI with gadolinium (T1) without evidence of pathologic lesion.

and the spinal cord.[6,7] Detection of this immunoglobulin in serum is highly suggestive of this diagnosis.[8] The incidence and prevalence of NMOSD vary among the studies; there is a female and AQP4-Ab+ predominance in middle-age adult, and manifests with optic neuritis, longitudinally extensive transverse myelitis (LETM), area post-rema, brain stem, cerebral and diencephalic syndromes.[2,3] Ankylosing spondylitis (AS) is a common chronic inflammatory rheumatic disease which is mediated by T cells; B cells only play a minor role. It is usually characterized by inflammatory back pain, structural and functional disorders, and restricted motion of spine, and it has a strong association with HLA-B27.[6,9]

TABLE 1 Laboratory data.

Test	Result
WBC	8×10^3/mm
Hbg	7.6 g/dL
Plt	145×10^3/mm
ESR	16 mm/h
CRP	3.6 mm/h
Vitamin B12	192 ng/dL
Vitamin D3	32 ng/dL
NMO IgG	Positive
MOG[a] IgG	Negative
T3	13 ng/dL
T4	11.6 ng/dL
TSH	0.6 mIU/mL
Anti-TPO	Negative
ANA	Negative
Anti-DsDNA	Negative
ANCA	Negative
Anti-RO and La	Negative

[a]Myelin oligodendrocyte glycoprotein antibody.

Neurological manifestations of AS are limited, and they focus on joint inflammation and long-standing bony pathology (ankyloses) related to compressive myelopathy, myelo-radiculopathy, and cauda equine syndromes.[10] Patient with NMOSD tends to have other coexisting autoimmune/connective tissue diseases. However, AQP-4-antibody-positive NMOSD coexisting with ankylosing spondylitis (AS) is rare.[11] AS and NMOSD share an obscure pathogenesis, while a T-cell-based autoimmunity is a possible explanation for the disease process considering the recently role of T cell in NMOSD and molecular mimicry might be an environmental factor that results in co-pathogenesis.[12] Ritwik Ghosh et al.[11] reported a 35-year-old Indian man with an undiagnosed progressive axial spondyloarthropathy (i.e., AS) is reported presenting with acute-onset LETM, a clinical subset of NMOSD. Lin et al. describe the case of a 46-year-old Chinese female with bilateral lower limbs and perineum numbness. AQP4-IgG antibodies were positive in both the serum and CSF of the patient. Additionally, HLA-B27 was positive in the serum. Spinal MRI showed T2 hyper-intense lesion in conus medullaris, C8-T1 and T11 of spinal cord.[6] Also; Soo Jeong et al.[12] reported a 52-year-old female known case of negative HLA-B27 AS, with paraparesis and paresthesia who had high signal intensity within the spinal cord from T10 to the conus medullaris on T2-weighted imaging, predominantly involving the central portion of the spinal cord (Table 2). Here, we have presented a rare case of NMOSD coexisting with AS; he referred by acute progressive paraparesis, and magnetic resonance imaging of the spinal cord showed multiple plaque with patchy enhancement in thoracic cord. The association between NMOSD and AS remains speculative, and this case highlights that systematic studies on the association are needed to clarify whether this coincidence is just a casual phenomenon or whether it points to a yet undiscovered link.

TABLE 2 Studies that induced coincidence NMOSD and AS.

References	Gender	Age (year)	Clinical presentation	HLA-B27	NMO Ab	LETM
[10]	Male	35	Low back pain and morning stiffness followed by asymmetric spastic paraparesis	Positive	Positive	C5-T4
[6]	Female	46	Bilateral lower limbs and perineum numbness	Positive	Positive	C8-T1
[11]	Female	52	Back pain and bilateral sacroiliitis followed by paraparesis and paresthesia	HLA-B27 Negative AS	Negative (in accordance with the revised diagnostic criteria)	T10-conus medullaris

AUTHOR CONTRIBUTIONS

Mehri Salari: Investigation. **Bahareh Zaker Harofteh:** Data curation. **Masoud Etemadifar:** Visualization.

ACKNOWLEDGMENTS

None.

FUNDING INFORMATION

None.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The authors confirm that data supporting the finding of this study are available within the article.

ETHICS STATEMENT

Written informed consent was obtained from sister of the patient to publish this report in accordance with journal's patient consent policy. Detailed authors contributed equally to conception, design, manuscript preparation, critical revision, and finalization. All the authors agreed to be accountable for all aspects of the work.

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REFERENCES

1. Ghosh R, Roy D, Dubey S, Lahiri D, Chatterjee S, Finsterer J. Jaw clonus in neuromyelitis optica spectrum disorder with subsequent osmotic demyelination syndrome. *J Fam Med Prim Care*. 2020;9(2):1209.
2. Asseyer S, Cooper G, Paul F. Pain in NMOSD and MOGAD: a systematic literature review of pathophysiology, symptoms, and current treatment strategies. *Front Neurol*. 2020;11:778.
3. Van Der Horst Bruinsma IE, Nurmohamed MT. Management and evaluation of extra-articular manifestations in spondyloarthritis. *Ther Adv Musculoskelet Dis*. 2012;4(6):413-422.
4. Chen CW, Wei JCC, Gu J, Yu D. Editorial: Advances in pathogenesis, etiology, and therapies for ankylosing spondylitis. *Front Immunol*. 2021;12:822582.
5. Zeng L, Yu G, Yang K, Xiang W, Li J, Chen H. Efficacy and safety of mesenchymal stem cell transplantation in the treatment of autoimmune diseases (rheumatoid arthritis, systemic lupus erythematosus, inflammatory bowel disease, multiple sclerosis, and ankylosing spondylitis): a systematic review and and meta-analysis of randomized controlled trial. *Stem Cells Int*. 2022;2022:9463314.
6. Lin J, Zhang J, Liu X, et al. Neuromyelitis optica spectrum disorder coexisting with ankylosing spondylitis: a case report. *Mult Scler Relat Disord*. 2020;40:101979.
7. Musubire AK, Derdelinckx J, Reynders T, et al. Neuromyelitis optica spectrum disorders in Africa: a systematic review. *Neurol Neuroimmunol Neuroinflamm*. 2021;8(6):e1089.
8. Ruiz-Gaviria R, Baracaldo I, Castañeda C, Ruiz-Patiño A, Acosta-Hernandez A, Rosselli D. Specificity and sensitivity of aquaporin 4 antibody detection tests in patients with neuromyelitis optica: a meta-analysis. *Mult Scler Relat Disord*. 2015;4(4):345-349.
9. HarjačekHarjaˇHarjaček M, Manuel Pimentel-Santos F, Calado Â, et al. MicroRNAs as biomarkers for the diagnosis of ankylosing spondylitis: a systematic review and meta-analysis. *Front Med*. 2021;1:701789.
10. Khedr EM, Rashad SM, Hamed SA, El-Zharaa F, Abdalla AKH. Neurological complications of ankylosing spondylitis: neurophysiological assessment. *Rheumatol Int*. 2009;29(9):1031-1040.
11. Ghosh R, Roy D, León-Ruiz M, Das S, Dubey S, Benito-León J. Seropositive neuromyelitis optica in a case of undiagnosed ankylosing spondylitis: a neuro-rheumatological conundrum. *Qatar Med J*. 2022;2022:29.
12. Jeong S, Lim YM, Jin JY, Kim H, Kim KK. Neuromyelitis optica spectrum disorder in a patient with ankylosing spondylitis. *J Clin Neurol*. 2018;14(1):102-103.

How to cite this article: Salari M, Zaker Harofteh B, Etemadifar M. Neuromyelitis optica spectrum disorder in a patient with ankylosing spondylitis: A case report. *Clin Case Rep*. 2023;11:e7556. doi:10.1002/ccr3.7556