

CASE REPORT

비전형 자기공명영상 소견과 임상경과를 보인 횡단척수염 1예

가천대학교 의과대학 길병원 신경과

양지원 박현미 이광우 이영배

Diagnostic Challenge in Transverse Myelitis: Atypical MRI and Presentation

Jiwon Yang, MD, Hyeon-Mi Park, MD, PhD, Kwang-Woo Lee, MD, PhD, Yeong-Bae Lee, MD, PhD

Department of Neurology, Gil Medical Center, Gachon University College of Medicine, Incheon, Korea

We describe a challenging case of myelitis in a patient with an unusual presentation, including distinctive, atypical MRI in the entire spinal cord with disseminated patchy lesions, and we review the literature regarding the radiological or clinical aspects of similar cases of rare myelitis.

Journal of Multiple Sclerosis and Neuroimmunology 11(1):30-34, 2020

Key Words: Transverse myelitis; Magnetic resonance imaging

Received
October 17, 2019

Revised
June 1, 2020

Accepted
June 10, 2020

Transverse myelitis (TM) is an inflammation of the spinal cord that can result in motor, sensory, and autonomic dysfunction. It can occur as an independent entity (idiopathic) or accompany a spectrum of central nervous system demyelinating diseases; connective tissue diseases; and vascular, neoplastic, and infectious diseases.¹ Occasionally, acute myelitis can be mistaken as Guillain-Barre syndrome (GBS), and vice versa when patients present with acute flaccid symmetric paralysis with hypo- or areflexia.² Here, we describe a case of acute myelitis initially misdiagnosed as paraparetic GBS in a patient with extremely atypical spinal cord images, and we review the relevant literature.

I CASE

A 43-year-old male was admitted to our hospital because he had difficulty walking and a tingling sensation in his feet. He did not have any previous medical illness, with the exception of an upper respiratory tract infection 2 weeks prior to admission. On admission, he reported an abnormal sensation that ascended from his feet to his thighs and perineum and voiding difficulty. Bilateral symmetrical weakness was observed in the lower extremities (Medical Research Council Grade 2) but not in the upper extremities. No clear sensory level on torso existed. Knee and ankle myotatic reflexes were almost absent, and pathologic reflexes such as the Babinski sign and ankle clonus were not observed. Initially, we suspected paraparetic variants of GBS based on the antecedent respiratory infection and neurological signs that suggested peripheral nerve involvement (absent myotatic reflexes and lack of pathologic reflexes). Routine laboratory tests were unremarkable, including complete blood count, blood chemistry, and serology for infections in-

Address for correspondence: Yeong-Bae Lee, MD, PhD
Department of Neurology, Gil Medical Center, Gachon University
College of Medicine, 21 Namdong-daero 774beon-gil, Namdong-gu,
Incheon 21565, Korea
Tel: +82-32-460-3346, Fax: +82-32-460-3344
E-mail: yeongbaelee@gachon.ac.kr

cluding syphilis and human immunodeficiency virus. Cerebrospinal fluid (CSF) analysis showed lymphocytic (97%) pleocytosis ($106/\text{mm}^3$) with a mildly elevated protein concentration (51.7 mg/dL) (Table 1). Because the patient's profound muscle weakness and sensory changes had progressed over 1 week prior to admission, intravenous immunoglobulin (IVIg) was administered upon hospitalization followed by 0.4 g/kg/day for 5 days. However, he did not show any improvement and stated that he even felt worse. After completion of IVIg, a nerve conduction study of all upper and lower extremities did not demonstrate any abnormalities in motor nerves, sensory nerves, and F-waves, except mild prolonged latency of the left side H-reflex. Therefore, the patient underwent spine MRI to exclude myelitis.

MRI of the whole spine revealed numerous T2-hyperintensities and variably-sized enhancing nodules from the upper cervical cord to the conus medullaris, with mild perilesional edema (Fig. 1). The appearance, size, and location of the lesions were diverse (some were asymmetric, some were central, and some were wedge-shaped). Analysis of the findings from the spine MRI and CSF resulted in a diagnosis of myelitis, and additional studies were conducted to confirm its etiology. The CSF was negative for viruses, bacteria, acid-fast bacilli, syphilis, fungi, and cytology. Further investigations were

performed to rule out neoplasm, lymphoma, sarcoidosis, and connective tissue diseases, which were other possible etiologies, including whole-body CT and fluorodeoxyglucose positron emission tomography, and the results were unremarkable. Tests for serum paraneoplastic autoantibodies, angiotensin-converting enzyme, antinuclear antibodies, extractable nuclear antigen, antineutrophil cytoplasmic antibodies, and vitamin B12 and copper levels were also performed, resulting in detection of anti-SS-A/Ro antibody. However, the patient had no relevant symptoms or signs indicating connective tissue disease. Serum anti-aquaporin-4-IgG antibody was not detected by cell-based indirect immunofluorescence assay (Euroimmun, Luebeck, Germany), but CSF-restricted oligoclonal bands (OCBs) were detected by isoelectric focusing and immunofixation. The CSF IgG index was 0.11. Brain MRI was unremarkable, and visual evoked potential and ophthalmological evaluation did not provide evidence of an optic nerve lesion.

After receiving high dose intravenous methylprednisolone (1 g/day for 5 days), the patient's motor, sensory, and urinary symptoms and the myotatic reflexes, improved significantly and rapidly; almost complete recovery was achieved. After the course of IV methylprednisolone was completed, oral prednisolone 60 mg/day was administered and reduced by 10 mg every 3 days. Finally, 5 mg every other day was main-

Table 1. Profiles of CSF analysis

CSF parameters	At admission	Ten days later after 1st puncture	One week later after 2nd puncture	One week later after 3rd puncture	Five months later
RBC ($/\text{mm}^3$)	3	200	5	100	0
WBC ($/\text{mm}^3$)	106 (L 97%, M 2%)	43 (L 95%, M 5%)	29 (P 1%, L 96%, M 3%)	23 (L 97%, M 3%)	3
Protein (mg/dL)	51.7	38.5	27.7	26.6	102.5
Glucose ratio, CSF/serum (mg/dL)	0.62 (50/81)	0.46 (75/164)	0.33 (61/183)	0.36 (52/144)	0.67 (75/112)
Oligoclonal band	N/A	Positive, type 2	N/A	Equivocal	Negative, type 1
IgG index	0.11	0.34	N/A	N/A	0.54
ADA (IU/L)	4.9	<1.0	<1.0	<1.0	<1.0
TB-PCR	Negative	Negative	Negative	Negative	Negative
Cytology	Negative for malignancy	Negative for malignancy	Negative for malignancy	Negative for malignancy	Negative for malignancy

CSF, cerebrospinal fluid; RBC, red blood cell; L, lymphocyte; M, monocyte; P, polymorphonuclear cells; WBC, white blood cell; N/A, not available; IgG, immunoglobulin G; ADA, adenosine deaminase; TB-PCR, mycobacterium tuberculosis-polymerase chain reaction.

tained for a few months. Although a follow-up cervical and thoracic spine MRI 5 months later demonstrated scattered, ill-defined T2-hyperintense lesions in the entire spinal cord, the extent and enhancement of the lesions were greatly decreased (Fig. 2). A lumbar puncture at the time of follow-up MRI revealed an acellular CSF ($3/\text{mm}^3$) with increased protein levels (102.5 mg/dL) and negative CSF OCBs (Table 1). The patient has yet to relapse one year after completion of treatment.

I DISCUSSION

The patient in the present case sequentially demonstrated an antecedent common cold, a subsequent abnormal sensation that ascended to the thighs and perineum, urinary difficulty, and profound symmetric weakness of both legs. The symptoms, absence of pathologic reflexes and myotatic

reflexes, and clear sensory level led to a misdiagnosis as GBS. GBS can mimic myelitis, and vice versa can occur.³ Therefore, red flags that cast doubt on the diagnosis of GBS should be considered, particularly profound bladder symptoms at onset or CSF pleocytosis ($>50/\text{mm}^3$). We assumed that the absent myotatic reflexes might have developed from involvement of not only the conus medullaris, but also the spinal nerve roots, although neither was apparent on the lumbar spine MRI.

Another interesting point to note was the lack of therapeutic response to and actual symptom exacerbation by IVIg in this myelitis case. Current first-line treatment of TM is high-dose IV methylprednisolone, and plasma exchange is considered for patients who fail to improve after glucocorticoid treatment.³ The clinical effectiveness of IVIg in treating TM had been supported or refuted by limited data. One multi-center, randomized, controlled trial of IVIg for treatment of

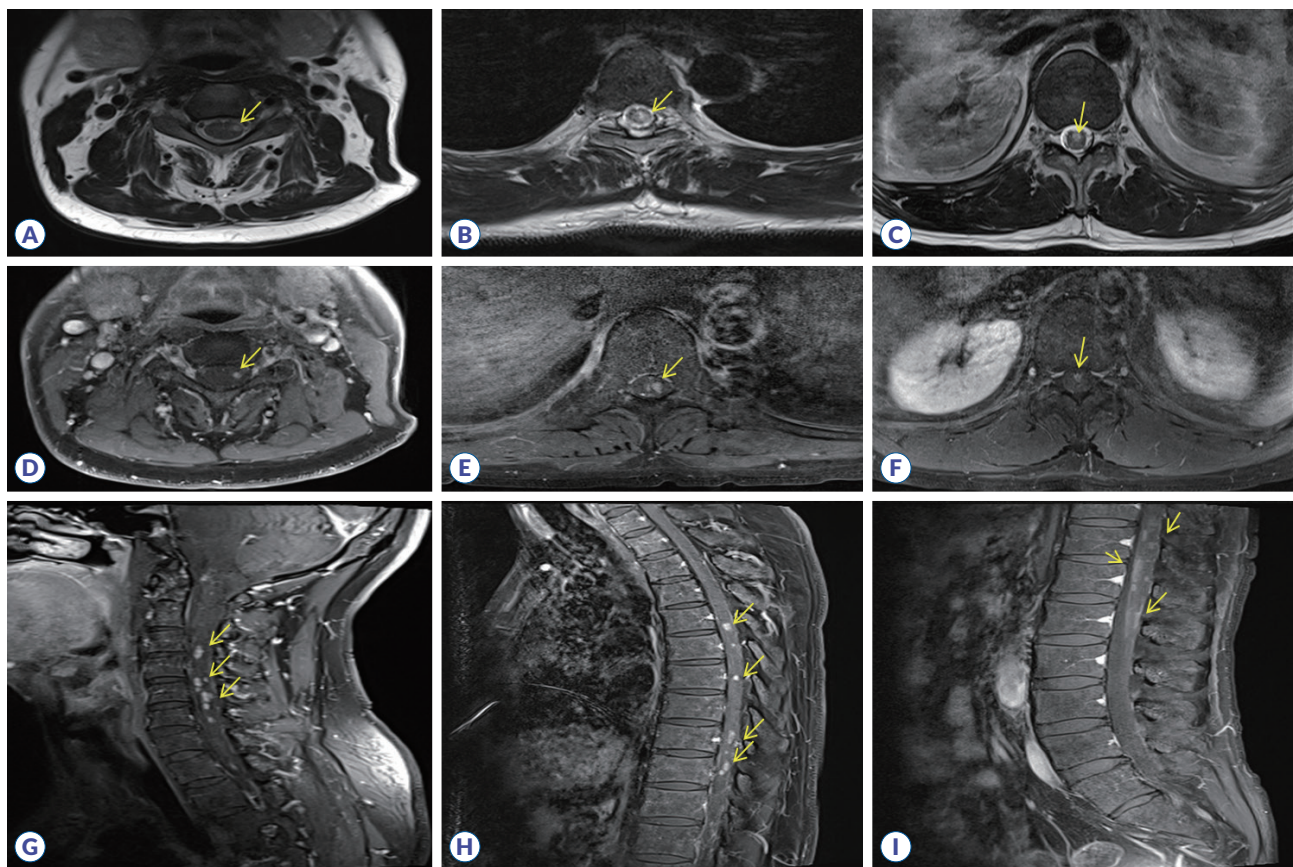


Figure 1. T2-weighted axial, T1-gadolinium enhanced axial and sagittal MRI of the cervical (A, D, G), thoracic (B, E, H), and thoracolumbar regions (C, F, I) showed multiple, variably-sized, patchy, and enhancing nodules that involved the entire spinal cord (yellow arrows).

TM in adults and children (STRIVE) did not reach the end point and could not determine the efficacy of IVIg in TM.⁴ Likewise, the present case does not advocate use of IVIg in TM, in contrast to use in GBS.

An idiopathic TM lesion seen on MRI is usually a cen-

tral T2-hyperintense signal, specifically a single or a few focal lesions that extend more than two segments and more than two-thirds of the cross sectional area of the cord.⁵ Radiological characteristics, such as the lesion distribution in cross-section, vertebral segment in length,



Figure 2. Follow-up T2-weighted and T1-gadolinium enhanced sagittal MRI scans of the cervical (A, B) and thoracic (C, D) region showed much less numbers and extent of the lesions.

and involved cord level, provide information to differentiate the etiologies of TM.^{5,6} However, our case was not able to be classified into a typical category. Widespread patchy lesions involving the whole spinal cord from the upper cervical cord to the conus medullaris are an unusual finding, for which an extensive evaluation was conducted. Diseases associated with myelitis, such as metastases, sarcoidosis, tuberculosis, infection, and systemic autoimmune diseases, rarely manifest myelitis as the first sign and typically involve other nervous system structures at the same time. Radiological characteristics discriminating the cause of secondary TM has not been elucidated: mostly in accordance with idiopathic TM. Several previous cases that presented in the form of longitudinal, extensive TM have been reported in tuberculosis, sarcoidosis, and systemic autoimmune diseases.⁷⁻⁹ However, cases with MRI appearances similar to the present case have not been reported. In this case, we should rule out tuberculosis as its neurological complications are well known in South Korea due to its high prevalence. Also, the possibilities of intramedullary spinal cord metastases and lymphoma should have been considered. Therefore, lumbar puncture was repeated four times, and the CSF was confirmed negative for adenosine deaminase, mycobacterium tuberculosis-polymerase chain reaction, and atypical malignant cells. The six cases of parainfectious myelitis with disseminated, discrete lesions scattered throughout the cord as described by Pradhan et al may be similar to our case, but there were not demonstrable MRI figures in the article.¹⁰

Two years after disease onset, the patient has not shown any clinical relapse. The final diagnosis was idiopathic TM that might have been a post-infectious complication of an antecedent respiratory illness. However, longer observation and follow-up radiological studies are required.

Our report may indicate that neurologists should keep in mind that TM could exhibit various clinical and radiological manifestations, and both GBS and TM should be considered as a differential diagnosis, especially in the presence of atypical findings.

REFERENCES

1. Transverse Myelitis Consortium Working Group. Proposed diagnostic criteria and nosology of acute transverse myelitis. *Neurology* 2002;59:499-505.
2. van den Berg B, Fokke C, Drenthen J, van Doorn PA, Jacobs BC. Paraparetic Guillain-Barré syndrome. *Neurology* 2014;82:1984-1989.
3. Scott TF, Frohman EM, De Seze J, Gronseth GS, Weinshenker BG; Therapeutics and Technology Assessment Subcommittee of American Academy of Neurology. Evidence-based guideline: clinical evaluation and treatment of transverse myelitis: report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. *Neurology* 2011;77:2128-2134.
4. Absoud M, Brex P, Ciccarelli O, Diribe O, Giovannoni G, Hellier J, et al. A multicentre randomised controlled Trial of IntraVenous immunoglobulin compared with standard therapy for the treatment of transverse myelitis in adults and children (STRIVE). *Health Technol Assess* 2017;21:1-50.
5. Goh C, Desmond PM, Phal PM. MRI in transverse myelitis. *J Magn Reson Imaging* 2014;40:1267-1279.
6. Schmalstieg WF, Weinshenker BG. Approach to acute or subacute myelopathy. *Neurology* 2010;75:S2-S8.
7. Garg RK, Malhotra HS, Gupta R. Spinal cord involvement in tuberculous meningitis. *Spinal Cord* 2015;53:649-657.
8. Flanagan EP, Kaufmann TJ, Krecke KN, Aksamit AJ, Pittcock SJ, Keegan BM, et al. Discriminating long myelitis of neuromyelitis optica from sarcoidosis. *Ann Neurol* 2016;79:437-447.
9. Wingerchuk DM, Weinshenker BG. The emerging relationship between neuromyelitis optica and systemic rheumatologic autoimmune disease. *Mult Scler* 2012;18:5-10.
10. Pradhan S, Gupta RK, Ghosh D. Parainfectious myelitis: three distinct clinico-imaging patterns with prognostic implications. *Acta Neurol Scand* 1997;95:241-247.