Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Diabetes & Metabolic Syndrome: Clinical Research & Reviews 15 (2021) 102305

Contents lists available at ScienceDirect

Diabetes & Metabolic Syndrome: Clinical Research & Reviews

journal homepage: www.elsevier.com/locate/dsx

Case Report

MRI-negative myeloradiculoneuropathy following Covid-19 infection: An index case

Sourav Metya [a], Supriya Shaw [a], Souvik Mondal [a], Bipresh Chakraborty [a], Shambaditya Das [b,*], Subhankar Roy [a], Mridul Kanti Das [a], Saubhik Kanjilal [a], Biman Kanti Ray [b], Souvik Dubey [b]

[a] Department of Internal Medicine, Institute of Post Graduate Medical Education and Research, Kolkata, India
[b] Department of Neurology, Institute of Post Graduate Medical Education and Research, Bangur Institute of Neurosciences Kolkata, India

ARTICLE INFO

Article history:
Received 25 August 2021
Received in revised form
30 August 2021
Accepted 2 September 2021

Keywords:
COVID-19
MRI negative Myelopathy
Radiculoneuropathy

ABSTRACT

Covid-19 associated several neurological manifestation in the form of Post-infectious transverse myelitis(TM) and para-infectious TM has been reported. A 54 years old female patient presented to us with acute retention of urine and upper motor neuron type of bilateral lower limb weakness in shock stage, after 12 days of covid-19 infection. MRI (3T) brain and spine showed no abnormality and Nerve conduction study showed acquired motor axonal polyradiculoneuropathy in bilateral lower limbs. We herein present an index case of MRI-negative myeloradiculoneuropathy following covid-19 infection.

The neurotropism of SARS-CoV-2 in particular has been well demonstrated, affecting both the central and peripheral nervous system either in isolation or rarely simultaneously [1]. Myeloradiculoneuropathy as a neurological manifestation of Covid-19 has rarely been reported [2–5]. We herein present an index case of a middle-aged female with MRI-negative myeloradiculoneuropathy following Covid-19 infection.

A 54-year-old hypertensive female presented with complaints of paraparesis for last 15 days, started as acute urinary retention, followed by paraparesis from next day, simultaneously involving both sides, progressing to maximal weakness within 6 hours, and difficulty in turning in bed, along with girdle-like-sensation around umbilicus with diminished sensation below it, without any upper limb weakness or cranial nerve symptoms. Enquiry revealed history of fever, cough and anosmia 12 days prior to ictus which resolved uneventfully within 3 days and had positive RT-PCR results of nasopharyngeal swab for SARS-COV-2.

Neurological examination was marked by spasticity of lower limbs except for hypotonia near both ankle joints, muscle power was diminished in both lower limbs along with truncal weakness [Medical Research Council grading, upper limbs(bilateral):5/5; lower limbs(bilateral):proximally 2/5 and distally 1/5], bilaterally knee jerks were exaggerated while ankle jerks were lost, upper limb jerks were normal, and plantar was bilaterally extensor. There was loss of all sensory modalities below T9 level. Other neurological examination was unremarkable. A syndromic diagnosis of myeloradiculoneuropathy was made.

Routine blood Investigations revealed normocytic anemia. MRI Brain and spine revealed no significant abnormality (Figs. 1 and 2). Nerve conduction study showed acquired motor axonal polyradiculoneuropathy in the bilateral lower limbs. Electromyography indicated neurogenic denervation pattern. Visual evoked potential was normal. CSF analysis showed pleocytosis with mildly elevated protein, neuroviral panel for viral DNA PCR was negative. Workup for primary CNS demyelination were unyielding(serum aquaporin-4 IgG, myelin oligodendrocyte glycoprotein antibody, oligoclonal band and IgG-index were negative). Targeted investigations directed for etiologies of Myeloradiculopathy were ruled out with appropriate investigations(serum vitamin B12,homocysteine, methylmalonic acid, folate, vitamin E,copper,HIV,hepatitis-B surface antigen, anti-hepatitis-C antibody, antinuclear antibody,anti-

* Corresponding author. Bangur Institute of Neurosciences, 52/1A, Sambhunath Pandit Street, Kolkata, 700020, India.
E-mail addresses: srvmetya7@gmail.com (S. Metya), shawsupriya@gmail.com (S. Shaw), souvikmondal751@gmail.com (S. Mondal), bipreshchakraborty007@gmail.com (B. Chakraborty), drshambadityadas@gmail.com (S. Das), subhankar05roy@gmail.com (S. Roy), drmridulkantidas@gmail.com (M.K. Das), saubhik75@gmail.com (S. Kanjilal), bimankantiray2019@gmail.com (B.K. Ray), drsouvik79@gmail.com (S. Dubey).

https://doi.org/10.1016/j.dsx.2021.102305
1871-4021/

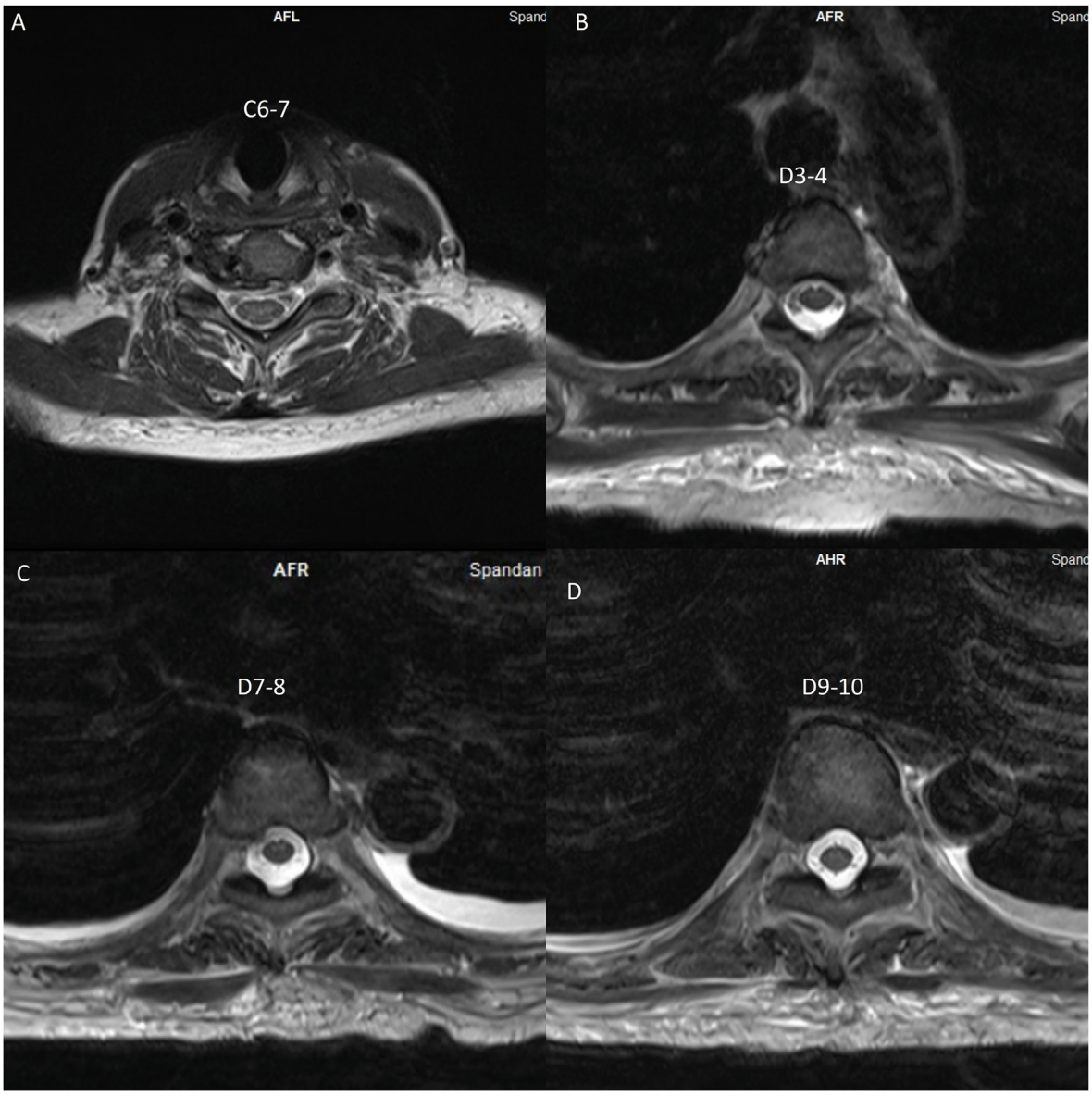

Fig. 1. MRI Spine Axial section T2 images at C6-7 level(A), at D3-4 level(B), at D7-8 level(C), at D9-10 level(D) showing no signal changes in cord.

double stranded DNA antibody,anti—sjögren's-syndrome-related antigen A and B autoantibody, serum angiotensin converting enzyme, antineutrophil cytoplasmic antibodies,anti-phospholipid antibody and paraneoplastic antibody panel were negative) [6].

Patient was subjected to 5 days of pulse methylprednisolone therapy(1 gm/day). In the absence of significant improvement following steroid therapy, plasmapheresis was planned however patient's kin refused consent. Immunoglobulin therapy(2 gm/kg) was instituted next with only mild improvement in the subsequent 1 month follow-up.

Acute transverse myelitis (ATM) is a rare neurological condition, however COVID-19-associated ATM cases haven't been infrequent, mostly post-infectious and less commonly para-infectious, accounting for 1.2% of the neurological complications of coronavirus [1,7]. MRI of spinal cord taken acutely can be normal in up to 30% of cases, however persistence of absence of signal changes in spinal cord imaging beyond 3 weeks in the index case makes it a diagnostic difficulty [8].

The proposed mechanisms in pathogenesis include: molecular mimicry, epitope spreading, bystander activation and polyclonal B-cell activation. In bystander effects, the pathogen directly invades the CSF or causes indirect damage through an immune -mediated process. Molecular mimicry related to cross-reacting of lymphocytic activation due to similar peptide sequence or three-dimensional structure self-antigen, and activation of auto-reactive lymphocytes during the inflammatory cascade in response to highly virulent pathogen as “bystander activation” serves as the two predominant mechanisms [1—3,7].

An acute immune-mediated polyradiculoneuropathy has been reported as most common form of peripheral nerve involvement in COVID-19. It is most likely secondary to a post-infectious immunopathogenesis rather than direct neuronal damage or a para-infectious mechanism. A predisposition to development of GBS and its variants related to host immunogenetic background and human leukocyte antigen(HLA) polymorphism in different populations has also been considered [1,2,5,9].

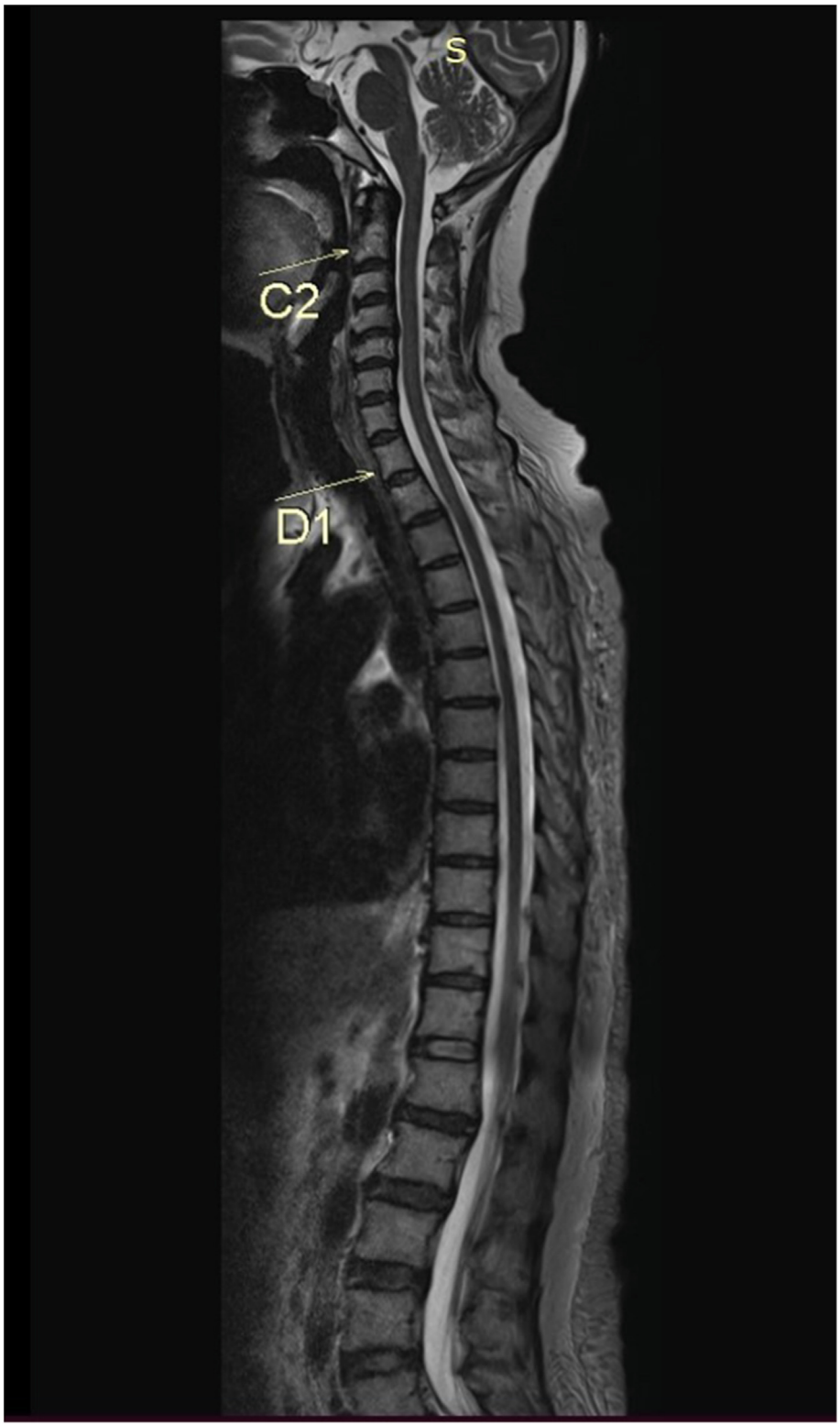

Fig. 2. MRI Spine T2 sagittal section showing no signal changes in cord.

A simultaneous myelopathy with acute polyradiculoneuropathy has only rarely been reported in relation to Covid-19 infection (See Table 1). Myeloradiculoneuropathy is a frequently encountered clinical scenario with wide array of etiologies, which should additionally include Covid-19 infections [6,8]. A meticulous history-taking and clinical examination can greatly aid in the unfurling of multiple neuro-axis involvement in Covid-19 infections even in the absence of neuro-imaging evidence.

Table 1
List of cases of Covid-19 infection with myelo-radiculo/neuropathy or MRI negative myelitis.

Study	Concurrent LETM and GBS by Khera et al. [3]	Acute motor axonal neuropathy and Myelitis by Masuccio et al. [2]	Acute necrotising Myelitis and acute motor axonal neuropathy by Maidenuic et al. [5]	MRI negative Myelitis by Memon et al. [10]	Case of elsberg syndrome in the setting of SARS COV-2 infection by Abram et al. [4]
Age	11 yr	70 yr	61 yr	65 yr	68 yr
Sex	Female	Female	Female	Female	male
Country	India	Italy	USA	USA	USA
Latency to development of neurological symptoms	Not specified	5 days	7 days	9 weeks	Few months
Neurological symptoms	Acute onset severe flaccid paraparesis	Difficult in walking with ascending paresthesia in all 4 limbs	Acute onset Paraparesis and urinary retention	Acute onset Paraparesis and urinary retention	Ascending numbness of lower limbs with genitourinary dysfunction
Severity of covid infection	Mild (low grade fever only)	Moderate (fever, myalgia, anosmia, cough)	Mild (fever, runny nose)	Severe(Fever, cough, headache, taste loss, shortness of breath)	No symptoms
Imaging findings (MRI findings)	Long segments intramedullary T2 hyperintesity signal from D7 to D10 without enhancement	Hyperintesity in post portion of spinal cord (C7-D1)	Patchy T2 hyperintesity within the central cord below foramen magnum proximal to C1−C2	Normal MRI findings	A Hyperintense signal in the dorsal cord at T10
CSF study	Not done	Normal cell count and normal protein	Cell count normal Protein raised(87) Glucose normal	Cell count 20 Lymphocytes predominant Protein 81	Cell count 10, all RBC, no WBC Protein 34
NCV findings	Motor axonal polyradiculopathy involving predominantly peroneal than tibial nerve	Reduction in motor amplitude, mild increase in distal latency and a B/L impairment of F waves	Acute motor axonal neuropathy with normal sensory conduction	Normal	Normal distal motor and sensory conduction. Tibial and peroneal H-reflex response were absent in right lower limb
Therapy	Iv Methylprednisolone Ivig Plasma exchange	IvIg Plasmapheresis	Iv Methylprednisolone Plasmapheresis	Iv Methylprednisolone Plasmapheresis	Iv Methhylprednisolone
Response	Good	No improvement	Partial improvement	Partial improvement	Poor

References

[1] Román GC, Gracia F, Torres A, Palacios A, Gracia K, Harris D. Acute transverse myelitis (ATM):Clinical review of 43 patients with COVID-19-associated ATM and 3 post-vaccination ATM serious adverse events with the ChAdOx1 nCoV-19 vaccine (AZD1222). Front Immunol 2021 Apr 26:879. 0.

[2] Masuccio FG, Barra M, Claudio G, Claudio S. A rare case of acute motor axonal neuropathy and myelitis related to SARS-CoV-2 infection. 2020 2687 J Neurol 2020 Sep 17;268(7):2327−30 [cited 2021 Jul 24], https://link.springer.com/article/10.1007/s00415-020-10219-5.

[3] Khera D, Didel S, Panda S, Tiwari S, Singh K, Concurrent Longitudinally Extensive Transverse Myelitis, Guillain-Barré. Syndrome in a child secondary to COVID-19 infection: a severe neuroimmunologic complication of COVID-19. Pediatr Infect Dis J 2021:E236−9 [cited 2021 Jul 24], https://journals.lww.com/pidj/Fulltext/2021/06000/Concurrent_Longitudinally_Extensive_Transverse.22.aspx.

[4] Abrams RMC, Desland F, Lehrer H, Yeung A, Tse W, Young JJ, et al. A case of elsberg syndrome in the setting of asymptomatic SARS-CoV-2 infection. J Clin Neuromuscul Dis 2021 Jun 1;22(4):228−31 [cited 2021 Jul 24], https://journals.lww.com/jcnmd/Fulltext/2021/06000/A_Case_of_Elsberg_Syndrome_in_the_Setting_of.8.aspx.

[5] Maideniuc C, Memon AB. Acute necrotizing myelitis and acute motor axonal neuropathy in a COVID-19 patient. J Neurol 2021 Feb 1;268(2):1 [cited 2021 Jul 24].

[6] S D. S D, A P, BK R. Myeloradiculoneuropathy due to vitamin B 12 deficiency: an unusual clinical and radiological presentation. BMJ Case Rep 2021 Jan 25;14(1) [cited 2021 Jul 24], https://pubmed.ncbi.nlm.nih.gov/33495192/.

[7] Mondal R, Deb S, Shome G, Ganguly U, Lahiri D, Benito-León J. COVID-19 and emerging spinal cord complications: a systematic review. Mult Scler Relat Disord 2021 Jun 1:51 [cited 2021 Jul 24], http://www.msard-journal.com/article/S221103482100184X/fulltext.

[8] Das S, Ray BK, Pandit A, Dubey S. MRI negative myeloradiculoneuropathy unmasking systemic lupus erythematosus. Rheumatology 2021 Mar 8 [cited 2021 Apr 10]; Available from: https://academic.oup.com/rheumatology/advance-article/doi/10.1093/rheumatology/keab216/6162870.

[9] J F, Fa S. Guillain-barre syndrome in 220 patients with COVID-19. Egypt J Neurol Psychiatry Neurosurg 2021 Dec 1;57(1) [cited 2021 Jul 24], https://pubmed.ncbi.nlm.nih.gov/33967575/.

[10] Memon AB, Al-Hader R, Patel S, Malik S, Megally M, Steijlen KL, et al. Late-onset rapidly progressive MRI- negative-myelitis after COVID-19 illness. Clin Neurol Neurosurg 2021 Mar 1;202:106513 [cited 2021 Jul 24].