


CASE REPORT



Longitudinally extensive transverse myelitis after Covid-19 vaccination: case report and review of literature

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ABSTRACT

Mass vaccination has been the main policy to overcome the Covid-19 pandemic. Several vaccines have been approved by the World Health Organization. With growing vaccination, safety concerns and adverse events that need prompt evaluation are also emerging. Herein, we report a case of a healthy woman with longitudinally extensive transverse myelitis after vaccination with the AstraZeneca vaccine. The patient was successfully treated after ruling out all the possible causes.

ARTICLE HISTORY

Received 3 December 2021
Revised 18 January 2022
Accepted 28 January 2022

KEYWORDS

Transverse myelitis; Covid-19; AstraZeneca

Introduction

A number of neurological symptoms have been reported with Covid-19 infection. These include several central nervous system (CNS) manifestations such as acute cerebrovascular disease, transverse myelitis, encephalopathy, and peripheral nervous system (PNS) manifestations like Guillain-Barré syndrome.¹

The first Covid-19 vaccines were introduced in late 2020.² Since several cases of post-vaccination neurological disorders were reported, including Bell's Palsy,³⁻⁵ Guillain-Barré syndrome,⁶⁻⁸ and transverse myelitis.⁹

Transverse Myelitis (TM) is a clinical syndrome characterized by sensory, motor, and autonomic dysfunctions as a result of immune-mediated spinal cord injury.¹⁰ A few cases of acute TM have been described in the literature recently in association with Pfizer-BioNTech, Moderna, and Johnson & Johnson's Covid-19 vaccines.^{11, 11-15} Here, we present a young female who presented with a longitudinally extensive TM following AstraZeneca vaccination against Covid-19.

Case presentation

A 31-year-old previously healthy woman presented to the emergency department with a 2-week history of progressive lower limbs paraparesis and paresthesia. Symptoms were more severe on the left side and were associated with pain in the left lower limb. She reported 1 week of urinary retention and 1 day of fecal incontinence prior to her presentation. Upon presentation, she was requiring assistance with ambulation and a urinary catheter was inserted. She denied any other neurologic or systemic symptoms. The patient had received first dose of Covid-19-Vaccine (AZD1222, AstraZeneca) 3 weeks prior to symptom onset. Her past medical history was significant for hyperthyroidism during pregnancy. She did not receive any medication. She had no known allergies. Physical examination revealed Medical Research Council

(MRC) grade +4/5 in right lower limb and 3/5 in the left lower limb. Deep tendon reflexes were exaggerated in the lower limbs, and Babinski sign was present bilaterally. Sensory examination showed decreased pin prick sensation in lower limbs, impaired proprioception sensation in bilateral toes, and saddle anesthesia.

She underwent whole spine and brain Magnetic Resonance Imaging (MRI) with contrast. MRI revealed cord expansion and signal hyperintensity of the spinal cord from T10 to L1 segment with heterogeneous enhancement (Figure 1(a,b)). Initial laboratory parameters were normal. The SARS-CoV-2 RNA PCR nasal swab test was negative. Chest Computed Tomography (CT) Scan revealed no significant pathology. Lumbar puncture was performed; Cerebrospinal fluid (CSF) examination showed a white blood cell count (WBC) of 40, with 97% of lymphocytes. CSF chemistry revealed elevated protein (62 mg/dl), normal sugar (92 mg/dl) and lactate dehydrogenase (21 IU/L). Angiotensin-converting enzyme (ACE) and oligoclonal bands (OCBs) in CSF were negative. Additionally, CSF culture was negative. Anti-myelin oligodendrocyte glycoprotein (MOG) and anti neuromyelitis optica (NMO) antibodies in serum were negative. The paraneoplastic and rheumatologic screening were unremarkable. Patient was diagnosed with longitudinally extensive transverse myelitis and was treated with IV methylprednisolone 1 g per day for 7 days. The patient was discharged after improvement. She continued on oral prednisolone 50 mg daily and tapered over 1 month.

The patient was reviewed 12 weeks later in clinic. She was able to walk without assistance. While her lower limbs power returned to normal, she continued to have left lower extremity spasticity and hyperreflexia along with a positive Babinski sign. She was also complaining of urinary frequency and saddle anesthesia. The follow-up MRI showed resolution of all changes seen in original MRI and no cord atrophy was detected (Figure 1(c,d)).



Figure 1. (a), (b) MRI reveals longitudinally extensive transverse myelitis from T10 to L1 with cord swelling and patchy/nodular enhancement, T2 and T1 with contrast, respectively; (c), (d) which turned to normal within 3 months followup, T2 and T1 with contrast, respectively.

Discussion

TM is a neurological disorder characterized by inflammation of the spinal cord without a compressive lesion. Most commonly it is associated with multiple sclerosis, neuromyelitis optica and infections. TM manifests as an acute or sub-acute sensorimotor and autonomic dysfunction and sphincter disturbance.¹⁶ Other less common causes of TM are systemic diseases, paraneoplastic, and post-infectious conditions.¹⁷

TM has also been reported after vaccination. A recent study showed that the cervical spine was mostly involved followed by the thoracic segment.¹⁸ TM has been mostly described in association with Influenza vaccine followed by Hepatitis B vaccine.¹⁷

TM is mostly seen in patients in the second and fourth decade of life and affects around 1–8 million individuals annually.¹⁶ The phenomenon of autoimmunity is thought to cause TM after vaccination, and the most common reason is the presence of adjuvants in the composition of vaccines.¹⁸ A molecular mimicry between infectious antigens and self-antigens is proposed to be responsible for autoimmunity.¹⁷

Our patient was diagnosed with a longitudinally extensive transverse myelitis based on Transverse Myelitis Consortium Working Group.¹⁹ In this patient, TM was appeared 3 weeks after vaccination and the temporal relation between the first shot of vaccination and onset of symptoms was in keeping with post vaccination myelitis once all other potential etiologies were excluded appropriately. The patient was tested negative for Covid-19 therefore; a post-infectious myelitis was ruled out. Brain imaging did not show intracranial lesions and CSF examination did not show OCB, while NMO and MOG antibodies were not found either; therefore, multiple sclerosis (MS), NMO spectrum disorders and MOG-associated disorders were unlikely. Vasculitis and paraneoplastic screening were also unremarkable leaving the post-vaccination TM as the potential suspect.

Given widespread vaccination against Covid-19, recognition and timely management of this condition have become very important. TM has been reported both as a complication of Covid-19 infection and the Covid-19 vaccines. Currently, there are 254 reported cases of neurological adverse events according to Vaccine Adverse Event Reporting System, associated with Pfizer-BioNTech,

Moderna, and Johnson & Johnson's Covid-19 vaccines, of which 9 of them were TM.²⁰ As of today, all of these vaccines have caused vaccine-associated TM to a different extent.^{17, 21–23}

Given .5 per million incidences of Covid-19-associated TM, the incidence of TM associated with Covid-19 vaccine appears to be considerable. With widespread vaccination, increasing number of cases with post-vaccine TM have been reported.^{9, 11, 13, 15} The underlying mechanisms of AstraZeneca vaccine-induced TM are not yet known, it has been proposed that either the virus structural surface vector glycoprotein antigen or its chimpanzee adenovirus adjuvant could be the trigger for the autoimmunity process.⁹

In our case, after extensive workup, patient's symptoms could not be better explained by any alternative etiology other than post-vaccination TM. We believe her symptoms could not be associated with Covid-19 infection since she had negative PCR results both before¹⁰ and after vaccination and did not report any symptoms of Covid-19. To our knowledge, this is the second case of a longitudinally extensive TM reported after AstraZeneca vaccine against Covid-19.¹³ We have also included the results of 10 weeks follow-up, which was not previously reported. Our patient fully recovered clinically and radiologically with the exception of mild neurological signs on examination in keeping with a monophasic nature of this condition.

In conclusion, with the growing neurological impact of Covid-19, vaccine-associated disorders should be considered when approaching patients with neurological symptoms after either infection with the virus or vaccination against it. Although establishing the diagnosis of post-vaccination TM is challenging due to the fact it is based on ruling out other causes, its clinical importance should not be overlooked. Our case emphasis on the value of early recognition and prompt treatment in such cases.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

The author(s) reported there is no funding associated with the work featured in this article.

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Consent for publication

This case report was specifically discussed with the patient and informed consent was obtained.

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