Sudden onset of myelitis after COVID-19 vaccination: An under-recognized severe rare adverse event

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Abstract

Myelitis has been reported as a complication of COVID-19 infection. However, it has rarely been reported as a complication of COVID-19 vaccination, and this may be the first case report following an mRNA vaccine. A 63 yo, otherwise healthy male, received his second dose of the Moderna vaccine on 08 April 2021. He had some initial pain and soreness at the injection site. Seventeen hours post dose, he reported pain and numbness in both calves which progressed to lower back pain, paresthesia in both feet, and pain in lower extremities. Over the day post- vaccination the patient's condition worsened and he was unable to walk and unable to urinate voluntarily. On the second day post- vaccination he presented to the Emergency Department and was admitted to the University of Iowa hospital unable to walk with severe pain in lower back, legs and feet, and numbness in buttocks. Laboratory findings were unremarkable and lumbar puncture was not diagnostic. MRI revealed increased T2 cord signal seen in the distal spinal cord and conus. Initial treatment included IV Immunoglobulin for 2 days, followed by methylprednisolone 1000 mg/day IV for 5 days. Discharge from the hospital occurred on 16 April 2021 to inpatient rehabilitation. Treatment consisted of oral prednisone 60 mg/day with a tapering schedule. The patient slowly improved and was able to ambulate unassisted at 25 days post -vaccination. This case represents one of the first cases of myelitis reported in the literature after COVID-19 mRNA vaccination. As of 27 April 2021 the FDA VAERS system has 45 reports of transverse myelitis after COVID-19 vaccination (21 after Moderna vaccine, 19 were after Pfizer vaccine, and 5 occurred after Janssen vaccine).

Key Words: COVID-19 vaccine, myelitis, transverse myelitis, serious adverse event

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Introduction

Transverse myelitis has been reported as a complication of COVID 19 infection.[1-5] However, case reports describing myelitis after COVID-19 vaccination have been rare and primarily after vaccination with the AstraZeneca/Oxford ChAdOx1 nCoV-19 vaccine, an adenovirus vector vaccine.[6,7] Goss et al reported that there were 9 cases of transverse myelitis in the Centers for Disease Control (CDC) Vaccine Adverse Event Reporting System (VAERS) database as of March 2, 2021.[8] To our knowledge, this is the first detailed case report of myelitis after the Moderna mRNA-1273 vaccine.

Case Report

A 63 yo, otherwise healthy male received his first vaccination in left deltoid with Moderna Lot 036A21A on 11 Mar 2021. Soreness at the injection site was the only adverse event. On 8 April 2021 at 1230 he received his 2nd injection in the left deltoid with Moderna 028A21A . 15 minutes after vaccination he noticed low level pain (1 on a 0-10 scale) around the injection site. This persisted throughout the day and evening. On 9 April 2021, 0515 while walking from bedroom to bathroom he noticed aching and slight numbness in calves of both legs, more prominent in left leg. At 0700 he developed lower back pain (3 out of 10) and aching and numbness extended from his calves to ankles. Over the next few hours lower back pain and leg aches persisted. At 1100 he experienced an involuntary erection lasting 5-10 minutes. During the afternoon, pain in the lower back increased to 6 out of 10, pain in lower legs increased (severity 2 out of 10), and he had paresthesias in both feet. At 1800 he had difficulty with ambulation and his feet became increasingly numb. Pain in lower legs and ankles persisted at level 4. At 1900 he noted his last voluntary urination before hospitalization. Over the next several hours he experienced greater difficulty walking and inability to sleep. On 10 April 2021 (day 2 post- vaccination) at 0100 he experienced sharp shooting pain from the buttocks down through the legs into bottoms of the feet lasting several seconds with greater severity in the left leg. The pain in the lower legs and ankles increased to level 5 and numbness in the buttocks and back of thighs started. The shooting pain persisted and at 0600 while attempting to get out of bed, he could not stand. His left calf, both ankles and both feet were completely numb. He was unable to urinate and was constipated. The patient arrived at University of Iowa Hospital Emergency Department at approximately 0830. At that time, his buttocks was completely numb, pain in the lower back, lower legs ankles and feet persisted (level 6). He was admitted to the hospital. At 1300 his pain levels suddenly and severely spiked, pain in lower back, legs, ankles and feet were all at level 10. Approximately 45 minutes after administration of narcotic analgesics pain decreased to level 8 and over the course of the next few hours decreased to 6. Over the next 4 days pain levels diminished. During his hospitalization, the patient continued to experience urinary retention and constipation along with other buttocks and lower extremity symptoms but no symptoms above the waist. He had left foot drop and brisk patellar and Achilles reflexes. The patient was discharged from the hospital to inpatient rehabilitation on 15 Apr 2021 (7 days of hospitalization). At that time the patient was voiding urine on his own with straight catheterization for retention as needed. He continued to experience bilateral lower extremity numbness and was walking with a walker or physical therapist. Inpatient treatment consisted of IVIG 0.5 g/kg on 10 Apr and 11 Apr (2 doses); Methylprednisolone IV

1 G/day 11-15 Apr (5 doses) followed by oral prednisone. He reported sporadic shooting pain in soles of feet and was discharged after 7 days in hospital. Discharge medications included prednisone 60 mg/day on a slow tapering schedule.

After 7 days of inpatient rehabilitation he was discharged to home, ambulating with two canes. He is now able to walk in his home without assistance, canes, or walker and continues to improve but some numbness continues in his feet and ankles. His current prednisone dose is 40 mg/day.

Laboratory tests

On admission

CBC and chemistries were within normal limits.

COVID-19 PCR test negative.

ESR 16 mm/hr (normal < 15)

C-reactive protein <0.5

PTT 23 sec

C3 and C4 complement normal

Rapid plasma reagin titer 1:1

During hospitalization:

Neuromyelitis Optica/Aquaporin-4-IgG – Serum- Negative

MOG FACS – Serum- Negative

MS screen- negative

SS A antibody 1.9AI (positive)- drawn 12 Apr after two doses of IVIG

SS B antibody negative

ANCA negative

Rheumatoid Factor negative (<10 IU/ml)

ANA <1:80

Imaging

MRI on 11 Apr 2021 of cervical thoracic and lumbar spine

Cervical and lumbar spines appear within normal limits. Increased T2 cord signal seen in the distal spinal cord and conus with questionable associated enhancement suggestive of myelitis.

MRI on 13 Apr 2021 of brain

Few punctate T2/FLAIR signal hyperintensities in bilateral corona radiata, nonspecific. No enhancing or restricting lesion.

CSF

Lumbar Puncture on 12 Apr 2021

Aerobic and anaerobic cultures negative; meningitis/encephalitis panel negative; glucose 74 mg/dL(40-75); total protein 37 mg/dL (15-45); cell count and differential normal; total nucleated cell count 3

Autoimmune Myelopathy Evaluation performed by Mayo Clinic labs was negative for all autoantibodies tested.

EMG

14 Apr 2021 No clear evidence for demyelinating polyradiculoneuropathy. One positive sharp wave in left gastrocnemius muscle.

Discussion

Two cases of transverse myelitis were reported with the ChAdOx1n CoV-19 vaccine (AZD1222), a replication-deficient chimpanzee adenoviral vector vaccine, from the four randomized controlled trials in Brazil, South Africa, and the UK which triggered a temporary pause in enrollment. One case was reported 14 days after booster vaccination and one case 10 days after a first vaccination.[6] Additionally Sing Malhotra et al reported a case of a 36 yo male who received the ChAdOx1n CoV-19 vaccine and on the 8th day post vaccination presented with abnormal sensations in both lower limbs. MRI on the 13th day post vaccination showed a T2-hyperintense lesion in the dorsal aspect of the spinal cord at the C6 and C7 vertebral levels. The patient responded well to IV methylprednisolone 1G/day for 5 days.[7]

As of April 27, 2021, VAERS has 133,321 reports for all adverse events after COVID-19 vaccine. Of these, 45 (0.03%) are reports of transverse myelitis. The ages of the patients with transverse myelitis ranged from 27 to 88 years with a median of 62 years, with symptoms beginning within 14 days for 71% of the reports. Twenty one of the reports were after the Moderna vaccine, 19 were after the Pfizer vaccine, and 5 occurred after the Janssen vaccine.[9] This case report is consistent with those in VAERS given the patient is 63 yo and the

onset was within 14 days of the second vaccine dose. In this case, no other etiology for lumbar spine myelitis was identified and the temporal association to the second dose of the Moderna vaccine was clear. Transverse myelitis is a very rare event in the population and has been reported after other types of vaccines (e.g. hepatitis B virus, measles-mumps-rubella, diphtheria-tetanus-pertussis) but the reports describe very few cases. Baxter et al described 7 cases after nearly 64 million doses of vaccine.[10] Agmon-Levin et al found 37 cases reported in the literature between 1970-2009.[11] Therefore, serious adverse events occurring soon after COVID-19 vaccination should be reported to the VAERS system and formally assessed as a potential safety signal with communication to health care providers. Given that myelitis has been associated with both COVID-19 infection and with COVID-19 vaccination, there may be an immunologic reaction to the spike protein that is misdirected to the spinal cord in these patients.

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