Case Report

International Journal of Research in Pharmaceutical Sciences

Published by JK Welfare & Pharmascope Foundation Journal Home Page: https://ijrps.com

Acute Transverse Myelitis Associated with COVID-19 Vaccine: A Case Report

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Article History:

Received on: 15 May 2021
Revised on: 20 Jun 2021
Accepted on: 25 Jun 2021

Keywords:

Pfizer,
vaccine,
acute transverse myelitis,
COVID-19,
MRI,
CSF protein

Abstract

The case report demonstrates the issue of Khalid Ali, who is a citizen of Yamen, explicitly living in Saudi Arabia. He is 38 years, weighs 82kgs, and of 162 cm in height. He is a sales professional and married with two kids. Khalid Ali has been living healthy until two years ago when he started experiencing pains in his lower extremities accompanied by numbness. He was treated, and everything went back to normal until soon when the case came back after the administration of the Pfizer vaccine as a preventive measure for COVID-19 disease. The consequence of the administration of the Pfizer vaccine resulted in severe pain and weaknesses in his legs and severe headache on the second day, which resulted in him being put on an ICU after 48 hours since he was almost paralyzed. A series of tests were conducted on him, including magnetic resonance imaging (MRI), hematology, and biochemistry which involved Cerebrospinal Fluid (CSF) protein test. MRI findings were significant since they indicated acute inflammation on the spine observed on the dorsal spinal cord with contrast and lumbosacral spinal cord. All the hematology tests turned out to be expected. Biochemistry conducted tests were similarly standard except for CSF protein which was highly abnormal. The combination of the high abnormal CSF protein test and acute inflammation of the spine observed from the MRI findings were confirmed evidence of acute transverse myelitis as a result of the administration of the Pfizer vaccine.

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ISSN: 0975-7538

DOI: https://doi.org/10.26452/ijrps.v12i3.3952

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INTRODUCTION

The study focuses on a patient named Khalid Ali from Yamani and lives in Bisha, located in the southern region of Saudi Arabia. Khalid is 38 years old, 167 cm in height, and weighs 80 kgs. He is married with two kids, the youngest being two years and ten months. He is a sales representative with a clear medical history free from diseases. He is generally in a good physical state, an excellent mood, and always thinks critically. Economically, he receives low income in the form of salary and incentives from his sales role. Khalid's issues started two years ago when he felt pain in his lower extremities accompanied by numbness. He was diagnosed through X-Rays and magnetic resonance imaging (MRI), but everything seemed normal. His doctor prescribed Naloxone for two months. The second appointment was made after six months, and he was advised not to carry heavy things. For some time, he felt normal pain and weaknesses disappeared until 2019 when the numbness resurfaced sometimes. On 27^{th} April 2021, Khalid received the first dose of the Pfizer vaccine. Everything was fine from the first day until the second day when he started to experience pain and weaknesses on his lower extremities accompanied by a severe headache. Forty-eight

hours later, he was not able to move his legs. This led to his admission to the ICU for three days but he later moved to the general admission unit. He later felt his legs but could not move since he was almost paralyzed. Khalid's condition is referred to as acute transverse myelitis, which is liked explicitly with vaccine injection. The transverse myelitis that affected Khalid is directly linked with the infusion of the first Pfizer vaccine against COVID-19. Transverse myelitis is generally a rare condition that causes neural injury (Agmon-Levin *et al.*, 2009). These neural injuries end up affecting the spinal cord. Acute transverse myelitis effects are a result of inflammatory disorder on the spinal cord (Arcondo *et al.*, 2011). Acute transverse myelitis is often naturally auto-immune and triggered by various factors such as vaccines (Agmon-Levin *et al.*, 2009). 2.69% of the post-COVID-19 vaccination complications are neurological issues in nature (Malhotra *et al.*, 2021). Despite the challenges experienced with the vaccines, their benefits outweigh the post-immunization risks involved. Post COVID-19 complications disorders are beginning to be evident in most areas through the adverse event following immunization (AEFI). Most of these neurological complications apparent through AEFI include facial palsy, stroke, paralysis, among other disorders. AEFI reported cases in the Vaccine Adverse Event Reporting System (VAERS) through the Centers for Disease Control (CDC) had shown a close relationship of the post-vaccine complications resulting from COVID-19 (Goss *et al.*, 2021) 254 or 2.69% out of 9442 reported neurological and linked to vaccine either produced by Astra Zeneca (Mahase, 2020), Pfizer, or Moderna. According to Drozdowski, idiopathic transverse myelitis cases are about 10 – 40% despite their complexities in diagnosis and etiology establishment (Drozdowski, 2008). Despite transverse myelitis having existed for years, its challenge has been both therapeutic and diagnostic. Transverse myelitis can be fatal, leading to partial and lasting neurological impairment or even permanent disability. The treatment approach of acute transverse myelitis is determined through the identified and established etiology. Acute transverse myelitis inconsistencies in diagnostics and precise definition of the condition are constantly discussed and reviewed by experts and specialists in Transverse Myelitis Consortium Group (Drozdowski, 2008).

METHODS

Transverse Myelitis's most preferred diagnostic methods include the MRI screening of the spinal cord and Cerebrospinal Fluid (CSF) examination (Drozdowski, 2008). MRI diagnosis is the most effective and efficient in identifying acute transverse myelitis. CSF examination involves the evaluation and assessment of the oligoclonal bands. In addition, other methods used include the inflammatory process biomarkers, neuronal-specific enolase, and 14-3-3 protein. Regarding the MRI, two tests were conducted, which focused on the dorsal spinal cord with contrast and lumbosacral spinal cord. In this case report, the patient underwent a series of MRI tests and other laboratory tests, including biochemistry and hematology, to determine his status. After the tests, MRI diagnosis has shown significant signs and symptoms of abnormalities on the spinal cord, unlike most biochemistry tests and hematology results. CSF protein test was also conducted under biochemistry tests to help in the assessment and examination of CSF.

RESULTS

Tests resulted in different findings, but they all show the presence of acute transverse myelitis. MRI results are shown in Figure 1.

DISCUSSION

The results in Figure 1 with contrast shown expanded edematous faint enhancing spinal cord at the level of D11 and D12 with anterior cortical and subcortical abnormal signal hyperintense in T1 hypointense in T2 and STIR surrounding by the sclerotic margin. This feature is suspected to be acute on top of chronic transverse myelitis for the clinical correlation. Unlike the MRI diagnosis of the lumbosacral spine, MRI diagnosis of the dorsal spine with contrast shows typical dimensions of the dorsal spinal canal. Additionally, there is no evidence of disc bulge or herniation. The dorsal vertebrae indicate a regular signal intensity pattern. There is no evidence of abnormal paraspinal soft tissue lesions. The above features and observations are suspected to be acute on top of chronic transverse myelitis for clinical correlations. The results of the MRI diagnosis of the lumbosacral spine (Figure 1) indicate the presence of mild straightening of the lumbar spine, which shows muscle spasms. Similarly, this effect brings about expanded edematous faint, enhancing the spinal cord at the level of D11 and D12 with the anterior cortical and sub-cortical. There is an abnormal signal hypointense in T1, hyperintense in T2, and STIR surrounding the sclerotic margin. These features are suspected to be acute on top of the chronic transverse myelitis for the clinical correlation. There is also a multi-level mild disc bulge at L4/L5 and L5/S1.

Additionally, the conus is observed to have a stan-

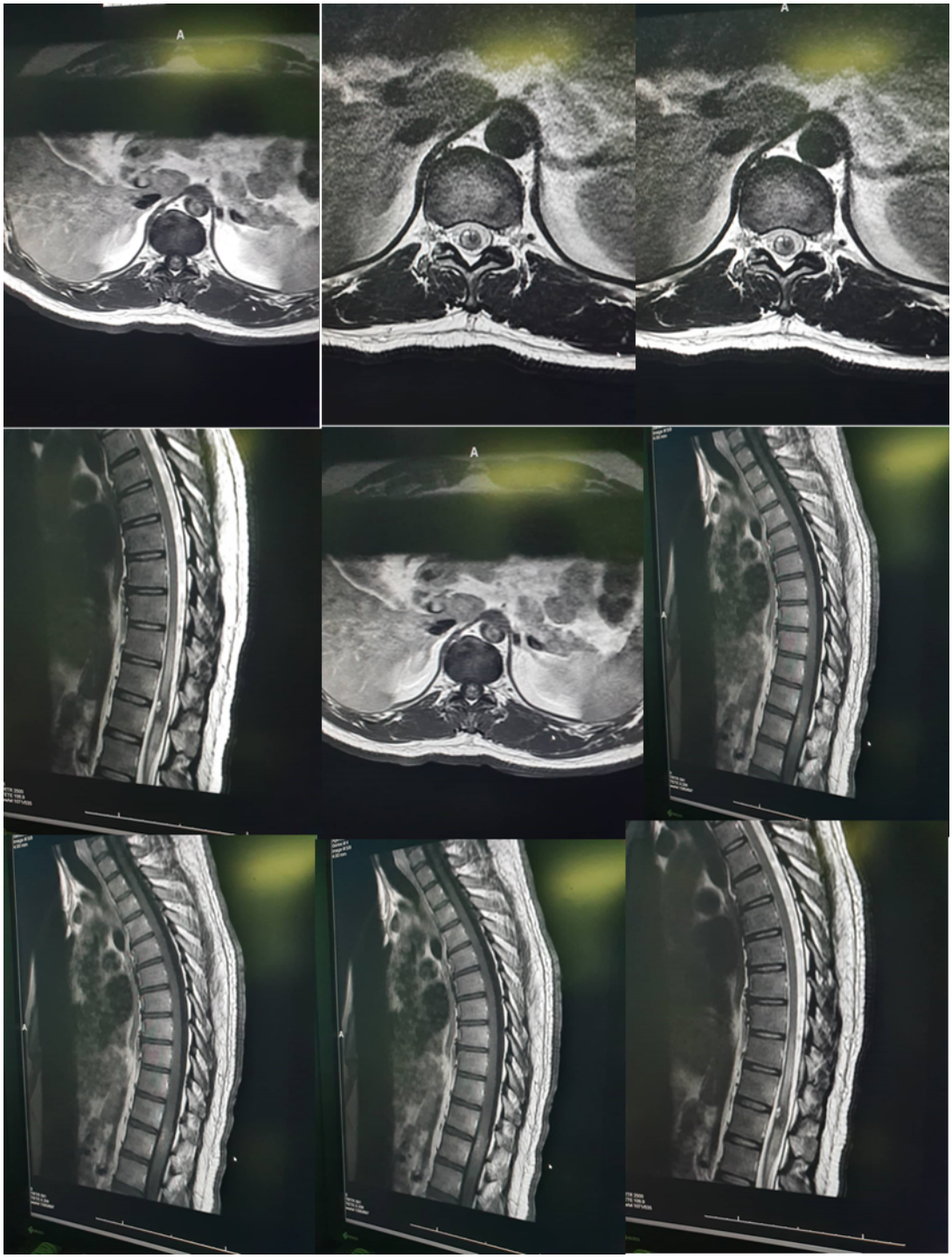

Figure 1: MRI diagnostic results of the spinal cord

dard size. The roots of the cauda equina and the surrounding CSF are evident. There is no sign of intradural mass that is observable. The vertebral bony structure shows a standard marrow signal. The facet joint shows no evidence of erosive or hypertrophic changes. The nerve roots are accessible in the intervertebral foramina—no abnormal paraspinal soft tissue lesions. The mild muscle spasm observed on Khalid's MRI lumbosacral spine diagnosis (Figure 1) indicated expanded edematous faint, enhancing spinal cord resulting in suspected acute transverse myelitis. There is a multi-level mild diffuse disc bulge at the L4/L5 and L5/S1.

The above MRI results confirm Khalid's pain and weaknesses on his lower extremities accompanied by a severe headache. It can also be linked to why he could not move his legs and the consequence of almost being paralyzed. The results also indicate the signs and symptoms of transverse myelitis, which happens due to vaccination.

Table 1: Hematology Section results

Hematology Section			
Test Name	Result	Unit	Normal Range
R.B.C	5.31 Normal	*1012	[4.7 – 6.1]
WBC	8.89 Normal	*109	[4 - 11]
Haemoglobin	15.5 Normal	q/dL	[14 - 18]
Haematocrit	45.6 Normal	%	[42 -52]
MCH	29.2 Normal	PG	[27 - 31]
FLT. CNT.	289 Normal	*109	[130 - 400]
MCHC	34 Normal	%	[33 - 37]
MCV	85.9 Normal	FL	[80 - 94]

(Brinar *et al.*, 2006)

Table 2: Biochemistry Section Lab results

Biochemistry Section			
Test Name	Result	Unit	Normal Range
Albumin	40.4 Normal	q/L	[35 - 5-]
ALT (SGPT)	14.7 Normal	U/L	[0 – 41]
AST (SGOT)	18.6 Normal	U/L	[0 - 40]
Chloride	106.9 Normal	mmol/L	[98 - 107]
Creatinine	86 Normal	umol/L	[15 - 115]
Magnesium	0.93	mmol/L	[ ]
Potassium	4.61	mmol/L	[ ]
Sodium	145	mmol/L	[ ]
Total Bilirubin	5.9	umol/L	[ ]
Total Calcium	2.43 Normal	mmol	[2.02 – 2.6]
Urea	6.5 Normal	mmol/L	[1.7 – 8.3]
CSF Glucose	4.63	mmol/L	[ ]
CSF Protein	621 High Abnormal	mq/L	[150 - 450]

(Brinar *et al.*, 2006)

Additionally, Transverse myelitis has much pathogenesis causing the disease, resulting in total or partial transverse lesion (Drozdowski, 2008), as evident through the MRI diagnosis of the dorsal spine with contrast. The effects of transverse lesions of the spinal cord led to an acute or subacute transverse myelitis (Brinar *et al.*, 2006). Critical impacts the motor-sensory mechanism, which results in paralysis or paresis (Drozdowski, 2008). Khalid's case is etiologically complex to identify since he has not had any previous medical historical issue linked with the present conditions. The case's complexity becomes hard to identify since one cannot determine its signs and symptoms explicitly. The complexity of explicit identification of transverse myelitis comes from several factors: infection, demyelinating, post-infection, immunological, neoplastic, vascular, and paraneoplastic, among others (Drozdowski, 2008).

In addition, the CSF protein test indicated a high abnormality result of 621 mq/L (Table 1), which is far beyond the normal range of between 150 – 450. The 38% increase of the CSF protein value indicated the severity of the acute transverse myelitis. CSF glucose had a value of 4.63 mmol/L (Table 2), which is within a normal recommended range. CSF glucose does not influence the effects of acute transverse myelitis on an individual. CSF protein and 14-3-3 protein tests are crucial and significant, especially in some cases when the MRI results cannot provide a conclusive confirmation of the presence of acute transverse myelitis. The rise of the CSF protein percentages on Khalid's diagnostics is due to the injection of the Pfizer vaccine, which alters the genetic sequences for the COVID-19 spike protein (Mahase, 2020). The spike proteins are produced after the administration of the Pfizer vaccine. When the multi-production of the proteins is intense, the effects lead to a compromised immune

system. Therefore, the immune system cannot identify or attack the COVID-19 virus, especially when the patient is vaccinated to prevent future infections.

According to Sejvar et al., Khalid's diagnosis was categorized as Level-2 diagnostic certainty (Sejvar *et al.*, 2007). Khalid experienced myelopathy, which was characterized by lower motor neuron pain and weaknesses. In addition to the pain, weakness, and paralysis on the lower part of the limbs, Khalid and fever due to the severe headache. The MRI findings indicated acute inflation (meninges) of the spinal cord. The myelitis categorization and classification of Khalid's case were done considering both the observable signs and symptoms combined with the MRI and CSF tests (Sejvar *et al.*, 2007). A Level-3 would also be a fit diagnostic certainty algorithm since Khalid presents signs and symptoms, including myelopathy and MRI results (Figure 1), demonstrating the acute meninges or demyelination of the spine.

The difference that comes with Level-2 and 3 is the categorizing techniques, especially the secondary aspects. Their primary categories are the same, but the secondary measures vary since Level-2 should involve two or more secondary signs while Level-3 should include only one of the secondary signs and symptoms (Sejvar *et al.*, 2007). The main differentiator of the Level-1 diagnostic certainty is the presence of acute spine meninges by histopathology. This forms the single primary sign and symptom that defines the Level-1 diagnostic certainty of the myelitis. The primary feature of the Level-2 and 3 is myelopathy. The secondary indicators of the Level-2 and 3 include a fever which is more than 38^0C, CSF pleocytosis, and MRI spinal cord result finding indicating acute meninges or demyelination. (Sejvar *et al.*, 2007)

CONCLUSION

Based on Khalid's signs and symptoms coupled with the MRI and CSF results, it can be concluded that he experienced acute transverse myelitis due to the injection of the Pfizer vaccine as immunization to prevent him against COVID-19. The findings of the MRI diagnosis of the dorsal spinal cord with contrast indicate expanded edematous faint enhancing spinal cord at the level of D11 and D12 with anterior cortical and subcortical abnormal signal hyperintense in T1 hypointense in T2 and STIR surrounding by the sclerotic margin. The findings of the lumbosacral spine observed on the MRI are similar to the dorsal spine findings. Additionally, apart from the MRI findings, the CSF protein had a higher 621 mq/L, amounting to 38% and far beyond the 150 – 450 mq/L range. This value signifies the presence of spike protein as a result of the administration of the Pfizer vaccine. Due to the complexity involved in diagnosing and identifying acute transverse myelitis due to vaccines. Additionally, hematology and other biochemistry tests are also conducted on top of the MRI approaches, which is the most common. Hematology Section results were regular and within normal range. Similarly, all the biochemistry tests were standard exclusive of CSF protein which was highly abnormal. The combination of the MRI's significant evidence regarding the acute inflammation of the spine and the high abnormal results of the CSF protein test confirms Khalid's paralysis, pain, and weaknesses on the lower limbs due to acute transverse myelitis due to administration of the Pfizer vaccine.

Funding Support

The authors declare that they have no funding support for this study.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

REFERENCES

Agmon-Levin, N., Kivity, S., *et al.* 2009. Transverse myelitis and vaccines: a multi-analysis. *Lupus*, 18(13):1198–1204.

Arcondo, M. F., Wachs, A., Zylberman, M. 2011. Transverse myelitis associated with anti-influenza A (H1N1) vaccination. *Medicina*, 71(2):161–164.

Brinar, V. V., Habek, M., *et al.* 2006. The differential diagnosis of acute transverse myelitis. *Clinical Neurology and Neurosurgery*, 108(3):278–283.

Drozdowski, W. 2008. Transverse myelitis. *Przeglad Epidemiologiczny*, 62(Supple 1):30–38.

Goss, A. L., Samudralwar, R. D., *et al.* 2021. ANA Investigates: Neurological Complications of COVID-19 Vaccines. *Annals of neurology*, 89(5):856–857.

Mahase, E. 2020. Covid-19: Oxford researchers halt vaccine trial while the adverse reaction is investigated. *BMJ*, 370:3525.

Malhotra, H. S., Gupta, P., *et al.* 2021. COVID-19 vaccination-associated myelitis. *QJM: An International Journal of Medicine*, pages 1–3.

Sejvar, J. J., Kohl, K. S., *et al.* 2007. Encephalitis, myelitis, and acute disseminated encephalomyelitis (ADEM): Case definitions and guidelines for collection, analysis, and presentation of immunization safety data. *Vaccine*, 25(31):5771–5792.