Acta Scientific Orthopaedics (ISSN: 2581-8635)

Volume 6 Issue 6 June 2023

Case Report

Axillary Nerve Palsy Following Intramuscular COVID-19 Vaccine: A Case Report

Emma E Johnson[1], Fotios Tjoumakaris[2], Edward Rosero[3], Shyam Brahmabhatt[3] and Mitesh Patel[4]*

[1]*Rothman Orthopaedic Institute, Philadelphia, PA, USA*

[2]*Rothman Orthopaedic Institute, Egg Harbor Township, NJ, USA*

[3]*Rothman Orthopaedic Institute, Willow Grove, PA, USA*

[4]*Rothman Orthopaedic Institute, Marlton, NJ, USA*

***Corresponding Author:** Mitesh Patel, Rothman Orthopaedic Institute, Marlton, NJ, USA.

DOI: 10.31080/ASOR.2023.06.0756

Received: April 13, 2023

Published: May 22, 2023

Abstract

Case: While minor transient adverse effects are common following vaccination for the prevention of COVID-19, in other instances injuries under the category known as shoulder injury related to vaccine administration (SIRVA) have been known to occur. We report a case of a 62-year-old man who presented with axillary nerve palsy two weeks following administration of the COVID vaccine.

Conclusion: Clinical suspicion should remain high of axillary nerve palsy as a rare, but significant adverse effect following vaccination for the prevention of COVID-19.

Keywords: Axillary; COVID-19; Nerve Palsy

Introduction

Following COVID-19 vaccination, transient adverse effects localized to the injection site, including myalgia and arthralgia, are common [1]. These symptoms usually begin soon after injection and resolve after 2-3 days. In rare instances, surrounding structures, including nearby bursae, tendons, ligaments, and nerves can be damaged during intramuscular injection, comprising a group of injuries known as shoulder injury related to vaccine administration (SIRVA) [2,3]. Of these injuries, axillary nerve palsy is one of the less frequently reported injuries [4,5]. The mechanism causing neurological damage can be mechanical (traumatic), vascular (ischemic) or chemical (neurotoxic). Herein, we report the first case of axillary nerve palsy following COVID-19 vaccination, postulated to be caused by chemical neurotoxicity.

Statement of informed consent

The patient was informed that the data concerning the case would be submitted for publication and the patient agreed.

Case Report

A previously healthy 62-year-old male presented with left shoulder pain and weakness three months after vaccine administration. He reported receiving the first dose of an intramuscular injection of the novel messenger RNA vaccine for the prevention of COVID-19 in the left deltoid in April 2021. Approximately 2 weeks after the injection, he began experiencing pain and numbness around the injection site along with weakness of his shoulder. Prior to presentation, he had undergone conservative treatments including a tapered steroid dosing regimen with methylprednisolone, gabapentin, and anti-inflammatory medication (ibuprofen, naproxen sodium), as well as physical therapy for 3 weeks. During that time, his numbness subsided. Physical examination revealed an age-appropriate male in no apparent distress. There was no warmth or redness of the left shoulder, however exam revealed significant atrophy of the left deltoid muscle, anteriorly and laterally, when compared to the right side (Figure 1). Upper extremity strength testing revealed 4/5 strength with left shoulder abduction and 4+/5 strength with left shoulder external rotation with the shoulder adducted. Range of motion for active forward flexion was 150 degrees; passive was 170 degrees. Passive range of motion for external rotation was 70 degrees; internal rotation was to L5. Sensation to light touch was normal. Range of motion, strength and sensation were normal on the contralateral side. At the time of examination, the patient denied any neck or radicular pain symptoms. Further, examination of the cervical spine demonstrated good range of motion and negative Spurling's and Lhermitte's tests.

True AP, outlet and axillary x-ray views showed evidence of mild pseudosubluxation, likely the result of deltoid atony (Figure 2). Left shoulder MRI revealed an 8x9 mm partial-thickness articular surface tear of the distal supraspinatus tendon, involving less than fifty percent of fiber thickness. There was minimal subacromial bursitis. Also noted was mild acromioclavicular joint osteoarthritis and fluid within the biceps sheath (Figure 3). This was consistent with normal degenerative changes and did not account for the level of discomfort or weakness the patient experienced. The deltoid muscle did not show evidence of edema, fatty infiltration, or streaking.

Figure 1: A. Left shoulder atrophy in comparison to the contralateral side. B. Anterior atrophy of the deltoid C. Atrophy of the deltoid, anteriorly, laterally and posteriorly.

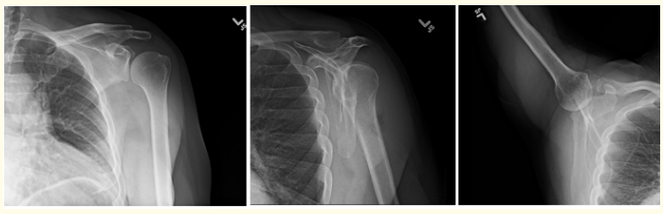

Figure 2: True AP, outlet, and axillary x-ray views of the patient's left shoulder, demonstrating mild pseudo subluxation.

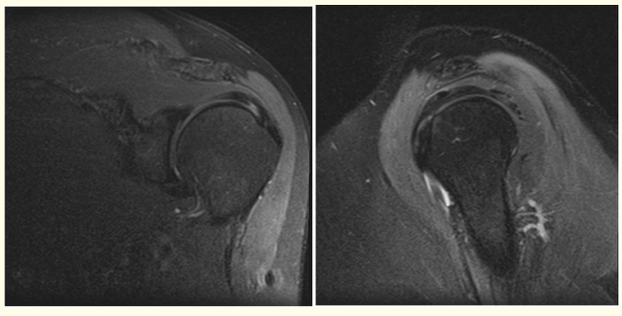

Figure 3: A. Coronal view of the shoulder, demonstrating low grade partial thickness rotator cuff tear and local reaction due to the recent vaccination, but no deltoid atrophy was noted B. Sagittal view of the shoulder which shows biceps tendinitis.

Three months after the vaccination, the patient was sent for a standard electrodiagnostic evaluation [electromyography and nerve conduction velocity studies (EMG/NCV)]. Evaluation of the left axillary motor and the right axillary motor nerves showed prolonged distal onset latency (L13.8, R9.1 ms; normal <5). The left median D2 sensory nerve showed prolonged distal onset latency (Wrist, 3.6 ms; normal <3.5 ms), reduced amplitude (Wrist, 14.9 μV; normal >15 μV), and decreased conduction velocity (Wrist-2nd Digit, 39 m/s; Normal >49 m/s). The left median motor, the left ulnar motor, and the left ulnar sensory nerves were unremarkable. The wave forms from NCV studies are demonstrated in Figure 4. EMG needle evaluation of the left deltoid showed increased insertion activity (2+), moderately increased spontaneous activity (2+), slightly increased polyphasic potentials (+1), and reduced recruitment. All remaining left upper extremity muscles showed no evidence of electrical instability. The patient was counseled regarding the injury and he was recommended to undergo follow-up EMG/NCV in 3 months to document recovery. At this time, the patient is clinically stable, participating in physical therapy, and expecting recovery of his deltoid function. A repeat EMG was recommended but unfortunately the patient did not follow up.

Figure 4: Nerve Conduction Velocity Waveforms.

Discussion

Based on history, clinical exam, and EMG/NCV, injury to the axillary nerve was confirmed. We postulate that the neurological deficits presented in our case may be attributed to chemical neurotoxicity to the axillary nerve following vaccination with the novel mRNA vaccination for the prevention of COVID-19. The

axillary nerve is a terminal branch of the posterior cord of the brachial plexus emanating from C5-C6. It is a mixed motor and sensory nerve. The motor branches supply the deltoid and teres minor, while the sensory branches provide sensation to the lateral aspect of the shoulder [17]. While there are other known causes of axillary nerve palsy including mechanical trauma, cervical radiculopathy or brachial plexopathy, in this case, the delayed onset from vaccination to pain and weakness align most with chemical neurotoxicity. Chemical neurotoxicity is caused by the tissue toxicity of the injected solutions, causing an inflammatory reaction that indirectly involves the nerve. While there have been cases of direct axillary nerve injury during other vaccine injections including the influenza vaccine [4,5] given the delayed onset of symptoms in this case, direct trauma is an unlikely mechanism. Recently, there have been an increasing number of reported cases of Parsonage-Turner syndrome following vaccination for the prevention of COVID-19 [7-11], however this patient's symptoms and EMG/NCV results were not consistent with a brachial plexopathy. In addition, the electrodiagnostic findings are consistent with an entrapment neuropathy involving the median nerve across the wrist, however clinically he is asymptomatic, and these findings are of unclear significance.

According to the VAERS database, 5 people have reported axillary nerve palsy in the period following vaccination. Additionally, there have been 89 cases reported of abnormal neurological examinations of any kind, 572 cases of neurological symptoms, 52 cases of abnormal nerve conduction studies, and 257 cases of nerve injury following vaccination with the novel mRNA vaccination for the prevention of COVID-19, as of October 10th, 2021 [12]. It is important to note that this database is comprised of self-reported adverse events, and as such the data may be incorrect or incomplete. Nevertheless, this data helps to further support that this may be a rare adverse effect of this vaccine.

There have been a handful of reported cases of bursitis following COVID-19 vaccines falling under the SIRVA classification of injuries [6,13-15]. however this is the first case of reported axillary nerve neurapraxia. With over 210 million people in the US having received at least one dose of the COVID-19 vaccine as of September 16th, 2021 [16] axillary nerve palsy may represent an underreported, yet rare adverse outcome of vaccination.

Conclusion

Clinical suspicion should remain high of axillary nerve palsy as a rare, but significant adverse effect following vaccination for the prevention of COVID-19.

Bibliography

1. Menni C., *et al*. "Vaccine side-effects and SARS-CoV-2 infection after vaccination in users of the COVID Symptom Study app in the UK: a prospective observational study". *The Lancet Infectious Diseases* 21.7 (2021): 939-949.

2. Atanasoff S., *et al*. "Shoulder injury related to vaccine administration (SIRVA)". *Vaccine* 28.51 (2010): 8049-8052.

3. Shahbaz M., *et al*. "Shoulder Injury Related to Vaccine Administration (SIRVA): An Occupational Case Report". *Workplace Health and Safety* 67.10 (2019): 501-505.

4. Davidson LT., *et al*. "Iatrogenic axillary neuropathy after intramuscular injection of the deltoid muscle". *American Journal of Physical Medicine and Rehabilitation* 86.6 (2007): 507-511.

5. Choi HR., *et al*. "Axillary nerve injury caused by intradeltoid muscular injection: a case report". *Journal of Shoulder and Elbow Surgery* 10.5 (2001): 493-495.

6. Cantarelli Rodrigues T., *et al*. "Subacromial-subdeltoid bursitis following COVID-19 vaccination: a case of shoulder injury related to vaccine administration (SIRVA)". *Skeletal Radiology* (2021): 1-5.

7. Diaz-Segarra N., *et al*. "Painless idiopathic neuralgic amyotrophy after COVID-19 vaccination: A case report". *PM R* (2021): 10.

8. Mahajan S., *et al*. "Parsonage Turner syndrome after COVID-19 vaccination". *Muscle Nerve* 64.1 (2021): E3-E4.

9. Queler SC., *et al*. "Parsonage-Turner Syndrome Following COVID-19 Vaccination: MR Neurography". *Radiology* (2021): 211374.

10. Koh JS., *et al*. "Neuralgic amyotrophy following COVID-19 mRNA vaccination". *QJM* (2021): hcab216.

11. Coffman JR., *et al*. "Parsonage-Turner Syndrome After SARS-CoV-2 BNT162b2 Vaccine: A Case Report". *JBJS Case Connect* 11.3 (2021).

12. VAERS. Centers for Disease Control and Prevention (CDC), and the Food and Drug Administration (FDA), agencies of the U.S. Department of Health and Human Services (HHS) (2021).

13. Boonsri P and Chuaychoosakoon C. "Combined subacromial-subdeltoid bursitis and supraspinatus tear following a COVID-19 vaccination: A case report". *Annals of Medicine and Surgery (London)* 69 (2021): 102819.

14. Schierz JH., *et al*. "Vasculitis and bursitis on [^{18}F] FDG-PET/CT following COVID-19 mRNA vaccine: post hoc ergo propter hoc?" *European Journal of Nuclear Medicine and Molecular Imaging* 8 (2021): 1-2.

15. Chuaychoosakoon C., *et al*. "Shoulder injury related to Sinovac COVID-19 vaccine: A case report". *Annals of Medicine and Surgery (London)* 68 (2021): 102622.

16. Centers for Disease Control and Prevention. CDC COVID Data Tracker". *Centers for Disease Control and Prevention* (2017).

17. Williams FH and Kumiga B. "Less common upper limb mononeuropathies". *PM R* 5.5S (2013): S22-S30.