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Case Report

Ulnar Mononeuropathy Associated with Covid-19 Infection, A Case Report

Leila Sadat Mohamadi Jahromi[1], MD; Hamid Reza Farpour [2,3]*, MD; Hossein Etminan[4], MD; Reyhaneh Parvin[5], MD

[1]Department of Physical Medicine and Rehabilitation, Shiraz Medical School, Shiraz University of Medical Sciences, Faghihi Hospital, Shiraz, Iran
[2]Bone and Joint Diseases Research Center, Department of Physical Medicine and Rehabilitation, Shiraz University of Medical Sciences, Shiraz, Iran
[3]Shiraz Geriatric Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
[4]Department of Internal Medicine, School of Medicine, Shiraz University of Medical Sciences, Shooshtary Hospital, Shiraz, Iran
[5]Department of Physical Medicine and Rehabilitation, Faghihi Hospital, Shiraz University of Medical Sciences, Shiraz, Iran

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ABSTRACT

Background: Covid-19 was reported in China for the first time. The most common manifestation of this novel infection is respiratory problems. However, it can also invade both central and peripheral nervous systems. The usual central nervous system complications were dizziness (16.8%) and headache (13.1%). The most common reported symptoms in patients with peripheral nervous system problems were taste impairment (5.6%) and smelling impairment (5.1%) due to olfactory nerve involvement.
Methods: We present a 46-year-old male who was referred to our clinic in Shiraz for electrodiagnosis and better evaluation due to paresthesia and numbness of the right 4th and 5th fingers accompanied by weakness and atrophy of the muscles in the ulnar nerve territory, which occurred during Covid-19 infection in this patient.
Results: Severe partial involvement of the right ulnar nerve at the elbow region was detected in the electrodiagnosis, and findings in the right elbow MRI favored ulnar neuritis.
Conclusion: Focal neuritis of the ulnar nerve (ulnar mononeuropathy) seemed to be a new presentation of peripheral nervous system involvement in COVID-19 diseas

Introduction

The most manifestation of coronavirus is a pulmonary infection, and the most common symptoms are fever, dry cough, fatigue as well as dyspnea [1-7]. However, neurological complications affecting both the central nervous system (24.8%) and peripheral nervous system (8.9%) have been reported by this infection. Dizziness (16.8%) and headache (13.1%) are the most common symptoms in patients with central nervous system (CNS) problems. Taste impairment (5.6%) and smelling problems (5.1%) secondary to olfactory nerve involvement are the most commonly reported symptoms in patients with peripheral nervous system (PNS) complications [3]. Some other PNS manifestations reported in the kinds of literature of COVID-19 include post-infectious inflammatory neuropathy like Guillain-Barre Syndrome (GBS), prone-positioning associated with peripheral neuropathy, critical illness polyneuropathy, entrapment neuropathy, secondary to the hematoma when receiving anticoagulation therapy for this disease, pure sensory neuralgic amyotrophy and parsonage-turner syndrome [8-11]. In this case study, we report a patient with electrophysiological findings of significant partial involvement of the right ulnar nerve around the elbow after developing COVID-19 infection. Based on the findings in favor of neuritis in Magnetic Resonance Imaging (MRI), we hypothesized that focal neuritis of the ulnar nerve (ulnar mononeuropathy) seemed to be a new presentation of peripheral nervous system involvement in COVID-19 disease.

Corresponding author:* Hamid Reza Farpour, Department of Physical Medicine and Rehabilitation, Bone and Joint Diseases Research Center, Shiraz University of Medical Science, Zand Street, Postal code: 71877-19446, Shiraz, Iran. **Tel: +98 9171179541, **Fax:** +98 71 32329040
Email: Farporh@gmail.com

Case Report

The patient was a 46-year-old Iranian man, a medical internist from Shiraz, and a known case of pulmonary emboli starting three years ago (on anticoagulant therapy) and Bariatric surgery due to obesity two years ago. He was referred to the physical medicine and rehabilitation unit in Imam Reza clinic in Shiraz for the electrodiagnosis (EDX) due to paresthesia of the right 4th and 5th fingers concomitant with weakness and atrophy of the ulnar innervated muscles in March 2021. He was almost well till eight months ago when he developed generalized myalgia, fever, cough, and dyspnea a few days after exposure to an infected patient with a positive SARS-CoV-2 Polymerase Chain Reaction (PCR) test. A spiral chest computed tomography scan showed 80% involvement of the lungs in favor of COVID-19 infection. Thus, he was admitted to one of the hospitals in Shiraz for better medical support. In the hospital course, he developed pain in the right forearm, gradually starting 4-5 days after admission. It was unilateral, vague, and constant radiating from his forearm to the hand. Finally, the pain intensity became too severe according to the Visual Analog Scale (VAS) score of 10/10 disturbed his sleep at night.

It was aggravated by any activities and relieved by consuming naproxen 500 mg orally twice a day (BID). After a few days, the pain intensity was decreased (VAS score:7/10) and replaced with tingling of the right 4th and 5th fingers. Gradual weakness started almost two weeks after the onset of his symptoms, presenting as an inability to write well. Then, after 2-3 months, atrophy of the muscles with ulnar innervation, including Flexor Carpi Ulnaris (FCU), First Dorsal Interosseous (FDI), and Abductor Digiti Minimi (ADM) occurred. Drug history of the patient included: Prednisolone 50 mg orally per day (QD) for five days and then 25 mg for the following other five days, Favipiravir 1600 mg orally BID for the first day of admission, 1200 mg BID for the second day, and 800 mg BID for the next five days. He did not have a history of trauma to the right upper limb, prolonged prone positioning, radicular neck pain or paresthesia, and pain in other limbs. In physical examination, the patient had a normal general appearance without pallor and was oriented to time, place, and person. Vital signs were typical. Light touch, pinprick, and temperature sensations decreased in the right medial hand, but both upper limbs' proprioception, vibration, and position sensations were intact and symmetric. Tinel's sign at the right cubital tunnel was positive.

In manual muscle testing before doing EDX, the forces of abduction and adduction of the right fingers were decreased to 3+/5, and atrophy of the muscles innervating by the ulnar nerve was obvious. The forces of other muscles were normal. The Froment test was positive. The range of motion of all joints, especially the right elbow, was intact. Hoffman and Babinski were not detected with signs of upper motor neuron lesions, including hypertonicity, and brisk deep tendon reflexes. Nerve conduction study showed: absent right ulnar sensory nerve action potential (SNAP), decreased ulnar nerve conduction velocity (NCV) across the right elbow while recording from ADM and FDI muscles (38 m/s and 33 m/s respectively) without conduction block, increased latency of the compound muscle action potential (CMAP) with stimulation across the elbow while recording from ADM and FDI (11.3 and 12.2 milliseconds, respectively), decreased CMAP amplitudes of right ADM and FDI muscles (less than half of the contralateral side). The electromyography's result favored a chronic neurogenic change in the right FCU, FDI, and ADM muscles without spontaneous activities. The conclusion was reported as a significant partial involvement of the right ulnar nerve in the elbow region. Based on findings in EDX, an MRI of the right elbow and laboratory evaluations, especially markers for vasculitis, were requested. MRI showed increased signal intensity and thickness in the course of the ulnar nerve around the elbow in favor of the ulnar neuritis (Figure 1). Laboratory data including Antinuclear Antibody (ANA), Anti-double strand DNA Antibody (Anti-dsDNA), Lupus Anticoagulant (LAC), Anti-Cardiolipin Antibody (ACLA), Anti-Neutrophilic Cytoplasmic Antibody (ANCA), Rheumatoid Factor (RF), Erythrocyte Sedimentation Rate (ESR), C-Reactive Protein (CRP) and C4 were normal. C3 was a little decreased, and white blood cells (WBC) were mildly increased (11.7*103 / micl). Besides, the plain radiography of the right elbow

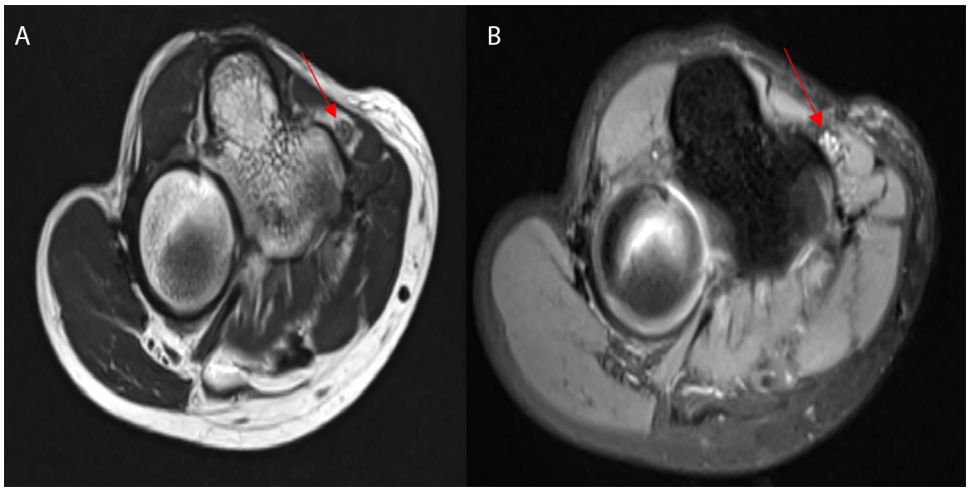

Figure 1: A: Axial T1- weighted image of the right elbow showed ulnar nerve enlargement and thickening. B: Axial T2 – weighted image demonstrated increased signal intensity and thickness of the right ulnar nerve.

was done, showing normal alignment without signs of cubitus valgus or varus.

Based on the above findings, injection of triamcinolone acetonide 40 mg around the right cubital tunnel, consumption of prednisolone 50 mg orally which was tapered within two months, and recommendation of using an elbow pad as a forearm rest to keep the elbow in relative extension, physical therapy and occupational therapy with a focus on strengthening the forearm flexors and pronators, flexibility and dynamic joint stabilization exercises for the patient performed. Thus, pain intensity (VAS score: 3/10) and muscle strength due to a manual muscle testing score of 4+/5 in the ulnar innervated muscles of the right side were achieved. The patient's written informed consent was taken to describe his present illness as the above.

Discussion

COVID-19 is a neurotropic microorganism [12]. Neurological manifestations involving both CNS and PNS have been reported in several studies [13-15]. Up to 8.9% of patients developed PNS complications from this infection [8]. The definite mechanism of neurological involvement for this virus is unknown, but according to several studies, multiple pathways have been suggested. They include direct invasion to the nervous system, entry through hematogenous ways, the release of inflammatory cytokines such as Interleukin-6 causing neurological and pulmonary injuries, and the possibility of expression of SARS-COV-2 receptor which is also called angiotensin-converting enzyme 2 in the nervous system [1, 3, 14]. Several researchers around the world reported GBS associated with Covid-19 infection. Abrams et al. described severe progressive GBS in the setting of acute Covid-19 disease presenting with rapid quadriparesis starting from the lower limbs [9]. In our patient, the clinical and electrophysiological presentations were different from GBS. For example, pain, paresthesia, and weakness were limited to one limb and did not progress to the other limbs.

Furthermore, the electrophysiological abnormalities in this patient were limited to one nerve. They did not meet the criteria for a multifocal acute demyelinating polyradiculoneuropathy which could be seen in GBS. Prone positioning is one of the best methods for oxygenation in patients with pulmonary infections. It is optimal to spend 12-16 hours per day managing respiratory distress [8, 10]. Malik et al. presented 12 patients with a history of hospitalization due to acute respiratory distress syndrome related to Covid-19 infection diagnosed with peripheral nerves injuries. All of them except one patient confirmed that they had prone positioning in the critical care unit [10]. Ulnar nerve injury may happen in patients with respiratory infections like Covid-19 due to the compression of the cubital tunnel secondary to the prolonged prone positioning. Male gender is a predisposing factor for this problem due to anatomical variations. Moreover, peripheral nerve injury can occur due to the complication of treatment for this infection, like nerve entrapment associated with hematoma in patients with anticoagulant consumption [8]. In our patient, negative history of prolonged prone positioning, no evidence of conduction block at the elbow in EDX, and definite findings of MRI in favor of the ulnar neuritis seemed to rule out positioning-induced peripheral nerve injury. Although the patient was on anticoagulant therapy (Rivaroxaban 20 mg orally QD) for a long time due to his previous pulmonary emboli, there was no evidence of hematoma in the MRI of the right elbow. Therefore, the possibility of ulnar entrapment secondary to the hematoma could be ruled out. Cacciavillani et al. presented a 52-year-old man with left forearm pain following dysesthesia and hypoesthesia in lateral antebrachial cutaneous nerve distribution a few days after Covid-19-induced respiratory infection. He recorded low amplitude SNAP of this nerve in EDX, and finally, a pure sensory brachial neuritis was confirmed for him [11].

In our patient, there was no history of shoulder and arm pain and any signs and symptoms in the distribution of other nerves, especially lateral ante-brachial cutaneous nerve, which was mostly involved in brachial amyotrophy. Furthermore, the findings of EDX (decreased NCV across the elbow and increased latency of CMAP above the elbow in ulnar nerve territory) confirmed the pathology at the elbow and not more proximal sites. Moreover, regardless of PNS manifestations of Covid-19 infection, tardy ulnar nerve palsy secondary to nonunion condylar fractures at the elbow eventually led to cubitus valgus or varus deformity might be another differential diagnosis [16]. However, our patient's plain radiography showed normal alignment of the right elbow, and no history of previous trauma was found. Based on history, physical examination, laboratory data, EDX, and finally, the findings in favor of neuritis in MRI, focal neuritis of the ulnar nerve (ulnar mononeuropathy) seemed to be a new presentation of peripheral nervous system involvement in COVID-19 disease. The limitations of this study were the lack of the same reports in the literature and the failure to perform the biopsy from the involved nerve in our patient to confirm this manifestation as a definite complication of this virus pathophysiologically. However, further studies are suggested to confirm the nature of this virus and thus, prevent its complications in the future, if possible.

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Conflict of Interest: None declared.

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