

Pain management for painful brachial neuritis after COVID-19: a case report

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Case report

In October 2020, a 55-year-old Chinese man travelled from Hong Kong to Paris to attend a family funeral. He had psoriatic arthropathy in remission without chronic pain. In November 2020 while still in France, he and seven family members developed fever and upper respiratory symptoms, confirmed to be coronavirus disease 2019 (COVID-19). The family remained in home isolation and required no medical treatment. The patient self-treated with traditional Chinese medication: Lianhua Qingwen herbal capsules for 1 week. Two weeks later, he returned to Hong Kong after testing negative for COVID-19. In December 2020, during mandatory quarantine on re-entry to Hong Kong, the patient suddenly developed pain that extended from the neck and right interscapular region to the shoulder and down along the ulnar side of the right arm and forearm. The patient described the pain as shooting and drilling in nature, constantly severe, worst at the interscapular region, and aggravated by shoulder movement. He also reported disturbed sleep and numbness over his entire right arm and weakened right hand grip. He had no other joint pain, rash, vesicles, or fever. At this time, he was still resting alone in a quarantine hotel and performing no physical work. Most activities of daily living were manageable but some, such as bathing and dressing, were difficult. Diclofenac 100 mg daily and gabapentin 200 mg 3 times daily prescribed at a COVID-19 Clinic were ineffective. The patient's younger sister who had recovered in France without medication reported similar symptoms in her left arm.

The patient presented to our pain clinic 1 month after pain onset. His motor symptoms had spontaneously improved although disturbing right shoulder and interscapular pain with paraesthesia persisted. There were no muscle wasting, scar, rash, or trophic changes. The patient's right arm was slightly warmer than the left, and upper limb joints were not swollen or tender and there was full range of movement. He reported decreased sensation to light touch, cold and pinprick over the whole right arm, but his sense of vibration and proprioception were preserved. No touch or mechanical allodynia

or hyperalgesia were noted. Apart from slightly weakened thumb opposition, other muscle strength, tendon reflexes and neck examination were unremarkable.

Analgesia was changed to pregabalin 75 mg twice per day and etoricoxib 90 mg daily as needed, and the patient was referred for occupational therapy for grip strengthening. Magnetic resonance imaging (MRI) in March 2021 revealed mild T2 hyperintensity at the right brachial plexus, suggestive of resolving neuritis (Fig). There was also cervical spondylosis without significant intervertebral foraminal narrowing or cord compression. Nerve conduction study in March 2021 was normal. Electromyography was not performed due to good neurological recovery.

At a subsequent 3-month follow-up examination in March 2021, the patient reported continued improvement with little or no pain. He reported only intermittent paraesthesia and mild weakness of his right hand and fingers. As a right-hander, he continued to have trouble turning keys and using chopsticks and pens. He coped with his office

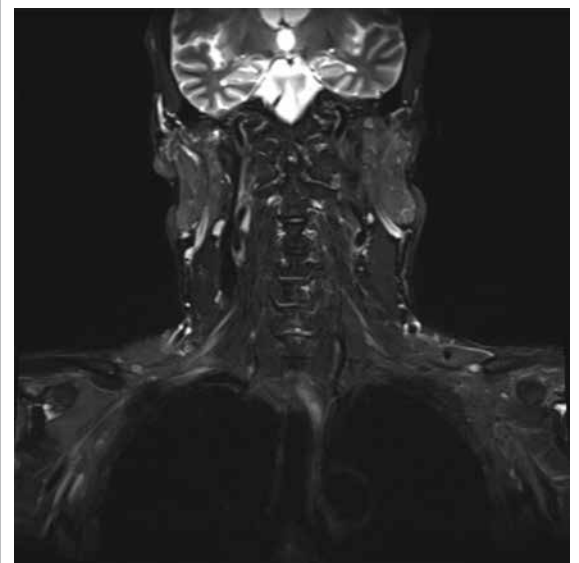


FIG. Magnetic resonance imaging showing mild T2 hyperintensity at the right brachial plexus

work with a speech-to-text converter to minimise keyboard usage. He could manage most household chores, including shopping for groceries, and slept well. He was calm and grieving appropriately for the loss of his mother. Pregabalin was gradually reduced, and he was weaned off etoricoxib.

Discussion

The Coronavirus family is known for its neurotropism with 36% of COVID-19 infected patients reporting some form of neurological manifestation.¹ Mechanisms involve direct neural infection, and indirect inflammatory and immunological reactions. Other possibilities are targeting of neuronal angiotensin-converting enzyme 2, vasculitis, thrombosis and iatrogenic, such as prone position-related effects or neuropathies.²

The pathophysiology of acute brachial neuritis is not well understood but the pre-existence of viral infection supports immunological mechanisms. Affected subjects have more lymphocytic activity to brachial (versus sacral) plexus nerve extracts and increased antibodies to peripheral nerve myelin. A hereditary form with mutation-related deficiency in proteins from the septin family has been identified.² Our patient took Lianhua Qingwen, a traditional Chinese medicine prepared from 13 herbs, shown to bind to angiotensin-converting enzyme 2 and shorten the course of COVID-19 infection.³ Drug-induced plexopathy, although less likely, remains possible.

Acute brachial neuritis is self-limiting but classically presents with excruciating pain at the shoulder, neck and interscapular region, followed by shoulder girdle weakness. Diagnosis is clinical and investigations are supportive. Cervical pathology is the major differential diagnosis but was excluded in our patient by MRI that revealed cervical spondylosis without nerve or cord compression or signal changes. Given the rheumatological history in our case, active autoimmune disease was also possible, but he had no such features.

To the best of our knowledge three cases of post-COVID-19 brachial neuritis⁴⁻⁶ have been reported but none in Hong Kong. Brachial neuritis is rare with an incidence of only 1.64 cases per 100 000 person-years, and underreporting is expected with isolation and restricted healthcare access during COVID-19. Compared to existing three cases, two cases similarly involved middle-aged men with delayed neuropathic symptoms 2 weeks after COVID-19 confirmation. One had similar symptoms to our patient, whereas the other two had either purely sensory components or solely proximal median nerve involvement. Our case and one existing case demonstrated classical MRI changes. Nerve conduction study in our patient did not demonstrate reduced action potential amplitude in affected nerves, which may have been related

to its performance at a later course of the disease. Given the rarity of the entity and its occurrence in our patient and his sister, further research to investigate the role of genetic susceptibility to the acute form is warranted. Management of brachial neuritis is supportive and focused on pain control and functional rehabilitation with physiotherapy and occupational therapy. There is limited evidence that steroids and immunoglobulins will hasten recovery so their use should be balanced against the risk of viral replication. Currently, there are no established guidelines for pain management in patients with or recently recovered from COVID-19. Specific precautions should be taken in pain management of these cases.

Paracetamol has limited efficacy for neuropathic pain. Care should be taken for patients with severe COVID-19, because viral-induced cytokine storm can suppress cytochrome P450, increasing the risks of hepatotoxicity. Nonsteroidal anti-inflammatory drugs offer effective analgesia for brachial neuritis by suppressing cyclooxygenase and prostaglandin production. Although there were early concerns about ibuprofen-associated decompensation in patients with COVID-19, this has not been supported by the World Health Organization after data review. Meanwhile, cyclooxygenase-2 selective nonsteroidal anti-inflammatory drugs disturb the thromboxane A₂-prostacyclin balance, potentially enhancing thrombotic tendency in patients with COVID-19. Our case illustrates the safe use of cyclooxygenase-2 inhibitors in a patient recently recovered from COVID-19. Among antineuropathic agents, gabapentinoids have relatively few adverse effects, lower cardiac toxicity, and fewer drug-drug interactions than tricyclic antidepressants and serotonin-noradrenaline reuptake inhibitors. Our patient was initially prescribed a relatively low dose of gabapentin that may account for its lack of effect. He was changed to pregabalin at a higher equivalent dose, with a better pharmacological profile with linear dose-response relationship and faster onset. Physicians should be alert to the sedative effects of analgesia that may worsen COVID-19-related ventilatory impairment. Opioids should be reserved for severe refractory pain.

Pain management for patients with or recently recovered from COVID-19 can be socially challenging. The need for quarantine delays presentation and management, and the associated mental stress and lack of social support may perpetuate pain. Although telemedicine enables remote medical care, controversies remain, and psychological engagement is less effective. Our patient's appropriate grief reaction and illness coping mechanism minimises risk of chronic pain.

Our case report is the first to focus on the clinical management of brachial neuritis in patients

with or recently recovered from COVID-19, and the first to identify a possible case series within a family. We hope our report of COVID-19-related brachial neuritis can promote awareness and understanding. Future research should focus on its pathophysiology including genetic susceptibility. Whether COVID-19 vaccination alters the course of acute brachial neuritis warrants further observation.

Author contributions

Concept or design: VYT Cheung, FPY Tsui.
Acquisition of data: VYT Cheung, JMK Cheng.
Analysis or interpretation of data: VYT Cheung.
Drafting of the manuscript: VYT Cheung.
Critical revision of the manuscript for important intellectual content: FPY Tsui, JMK Cheng.

All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

All authors have disclosed no conflicts of interest.

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Ethics approval

The patient was treated in accordance with the Declaration of Helsinki. The patient provided informed consent for the treatment/procedures, and for publication.

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Answers to CME Programme

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I. Clinical outcomes of fast-track total knee arthroplasty for patients aged >80 years

A	1. False	2. True	3. True	4. True	5. True
B	1. False	2. True	3. True	4. False	5. True

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II. Prevalence of unruptured intracranial aneurysms in the Hong Kong general population and comparison with individuals with symptoms or history of cerebrovascular disease

A	1. True	2. False	3. True	4. False	5. True
B	1. True	2. False	3. True	4. False	5. True