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COVID-19 and its Impact on Back Pain

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Low back pain is the most common musculoskeletal complaint affecting every population worldwide.[1] It is the leading cause of diminished activity and loss of work in addition to one of the most frequent reasons for physician visits.[2-3] In 2016, direct treatment for back and neck pain was reported to cost over $134 billion US dollars annually in the United States, the highest of 154 conditions reviewed.[4] An earlier review noted that the direct treatment expenditures are only a small percentage of the total economic impact when indirect costs of disability are calculated. Furthermore, outcomes of low back pain treatment are often tenuous and tremendous efforts have been initiated to improve phenotyping of such pain patients in hopes to lend to more precision to spine care management and outcomes.[5] Spinal disorders are of particular concern in underserved and low- and middle-income countries, especially in the elderly and working populations.[6] Back pain is more common and associated with worse outcomes and lower life expectancy in underserved populations.[7] Thus, back pain represents a considerable physical and socioeconomic burden and should be considered a global public health issue. The relationship or association between the coronavirus-19 (COVID-19) infection and spine pain, however, has yet to be investigated.

As of June 28, 2021, there are over 180 million confirmed cases of COVID-19 reported by the World Health Organization. As the population of individuals recovering from COVID-19 continues to grow, the treatment needs of COVID-19 survivors remain largely unknown. However, several reports are beginning to describe the post-acute COVID-19 syndrome as any constellation of respiratory, cardiovascular, neuropsychiatric, gastrointestinal, dermatologic, or other general symptoms persisting beyond 4 weeks from the initial onset of COVID-19 symptoms.[8] Notably, joint pain is reported as the third most common sequelae (27.3%) behind fatigue (53.1%) and dyspnea (43.4%).[8] Additionally, concern for chronic pain syndromes following COVID-19 is beginning to emerge amongst the rehabilitation and pain control communities.[9,10] The proposed mechanism for chronic pain in COVID-19 survivors is multifactorial. Several articles have reported that risk factors for chronic pain include baseline health characteristics of COVID-19 survivors (increased age, comorbidities), exposure to intensive care (immobility, positioning, ventilation), and exacerbation of underlying mental illness.[9,10] However, another component to the potential post-COVID chronic pain syndrome that is unique from other acute illnesses is the potential neurologic insult leading to increased pain and potentially altering the perception of pain among survivors. This is of particular concern given the hypothesized neurotropism of COVID-19.[9-11]

The neuroinvasive propensity of the coronaviridae family has been demonstrated previously as a feature of the severe acute respiratory coronavirus (SARS), an earlier member of the coronavirus family that was highly pathogenic.[12] The coronaviridae family are enveloped viruses with a positive non-segmented single-stranded ribonucleic acid (RNA) genome that codes for several structural and non-structural proteins.[13] Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes COVID-19, shares a similar viral structure and infection pathway with the other coronaviruses.[12] In fact, SARS-CoV-2 utilizes the same entry mechanism into human host cells via binding of the viral spike-glycoprotein to the host receptor angiotensin-converting enzyme 2 (ACE2).[12-15] Cells that are permissive to infection include macrophages, microglia, and astrocytes.[16] While this receptor mediates the initial entry of the virus into the upper respiratory system driving the acute COVID-19 pneumonia, this receptor is also present on neural tissue and is hypothesized to play a role in the development of chronic pain and post-acute COVID-19 syndrome.[16]

Given the involvement of the ACE2 receptor within neural tissue, it is unsurprising that neurologic symptoms are being

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reported with COVID-19. A retrospective case series in Wuhan, China reported neurologic symptoms in 36% of COVID-19 patients.[17] These symptoms are related to the central nervous system (headache, dizziness, impaired consciousness, ataxia, acute cerebrovascular disease, and epilepsy), peripheral nervous system (hypogeusia, hyposmia, hypopsia, and neuralgia), and skeletal muscle.[17] Furthermore, there are reports of different strains of coronoviridae remaining latent in the central nervous system.[18] This raises the concern that COVID-19 could potentially behave in a manner similar to the herpes simplex virus with the potential for late neurologic sequelae during reactivation of the virus.[18] Additionally, coronavirus RNA has been detected in various neurologic diseases including multiple sclerosis, which arises the possibility that COVID-19 could play a triggering role for neurologic disease in predisposed individuals.[18] While it is becoming increasingly evident that COVID-19 likely infects the neural tissue, the long term impact on nerve function remains unclear.

However, it should be noted that there are alternative possibilities for the pain syndromes suggested to be related to COVID-19. As many COVID-19 patients with severe symptoms are older adults, it is common for these older patients to experience chronic pain even in the absence of COVID-19 infection. Thus, the increased neurologic symptoms may not be attributable to the virus. It is possible that the reported increase in pain among COVID-19 patients may only be a transient condition. This would be similar to the flu with pain flaring up only during the acute infection. Though this would not explain the reports of post-COVID syndrome. Regardless, until COVID-19 and its neurologic implications are better understood, the potential for altered pain sensation and chronic pain associated with the virus remain likely possibilities and something that healthcare providers should consider in patient care.

As many higher-income communities emerge from the immediate demands of the pandemic, it is paramount that providers consider the global burden of disease. This is especially true of low- and middle-income countries and communities where COVID-19 infections recently skyrocketed, and vaccinations remain scarce. The COVID-19 resurgence in India, for example, led to a reported 400 000 new cases of COVID on May 1, 2021 with a total of 30 million cases to date according to the World Health Organization; notably, these numbers are likely underestimated due to backlogged test results, poor access to testing, and many people not being tested due to fear of stigma.[19] Not only is this concerning in the immediate management of COVID-19 in these areas, but also for the potential post-acute COVID-19 syndrome within the unprecedented number of survivors. Should there be neurologic and/or pain syndromes associated with COVID-19 recovery, the pandemic has the potential to exacerbate the preexisting disparity in spine care within underserved communities. This is especially apparent with the emergence of telehealth throughout the pandemic and the likelihood that virtual medicine will persist after the pandemic.

The effects of the COVID-19 pandemic reverberated throughout the medical field and spine surgeons are no exception. With the cancellation of elective surgeries and in-person clinic, telehealth emerged as a crucial medium for facilitating the patient-physician interaction throughout the pandemic.[20] Over half of spine surgeons worldwide reported using telehealth to conduct a significant (>25%) number of patients visits.[21-27] This leads the potential to exacerbate healthcare disparities within underserved areas without internet access.[21-27] Should virtual health persist beyond the pandemic, infrastructure should be implemented into underserved areas across the developed and undeveloped world to increase access to experienced clinicians. This could potentially begin to address some of the disparities present in the current treatment of back pain in these areas.

We implore the spine community to become more cognizant of the potential implications that COVID-19 may have upon spine care. We should be proactive rather complacent in addressing such issues early-on, especially in medically underserved areas. In lieu of the aforementioned concerns, the following action items need to be addressed moving forward:

1. It is essential that we begin to account for the potential confounding, if not causative, effects of this virus on back pain. Standardized metrics for evaluating spine pain both in the clinical and research settings need to begin to account for COVID-19 history including exposure, hospitalization, and/or vaccination status.
2. Future large-scale retrospective and prospective epidemiologic studies should be conducted to determine the prevalence of chronic regional and multiple joint pain among COVID-19 survivors in order to clarify whether the coronavirus has adverse effects (eg exacerbation) on pain. Prospective studies are ultimately needed to determine whether COVID-19 survivors are more likely to have new onset of chronic pain or recurrent pain, and how being vaccinated can mitigate the severity of such effects.
3. The spine community must consider the impact of COVID-19 on underserved and low- and middle-income countries who have not only been disproportionately affected by COVID-19, but also lack the resources and infrastructure to manage potential sequelae.

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