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“The Pathology of Extended Initial COVID-19 Infection vs. Post-acute Sequelae of COVID-19: A Comparison of Autopsy Findings”

Cases of post-acute sequelae of COVID-19 (PASC), also known as long-haul COVID-19, are characterized by the delayed, consequential effects of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. Patients may have appeared to recover from the initial infection, but experience symptoms and injuries of the disease weeks or months later. Autopsy studies to pinpoint ailments of post-acute sequelae of COVID-19 have only initially begun. In this study, the cases in which patients tested positive for the coronavirus in the hospital and remained there until death are compared to the cases of patients who recovered from the initial infection of SARS-CoV-2, but experienced sequelae of the condition numerous weeks to months later. We have collected data from thirteen autopsy cases to date to examine the pathological findings of post-acute sequelae of COVID-19 (PASC) and how they differ from those of initial infections that are severe and extended.

Autopsies were performed on thirteen decedents with an age range of 42-79 years with cause of death related to COVID-19 infection. Before the autopsies were performed, consent was obtained from the decedents' next of kin. The cases were separated into two groups based on the timeline of admission to the hospital to time of death: those who received a positive SARS-CoV-2 PCR test upon admission to the hospital and succumbed to the initial COVID-19 infection and those who received a positive test in the past, seemed to recover from the initial infection, and developed sequelae weeks or months later. Cases in which the number of symptomatic days plus the number of days from time of admission to death exceeds thirty days are considered extended or potentially PASC-related. The comparison of timelines assists in sorting the autopsy cases into two distinct groups. Pathological findings within the pulmonary, cardiac, gastrointestinal, and neurologic systems also showed differences between severe acute infection and likely post-acute sequelae of COVID-19.

Gross findings primarily included inflammation and thrombotic events in patients who underwent a severe, fatal initial infection. Common microscopic findings in the lungs included proliferative to organizing diffuse alveolar damage (DAD), the pathologic counterpart of acute respiratory distress syndrome (ARDS). Findings in cases likely related to PASC included extensive alveolar fibrosis, fibrosing organizing pneumonia, and thrombi within medium and large vessels. Additionally, late thrombotic events, and cardiac inflammation including macrophage infiltration appeared to be present in cases of PASC. Positive staining for SARS-CoV-2 proteins by immunostain could also be found in the blood vessels of other organs. The most common comorbidities in both groups included hypertension, diabetes mellitus, morbid obesity. Our findings suggest that there may be pathologic differences between extended acute COVID-19, and PASC-related disease.