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Role of Radiology in the Diagnosis of COVID-19 Pneumonia

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Commentary

A novel coronavirus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) developed in Wuhan, China, creating a condition known as coronavirus disease (COVID-19), which soon spread to become a global pandemic. This virus has common, but not unique, clinical and imaging characteristics, which has sparked interest in developing criteria for estimating the likelihood of infection in order to improve patient care, aid in the identification of associated morbidities, and optimise the use of global healthcare resources in order to address risk of potential health-care overuse.

COVID-19 lung infection is frequently linked with mild GGOs that are difficult to see on chest radiographs or are occult. As a result, chest CT may be explored to test for COVID-19 in immune-compromised individuals, just as it is routinely used in some institutions to evaluate for pulmonary infection in patients with leukaemia and febrile neutropenia. This is especially crucial if there are delays in receiving RT-PCR results or if RT-PCR testing is restricted locally. A normal chest CT, on the other hand, does not rule out COVID-19 infection.

While infectious illness outbreaks can be damaging to health systems, they are not new to our island state, particularly in radiology departments. The critical role of radiography in pandemics has been extensively documented dating back to the 1918 influenza pandemic, but none was more recent than the severe acute respiratory syndrome (SARS) epidemic in 2003, when radiology departments were forced to make urgent operational modifications. This is thought to reduce heterogeneity in the interpretation of chest radiography data and promote correct identification of often and infrequently reported imaging characteristics in this clinical context, similar to standardised CT reporting. The section on reporting CT findings goes over the reasons for using standardised reporting language in further detail. The imaging findings are regarded typical of COVID-19 pneumonia in the right clinical scenario, but they can also be observed in other kinds of viral pneumonia, such as influenza pneumonia, as well as with a medication reaction or organising pneumonia.

The aetiology of viral pneumonia is linked to the CT patterns of the infection. The pathophysiology of viruses in the same family is comparable. As a result, chest CT scans of viral pneumonia produced by different viruses from the same virus family show a similar pattern. According to genomic study, SARSCoV-2 belongs to the Betacoronavirus genus. In 2003 and 2012, SARS CoV and MERS-CoV were identified as Coronaviridae viruses, respectively. Some CT characteristics seen often in individuals with confirmed COVID-19 in our study are comparable to those seen in patients with SARS and MERS.

A chest radiograph is low-cost, widely available, simple to use, and portable. An early chest radiograph not only aids in the detection of pneumonia symptoms, but also in the provision of a different diagnosis. In areas with a high frequency of COVID-19, medical triage is indicated for individuals who appear with moderate to severe clinical symptoms. Ground-glass opacities and consolidations are common chest radiograph findings in COVID-19 pneumonia, especially in the bilateral, peripheral, and lower zone distributions. Lymphadenopathy or pleural effusion in children under the age of five is uncommon. However, because the sensitivity of a conventional chest radiograph varies on the time of imaging and the severity of pulmonary involvement, it cannot rule out the diagnosis of COVID-19.

Because the respiratory system is the region of the human body that is most impacted by the virus, X-rays of the chest may prove to be a more effective method than thermal screening. Due to breakthroughs in algorithms, the availability of massive datasets, and powerful GPUs that allow deep architecture training, image recognition jobs have progressed in recent years. For applications like picture identification and classification, Convolution Neural Networks (CNNs), Residual Networks, and training approaches like transfer learning have provided state-of-the-art performance.

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