

COVID-19 Infection: Early Lessons

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Canadian Association of
Radiologists' Journal
1-2

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DOI: 10.1177/0846537120914428
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Since the discovery of COVID-19, the epidemic has not only swept through China but also spread throughout the world. Radiology departments are crucial in the fight against the epidemic because imaging is one of the most important methods of diagnosing COVID-19.^{1,2} *Canadian Association of Radiologists Journal* editorial team discussed challenges of prompt detection of the coronavirus infection encountered by radiologists from the First Affiliated Hospital of Shenzhen University, Shenzhen, China.

What Is a Present Experience of Your Institution With Assessment of Patients With Suspicion for COVID-19 Infection?

By March 2, 2020, 1650 suspected patients arrived to our hospital for assessment; 1396 of whom had positive pulmonary computed tomography (CT) findings and positive reverse transcription polymerase chain reaction (RT-PCR) test, and 16 cases had been confirmed by RT-PCR only. One of the patients presented with typical viral pneumonia on CT, and rapidly progressed to the death due to acute respiratory distress syndrome. Twice RT-PCR tests were negative, and no diagnosis was made in the end. Due to the low sensitivity of RT-PCR, it is difficult to diagnose COVID-19 infection, which affects the timely treatment and disposition of patients. In addition, at the beginning of the outbreak, the virus' infectious characteristics were completely unknown, including strong infectivity and the presence of asymptomatic patients.

What Is the Role of Chest Radiographs and Chest CT in Imaging Detection of Coronavirus Infection?

Mobile chest radiography units had been used in isolation areas and intensive care and emergency departments for preliminary diagnosis of pulmonary infection in suspected cases and bedside monitoring of critically ill patients. At the early stage of the COVID-19 infection, the chest radiographs showed no abnormalities. Patients with positive RT-PCR test and more advanced disease had localized or multisegmental bilateral interstitial opacities with peripheral predilection. In severe cases, multiple alveolar consolidations were seen in both lungs. We noted progression to critical disease in some cases, manifesting as a "white lung" with a small amount of pleural

effusion. Based on our experience, chest radiographs have a low sensitivity to imaging findings of coronavirus infection.

In our institution, high-resolution CT without contrast enhancement is the imaging modality of choice for patients with suspected COVID-19 infection. The typical findings of COVID-19 infection on HRCT include ground-glass opacities, vascular dilation inside the lesion, "crazy-paving" pattern, and interlobular septal thickening.¹ The distribution is mostly bilateral with lower lobes predilection (66%). However, about 25% of the RT-PCR positive cases had negative or atypical chest CT findings, for example, single ground glass nodules, cavitation, and combination of ground-glass opacities and alveolar consolidations.

What Is Your Approach to Patients With Negative RT-PCR?

Our institution has developed a series of flowcharts, which show how to deal with patients with negative results of RT-PCR test and suspicious findings on chest CT.³ We do not refer the patient directly to the hospital for infectious diseases but make a comprehensive judgment based on the patient's epidemiological history, blood work, previous medical history, and so on. Patients with clinical suspicion to coronavirus infection stay in the isolation ward of our institution for observation and symptomatic treatment, and RT-PCR testing is repeated until the patient was confirmed as negative. A history of exposure to infectious diseases is the most important piece of clinical information in the diagnostic process. Patients with a history of exposure, even if all tests are negative, must be isolated at home for 14 days. Once they have fever, cough, general weakness, chest tightness, shortness of breath, and other symptoms, they must stay in the hospital for isolation, observation, and further medical examination.

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How You Protect Radiology Department Staff at Your Institution?

The CT examination room is divided into 4 levels of protective zones. There are separate CT examination rooms and special channels for suspected patients, which strictly follow the respiratory infectious disease protection guidelines of the World Health Organization and are set as level 2 protection. Disposable medical caps, protective glasses or face masks (anti-fog type), medical protective masks (N95), protective clothing or gowns, disposable latex gloves (double layers), and disposable shoe covers are all required for medical staffs, and hand hygiene is strictly implemented.

Suspected patients are taken by the fever clinic's nurse to our department's special examination room. The X-ray technologist instructs the patient to put on a disposable mattress and lay on the table of CT. When finished, she/he puts the mattress in a special set of contaminated trash cans, and the patient is taken away by the nurse. Then the nurses in our department put on the protective clothing to enter the examination room and strictly disinfect the examination room and the equipment.

After the medical providers take off the protective clothing, they need to shower with high temperature water before they leave the hospital. The clothes, things, bags, keys, and hands should be disinfected with 75% alcohol. The radiology department should be disinfected by ultraviolet lamp and disinfectant 3 times a day. Bare hands shall not touch the door handle.

Authors' Note

Yi Lei, Han-Wen Zhang, and Juan Yu contributed equally to this study.

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