

Radiological Basis of COVID-19

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Abstract

SARS-CoV-2 spread from China initially and rapidly expanded around the world. It can result in acute and fatal pneumonia. The disease is termed Corona Virus Disease 2019 (COVID-19) with clinical manifestations similar to those previously experienced in prior corona virus diseases, namely SARS-CoV and MERS-CoV. Moreover, some patients with COVID-19 have been reported with neurologic manifestations such as headache and anosmia and even loss of consciousness. Increasing evidence shows that corona viruses are not always limited in the respiratory system and that they may reach the gastrointestinal system and central nervous system. The investigations radiologically and otherwise remain challenging. Here we discuss the radiological manifestations.

Keywords: COVID-19; SARS-COV-2; CT Findings; CT Stages of COVID-19

SARS-CoV-2 spread from China initially and rapidly expanded around the world. It can result in acute, and fatal pneumonia. The disease is termed Corona Virus Disease 2019 (COVID-19) with clinical manifestations similar to those previously experienced in prior corona virus diseases, namely SARS-CoV and MERS-CoV. Moreover, some patients with COVID-19 have been reported with neurologic manifestations such as headache and anosmia and even loss of consciousness. Increasing evidence shows that corona viruses are not always limited in the respiratory system and that they may reach the gastrointestinal system and central nervous system. Radiology remains one of the basic modality of investigation amongst these patients.

Chest X ray evaluation may not show anything and may have little diagnostic value, sometimes even in serious cases.

CT chest may be more sensitive. The progress of the features are also useful in studying the progression of the disease. CT scan has sometimes been found to be positive when the RT-PCR is negative in the initial phase of the disease. The findings of CT scan of the chest include:

1. Ground glass opacification, which is usually bilateral in the lungs and has a peripheral distribution. It could be patchy or punctate. A multilobar involvement (particularly peripheral and/or posterior lobes) is seen. Right sided lower lobe is probably the most commonly involved lobe and the least frequently affected lobe is the right middle lobe. The ground glass appearance may be found in isolation or in combination with consolidative opacities. These lesions were found to be rounded, predominantly linear, and in crazy waving pattern.
2. Interlobular septal thickening.

- 3. Bronchiectasis.
- 4. Pleural thickening.
- 5. Subpleural involvement.

The less common signs are:

- 6. Pleural effusion.
- 7. Pericardial effusion.
- 8. Lymphadenopathy.
- 9. Cavitation.
- 10. CT halo sign.
- 11. Pneumothorax.
- 12. Interstitial septal thickening (enlarged fibrous stripes).
- 13. Pulmonary nodules.

Patients who have a more serious condition and are in ICU are found to have multiple lobar and subsegmental consolidations. Some of the commonest patterns found in the CT scan are:

- a. Ground glass opacities with consolidation.
- b. Bilateral fuzzy edged ground glass opacity with interlobular septal thickening.
- c. Multiple patchy consolidative opacities.

Ground glass opacity and consolidative features are the commonest findings- former being more frequently seen in patient with age less than 50 years and latter relatively with increased frequency in patients with age group more than 50 years. Patients older than 60 years showed more extensive focal ground glass opacity.

Stages of COVID-19 by CT scan can possibly be:

Stage	Duration	Findings
Ultra Early	Asymptomatic 1 - 2 weeks after exposure	Single or multiple focal ground glass opacity, patchy consolidative opacities, pulmonary nodules encircled by ground glass opacities, and air bronchograms.
Early	Early symptomatic presentation	Single or multiple focal ground glass opacity, focal ground glass opacity with interlobular septal thickening.
Rapid Progression	Day 3 - 7 of symptomatic presentation	Large, light consolidation opacities and air bronchograms.
Consolidation	Second week of symptomatic presentation	Reductions in density and size of the consolidative opacities may be seen.
Dissipation	About 2 - 3 weeks after onset	Dispersed patchy consolidative opacities, reticular opacities (strip like opacities), bronchial wall thickening and interlobular septal thickening.

CT findings are most prominent at day 10 of the disease and improvement may be seen after day 14. The most common findings on follow up CT scan included increased consolidative opacities and loss of crazy paving pattern [1,2].

Bibliography

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