Imaging of COVID-19

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Disclosure

• This presentation has been created using multiple resources including Society of Thoracic Radiology and RSNA online and published data.

• It is very likely that diagnostic criteria will be modified over time, however as of now (03/2020) this is an updated version of current preliminary imaging findings with CT.
COVID-19 Reporting

• Because of the low specificity of airspace opacities for COVID-19, the terms coronavirus or COVID-19 should **not be used** unless there is a high clinical suspicion.
CXR Reporting Guidelines if COVID-19 is suspected clinically.

• Please note CXR is insensitive for detecting early airspace disease.

• If you have a **negative** radiograph

• **IMPRESSION:** Negative for airspace disease. Please note that chest radiography has a low sensitivity for subtle airspace disease such as “ground-glass opacities”
CXR Reporting Guidelines if COVID-19 if suspected clinically.

• If you have a positive radiograph with subtle generally lower lobe predominant early airspace opacities.

• **IMPRESSION:** Study is positive for airspace disease. Although nonspecific, based on clinical suspicion these findings could represent viral pneumonia.
CXR in a patient with + COVID-19

Note very subtle lower lobe interstitial opacities.
CXR in another patient with + COVID-19

Note lower lobe predominant airspace opacities.
When To perform CT chest For COVID-19

• CT chest should not be used to screen for or as a first-line test to diagnose COVID-19

• CT chest should be used sparingly and reserved for hospitalized, symptomatic patients with specific clinical indications for CT.

• Appropriate infection control procedures should be followed before scanning subsequent patients.
CT chest IN COVID-19

• Up to approximately 50% of patients with COVID-19 infection may have normal CT scans 0–2 days after onset of flu-like symptoms from COVID-19

• COVID-19 RT-PCR sensitivity may be as low as 60-70%; therefore patients with pneumonia due to COVID-19 may have lung abnormalities on chest CT but an initially negative RT-PCR.

Kane et al. https://pubs.rsna.org/doi/10.1148/radiol.2020200527
Radiological Society of North America Expert Consensus Statement on Reporting Chest CT Findings Related to COVID-19. Endorsed by the Society of Thoracic Radiology, the American College of Radiology, and RSNA.

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CT chest in COVID-19

High confidence features:

• Peripheral and bilateral groundglass opacities with or without consolidation or visible intralobular lines (“crazy-paving”).
• Multifocal groundglass opacities of rounded morphology with or without consolidation or visible intralobular lines (“crazy-paving”).
• Some authors have described a lower>upper lobe predominance of findings.
• Reverse halo sign can be seen later in the disease as a sign of organizing pneumonia.

Kane et al. https://pubs.rsna.org/doi/10.1148/radiol.2020200527
CT chest in COVID-19

**Indeterminate confidence features:**

- Multifocal **non-rounded non-peripheral bilateral** groundglass opacities without clear distribution.
- Please note more diffuse airspace disease can occur when the disease advances leading to an ARDS pattern.

CT chest in COVID-19

Atypical findings suggesting an alternative diagnosis:

• Lobar pattern of consolidation, specially without groundglass opacity.
• Pleural effusion
• Multiple pulmonary nodules (centrilobular and tree in bud)
• Cavitation
• Lymphadenopathy

Kane et al. https://pubs.rsna.org/doi/10.1148/radiol.2020200527
Case #1 of +COVID 19

Ming-Yen Ng et al. https://pubs.rsna.org/doi/10.1148/ryct.2020200034
Case #2 of +COVID-19

Ming-Yen Ng et al. https://pubs.rsna.org/doi/10.1148/ryct.2020200034
Case #4 of +COVID 19

Case #5 of +COVID 19
Case #6 of +COVID 19
Case #7 of +COVID 19)
Case #8 of +COVID 19
Case #9 of +COVID 19
Patient under investigation with suspicious features for COVID-19
CT Chest Reporting Guidelines If COVID-19 is suspected clinically

- **Scenario #1**: Typical appearance (high confidence):
- **Impression**: “Commonly reported imaging features of viral pneumonia including (COVID-19 pneumonia) are present. Other processes such as organizing pneumonia as can be seen with drug toxicity and connective tissue disease, which can cause a similar imaging pattern.”

CT Chest Reporting Guidelines If COVID-19 is suspected clinically

• Scenario #2: Indeterminate findings (intermediate confidence):

• Impression: “Imaging features can be seen with atypical infection such as viral pneumonia including (COVID-19 pneumonia), though are non-specific and can occur with a variety of infectious and noninfectious processes.”

Scenario #3: Atypical findings (low confidence):

Impression: “Imaging features are atypical or uncommonly reported for (COVID-19) pneumonia. Alternative diagnoses should be considered.”

CT Chest Reporting Guidelines If COVID-19 is suspected clinically

- **Scenario #4**: Negative findings:
- **Impression**: “No CT findings present to indicate pneumonia.” (Note: CT may be negative in the early stages of COVID-19.)

CT Chest Reporting Guidelines

If COVID-19 is NOT suspected clinically

• If you are strongly concerned for COVID-19, you should communicate and discuss findings with the treatment team.

• If COVID-19 is not suspected clinically there is still debate between different authors in regards to using the term “coronavirus” or “COVID-19” in the impression.
Thank you