



Imaging of COVID-19

Daniel Ocazonez, MD

Assistant professor, Cardiothoracic Imaging Section
Department of Diagnostic and Interventional Imaging
The University of Texas Medical School at Houston

Contributors

- Dr. Ferguson
- Dr. Odisio
- Dr. Hanna
- Dr. John
- Dr. Spence
- Dr. Nicks
- Dr. Bilow
- Dr. Matta
- Dr. Chua
- Dr. Jaideep Barge
(Radpartners)

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 probably 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.

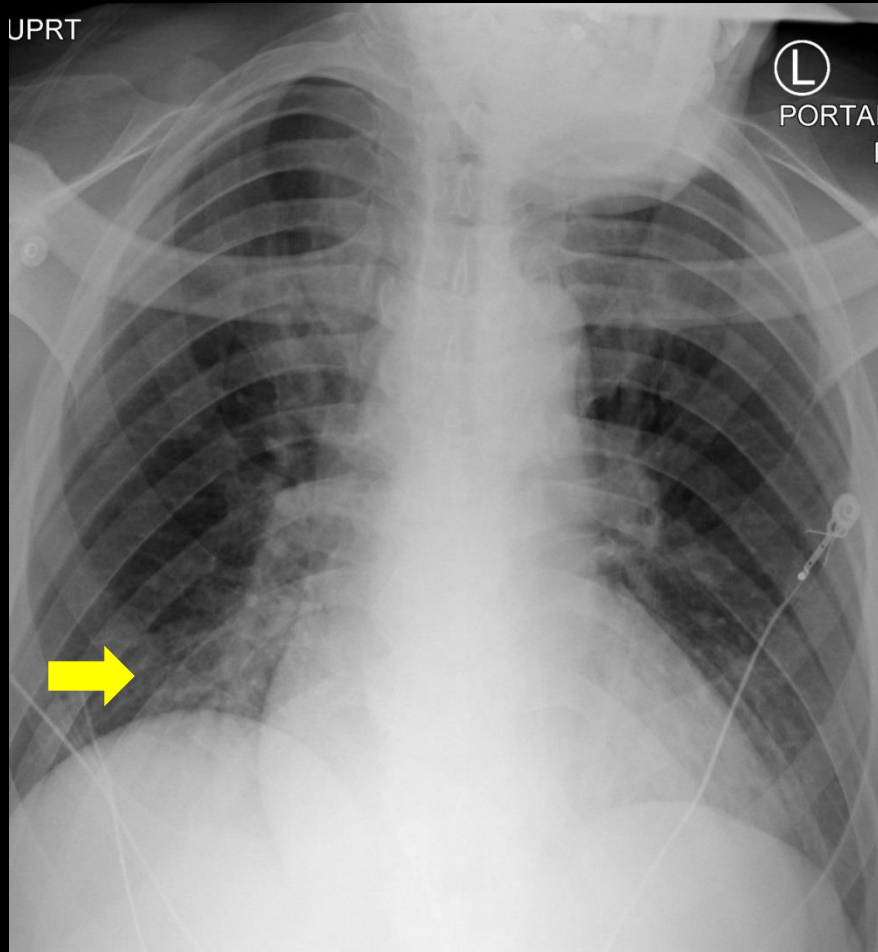
CXR Reporting Guidelines if COVID-19 is suspected clinically.

- 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.

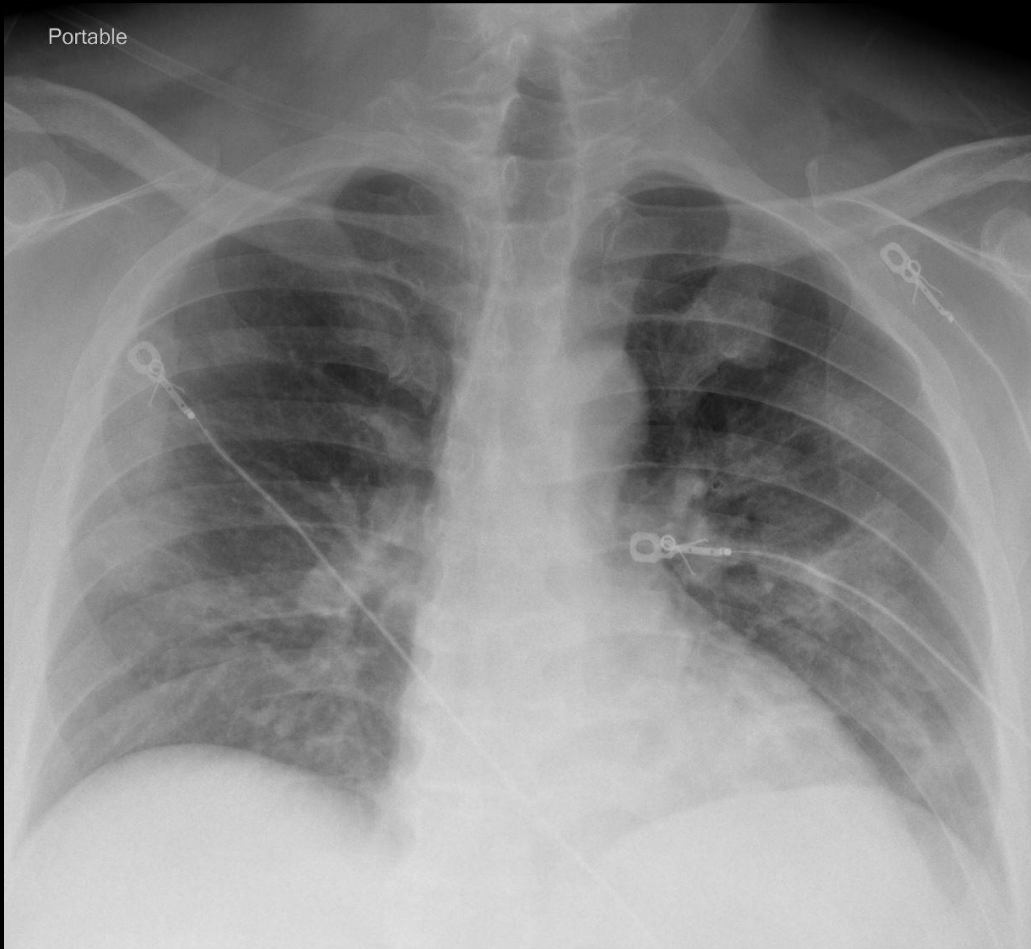
- If you have a **positive** radiograph with subtle generally lower lobe predominant early airspace opacities.
- **IMPRESSION:** Study is positive for airspace disease. Although nonspecific, based on clinical suspicion these findings could represent viral pneumonia.

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.

CT chest in COVID-19

High confidence features:

- Peripheral and bilateral groundglass opacities with or without consolidation.
- Multifocal groundglass opacities of rounded morphology with or without consolidation.
- Some authors have described a lower>upper lobe predominance of findings.

[Kane et al.https://pubs.rsna.org/doi/10.1148/radiol.2020200527](https://pubs.rsna.org/doi/10.1148/radiol.2020200527)

Simpson et al. Confidence levels in reporting COVID-19 on CT Imaging. Ctisus webpage.

CT chest in COVID-19

Intermediate confidence features:

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

Simpson et al. Confidence levels in reporting COVID-19 on CT Imaging. Ctisus webpage.

CT chest in COVID-19

Low confidence features:

- Lobar pattern of consolidation
- Consolidation without groundglass opacity

Simpson et al. Confidence levels in reporting COVID-19 on CT Imaging. Ctisus webpage.

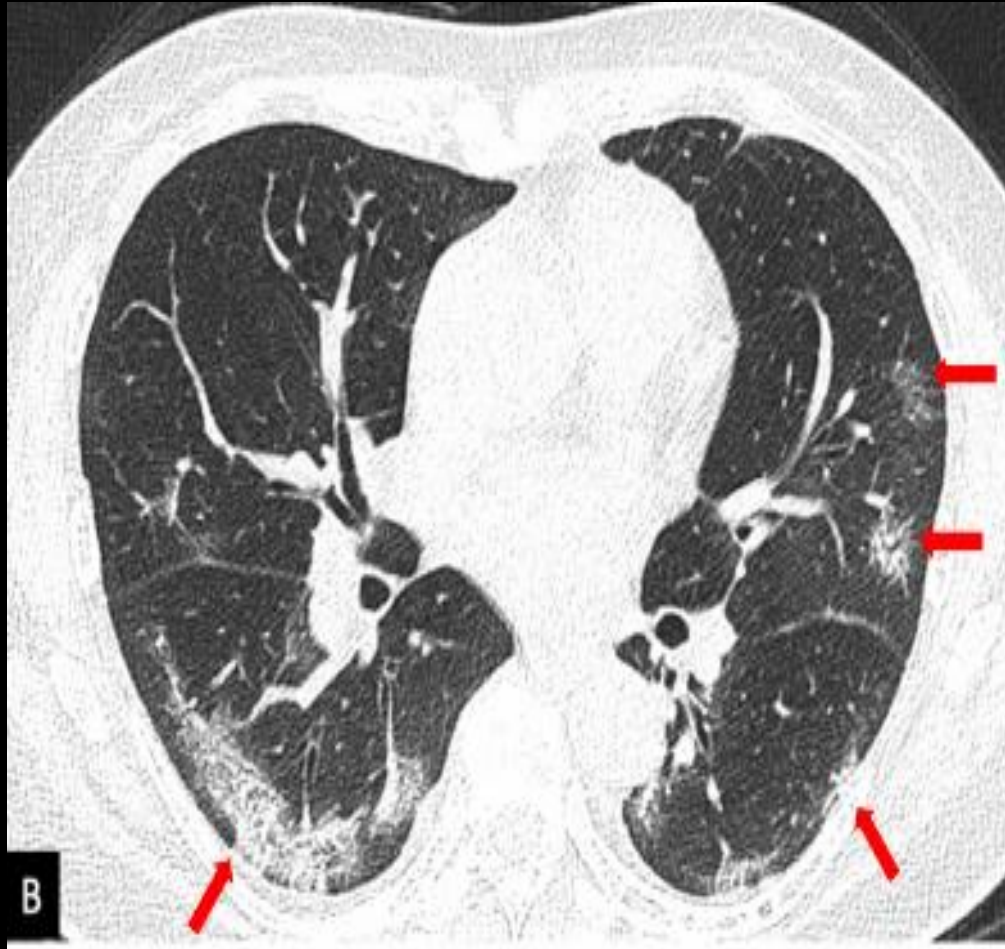
CT chest in COVID-19

- The presence of these findings suggests an alternative diagnosis:
 - Pleural effusion
 - Multiple pulmonary nodules
 - Cavitation
 - Lymphadenopathy

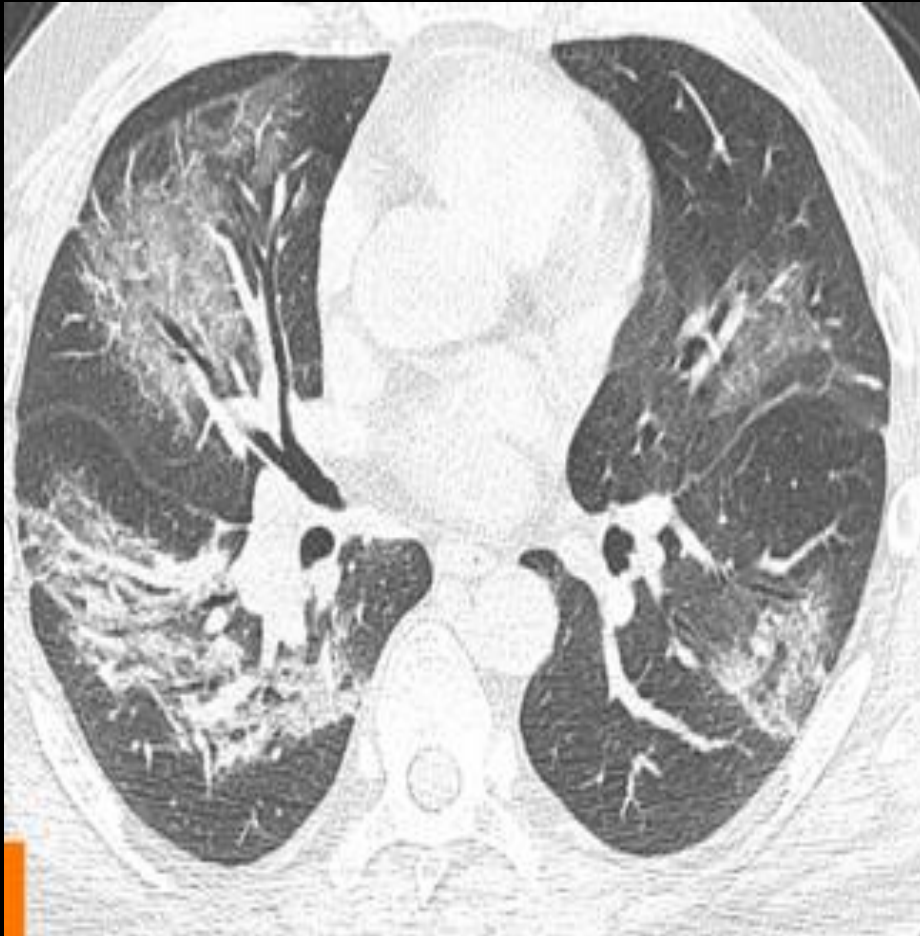
[Kane et al.https://pubs.rsna.org/doi/10.1148/radiol.2020200527](https://pubs.rsna.org/doi/10.1148/radiol.2020200527)

Simpson et al. Confidence levels in reporting COVID-19 on CT Imaging. Ctisus webpage.

Case #1 of +COVID 19

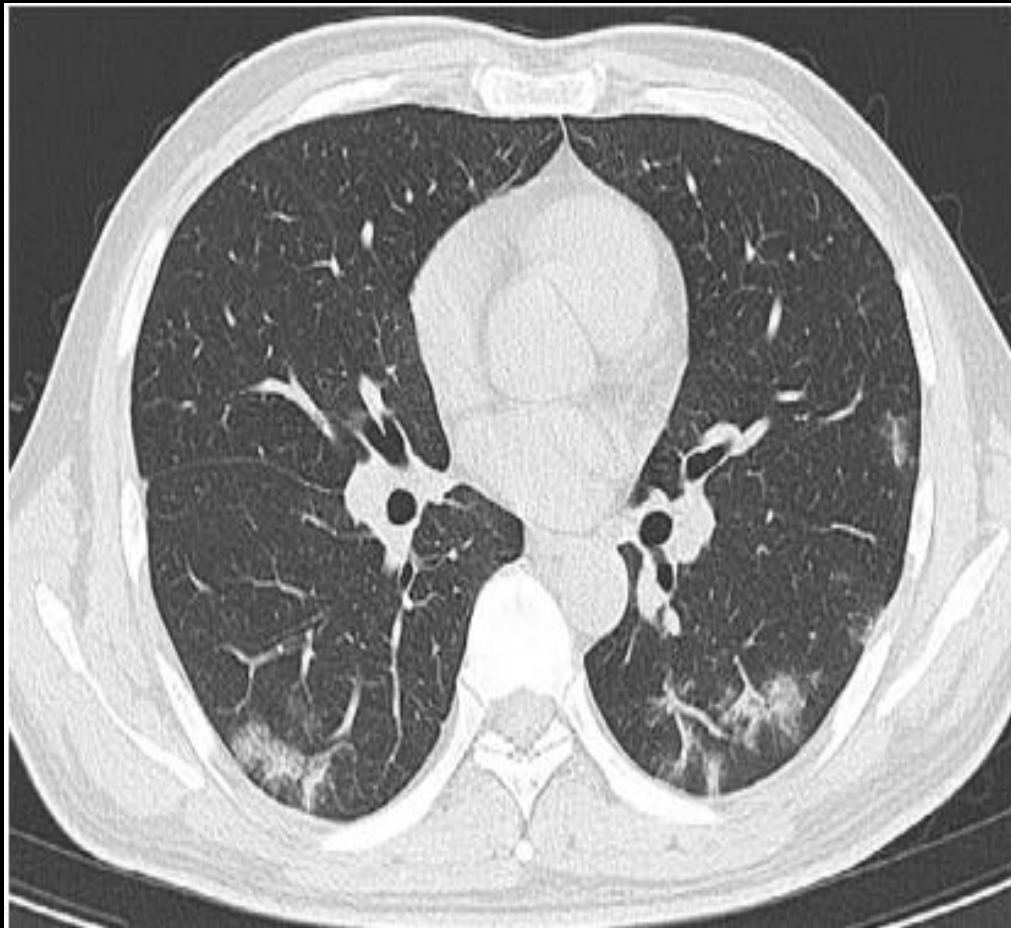


Case #2 of +COVID 19



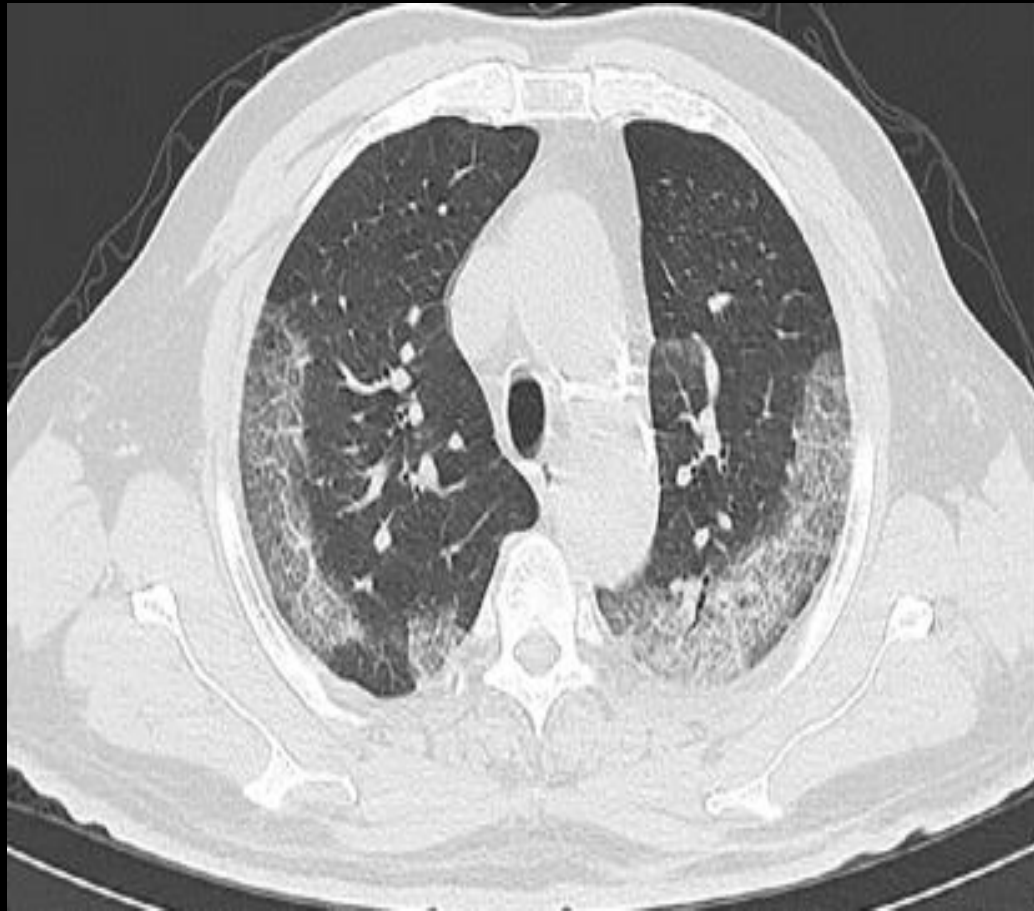
Ming-Yen Ng et al. <https://pubs.rsna.org/doi/10.1148/ryct.2020200034>

Case #3 of +COVID 19

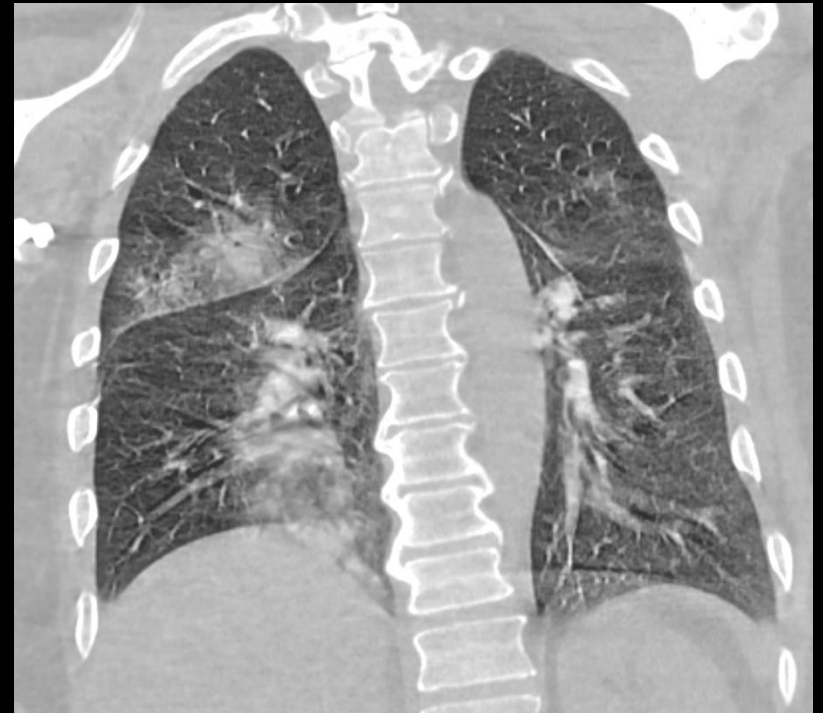


Fang Yicheng et al. <https://pubs.rsna.org/doi/pdf/10.1148/radiol.2020200432>

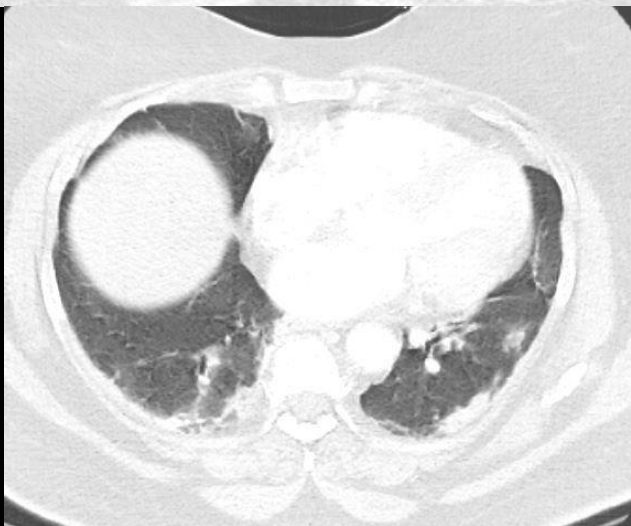
Case #4 of +COVID 19



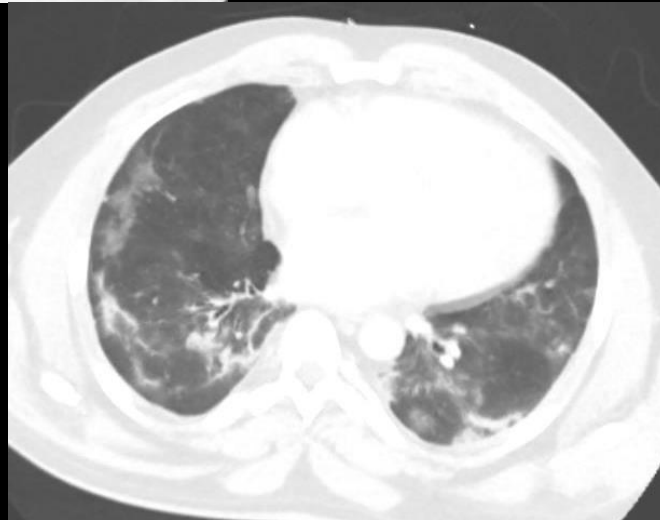
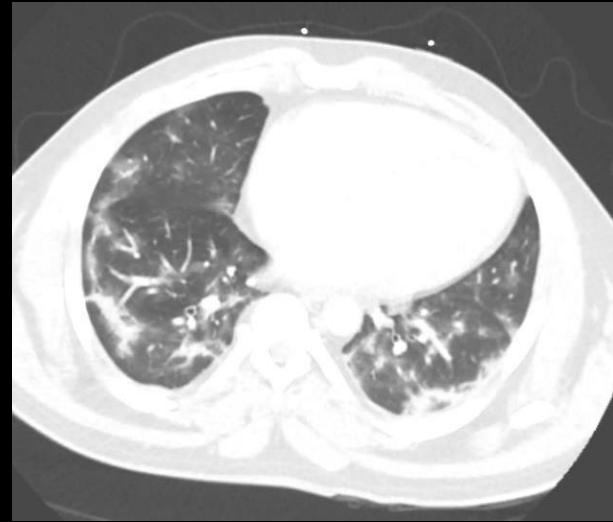
Case #5 of +COVID 19



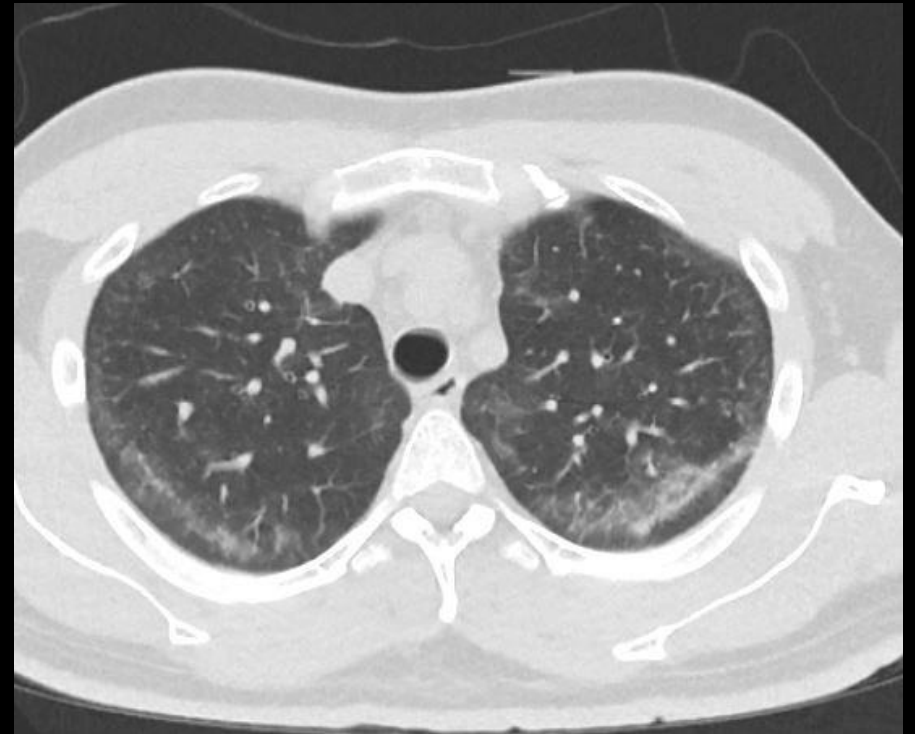
Case #6 of +COVID 19



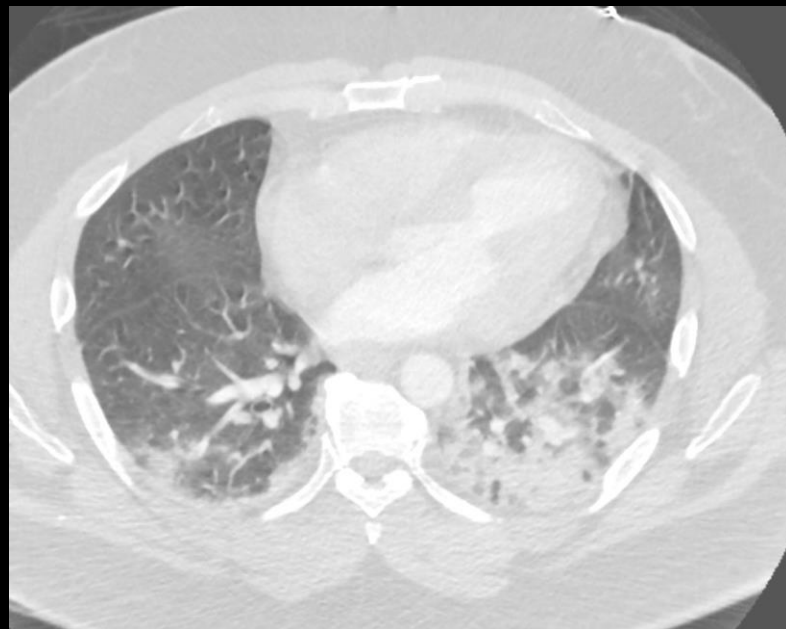
Case #7 of +COVID 19)



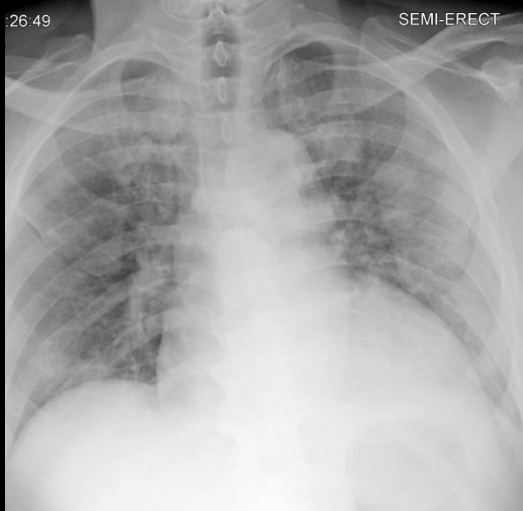
Case #8 of +COVID 19



Case #9 of +COVID 19



Patient under investigation with suspicious features for COVID-19



CT Chest Reporting Guidelines If COVID-19 is suspected clinically

- State that the findings are consistent with clinically suspected diagnosis of viral pneumonia in this case COVID-19, although not specific.
- **IMPRESSION:** Findings consistent with but not specific for atypical pneumonia. Based on clinical suspicion these findings could represent viral pneumonia from COVID-19.

CT Chest Reporting Guidelines If COVID-19 is suspected clinically

- For lungs that appear clear on CT ordered for patients at high risk for COVID-19.
 - **IMPRESSION:** No airspace disease identified. Please note that lungs may initially appear clear in the first few days after COVID-19 infection.

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 Please **do not** use the term “coronavirus” or “COVID-19”.
- **IMPRESSION:** Findings consistent with but not specific for atypical pneumonia including viral pneumonia.

Thank you