



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.jfma-online.com



Letter to the Editor

CT chest findings in coronavirus disease-19 (COVID-19)



To the Editor,

We read with great interest the timely presented research article by Cheng et al. outlining the first case of COVID-19 in Taiwan.¹ With World Health Organization (WHO) declaring the disease to a pandemic level, it is important for the active clinicians to be well versed with the clinical and radiological findings of this disease for early diagnosis and action.^{2,3} In this article, the authors have meticulously delineated the clinical progress of the patient but most impressive part is the succinct but clear explanation of the radiological features. With our letter we wish to complement the article and elaborate more in the chest imaging in COVID-19. Although most of the radiological findings presented in these patients are generic and can be seen in many systemic infectious processes such as pneumonia (viral or bacterial), inflammatory conditions (inflammatory lung diseases, vasculitis) and cardiac etiologies affecting lung parenchyma such as decompensated congestive heart failure, early recognition and high index of suspicion is of paramount importance.

In terms of the radiological findings on a chest X ray or CT scan, the infiltrative process can be even seen unilaterally unlike the case in description.^{4–6} As the timeline progresses and with the progression of the disease, the radiological findings tend to become more confluent and bilateral. These can range from ground glass opacities (GGOs) to dense consolidations. At this point there is limited evidence to state that denser or more confluent radiological lung involvement is linked to worse clinical outcomes, but it is clear that the longer duration of illness is definitely linked to diffuse bilateral infiltrates with bibasilar distribution.^{4,7,8}

Even though the authors described this case as confirmed corona virus infection, they have omitted the important additional information about these patients such as underlying medical comorbidities, fluid status (volume overload), recent use of steroids and other concomitant infections (superadded pneumonia with corona virus infection).

As we see more and more of these cases, it would also be interesting to know the difference in the radiological features of patients that required mechanical ventilation

versus patients who did not, since positive pressure ventilation can affect the radiological findings in these patients. The readers would also benefit from the information about difference in clinical outcome of these patients with benign initial chest imaging that progressed to prolonged illness and/or further need for invasive mechanical ventilation versus the patients who present with early confluent radiological findings.

Finally, it is expected that just like any other illness, these patients will present with sepsis like presentation and will be aggressively fluid resuscitated. Cautious (restricted) intravenous fluid strategy should be the used in these patients to avoid fluid overload and progression to ARDS which is more likely seen with liberal fluid strategy would.

This important publication definitely provides valuable information to the readers. Further characterization of radiological features in the right context of patient specific comorbidities and relation with other medical conditions (superadded pneumonia, underlying heart failure or fluid overload and rheumatological diseases) would definitely add value to the knowledge in this field and educate the treating clinician pool of internists, pulmonologists, intensivists and radiologists alike.

Declaration of Competing Interest

The authors have no conflicts of interest relevant to this article.

References

1. Cheng SC, Chang YC, Fan Chiang YL, Chien YC, Cheng M, Yang CH, et al. First case of coronavirus disease 2019 (COVID-19) pneumonia in Taiwan. *J Formos Med Assoc* 2020;119(3):741–51.
2. Sahu KK, Mishra AK, Lal A. Comprehensive update on current outbreak of novel coronavirus infection (2019-nCoV). *Ann Transl Med* 2020. <https://doi.org/10.21037/atm.2020.02.92>.

<https://doi.org/10.1016/j.jfma.2020.03.010>

0929-6646/Copyright © 2020, Formosan Medical Association. Published by Elsevier Taiwan LLC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

3. Sahu KK, Mishra AK, Lal A. Novel coronavirus (2019-nCoV): update on 3rd coronavirus outbreak of 21st century. *QJM Month J Assoc Phys* 2020 [Epub ahead of print].
4. Bernheim A, Mei X, Huang M, Yang Y, Fayad ZA, Zhang N, et al. Chest CT findings in coronavirus disease-19 (COVID-19): relationship to duration of infection. *Radiology* 2020 Feb 20:200463. <https://doi.org/10.1148/radiol.2020200463> [Epub ahead of print].
5. Pan F, Ye T, Sun P, Gui S, Liang B, Li L, et al. Time course of lung changes on chest CT during recovery from 2019 novel coronavirus (COVID-19) pneumonia. *Radiology* 2020 Feb 13:200370. <https://doi.org/10.1148/radiol.2020200370> [Epub ahead of print].
6. Akella P, Loganathan S, Jindal V, Akhtar J, Lal A. Anti PD-1 immunotherapy related interstitial lung disease presenting as respiratory failure - A review with case series. *Respir Med Case Rep* 2019;26:17–22.
7. Lal A, Akhtar J, Ullah A, Abraham GM. First case of pleural empyema caused by *Staphylococcus simulans*: review of the literature. *Case Rep Infect Dis* 2018 Oct 11;2018:7831284.
8. Lal A, Davis MJ, Akhtar J, Chen Y, Davis S. Serious cover-up: Hodgkin's lymphoma masked by organizing pneumonia. *Am J Med* 2018;131(10):1174–7.

Amos Lal*

Division of Pulmonary and Critical Care Medicine, Mayo Clinic, Rochester, MN, USA

Ajay Kumar Mishra

Kamal Kant Sahu

Department of Medicine, Saint Vincent Hospital, Worcester, MA, USA

E-mail addresses: ajaybalasore@gmail.com (A.K. Mishra), kamalkant.sahu@stvincenthospital.com (K.K. Sahu)

*Corresponding author.

E-mail addresses: Lal.Amos@mayo.edu, manavamos@gmail.com (A. Lal)

11 March 2020