

CHEST CT IMAGING FEATURES OF PROGRESSIVE PHASE COVID-19 PNEUMONIA AND EVOLUTION OF FINDINGS

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ABSTRACT

Introduction: In the natural course of COVID-19 (coronavirus disease 2019) pneumonia, four stages have been described with aggravation and extension of the lesions in the progressive stage and a more slower increase toward the maximum involvements in the peak stage before the absorption phase. A distinct pattern and time course of evolution is observed depending on the severity of the disease.

Materials and methods: We aimed to present chest CT findings of advanced stage Covid-19 pneumonia observed in our patients with rRT-PCR test-confirmed COVID-19, from the March 15 to August 15 2020.

Results: As the disease progress more central involvement of the lung with increased GGOs (with or without reticulation) and consolidations occur and may be accompanied by development of organizing changes appearing usually as irregular, frequently linear consolidative opacities with possible bronchial changes. In addition, rarely encountered extraparenchymal findings and some atypical CT features unexpected to be identified in new coronavirus disease can be observed. In the survival patients this progressive period is followed by the absorption phase, which may or may not be accompanied by irreversible pulmonary changes like fibrosis or cystic formations.

Conclusion: We believe that being familiar with chest CT manifestations of advanced stage Covid-19 pneumonia and the changes throughout the disease process will be helpful in the management of Covid-19 pneumonia. Moreover, Covid-19 pneumonia can still be the concern in the presence of atypical findings either due to a coinfection/superinfection or as rarely occurring features with currently unknown mechanisms.

Keywords: Covid-19, SARS-CoV-2, organising pneumonia, reversed halo.

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Introduction

In the natural course of COVID-19 (coronavirus disease 2019) pneumonia, four stages have been described with aggravation and extension of the lesions in the progressive stage (about 5th to 8th days) and a more slower increase toward the maximum involvements in the peak stage (about 9th to 13th days) before the absorption phase which may or may not be accompanied by irreversible pulmonary changes^(1, 2). A distinct pattern and time course of evolution is observed depending on the severity of the disease. Being familiar with different evolution patterns is useful to distinguish expected changes of this natural course from the findings of poor prog-

nosis. In addition to that, chest CT plays a crucial role also in the detection of complications, like pulmonary embolism during the disease course. In this pictorial review, we aimed to present chest CT manifestations of advanced Covid-19 pneumonia, the rarely encountered extraparenchymal findings and modifications in these CT features observed in the re-examination CT scans during the follow-up of our patients with confirmed Covid-19, from the March 15 to August 15, 2020 were presented.

Ct manifestations observed in advanced stages

In the progressive and peak stages, increase in the GGOs (with or without reticulation) & consol-

idations occur and may be accompanied by development of organizing pneumonia pattern, appearing usually as irregular, frequently linear consolidative opacities^(1,2) (fig. 1A, 1D, 1E, 1F, 1G, 2A and 2C).

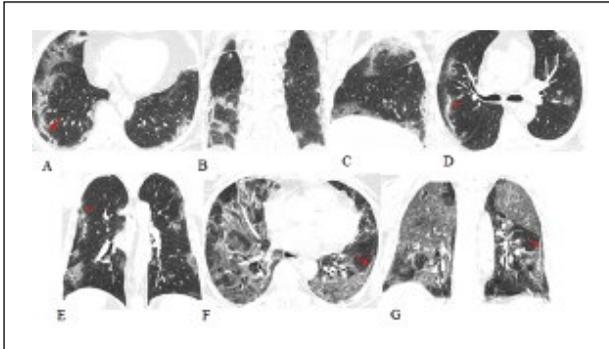


Figure 1: a-g. axial (a), coronal (b) and sagittal (c) chest CT images of a 60 year old male, axial (d) and coronal (e) chest CT images of a 79 year old male and axial (f) and coronal (g) chest CT images of a 74 year old male with confirmed Covid-19, show bilateral GGOs and linear consolidations (a, d, e, f, g red arrows) resulting in organizing pneumonia pattern. Note the presence of interlobar pleural thickening in the first patient (b, c, white arrows) and white lung appearance (f, g) in the third patient.

It is a common but a nonspecific pattern of alveolar inflammation along with the involvement of bronchioles, which can be caused by various infectious and noninfectious etiologies. It may be associated with bronchial changes including bronchial wall thickening and bronchiectasis caused by inflammatory damage of bronchial wall, more frequently reported in critical cases compared to mild cases^(3,4,5) (fig. 2A, 2B, 2C and 2E). A reversed halo sign, also known as atoll sign indicates an area of GGO surrounded by a complete/incomplete ring of consolidation. We have encountered reversed halo sign in our patients more often than other types of viral pneumonia (fig. 3A, 3C, 3D, 3E and 3F). It is also a nonspecific pattern of organising pneumonia and has been reported variably in patients with Covid-19⁽⁶⁾. The mechanism of this sign is not clear. Some studies argued that it depicts disease progression that make the consolidation developed around the GGO. In contrast, others opined that it is related with absorption in the lesion leaving a decreased attenuation in the center. As another form of organising pneumonia, a perilobular pattern which is composed of a polygonal shape linear/curvilinear opacities thicker than the linear opacities of reticulation has also been reported in patients with Covid-19, and we have seen this CT feature occasionally in our cases⁽⁷⁾ (fig. 4, 5B). In the recovery phase, the GGOs and consolidations are gradually reabsorbed with or without persistent pulmonary

changes like fibrosis or cystic formations. When the areas of consolidations begin to absorb from the periphery to the center, the reduced attenuation towards GGO has been resembled a melted sugar⁽⁸⁾ which is like the opposite pattern of absorption proposed in the possible pathological mechanisms of reversed halo sign.

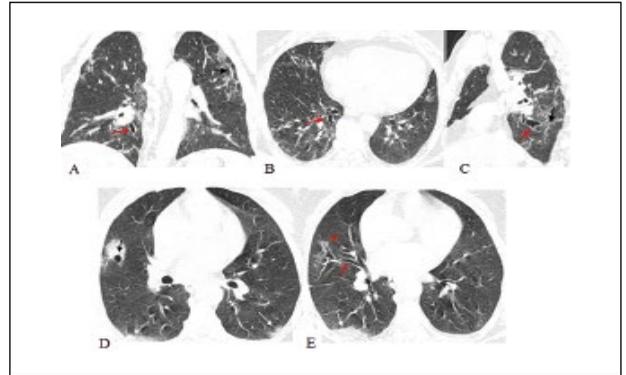


Figure 2: a-e. coronal (a), axial (b) and sagittal (c) chest CT images of a 54 year old male show bilateral peripheral GGOs and linear consolidations (a, c, black arrows) resulting in organizing pneumonia pattern and the presence of bronchiectasis with bronchial wall thickening (a, b, c, red arrows) Axial (d, e) chest CT images of a 61 year old female with confirmed Covid-19, display a round shaped peripheral consolidation with air bubble sign (d, black arrow) in the right middle lobe. Just inferior to this consolidative opacity, bronchiectasis and bronchial wall thickening is recognisable (d, red arrows). Subpleural patchy consolidations in both lower lobes are also visible (d, e, white arrows).

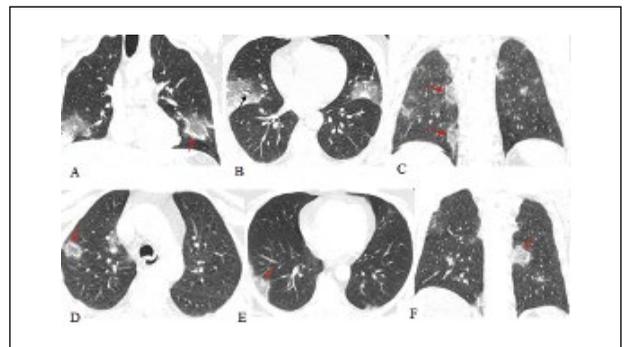


Figure 3: a-f. Coronal (a) and axial (b) chest CT images of a 57 year old male with confirmed Covid-19, show the same lesion demonstrating both “reversed halo sign” superiorly (a, red arrow) and “halo sign” inferiorly (b, white arrow). Another patchy subpleural GGO associated with pulmonary vascular prominence and air bronchogram sign is visible in the middle right lobe (b, black arrow). Coronal (c) chest CT image of a 39 year old, axial (d) chest CT image of a 52 year old, coronal (e) chest CT image of a 33 year old and axial (f) chest CT image of a 65 year old females with confirmed Covid-19, demonstrate round shaped or patchy areas of GGOs surrounded by a complete/incomplete ring of consolidation, the “reversed halo sign” (red arrows).

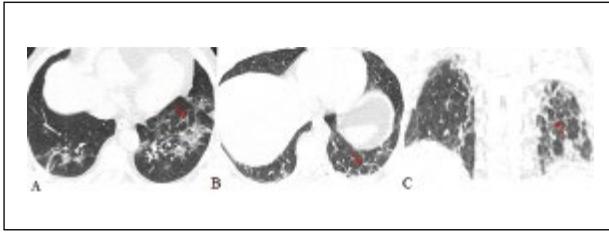


Figure 4: a-c. Axial (a) chest CT image of a 64 year old and axial (b), coronal (c) chest CT images of a 27 year old males, show arcade shaped thickening of interlobular septa representing the perilobular pattern of organising pneumonia (red arrows). Note the presence of an irregular fibrotic opacity in the right lower lobe of the second patient (c, white arrow).

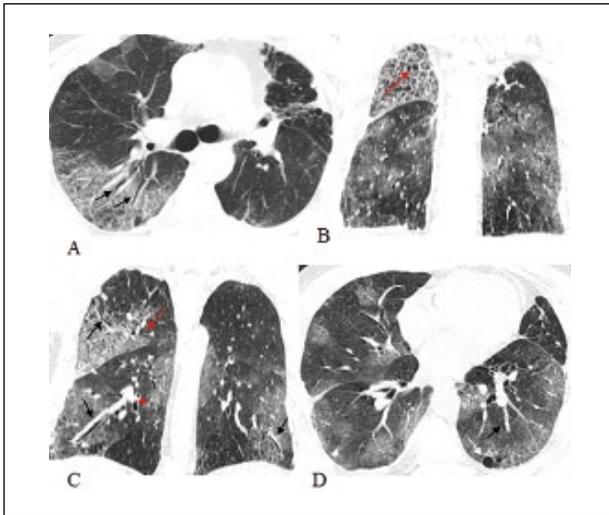


Figure 5: a-d. Axial (a), coronal (b) chest CT images of a 70 year old male and coronal (c), axial (d) chest CT images of a 75 year old male with confirmed Covid-19, demonstrate extensive areas of GGOs with panlobar involvement. Pulmonary vascular prominence with air bronchogram signs is visible within the GGOs (a, c, d, black arrows). The perilobular pattern of organising pneumonia formed by prominent interlobular septal thickening delineating secondary pulmonary lobules is seen (b, red arrow). Note the presence of bronchiectasis with bronchial wall thickening (c, red arrow head), and multiple bronchioloectasis (c, red arrow). Multiple air bubbles are also recognisable (c, d, white arrows).

During the healing of the pulmonary inflammation, cystic air spaces may also develop, usually in the subpleural areas due to the predominant involvement of the lesions in the subpleural regions (fig. 6). These subpleural cystic air spaces are assumed to be associated with increased risk for spontaneous pneumothorax⁽⁹⁾. Pulmonary fibrosis which is defined as scarring of the lung interstitium with or without associated tractional bronchiectasis, occurs mainly in the healing stage with absorption of the GGOs and consolidations. It is argued that whether this indicates

a good prognosis implying the control and recovery of the pulmonary inflammation or worse prognosis making chronic interstitial diseases possible in the future⁽²⁾. On the other hand, fibrotic streaks may also be encountered in the proliferative phases, even if as an only finding like in our one case (fig. 7B).

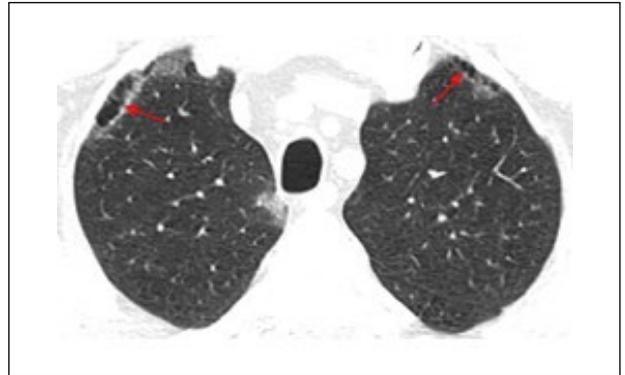


Figure 6: Axial chest CT image of a 55 year old female with confirmed Covid-19, shows multifocal subpleural GGOs in bilateral upper lobes. Note the subpleural cystic formations associated with the GGOs (arrows), which are assumed as potential risk for spontaneous pneumothorax.

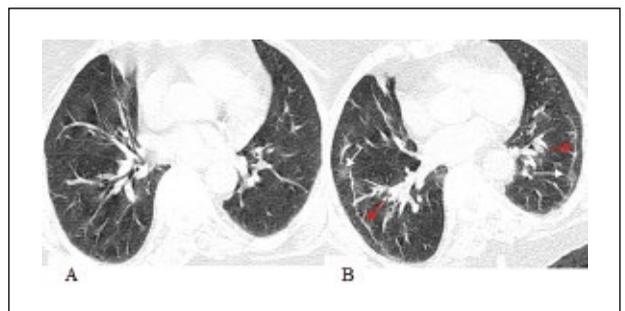


Figure 7: a, b. Axial chest CT images of a 77 year old female showed no infiltration at first (a) but her rRT-PCR test for Covid-19 was positive. On day 7, the re-examination CT scan revealed bilateral peripherally located thin fibrotic streaks (b, red arrows) in association with a faint areas of GGOs (b, white arrows).

A subpleural curvilinear line, a curvilinear opacity with a few millimeters of thickness, close to the pleural surfaces, is among the rare CT features observed in Covid-19 pneumonia and may occur due to fibrosis or can be seen in association with pulmonary edema when observed in the proliferative stages⁽¹⁰⁾ (fig. 8).

Extraparenchymal findings

Extraparenchymal manifestations are rare to be identified in chest CT of Covid-19 patients and usually observed concomitantly with pulmonary disease. In addition, they may be present on its own, especially in elderly patients with comorbidities like cardio-

vascular diseases. Among others, pleural pathologies particularly pleural thickening are relatively more frequent and can be seen in the pleura adjacent to the lesions of Covid-19 or interlobar pleural parts can be thickened. These are best seen on mediastinal window (fig. 1B, 1C).

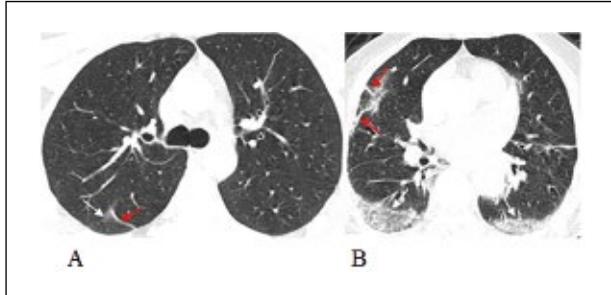


Figure 8: a, b. Axial (a) chest CT image of a 33 year old male shows unilateral, unifocal involvement characterized by a subpleural curvilinear line, possibly due to pulmonary edema (a, red arrow) associated with a small, faint area of GGO (a, white arrow). Axial (b) chest CT image of a 65 year old female with confirmed Covid-19, shows subpleural GGOs in bilateral lower lobes (b, white arrows) and subpleural curvilinear lines (b, red arrows).

Pleural effusion has been variably reported in Covid-19 patients and is thought to be associated with poor prognosis⁽¹¹⁾ (fig. 9B, 9E).

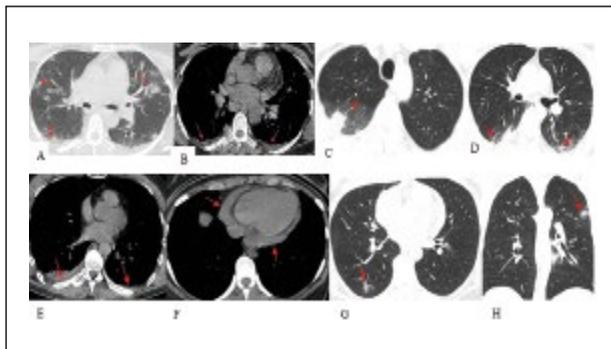


Figure 9: a-h. Axial (a,b) chest CT images of a 53 year old female with confirmed Covid-19, show bilateral areas of GGOs (a, arrows) and bilateral pleural effusion (b, arrows). Axial (c-d) chest CT images of a 43 year old male with confirmed Covid-19, show GGO surrounding a central round shaped consolidation resulting in halo sign in the right upper lobe (c, arrow) and irregular subpleural consolidations with linear organising changes (d, arrows). Thin pleural effusions in both sides are visible (e, arrows). Axial (f, g) and coronal (h) chest CT images of a 52 year old female with confirmed Covid-19, demonstrate pericardial effusion with maximum thickenes of 1.7 cm (f, arrows) and bilateral peripheral GGOs (g, h, arrows).

Complicated pneumonia with spontaneous pneumothorax is very rare and is thought that it occurs as a result of alveolar damage associated with

cystic formations in the frequently involved subpleural regions, causing a potential risk to rupture into the pleural cavity⁽⁹⁾. Pericardial effusion is also rare and may be associated with myocardial injury (myocarditis) or can be the sign of acute pericarditis. We observed pericardial effusion with thickness of greater than 1 cm in only one of our patients (fig. 9F).

Mediastinal lymphadenopathy with short axis diameter greater than 1 cm although is not expected to be identified in viral pneumonia, highly sizeable mediastinal lymph nodes have been reported in Covid-19 patients, particularly in severe cases^(10, 12). We observed such sizable lymph nodes rarely in our patients (fig. 10A, 10C).

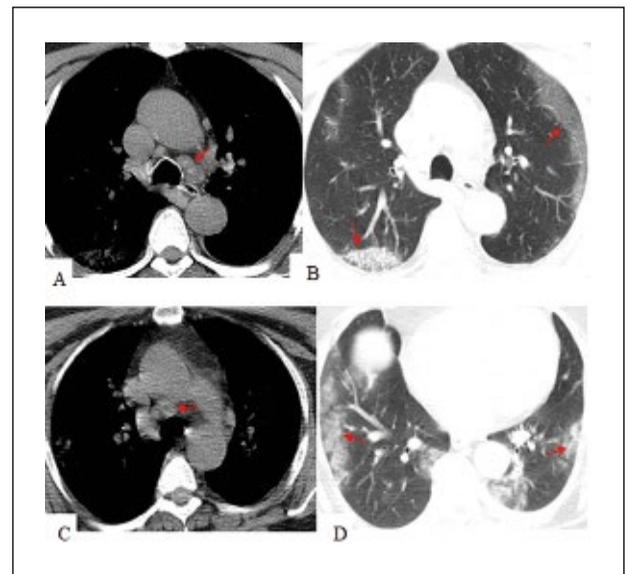


Figure 10: a-d. Axial (a, b) chest CT images of a 67 year old male and axial (c, d) chest CT images of 64 year old female with confirmed Covid-19, demonstrate enlarged mediastinal lymph nodes with short axis diameter greater than 1 cm (a, c, arrows). Note the presence of peripheral GGOs and consolidations (b, d, arrows).

However, we observed an increase in the size and cortical thickness of a mediastinal lymph node in one of our cases during the disease course on follow up CT scan, which supports the studies reporting the mediastinal lymphadenopathy among the CT manifestations of Covid-19 (shown in fig. 17).

Disturbed coagulation functions have been well documented in Covid-19 patients, posing a significant risk for deep vein thrombosis and pulmonary embolism, but also for other acute thromboembolic complications like myocardial infarction or ischemic stroke⁽¹³⁾ (fig. 11A, 11C). In cases with clinical suspicion for pulmonary embolism, pulmonary CT angiography (CTA) should also be performed. However, it is worth to note that a precontrast chest CT is still

needed in these patients to prevent any confusion due to mosaic perfusion of CTA, which may be mistaken as GGO. Examples of follow up chest CT scans and the evolution of findings in time are presented in the figures 12, 13, 14, 15, 16, 17.

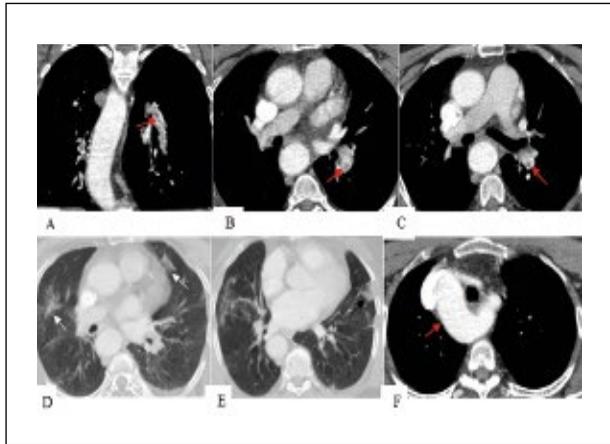


Figure 11: a-f. Contrast enhanced coronal (a), axial (c-f) chest CT images of a 64 year old female with confirmed Covid-19, demonstrate an acute pulmonary embolism in the left interlobar artery (a-c, red arrows) and bilateral patchy areas of GGOs (d, e, white arrows). Note also the presence of right archus aorta (f, red arrow).

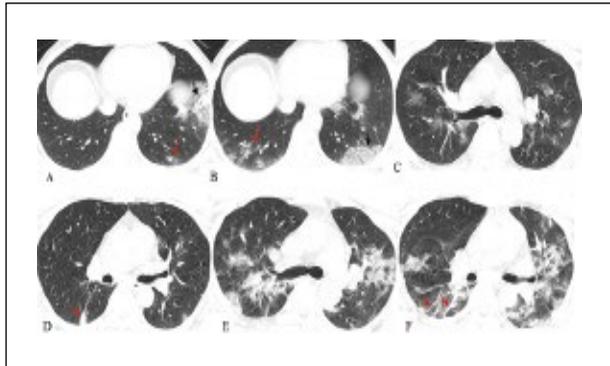


Figure 12: a-f. Axial (a, b) chest CT images of a 33 year old male with confirmed Covid-19. On admission day, CT image (a) shows an anteriorly located, partially consolidated subpleural GGO with air bronchogram signs (black arrow) and a posteriorly located smaller infiltration (red arrow) in the left lower lobe. On day 9 (4 days after treatment), re-examination CT image (b) shows obvious resorption of the anteriorly located lesion with further extension of the smaller infiltration (black arrow) and re-appearance of patchy GGOs at posterior basal segment of the right lung (red arrow). Axial (c-f) chest CT images of a 43 year old man with confirmed Covid-19. On admission day, CT images (c, d) show multiple bilateral patchy areas of GGOs and a subpleural consolidation (d, red arrow). Three days after admission, re-examination CT images obtained from the same levels (e, f) show increase in the extent and density of the GGOs (e) and newly appeared consolidations in association with linear opacities (f, red arrows) resulting in organising pneumonia pattern.

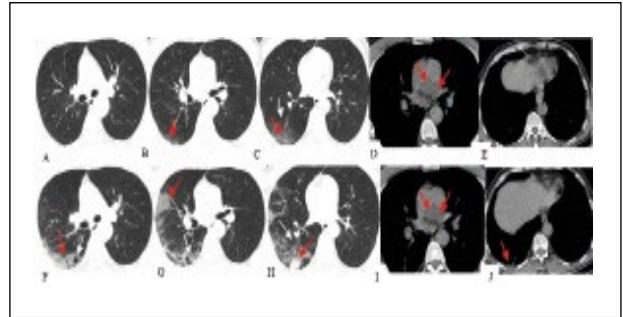


Figure 13: a-j. Axial CT images of a 66 year old male with confirmed Covid-19. On admission day, CT images (a-e) show a subpleural GGO in the posterior right lower lobe (b, c, red arrow) associated with perilesional bronchiectasis (c, white arrow). Enlarged mediastinal lymph nodes with maximum short axis diameter of 1.8 cm are visible (d, red arrows). On day 7, re-examination CT images obtained from the same levels (f-j) show newly appeared GGOs in the right lung (f, g, red arrows) with an air bubble (f, white arrow). GGOs with linear consolidations resulting in spider web sign is recognizable (g, white arrow). A newly developed round shaped subpleural consolidation is shown (h, red arrow) with persistence of the perilesional bronchiectasis (h, white arrow) in the posterior right lower lobe. Note also the persistence of mediastinal lymph nodes (i, red arrows) and development of a focal pleural thickening at the right lung bases (j, red arrow).

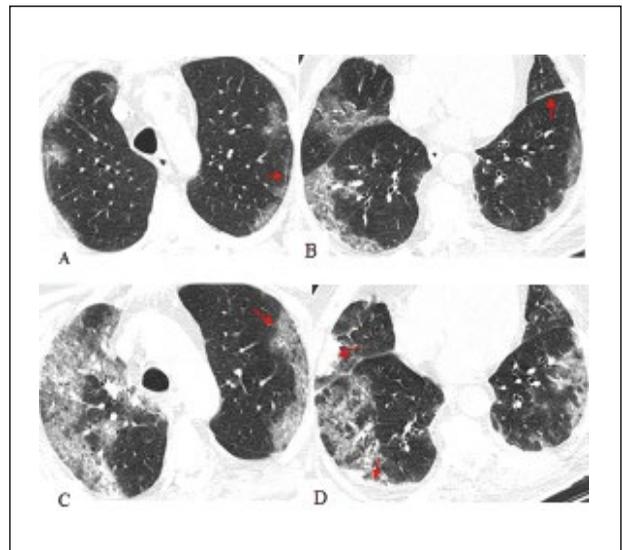


Figure 14: a-d. Axial chest CT images of a 79 year old male with confirmed Covid-19. On admission day, CT images (a, b) show peripheral located patchy areas of GGOs in both lungs with a thin subpleural fibrotic streak in the left upper lobe (a, arrow) and interlobar pleural thickening (b, arrow). Four days after admission, re-examination CT images obtained from the same levels (c, d) show that the involved areas of the lung increased with development of crazy paving pattern (c, arrow) and consolidations (d, arrows). This patient was admitted to ICU and died on day 13.

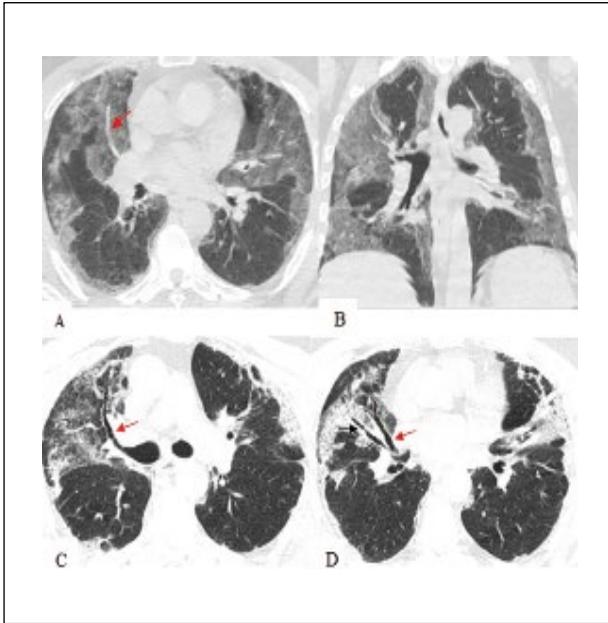


Figure 15: a-d. Axial (a, c, d) and coronal (b) chest CT images of a 67 year old male with confirmed Covid-19. On admission day, CT images (a, b) performed just before admission in ICU show bilateral extensive areas of GGOs resulting in white lung appearance. Prominent pulmonary vessel sign within the GGO is visible (a, arrow). On day 14, re-examination CT images (c, d) show that the GGOs were absorbed and manifested as irregular consolidations associated with distorted and dilated bronchi showing bronchial wall thickening (c, d, arrows).

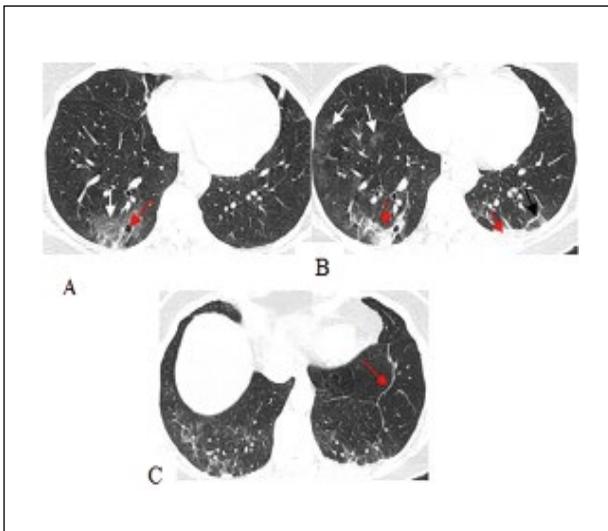


Figure 16: a-c. Axial chest CT images of a 60 year old female with confirmed Covid-19. On admission day, CT image (a) demonstrates a partially consolidated subpleural GGO (a, white arrow) with air bubble sign (a, red arrow). 5 days after admission, re-examination CT images (b, c) show new areas of faint GGOs (b, white arrows) and development of consolidations (B, red arrows) in association with linear opacities (b, black arrow) of organising pneumonia pattern. Note the development of a fibrotic streak in the left lower lobe (c, arrow).

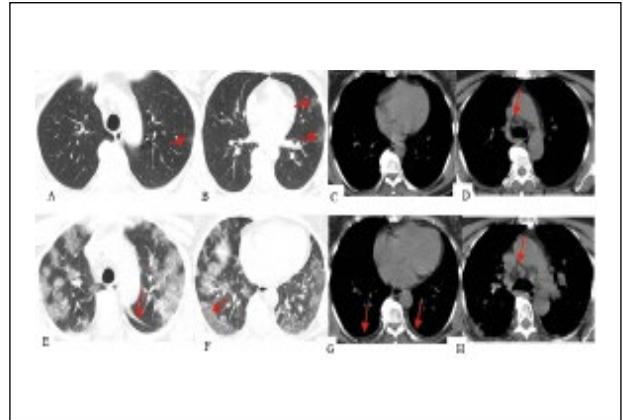


Figure 17: a-h. Axial chest CT images of a 59 year old female with confirmed Covid-19. On admission day, CT images (a-d) demonstrate some patchy areas of subpleural GGOs (a, b, arrows). There is no pleural effusion (c). Note the presence of enlarged mediastinal lymph node (d, arrow). On day 2, re-examination CT images (e-h) show extensive areas of GGOs forming white lung appearance. Interlobar pleural thickening (E, arrow) and crazy paving pattern (f, arrow) are recognizable. Note the presence of bilateral small amount of pleural effusion (g, arrows) and the increase in the size and cortical thickness of the mediastinal lymph node (h, arrow).

Unexpected ct features in covid-19

Focal segmental or lobar consolidations, multiple small centrilobular nodules and tree in bud appearances are not expected to be identified in Covid-19 in the absence of superinfection. However, secondary infections are common particularly in severely ill Covid-19 patients with much greater frequency in the ICU. In one of our patient, chest CT showed diffuse small centrilobular nodules & tree in bud appearance accompanied to the focal peribronchovascular GGOs. It was considered as a bacterial superinfection which disappeared on re-examination CT scan following antibacterial treatment, as contrary to the progression of the CT manifestations of Covid-19 (fig. 18).

Pulmonary cavitation although reported in a few cases of Covid-19 pneumonia^(14, 15), it is uncommon to be identified in viral pneumonia. We have observed only one case of cavitory lesions during the course of Covid-19 pneumonia, which was diagnosed as secondary bacterial infection by bronchoalveolar lavage (BAL)⁽¹⁶⁾. Therefore, in cases of cavitory lesions superinfection should always be considered before assuming the necrotising pneumonia as the consequence of Covid-19 itself.

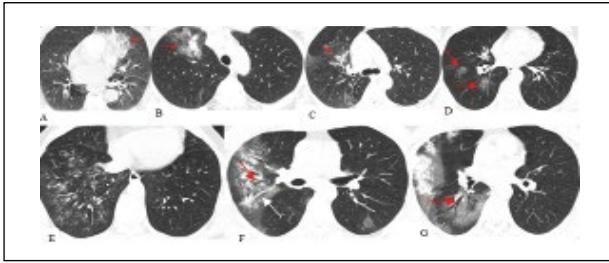


Figure 18: Axial (a) chest CT image of a 45 year old male shows a unifocal segmental consolidation and GGO with air bronchogram signs in the left upper lobe consistent with bacterial pneumonia (arrow). Axial (b,c) chest CT images of a 53 year old female negative rRT-PCR test show mixed opacity of segmental consolidation and GGO (b, arrow) accompanied by small centrilobular nodules with a tree in bud appearance (c, arrow). Axial (d-g) chest CT images of a 69 year old male. On admission day, chest CT image (d) shows peribronchovascular GGOs in the right lower lobe (d, arrows) consistent with the CT features of Covid-19 pneumonia. Multiple tiny centrilobular nodular GGOs and tree in bud appearance were also present in the right lower lobe (e). His rRT-PCR test was positive for Covid-19. Therefore, the CT findings on image (e) has been considered as superinfection. On day 8, chest CT images (e,f) following treatment, show progression in the GGOs with addition of patchy consolidations in the right lung and disappearance of the infiltrations of superinfection. Note the newly appeared air bronchogram (f, red arrow) and prominent pulmonary vessel signs (f, white arrow) within the lesion and distorted bronchiectasis (g, arrow).

Incidental identification of covid-19 pneumonia at basal segments of the lung

With the increased number of asymptomatic patients, Covid-19 pneumonia can be incidentally established at lung bases which was partially covered on abdominopelvic CT scans or magnetic resonance imaging (MRI) (17) performed for different reasons (fig 19)⁽¹⁷⁾.

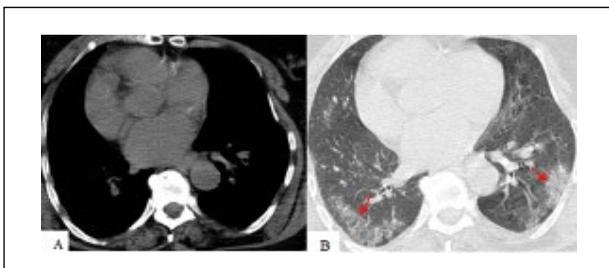


Figure 19: a, b. Axial (a, b) CT images a 77 year old female with left abdominal pain. Noncontrast abdomen CT image (a) at the level of lung bases and parenchymal window of the same image (b) revealing patchy, subpleural GGOs in both lower lobes (arrows). Pulmonary parenchymal window should always be examined on abdominopelvic CT scans.

Therefore, we should be aware of suspicious findings of COVID 19 pneumonia in all radiological imaging modalities to allow early recognition of these asymptomatic carriers and prevent further transmission of the infection.

Conclusion

In this study, we highlighted the chest CT manifestations of the advanced stage Covid-19 pneumonia, the rarely encountered extraparenchymal findings and evolution of the CT features on re-examination CT scans during follow-up. In addition, we presented some atypical CT features unexpected to be identified in new coronavirus disease. However, we also focused on the fact that Covid-19 pneumonia can still be the concern in the presence of these atypical findings either due to a coinfection/superinfection or as rarely occurring features with currently unknown mechanisms.

References

- 1) Bernheim A, Mei X, Huang M et al. Chest CT findings in coronavirus disease -19 (COVID-19): relationship to duration of infection. *Radiology* 2020; 295: 685-691.
- 2) Pan F, Ye T, Sun P, et al. Time course of lung changes on chest CT during recovery from 2019 novel coronavirus (COVID-19) pneumonia. *Radiology* 2020 Feb 13.
- 3) Zhao W, Zhong Z, Xie X, Yu Q, Liu J. Relation between chest CT findings and clinical conditions of coronavirus disease (COVID-19) pneumonia: a multicenter study. *AJR Am J Roentgenol* 2020; 1-6.
- 4) Salehi S, Abedi A, Balakrishnan S, Gholamrezanezhad A. Coronavirus disease 2019 (COVID-19): a systematic review of imaging findings in 919 patients. *AJR J Roentgenol* 2020; 1-7.
- 5) Wang Y, Dong C, Hu Y, et al. Temporal changes of CT findings in 90 patients with COVID-19 pneumonia: a longitudinal study. *Radiology* 2020; 200843.
- 6) Huang P, Liu T, Huang L, et al. Use of chest CT in combination with negative RT-PCR assay for the 2019 novel coronavirus but high clinical suspicion. *Radiology* 2020; 295: 22-23.
- 7) Mehrjardi MZ, Kahkouee S, Pourabdollah M. Radio-pathological correlation of organizing pneumonia (OP): a pictorial review. *Br J Radiol* 2017; 90: 20160723.
- 8) Yueying Pan & Hanxiong Guan. Imaging changes in patients with 2019-nCov. *European Radiology* (2020) 30: 3612-3613.
- 9) Noppen M. Spontaneous pneumothorax: epidemiology, pathophysiology and cause. *Eur Respir Rev.* 2010; 19(117): 217-219.
- 10) Wu J, Wu X, Zeng W, et al. Chest CT findings in patients with coronavirus disease 2019 and its relationship with clinical features. *Invest Radiol* 2020; 55: 257-261.

- 11) Kunhua Li JW, Wu F, Guo D, Chen L, Zheng F, Li C (2020) The clinical and chest CT features associated with severe and critical COVID-19 pneumonia. *Invest Radiol*.
- 12) Xavier Valette, Damien du Chevron, Suzanne Goursaud. Mediastinal lymphadenopathy in patients with severe Covid-19. *Lancet Infect Dis* 2020.
- 13) Richard C. Becker COVID-19 update: Covid-19-associated coagulopathy. *J Thromb Thrombolysis*. 2020 May 15: 1-14.
- 14) Zhifeng Xu Aizhen Pan Huiling Zhou. Rare CT feature in a COVID-19 patient: cavitation. *Diagn Interv Radiol* 2020; 26: 380-381.
- 15) Vijairam Selvaraj and Kwame Dapaah-Afryie. Lung cavitation due to COVID-19 pneumonia. *BMJ Case Rep*. 2020; 13(7): e237245
- 16) Erok, Berrin, Kibici, Kenan, Atca, Ali Onder. Pulmonary cavitation in COVID-19 pneumonia; is it primary or secondary? *African Journal of Respiratory Medicine* ; 15(1), 2020.
- 17) Atca, Ali Onder, Erok, Berrin, Kibici, Kenan. MRI appearance of COVID-19 pneumonia: an incidental finding. *African Journal of Respiratory Medicine* ; 15(2), 2020.

Main points:

**In the course of the disease, CT manifestations show a distinct pattern and time course of evolution in survival patients depending on the severity of the disease and may result in complete absorption or persist with irreversible changes such as patchy areas of fibrosis or cystic formations.*

**Extraparenchymal manifestations are rare to be identified and may be present on its own independently from Covid-19, especially in elderly patients with comorbidities or may occur as a complication in the course of the disease*

**Covid-19 pneumonia can still be the concern in the presence of atypical findings unexpected to be observed in a viral pneumonia, either due to a coinfection/superinfection or as a rare feature with currently unknown mechanisms.*

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