Radiographic Appearances of Covid-19

Elizabeth Barrett, Penny Jack & Claire Lockwood—Reporting Radiographers

NHS Dartford and Gravesham NHS Trust

Signs and symptoms

The BMJ (2020) [1] states the following as clinical characteristics based on 1099 hospitalised patients in Wuhan China:

- Cough **69%**
- Fatigue **38%**
- Sputum **34%**
- Loss of taste and smell **30%**
- Temperature >38°C **22%**
- SOB **19%**
- Muscle aches **15%**
- Sore throat and/or headache **14%**
- Nasal congestion, nausea or vomiting **5%**
- Diarrhoea **4%**

Diagnosis

- Diagnosis requires a supportive clinical history including clinical manifestations such as fever together with any chest radiography changes. [2]
- Upper respiratory tract sample (single swab for throat and nose). The real-time reverse transcriptase-polymerase chain reaction test (RT-PCR) is the current definitive test for COVID-19. Studies have reported high specificity with varying degrees of sensitivity (60% [3] - 97% [4]) meaning that false negative test results are a clinical problem.
- A study of 138 hospitalised patients found that blood tests demonstrated lymphopenia, increased prothrombin time, increased lactate dehydrogenase and mild elevation in inflammatory markers such as CRP and ESR. [5]

Chest radiograph findings of COVID-19

Chest radiographs (CXR) are a key diagnostic test when investigating patients with respiratory symptoms and are advocated as the first imaging examination in patients with suspected Covid-19. A baseline CXR has a reported sensitivity of 69% .[6] They can guide individual patient management, identify complications or look for an alternative diagnosis. [7] A normal imaging investigation does not exclude Covid-19 in high risk patients.

Table 1

Radiographic Findings (Fig 1-6)	Uncommon Findings
Patchy airspace consolidation (shadowing or opacification)	Pleural Effusion
Lower Zones	Lymphadenopathy
Peripheral	
Bilateral	Ref: [5,8,9].

Table 1 shows the classic radiographic appearances of Covid-19 pneumonia. The findings are further classified into mild, moderate and severe [7] as shown in Table 2.

Table 2

Description	Lung field appearance on CXR
Mild (Fig 1-3)	White < Black
Moderate (Fig 4-5)	White = Black
Severe (Fig 6)	White > Black Ref [7].

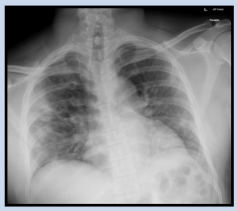

Fig 1

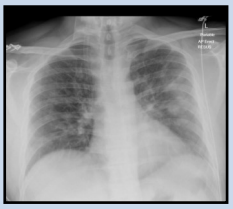

Fig 2

Fig 3

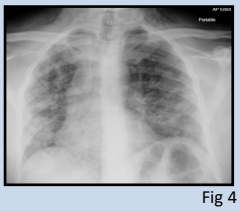

Fig 4

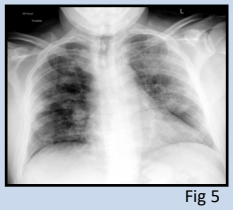

Fig 5

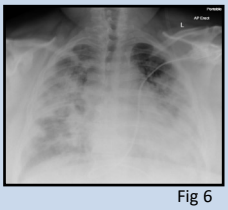

Fig 6

Figures 1-3 show mild bilateral patchy airspace shadowing predominantly in a peripheral lower zone distribution. Figures 4-5 show moderate shadowing. Figure 6 demonstrates severe changes.

Overall, the imaging findings are highly nonspecific and might overlap with the symptoms of other viral pneumonias, atypical pneumonia, interstitial lung disease and pulmonary oedema [10] because of the disease prevalence, currently these changes are more likely to be COVID-19.
Non-COVID-19 pathology that could explain the patient's symptoms include pneumothorax, pleural effusion and pulmonary oedema. Confirmation with the viral test is required . [11]

Computed Tomography (CT) findings of COVID-19

Current best practice guidance advises that CT should not be used to diagnose COVID-19; however, it may be useful in assessing for complications.[12]
There have been a variety of CT findings reported in the literature below are the most characteristic patterns and distributions found . [13]

- Ground glass opacification (GGO) +/- air space consolidation
- Bilateral involvement
- Peripheral distribution
- Involving more than one lobe of the lungs
- 'Crazy paving' appearance has been described.

GGO is defined as hazy areas of increased density that do not obscure underlying vasculature. [14]

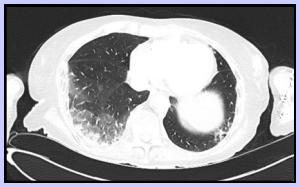

Fig 7

Figure 7 is an axial CT slice of a patient found to be COVID-19 positive who presented from a nursing home following a fall. The CT demonstrates bilateral GGO and patchy opacities in both hemithoraces consistent with COVID-19.

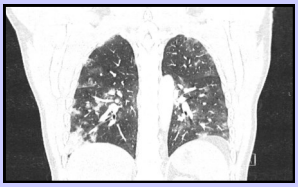

Fig 8A

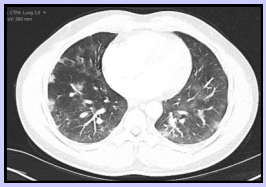

Fig8b

Figure 8A and 8B are coronal and axial CT slices demonstrating bilateral prominent predominantly peripheral GGO are consistent with COVID19 pneumonia in a patient who present with acute shortness of breath and hypoxia.

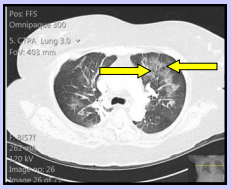

Fig 9

Figure 9 demonstrates classic 'crazy paving appearance where there are thickened intralobular lines (strands of connective tissue separating adjacent pulmonary acini and lobules) combined with GGO.

Treatment

Currently (May 2020) no specific treatment or vaccine exists for COVID-19. Therefore resources have been concentrated on public health measures to prevent further transmission of the virus.
Hospitals can provide effective supportive therapies which encompass empirical treatments with antibiotics, antivirals, and other supportive measures, where clinically necessary, such as mechanical ventilation and extracorporeal membrane oxygenation (ECMO). If the patient deteriorates into respiratory distress, studies have shown a benefit for patients being turned prone. [15] This has been adopted in COVID-19 patients to improve their lung oxygenation.
Vaccines for the coronaviruses are under development and the use of plasma therapy is also being trialled.

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