Clinical History:

A female patient, 39-years-old, fever (38.1?) and dry cough for seven days. A chest CT obtained two days after the onset of the symptoms shows nodular ground-glass opacity and consolidation (white arrows) scattered in the lower lobe of the left lung (Fig. 1a). Laboratory studies showed leukopenia (white blood cell count, $2.57 \times 10^9/L$, normal range $4.0 \times 10^9-10.0 \times 10^9/L$) and lymphokine IL-6 level was increased (25.7 pg/ml, normal range 0.1-2.9 pg/ml). Several additional laboratory tests were abnormal, including C-reactive protein (CRP, 7.9 mg/L; normal range <5.0 mg/L), D-dimer concentration (0.71mg/L, normal range <0.5mg/L) and Serum Amyloid A (SSA) concentration (84.2mg/L, normal range <10.0mg/L).

Imaging Findings:
Figs. 1a-1d CT shows dynamic changes on unenhanced CT of patient on day two, nine, 11 and 17 after the onset of symptoms, separately. Fig. 1a shows nodular ground-glass opacity and consolidation (white arrows) scattered in the lower lobe of the left lung. Fig. 1b shows consolidation of right lower lobe and healing of the consolidations and ground-glass opacity (white arrow). Figs. 1c and 1d CT show that lesions almost disappeared (white arrow).

Follow-up and outcome

The patient was admitted to hospital on January 24, 2020 and the temperature was normal after admission. The RT-PCR of the patient’s sputum for the SARS-COV-2 nucleic acid on January 25 was negative while positive on January 27. Laboratory studies on January 29 showed leukopenia (2.5×10^9/L), normal lymphocyte cell count (1.44×10^9/L) and normal CRP. Several additional laboratory tests were abnormal, including albumin reduction (ALB, 36.9g/L, normal range 60-80 g/L), pre-albumin reduction (PALB, 13.7mg/dl, normal range 28-36 mg/dl), retinol binding protein reduction (RBP, 21.9mg/L, normal range 26.7-57.9mg/L), lactic dehydrogenase increased (LDH, 295U/L, normal range ?252U/L), hypophosphataemia (0.68mmol/L, normal range ?0.8mmol/L), lymphokine IL-6 level was increased (9.9 pg/ml). The RT-PCR of the patient’s sputum for the SARS-COV-2 nucleic acid on January 29 and February 1 were negative while positive on February 2 (Fig. 2). CT follow-ups show healing of the consolidations and ground-glass opacities on January 26, February 3 and February 8 after the onset of the symptoms (Figs. 1b-1d). Laboratory studies on February 13 showed normal white blood cell count (5.3×10^9/L), lymphocyte cell count (1.44×10^9/L), CRP (0mg/L) and IL-6 (2.3pg/ml). The patient was treated with antiviral drugs ((Celiba) lopinavir / ritonavir, 500mg peros bid, January 28, from 2020 to February 2, 2020), traditional Chinese medicine decoction (1 dose peros bid, from February 6 to February 21) and oxygen therapy (inhale oxygen through a nasal cannula supportive care, oxygen concentration: 30%, from January 24 to February 21). No adverse reactions were found during treatment. After treatment, the patient’s respiratory symptoms improved significantly, and the chest CT inflammation was significantly reduced. The RT-PCR of the patient’s sputum for the SARS-COV-2 nucleic acid on February 13, February 18 and February 20 were negative, which met the discharge standard.

Discussion:

Background:

COVID-19 is a new type of infectious disease that mainly affects the lungs. More than 70,000 patients in China have been infected with SARS-CoV-2 (formerly called 2019-nCOV) by March 3, 2020 [1-3]. Real-time fluorescence polymerase chain reaction (RT-PCR) of the patient’s sputum positive for the SARS-CoV-2 nucleic acid is the basis of novel coronavirus pneumonia (NCP) diagnosis [4]. A chest computed tomography (CT) scan is the main examination for lung lesions, playing a vital role in the clinical diagnosis, observation of curative effect, and prognostic evaluation of this disease.

Clinical Perspective:

The isolation and confirmation of COVID-19 pathogens is critical to the clinical diagnosis, treatment and prevention of the disease. Sometimes, a patient undergoing unenhanced chest CT may show ground-glass opacities scattered in the subpleural area of the lungs at an early time when the RT-PCR of the patient’s sputum for SARS-COV-2 nucleic acid is still negative.

Essentials for radiologists:

1. Novel coronavirus pneumonia at early stage (1-5 days) is characterised by ground-glass opacity and consolidation in the basal and peripheral of bilateral lungs.

2. As the disease progresses, crazy paving and consolidation become the dominant CT findings, peaking around 9–13 days followed by slow clearing at approximately 1 month and beyond [5].
3. Pleural effusions and mediastinal lymphadenopathy are rare in COVID-19 patients.

4. The radiologist should preferably know that the disease requires differential diagnosis with lobular pneumonia, idiopathic pulmonary fibrosis (IPF) and organising pneumonia. Lobular pneumonia manifests as patchy consolidation with poorly defined airspace opacities, usually involving several lobes. Laboratory studies will find leukocytosis and neutropenia. IPF is the most common idiopathic interstitial pneumonia and has the second-worse prognosis of all. Clinical symptoms of IPF include dry cough and dyspnoea. IPF usually affects patients >50 years old. Laboratory studies are normal. Organising pneumonia is a nonspecific response to injury characterised by granulation polyps which fill the distal airways, producing peripheral chronic rounded and nodular consolidation.

Take Home Message:

Chest CT plays an important role in the diagnosis and follow-up of this new type of viral pneumonia, first by supporting early diagnosis and patient isolation when RT-PCR may not yet be positive.

Written patient consent for this case was waived by the Editorial Board. Patient data may have been modified to ensure patient anonymity.

**Differential Diagnosis List:** Coronavirus Disease-19 (COVID-19), Lobular pneumonia, Idiopathic pulmonary fibrosis (IPF), Organising pneumonia

**Final Diagnosis:** Coronavirus Disease-19 (COVID-19)

**References:**


**Figure 1**

Description: Shows nodular ground-glass opacity and consolidation (white arrows) scattered in the lower lobe of the left lung on day two after the onset of symptoms. **Origin:** Department of Radiology, Fuyang Second People’s Hospital, Fuyang, Anhui, China 2020
Description: Shows consolidation of right lower lobe and healing of the consolidations and ground-glass opacity (white arrow) on day nine after the onset of symptoms. Origin: Department of Radiology, Fuyang Second People’s Hospital, Fuyang, Anhui, China 2020
Description: CT shows that lesions progressively disappeared (white arrow) on day 11 and day 17 after the onset of symptoms, separately. Origin: Department of Radiology, Fuyang Second People’s Hospital, Fuyang, Anhui, China 2020
Description: CT shows that lesions progressively disappeared (white arrow) on day 11 and day 17 after the onset of symptoms, separately. Origin: Department of Radiology, Fuyang Second People’s Hospital, Fuyang, Anhui, China 2020
**Figure 2**

Description: The timeline of patient’s CT examinations and RT-PCRs for the SARS-COV-2 nucleic acid. (+): positive ; (-): positive ; ?: progress??: decrease or disappearance. The number in the circle (d*) represents the days after the onset of symptoms. **Origin:** Department of Radiology, Fuyang Second People’s Hospital, Fuyang, Anhui, China 2020