CLINICAL IMAGE

Abnormalities on chest computed tomography in patients with coronavirus disease 2019

Magdalena Rogalska-Płońska[1], Andrzej Kuźmicz[2], Tadeusz W. Łapiński[1], Robert Flisiak[1]

1 Department of Infectious Diseases and Hepatology, Medical University of Bialystok, Białystok, Poland
2 "Diagnostics" Medical Center, Radiological Laboratory of Computed Tomography, Białystok, Poland

At the end of 2019, the first cases of serious pneumonia associated with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection were reported in China. Within a few weeks, the disease caused by this new coronavirus, called coronavirus disease 2019 (COVID-19), became a pandemic.

Typical symptoms of COVID-19 include fever, muscle pain, dry cough, dyspnea, and fatigue.[1] However, interstitial pneumonia leading to respiratory failure is the most serious presentation. The routine diagnosis of the disease is based on the detection of viral RNA in the nasopharyngeal mucus using a real-time polymerase chain reaction test. Unfortunately, the sensitivity of such laboratory diagnostic tool is insufficient. That is why computed tomography (CT) can help diagnose COVID-19 and monitor specific lung lesions.[2,3]

Here, we present 3 cases of patients infected with SARS-CoV-2 and describe lesions detected on chest CT, which shows the usefulness of this modality in the diagnosis and management of COVID-19–related pneumonia.

Patient 1, a 70-year-old woman diagnosed with COVID-19, was admitted to the hospital because of fever, dry cough, and dyspnea. The physical examination revealed no auscultatory changes, a respiration rate of 18 breaths/min, and an oxygen saturation of 89%. The baseline, native chest CT scan revealed the irregular areas of consolidative, ground-glass opacities (GGOs) affecting all lobes of the lungs. Some parts of the right lung had a cobblestone appearance (FIGURE 1A). Linear opacities in the anterior fields and bases of the lungs were also visualized. The patient was treated with hydroxychloroquine, lopinavir/ritonavir, and a single dose of tocilizumab, according to the recommendations of the Polish Association of Epidemiologists and Infectiologists.[4] The applied treatment resulted in significant clinical improvement, but follow-up CT performed 10 days later revealed diffused GGOs and the cobblestone

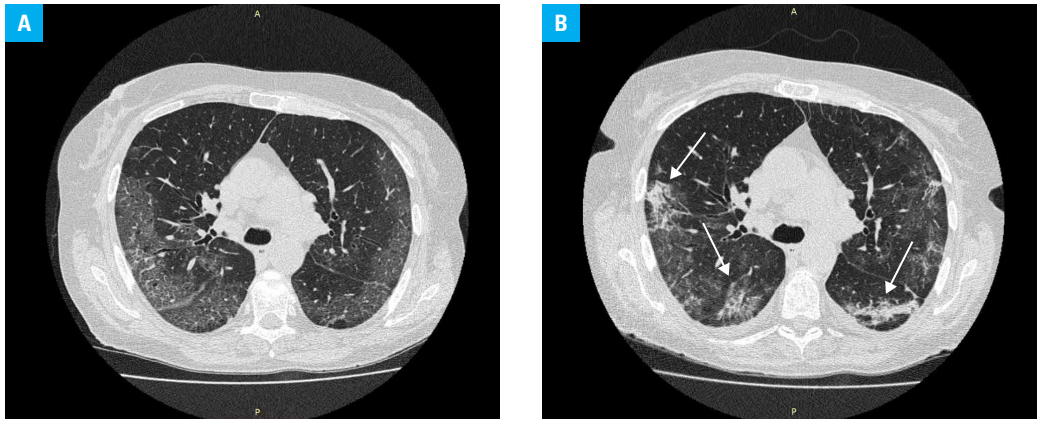

FIGURE 1 Patient 1: **A** – computed tomography (CT) before treatment: irregular, confluent ground-glass opacities covering all lobes in both lungs; the paving pattern in segments 2, 3, 4, and 6 of the right lung; linear compaction in the anterior middle fields and at the base of the lungs; **B** – CT performed 10 days after treatment with tocilizumab: extensive ground-glass opacities and consolidations in single, paving stone–like patches (arrows); the image indicates a period of sharp, highly consolidated lesions.

Correspondence to:
Prof. Robert Flisiak, MD, PhD, Department of Infectious Diseases and Hepatology, Medical University of Bialystok, ul. Żurawia 14, 15-540 Białystok, Poland, phone: +48 85 740 94 30, email:robert.flisiak@umb.edu.pl
Received: April 29, 2020.
Revision accepted: May 11, 2020.
Published online: May 18, 2020.
Pol Arch Intern Med. 2020; 130 (6): 541-543
doi:10.20452/pamw.15363

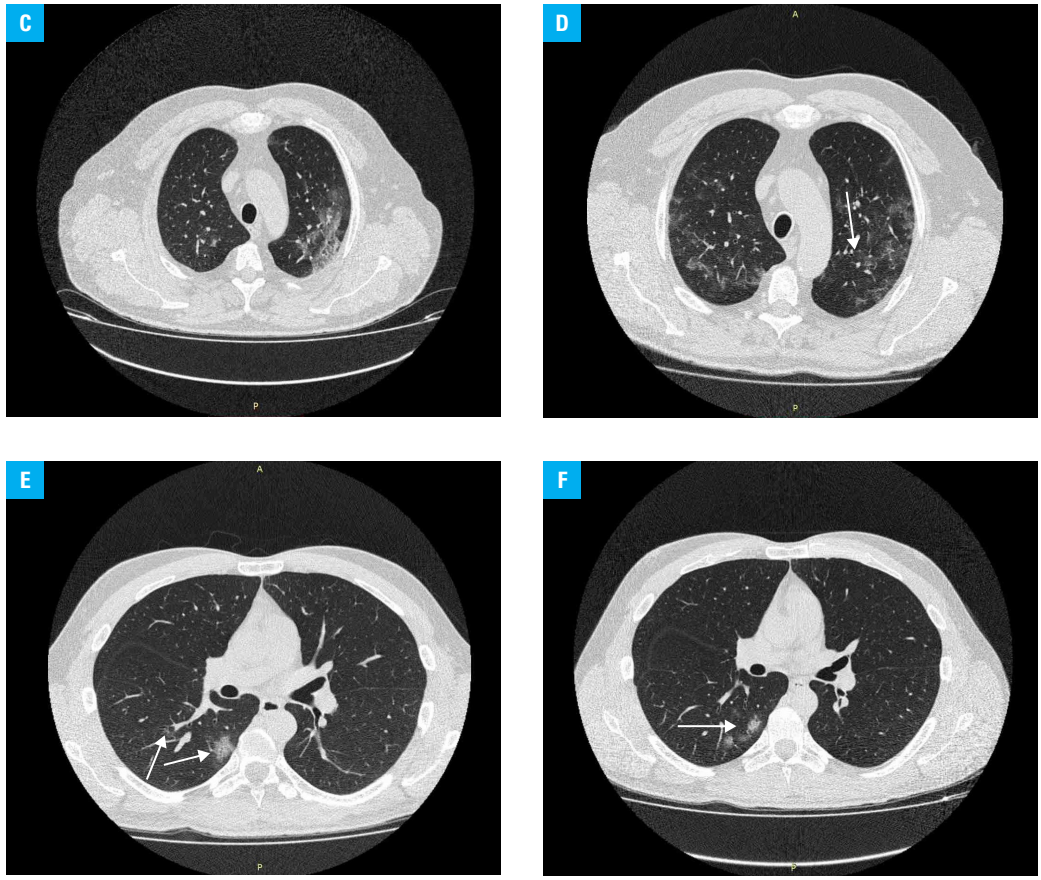

FIGURE 1 Patient 2: **C** – CT before treatment: disseminated, irregular ground-glass opacities in all segments of both lungs, hyperdense lesions in the right lung, features of thickening of the interlobular septa, as well as linear and reticular densities; **D** – CT performed 10 days after treatment with tocilizumab: lesion regression, smaller ground-glass opacities in all segments, and resolution of consolidations (arrow). Patient 3: **E** – CT before treatment: a few scattered, varying in size, poorly delimited, confluent, reticulate, finely spotted densities with discrete areas of reduced transparency and ground-glass opacities (arrows) in the right lung; **F** – follow-up CT: a less saturated hyperdense focus in segment 2 of the right lung; multiple small, more organized densities (arrow), with no evidence of ground-glass opacities, seen in segment 6 of the right lung

road sign, which indicated the peak consolidation of lung lesions (FIGURE 1B). Computed tomography repeated after the following 10 days showed regression of lung lesions.

Patient 2, a 68-year-old man diagnosed with COVID-19, was admitted to the hospital because of fever and dry cough. The physical examination revealed no auscultatory changes over the lungs, a respiration rate of 17 breaths/min, and an oxygen saturation of 88%. Routine blood tests were performed and the serological test was positive for *Mycoplasma pneumoniae*. On initial, native chest CT, there were diffused, irregular GGOs seen in all segments of both lungs, yet more clearly marked in the right lung (FIGURE 1C). Thickened interlobular septa and linear or reticular opacities were also observed. The patient was treated with hydroxychloroquine, lopinavir / ritonavir, and tocilizumab.[4] Due to *M. pneumoniae* infection, doxycycline was introduced. We observed rapid improvement of the patient's general condition. Follow-up CT after 10 days revealed regression of pulmonary consolidations and GGOs in all lobes (FIGURE 1D).

Patient 3, a 34-year-old man diagnosed with COVID-19, was admitted to the hospital because of fever, acute rhinitis, and dry cough, with an oxygen saturation of 93%. The patient tested positive for *M. pneumoniae*. The baseline, native chest CT scan revealed a few scattered, poorly demarcated areas of merging reticular and patchy opacities of different sizes in the right lung (FIGURE 1E). Ground-glass opacities were also seen. Hydroxychloroquine, lopinavir / ritonavir, and azithromycin (for *M. pneumoniae*) were started. The patient's general condition improved and follow-up CT showed smaller subpleural consolidations and more organized, minor consolidations in the right lung (FIGURE 1F).

All things considered, the presented cases lead to a conclusion that patients with diagnosed COVID-19 should have baseline, native chest CT performed at the early stage of the symptomatic disease to facilitate diagnosis, treatment choice, and medical management.

ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.

HOW TO CITE Rogalska-Płońska M, Kuźmicz A, Łapiński TW, Flisiak R. Abnormalities on chest computed tomography in patients with coronavirus disease 2019. Pol Arch Intern Med. 2020; 130: 541-543. doi:10.20452/pamw.15363

REFERENCES

1 Zhao W, Zhong Z, Xie X, et al. CT scans of patients with 2019 novel coronavirus (COVID-19) pneumonia. Theranostics. 2020; 10: 4606-4613.

2 Chakraborty C, Sharma AR, Sharma G, et al. SARS-CoV-2 causing pneumonia-associated respiratory disorder (COVID-19): diagnostic and proposed therapeutic options. Eur Rev Med Pharmacol Sci. 2020; 24: 4016-4026.

3 Ding X, Xu J, Zhou J, Long Q. Chest CT findings of COVID-19 pneumonia by duration of symptoms. Eur J Radiol. 2020; 127: 109009.

4 Flisiak R, Horban A, Jaroszewicz J, et al. Management of SARS-CoV-2 infection: recommendations of the Polish Association of Epidemiologists and Infectiologists as of March 31, 2020. Pol Arch Intern Med. 2020; 130: 352-357.