

Case Series: Are the centriacinar nodularity pattern related to Covid-19 Pneumonia?

Hatice Kilic¹; Emine Arguder¹; Esmehan Akpınar²; Ebru Şengül Seref Parlak²; Sibel Gunay²; Yasin Kocaman²; Mukremin Er²; Aynil Dalkiran²; Selcuk Parlak³; Aysegul Karalezli¹

¹Ankara Yıldırım Beyazıt University School of Medicine, Department of Chest Diseases, Ankara.

²Ankara City Hospital, Department of Chest Diseases, Ankara.

³Ankara City Hospital, Department of Radiology, Ankara.

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***Corresponding Author:** Hatice Kilic, Ankara Yıldırım Beyazıt University School of Medicine, Department of Chest Diseases, Postal code: 06800 Ankara, Turkey. Phone: +90 0312 552 60 00
Email: drhaticeb@yahoo.com

Abstract

Introduction: Throughout the world, during the pandemic process, Thorax Computed Tomography (CT) contributed to the diagnosis with higher sensitivity than laboratory tests in COVID-19 pneumonia.

Material and Methods: During the pandemic period, 224 COVID-19 Pneumonia cases were followed in our chest diseases clinic. Throughout the pandemic, thorax CT was performed in all cases according to World Health, Organization, European Radiology Association and health ministry guidelines. Thorax CT's of the cases were evaluated and reported by a Radiologist and a Chest Diseases Specialist. Cases with a rare COVID-19 finding with a centriacinar nodule were collected.

Results: Demographic data, symptoms, physical examination findings, rt-PCR test results, posteroanterior chest x-ray findings and Thorax CT findings of the cases followed in our clinic were recorded. During the 3-month period, 224 cases were followed in the chest diseases clinic. Sentiacinar nodule pattern was observed in thorax CT in 11 cases.

Conclusions: Our case series is presented in terms of the necessity to investigate the case in terms of COVID-19 pneumonia with symptoms and findings in patients with a rare pattern of centriacinar nodule.

Keywords: COVID-19; lung; pneumonia; centriacinar; nodule.

Introduction

The viral infection is responsible for a respiratory disease, COVID-19 (corona virus disease 19), has rapidly spread worldwide since the beginning of 2020, affecting most European countries in March 2020, with Italy, Spain, France and Turkey being the most severely affected to date [1]. There have been published several studies in the past few months describing the computed tomography (CT) features and radiological pattern of Corona Disease 2019 (COVID-19). After an extensive literature search, we have reviewed and provided several pattern in patients with the COVID-19 Pneumonia. Seventy eight% of patients with real time-polymerase chain reaction (RT-PCR) confirmed COVID-19 infections had either ground-glass opacities (GGO), consolidation or both on the metaanal-

ysis of CT features of COVID Pneumonia patients [1]. The progression of these initial lesions were been to consolidations and diffuse lesions with septal thickening, air bronchograms in the advanced stages. These lesions were finally resolving completely without or with residual fibrotic strips. Also found to be rare pattern pulmonary vessels pathology, pleural effusion and lymphadenopathy. There were correlated with poor clinical prognosis [2].

It was collected nine patients with COVID-19 infections who had undergone chest radiography and CT scans by Korean investigator. They were manifested as as mixed GGO and consolidative lesions (50%), followed by pure GGO lesions (35%), lesions with a crazy-paving appearance (10%), and areas of consolidation (5%). The nodular lesions were primarily dis-

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tributed along the bronchovascular bundles (59% vs. 28%; $p = 0.006$) and tended to manifest as pure GGO lesions (57% vs. 35%; $p = 0.069$) [3]. In another study, 149 patients were recruited from the hospital in China. It was described the diffuse centriacinar nodules were found in 3 of patient's with Pneumonia by computed tomography [4]. Hence, this case series was to describe the rare imaging manifestation that is centriacinar nodule in patients with pneumonia suspected COVID-19. We were diagnosed in eleven of patients with pneumonia who are defined diffuse centriacinar nodules by computed tomography.

Case series

In our Department of Pulmonary, 224 patients were admitted to the hospital. Pneumonia was diagnosed in accordance with the 2020 guidelines of the Infectious Diseases Society of America and the American Thoracic Society [5]. All imaging features were reviewed and evaluated by two experienced radiologists and Chest Physician. The CT features included ground-glass opacities (GGO), mixed GGO, consolidation, air bronchogram, nodule, tree-in-bud sign, reticular pattern, subpleural linear opacity, bronchial dilatation, and cystic change. All terms were defined in accordance with Fleischner Society guidelines [6]. Centriacinar nodules were diagnosed by thorax CT in eleven patients with COVID-19 Pneumonia.

Case 1 (ÖA)

A 40-year-old male patient was admitted to the emergency room complaining of 1 day history of chills. Although there was no finding in the posteroanterior chest radiograph of the patient in the emergency room, thorax computed tomography revealed findings consistent with pandemic viral pneumonia in the left lobe with centriacinar nodules in the upper lobe posteriorly accompanied by air bronchograms (**Figure 1**). Preliminary diagnosis of COVID-19 Pneumonia considered with clinical and laboratory findings the case was hospitalized. Nasopharyngeal swab positive for coronavirus (real-time PCR). There was no feature in her resume and family history. The patient reported being a 40 years / pack of smoking. No pathological finding was detected on physical examination. Laboratory findings were as follows: white blood cell count of 10.500 per μL (80.9% neutrophils, 11.8% lymphocytes and 5.3% monocytes), haemoglobin 15.3 g.dL^{-1} , thrombocytosis (653.000 per μL), increased serum inflammatory markers (erythrocyte sedimentation rate 64 mmh^{-1} , C-reactive protein 186 g.L^{-1} , procalcitonin 0.20 mikrog.L^{-1}), serum iron and ferritin arrangement of chronic disease (serum iron 8 $\mu\text{g.dL}^{-1}$ and ferritin 427 mikrog.L^{-1}), slight increase in creatinine kinase (403 U.L^{-1}), and direct bilirubin (0.23 mg.dL^{-1}). Renal function normal range and coagulation were slightly increase (serum d-dimer value 1.16 mg.dL^{-1}).

The patient was treated with plaquenil, azithromycin, ceftriaxone. Oxygen saturation by pulse oximetry was 97% on room air. The physicians were followed up to patients in terms of QT prolongation. No cardiotoxicity was observed. Azithromycin treatment was discontinued on the 5th day in the patient

who had an increase in liver function tests on the 4th day of follow-up. The patient, who received clinical and laboratory responses, was discharged with low molecular unfractionated heparin prophylaxis.



Case 2 (SU)

A 48-year-old male patient presented complaining of a 1-week history of shortness of breath, myalgia and sore throat. In addition, the patient have been started diarrhea for 2 days and applied to the emergency room. The thorax CT scan was revealed of micronodular pattern (centriacinar nodules) with low attenuation in both lung lower zones. The patient was hospitalized with a preliminary diagnosis of COVID-19 Pneumonia. The patient reported being a 20 years/pocket/day smoking. There was a history of HT in the patient's evaluation. On physical examination, there was no pathological finding. Antibacterial and antiviral treatment was started. There was no additional problem during follow-up. The patient was discharged with recommendations.

Case 3 (ŞY)

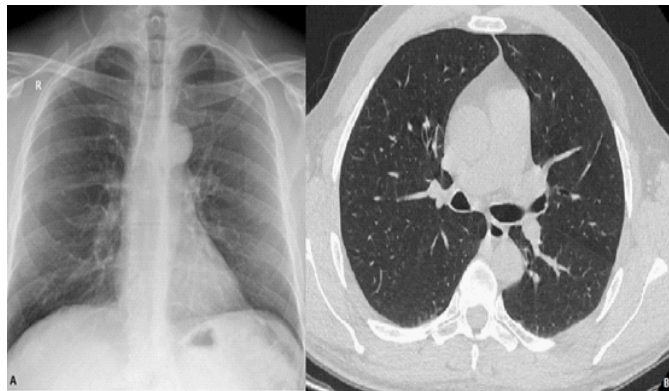
A 41-year-old male patient was admitted to the emergency room on 3 co-workers with a positive COVID-19 test and he was complaining of a weakness and widespread myalgia. The patient who was underwent Thorax Computed Tomography at the emergency department was hospitalized with the diagnosis of COVID-19 Pneumonia due to the presence of low attenuation centriacinar nodules. COVID-19 PCR test result was positive. He received antiviral treatment for 5 days. The 2nd COVID-PCR sent on the 6th day after treatment was negative. The patient was recovered 7th day on admission.

Case 4 (MD)

A 49-year-old male was dealing with welding. He applied to the emergency room with chills and fever, which started 1 day ago. The patient, who had no contact history, applied to the emergency room complaining of the loss of sore throat, cough, weakness and sense of smell. He was hospitalized with findings consistent with COVID-19 in the thorax CT taken. There was no feature in the patient's resume and family history. He used to smoke a few cigarettes a day. The patient recovered partially after antiviral treatment and discharged on the 6th day of hospitalization.

Case 5 (ABO)

A 63-year-old male patient had complaints of fever, headache and weakness 25 days ago. After 1-2 days of complaints, cough and shortness of breath began. The patient, who did not exceed the complaints in 15 days, applied to the emergency room. The patient was hospitalized with the diagnosis of COVID-19 Pneumonia on thorax CT, following more prominent bilateral centriacinar nodules on the right (**Figure 2**). There was no feature in her resume and her family history. The patient who smoked a pack of cigarettes for 10 years and had quit smoking for 20 years. Her routine biochemistry had lymphopenia and moderate d-dimer increase. The patient was treated with on antiviral therapy. The patient was discharged and her complaints improved.



Case 6 (YG)

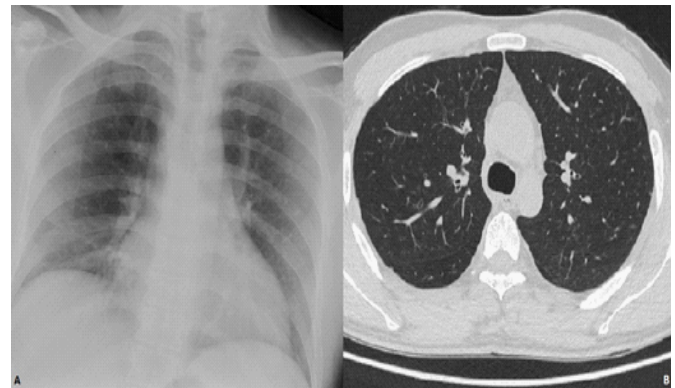
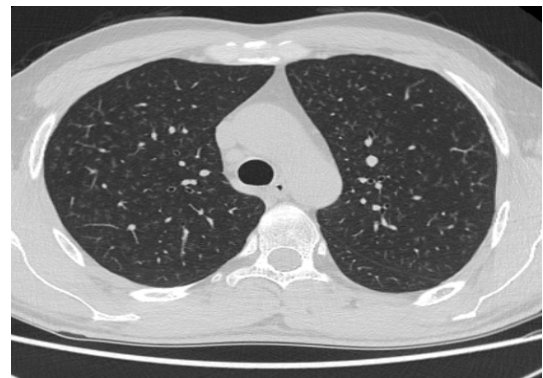
A 42-year-old male patient presented to the emergency room after 3 individuals in the family had COVID positivity. The patient had no complaints other than fever, along with the malaise that started the day before. There was a comorbid diagnosis of coronary artery disease. The patient quit smoking 8 months ago, while smoking 20 years 1p / day. Similar appearance was detected in the thorax CT of the patient. Two COVID-PCR tests, sent on the 1st and 6th days after treatment, were positive. When the two COVID-PCR tests sent on the 10th and 12th days were found to be negative, the patient was discharged.

Case 7 (MCÖ)

A 34-year-old male is admitted to the emergency room with the complaint of cough and shortness of breath for 2 days without any illness. The patient's CT had centrilobular emphysema and diffuse centriacinar nodule (**figure 3**). The case is hospitalized with the diagnosis of COVID-19. The patient had a history of smoking 2p/ghjday for 20 years. Two PCR tests result's were negative. The patient was discharged by recovering complaints with treatment.

Case 8 (HE)

The patient who was followed-up with the diagnosis of COPD, OSAS and CAD presented with similar thoracic CT findings (**Figure 4**). COVID PCR tests result's were negative. The patient who smoked 20 years and 2 packs of days had quit smoking for 10 years. The patient had shortness of breath and cough sputum. The patient who was relieved after the treatment was discharged with recommendations.



Case 9: (iA)

A 38-year-old male patient who was followed up due to bronchiectasis was hospitalized with similar findings. He had severe myalgia and weakness, and 39 degree fever. Laboratory findings were as follows: white blood cell count of 5290 per μL (82% neutrophils, 12 % lymphocytes and 4.3% monocytes), haemoglobin 13 g.dL⁻¹, thrombocytosis (157.000 per μL), increased serum inflammatory markers (erythrocyte sedimentation rate 53 mm.h⁻¹, C-reactive protein 79 g.L⁻¹, procalcitonin 0.18 mikrog.L⁻¹), serum iron and ferritin arrangement of chronic disease (serum iron 40 $\mu\text{g.dL}^{-1}$ and ferritin 430 mikrog.L⁻¹), moderate increase in creatinine kinase (699 U.L⁻¹), and direct bilirubin (0.23 mg.dL⁻¹). Renal function normal range and coagulation were slightly increase (serum d-dimer value 0.58 mg.dL⁻¹ fibrinogen 5.54 g- L⁻¹). Favipravir treatment was given to the patient, whose complaints increased and laboratory markers increased. With the treatment, clear clinical and laboratory responses were obtained. The first 2 PCR test were positive, 3th and 4th test was negative, and the patient was discharged with recommendations.

Case 10 (SŞ)

34-year-old male patient, The non-smoking patient without comorbidity presented with similar CT findings. COVID PCR test results were negative (**Figure 5**). The patient was discharged with recommendations after treatment.

Case 11 (NT)

A 35-year-old male patient was admitted to the emergency room with a common myalgia 1 day ago. The patient, compatible with COVID-19, was hospitalized in our service as a clinic and laboratory. The COVID PCR test result of the non-smoker patient with no disease was positive. Clinically improved with antiviral and antibacterial therapy. The PCR test sent on the

6th day of the patient was positive again. The results of the COVID-PCR 3. Test sent on the 11th day were negative. The patient was discharged with recommendations (**Figure 6**).



Discussion

To our knowledge, this report is the largest uni-center case series data of hospitalised patients with COVID-19 Pneumonia that is seen by centriacinar nodular pattern. The 11 of patients were admitted to hospital who are lung parenchyma were detected centriacinar nodules by imaging of CT. While confirmation of the diagnosis of COVID-19 Pneumonia may delay results of laboratory and reverse-transcription polymerase chain reaction (RT-PCR) tests. In this situations, radiologists can help in this disease by identifying and characterising pulmonary involvement of COVID-19 [6]. Common radiological findings of diffuse alveolar damage, ground glass opacity and organising pneumonia is non-specific pattern. Also, these finding is generally seen in viral infections. This pandemic situations makes imaging a good accurate tool to stratify patients selected from the first-line clinical triage [7]. A 1.014 Chinese patients reported a higher sensitivity for chest computed tomography (CT) compared to RT-PCR [8].

In the disease, CT typically shows bilateral ground glass opacities, with a predominantly peripheral, subpleural location [9-11] according to European Radiological Society. These opacities can be vary intralobular reticulations, crazy paving pattern and linear consolidation or areas with reverse halo appearances [12]. Significantly, mucoid impactions, centrilobular nodules, lobar consolidation, lymphadenopathy or significant pleural effusions are infrequently seen in COVID-19 [13]. Also, American Society of Thoracic Radiology were reported similar results [14].

At the point during the COVID-19 outbreak the study was performed in the China. It was considered imaging patterns of multifocal, peripheral, pure GGO, mixed GGO, or consolidation on chest CT scans. Although the air bronchogram reticular pattern was more frequently seen in patients with positive PCR results, centrilobular nodules were less frequently seen in patients with positive results. COVID-19 PCR test was positive in 5 of our cases.

Pleural effusion and lymphadenopathy were not found. Cystic changes and tree-in-bud sign were found in only one of the patients with COVID-19 according to previously published studies [15-20]. We have been followed up 11 of patients with centriacinar nodular pattern in our Pulmonology Department for two months.

Our article had some restrictive factors. Some of our patients

had been smoking while some had never smoked or had quit smoking for a long time. It was not determined whether patients without older Thorax CTs had respiratory bronchiolitis before COVID infection. However, all cases were consistent with symptom, clinical and laboratory values, and typical COVID-19 Pneumonia. Therefore, antiviral treatments were initiated and clinical and laboratory responses were received. Respiratory bronchiolitis is a very rare interstitial disease. Whereas, in cases followed up during the pandemic period, radiological respiratory bronchiolitis pattern was observed at a frequency of 4.9%; COVID-19 was evaluated as the image of radiological involvement. As a result; It was found in previous studies that thorax CT had higher sensitivity than PCR in detecting COVID-19 infection [15]. However, it was suggested that CT should not be taken in asymptomatic patients in published series. Because, when appropriate clinical and laboratory not accompanied, other disease findings were shown to mimic COVID-19 Pneumonia. We presented our 11 cases who were admitted to our clinic with the COVID-10 infection clinic and were a rare pattern in COVID-19. Thus, we wanted to emphasize the need for evaluation in terms of COVID-19 Pneumonia in patients presenting with this CT finding.

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