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Spontaneous Pneumothorax and Pneumomediastinum Following COVID-19

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Abstract

Background: Pneumomediastinum and pneumothorax are usually rare conditions after pneumonia. This study examines the progress of pneumonia of the coronavirus disease 2019 (COVID-19) to spontaneous pneumothorax and pneumomediastinum in a patient.

Case Presentation: The patient was a 40-year-old man who complained of nonproductive cough and dyspnea. He also complained of fever, sore throat, back, and chest pain. The patient used to smoke but now he quit. His O₂ saturation was 89% at the time of admission. He was assessed with suspicion of COVID-19. CT scans of the chest showed brief changes of emphysema and a ground glass view was also seen in the lungs. In the patient's tests, RT-PCR testing of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was performed and it was positive. Treatment was initiated and because of the progression of symptoms, the serial CT scanning of the patient's lungs was performed daily; and cavitory changes, air-fluid appearance, and destructive changes of lungs were reported. After eight days, the patient's cough worsened. CT scans of the patient's lungs showed some bullae, pneumothorax, and pneumomediastinum, thus a chest tube was inserted and oxygen therapy was begun on the patient with 3-6 L/min. After 5 days in CT, the patient was relieved of pneumothorax and pneumomediastinum and after a week, the chest tube came out.

Conclusion: Pulmonary lesions of COVID 19 can progress to bullae, pneumomediastinum, and pneumothorax. Deterioration of dyspnea and respiratory symptoms can be a warning of pneumomediastinum and pneumothorax that can be confirmed by graphics and timely treatment of the patient can be life-saving.

Keywords: Pneumothorax, Pneumomediastinum, COVID-19

1. Background

COVID-19, which began in Wuhan, China, and has affected many countries, is a beta-corona virus that infects the lower respiratory tract and is similar to pneumonia infection.¹ Pneumonia caused by coronavirus disease 2019 (COVID-19) is a highly contagious disease and has caused many deaths worldwide.² COVID-19 in terms of severity includes mild disease in 81% of cases, severe disease in 14%, and critical disease in 5% of cases.³

The total mortality rate is expected to vary between 2% and 3%. No deaths have been reported in non-critical cases. The mortality rate in hospitalized adults ranged from 4% to 11%.⁴ Most deaths are due to old age or certain prior diseases such as cardiovascular disease, diabetes, chronic lung disease, high blood pressure, and cancer.⁵

Spontaneous pneumothorax is due to sudden rupture of a subpleural bullae,⁶ and is usually a rarer condition. In SARS epidemic, cases of pneumothorax⁷ and

pneumomediastinum⁸ have been reported in the past. Some cases of pneumothorax and pneumomediastinum have been reported in COVID-19.^{9,10} This study examines the progress of pneumonia of the COVID 19 to spontaneous pneumothorax and pneumomediastinum in a patient.

2. Case Presentation

The patient was a 40-year-old man who complained of nonproductive cough and dyspnea. He has been receiving outpatient treatment of dry cough for two weeks before the visit and has been hospitalized due to worsening cough and dyspnea. He also complained of fever, sore throat, back and chest pain and he did not have nausea, vomiting, or diarrhea. The patient used to smoke and has now quit and was not taking any medication. His vital signs at the time of admission were temperature 37°C orally, blood pressure 125/83 mm Hg, respirations 20 per minute, and O₂ sat: 89%. He was assessed with suspicion of COVID-19.

CT scans of the chest showed brief changes of emphysema. The ground glass view was also seen in the lungs. In the patient's tests, CRP: 0.6 (mg/L), ESR: 39 (mL/h), LDH: 395 (U/L), WBC = 7400 ($\times 10^6/L$), HB = 11.8 (g/L), PLT = 217000 ($\times 10^6/L$), BUN = 6 (mg/dL), Cr = 1.0 (mg/dL) were reported. RT-PCR testing of SARS-CoV-2 was performed and it was positive. Treatment was initiated by chloroquine (500 mg q12h on the first day followed by 250 mg q12h, orally) plus atazanavir/ritonavir (300/100 mg SD, orally) and due to suspicious co-bacterial infection cefixime (400 mg SD, orally) was recommended. Because of the progression of symptoms, the serial CT scanning of the patient was performed and cavitory changes, air-fluid appearance, and destructive changes of lungs were reported. After eight days, the patient's cough worsened and O2 SAT was decreases significantly.

CT scans of the patient's lungs showed some bullae s, pneumothorax, and pneumomediastinum, possibly due to the rupture of the emphysematous bullae. A chest tube was inserted and oxygen therapy was started on the patient with 3-6 L/min and meropenem 1 g IV TDS and levofloxacin 500 mg IV, q24h, were administered. The patient was also received nebulized Pulmicort 0.5 mg qid and Atrovent 250 $\mu\text{g/mL}$ qid. After 5 days in CT, the patient was relieved of pneumothorax and pneumomediastinum and after a week, the chest tube came out. The patient was discharged with NAC 600 mg daily for 2 months, and an Foradil inhaler

capsule twice daily for one month (Figure 1).

3. Discussion

This patient was a case with advanced COVID-19, followed by subsequent pneumothorax and pneumomediastinum. Spontaneous rupture of a subpleural bolus is the main cause of early spontaneous pneumothorax¹¹ and pneumomediastinum is usually a rare disease caused by increased pressure inside the alveolar cavity and later ruptures. Risk factors for spontaneous pneumothorax include smoking, age, short stature, men, body mass index, prolonged cough, strenuous exercise, and certain conditions such as chronic obstructive pulmonary disease. Smoking, aging, tall stature, male, body mass index, prolonged cough, intense exercise, and certain conditions such as chronic obstructive pulmonary disease are factors that may cause spontaneous pneumothorax.^{12,13}

In this patient, the cause of the lesion progress to the bull and its rupture is unknown, but in the initial CT of the patient, mild emphysematous changes were evident and the patient had a history of smoking in the past. Another review study found that active smoking increased the risk of severe COVID-19.¹⁴ Previous studies in SARS have shown the prevalence of 1.7% of pneumothorax in patients receiving mechanical ventilation. Pneumomediastinum has also been reported following COVID-19 intubation,^{15,16} but there is still little information about spontaneous pneumothorax and pneumomediastinum in

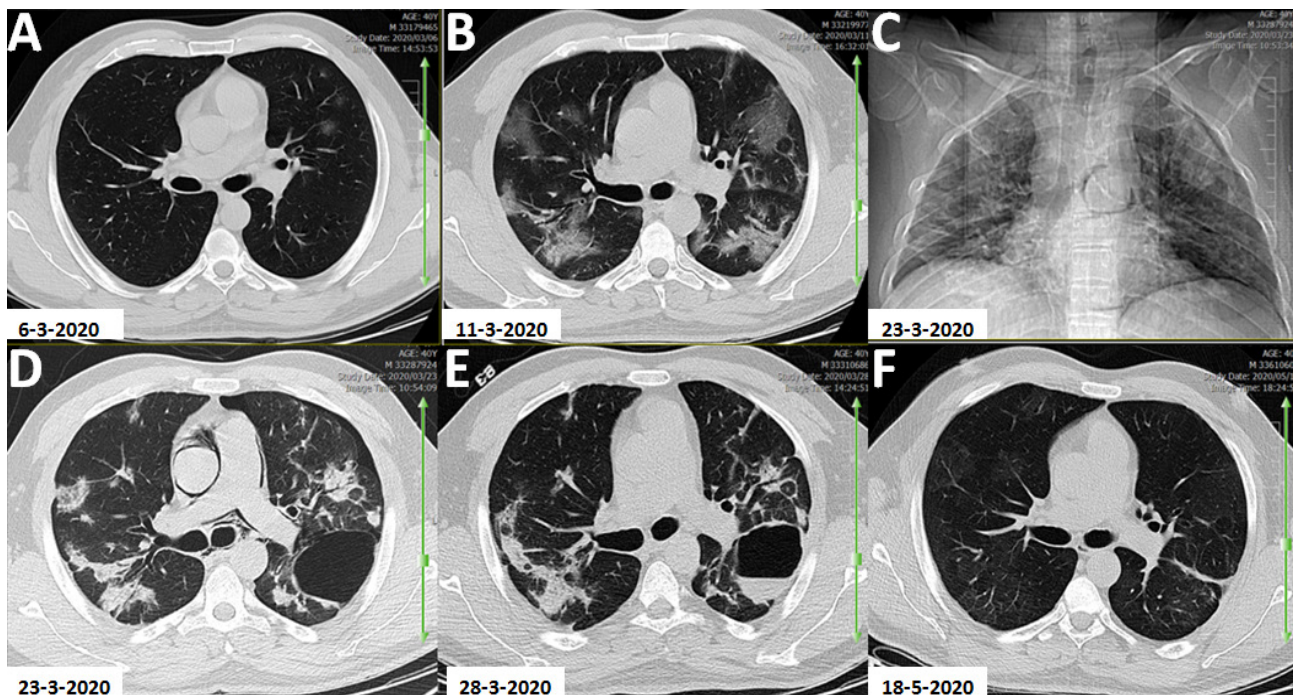


Figure 1. Multiple chest CT scan images without contrast showed small GGO in the left lung at admission day (A), multifocal patchy GGO five days later (B), bilateral patchy consolidative opacities with large bulla formation in the left lung, pneumomediastinum and left pneumothorax on 17 day of hospitalization (C-D), bilateral patchy consolidative opacities with an air-fluid level in left lung bulla with complete resolving of pneumomediastinum and pneumothorax (E), and finally complete resolution of opacities and bulla with very faint residual GGO in follow up ct scan 50 days later.

COVID-19.^{17,18}

The management of pneumothorax and pneumomediastinum in COVID-19 is probably similar to other cases with the installation of chest tube pneumothorax.¹⁹

4. Conclusion

Depending on the condition, pulmonary lesions of COVID-19 can progress to bullae, pneumomediastinum, and pneumothorax. Deterioration of dyspnea and respiratory symptoms can be a warning of pneumomediastinum and pneumothorax that can be confirmed by graphics and timely treatment of the patient can be life-saving.

Authors' Contributions

EV designed the study, SJM conceived and planned the treatments, HM wrote the paper and ED provided final approval of the version to publish.

Conflict of Interest Disclosures

The authors declare that there is no conflict of interests.

Ethical Approval

All the procedures were confirmed by Baqyatallah Hospital Research Committee.

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