

Case Report: Delayed Recurrent Spontaneous Pneumothorax Associated with COVID-19

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ABSTRACT

Rapid spread of the latest Coronavirus infection (COVID-19) issued a big challenge to health-care systems. It took COVID-19 only few months to be labelled as Pandemic by World Health Organization (WHO). The challenge effects has been vast since there was inadequate information about manifestation and treatment of the new disease. COVID-19 was known as a Respiratory Tract Infecting virus first but soon after it turned into a potentiated worldwide threat, first reports started to unveil more characteristic conditions of the disease such as olfactory failure and gastrointestinal discomfort. These characteristics helped to have a better sight in order to detect patients in initial stages of the disease.

KEYWORDS

Pneumothorax Associated, COVID-19, Interstitial Lung Disease (ILD), Spontaneous Pneumothorax.

Introduction

Since late December 2019, the health-care systems encountered a novel kind of viral disease which caused a profound quantity of death and morbidity.(1-3)Additionally, lack of information at the first months made the situation more complicated.(4-6)Some characteristics such as olfactory failure and gastrointestinal discomfort were reported just after the onset of the disease.(7, 8) Nevertheless, as more than a year passed, secondary complications such as COVID-19 associated Pneumothorax merged.(9)Pneumothorax is a condition in which air blows out the lungs into the chest and may cause acute shortness of breath and can be even fatal.(10) Usually, it happens either in concurrence with barotrauma during mechanical ventilation or may happen spontaneously.(10) Recent findings show several cases in which pneumothorax happens in people with COVID-19 infection even in absence of mechanical ventilation.(11)Thus, we are not only responsible to take lifesaving actions in acute phases, but realize and prevent further sequels of the disease.Herein, we are going to introduce a patient suffering COVID-19 infection with no coincident bilateral pneumothorax.

Case Description

A 64-year-old man admitted to the Emergency Room (ER) with shortness of breath and swelling of right lower extremity. There was no remarkable medical history unless a prior 4-day hospital admission, about four weeks earlier, due to fever, malaise, and dyspnea with a positive RT-PCR for COVID-19. The patient was discharged after relative improvement in order to fulfill his treatment at home. After the discharge, he was totally symptom-free until he experienced an increasing shortness of breath and swelling of the right lower extremity, four days before he was admitted to our emergency ward. On admission, his vital signs indicated a body temperature of 38.1°C, BP: 140/90 mmHg, PR: 100, and a plunged O₂ Saturation into 68% that could be corrected to 97% by a 10 lit/min reserve bag. In initial physical examination, there was a decrease in pulmonary sounds in lower right lung. Furthermore, circumference of right leg was 42 cm, 3cm more than left leg's, and it was tender, warm, and erythematous as well.

According to the findings in physical examination, the patient immediately underwent a pulmonary CT Angiography (CTA) in order to rule out possible pulmonary thromboembolism (PTE). Although no evidence of pulmonary thrombosis was seen in the Chest CT,Organizing Pneumonitis (OP) and to some extent, Interstitial Lung Disease (ILD)

was detected in lower lobe of the right lung. [Fig1]

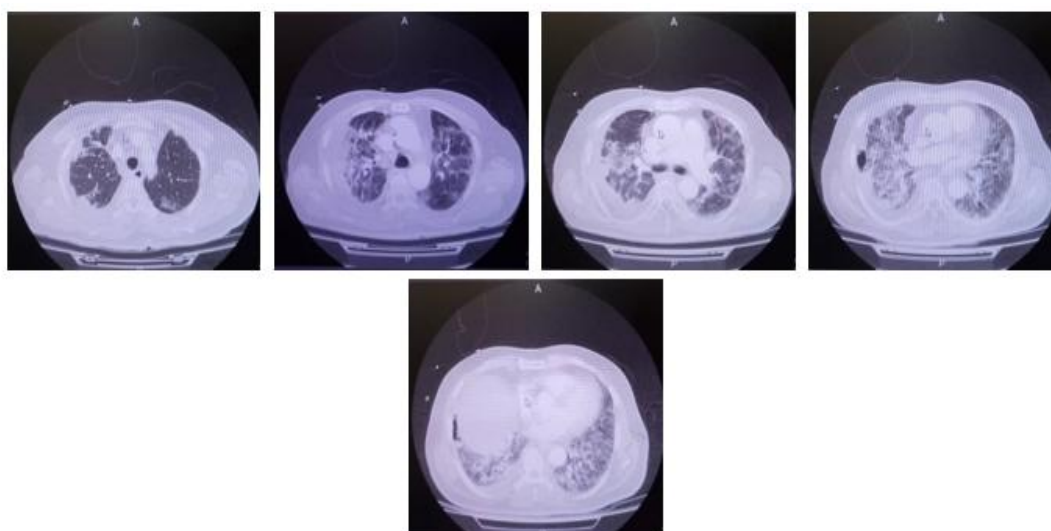


Figure 1. Chest CT with contrast on the first day of admission showing parenchymal involvement

Additionally, Color Doppler Ultra sonography ruled out deep vein thrombosis (DVT) and subsequently, Vancomycin, and other spread spectrum antibiotics administered for possible soft tissue infection due to previous hospitalization.

Unexpectedly, laboratory examinations resulted in a negative RT_PCR for COVID-19 infection and also an abnormal LFT which led the patient underwent liver ultra-sonography (US).[Table1] Regarding to normal US report, LFT alteration could be caused due to the recent inflammation. In addition, a raise in blood BUN and Creatinine was reported. As the patient had got no renal dysfunction formerly, it could be interpreted as the effects of nephrotoxic antibiotics on kidneys. Therefore, all medications were renal adjusted.

Table 1. Laboratory data of the patient

Laboratory Data				
Variable	Reference Range, Adults	Hospital on Evaluation		
		First	Second	Third
CBC				
Hematocrit (%)	42-50	29.1	32.9	32.6
Hemoglobin (gr/dl)	14-17	9.7	11.1	10.9
White Blood Cells (10^3/μL)	4-10	11.7	14.25	15.9
Differential count (%)				
Neutrophils		90.7		
Band forms		0		
Lymphocytes		10	3	3.4
Monocytes		8.3	5.6	4.5
Eosinophils		0	0.6	0.3
Basophils		0.1	0.1	0.2
Platelets (*10^3/microliters)	150-450	192	141	120
ABO blood type				
d-Dimer (ng/ml)		Negative		
Fibrinogen (mg/dl)		Normal		
Activated partial thromboplastin time (sec)	30-40	46	65	45
Prothrombin time (sec)	11-15			
International normalized ratio		1	1.1	1
Venous blood gas				
pH		7.36		

PCO ₂ (mmHg)		44.1		
PO ₂ (mmHg)		26.8		
PHCO ₃ (mmol/l)		24.4		
Hemoglobin(g/dl)		12.4		
Biochemistry				
Sodium (milieq/l)	135-145	140	138	142
Potassium (milieq/l)	3.5-5	4.9	4.7	4.2
Urea nitrogen (mg%)	6-22	20	26	23
Creatinine (mg%)	0.5-1.4	1.6	1.2	0.9
BS		230		
Total bilirubin (mg/dl)				
Protein (g/dl)				
Total	6.1-8.3	5.2		
Phosphorus (mg/dl)	2.5-5			3.3
Magnesium (mg/dl)	1.8-2.6			2.1
Calcium (mg%)	8-10.6			8.7
Lactate dehydrogenase (iu/liter)	Up to 480	504		
Alkaline phosphatase (U/liter)	80-306	794	689	540
Aspartate aminotransferase (U/liter)	3-49	152	92	75
Alanine aminotransferase (U/liter)	3-46	145	92	74
Troponin I (ng/ml)	Less Than 0.4	0.3	0.2	0.3
Pleural effusion Analysis				
Glucose(mg/dl)		217		
Protein(g/dl)		3.1		
LDH(unit/l)		1917		
RBC		100,000		
WBC		600		
PMN		90		
Lymph		10		
Urinalysis				
pH		5		5
Specific gravity		1.030		1.015
Appearance		Turbid		Semi-Clear
Color		Yellow		Yellow
White Blood cells		10-12		4-6
Red Blood Cells		4-6		10-12
Nitrites				Negative
Urobilinogen		Negative		Negative
Albumin		Negative		Negative
Glucose		Negative		Negative
Ketones		Negative		Negative
Blood		Negative		Negative
Bilirubin		Negative		Negative
Sediment (per high-power field) (mmol/liter)		Negative		Negative
Bacteria		Negative		Negative
White-cell casts		Negative		Negative
Squamous epithelial cells		Negative		Negative
Amorphous crystals		Negative		Negative
Urine Culture		No Growth		
Sputum Culture Staphsaprophiticus				
Galactomannan	Less than 0.9	(Negative)		
Stool Culture				
Stool Exam		Normal		
CRP	Less than 10	Positive+++ (107)	Positive+++ (77)	Positive+++
Blood Culture		No Growth	No Growth	
ESR				
TIBC(mg/dl)	230-360	90	237	

HBS Antigen	Negative
HCV Antibody	Negative
Ferritin(ng/ml)	451

On 4th day of admission, dyspnea deteriorated and chest x-ray and chest CT demonstrated a pneumothorax in the right hemi thorax. [Fig2] Subsequently, a chest tube was inserted through his chest wall on the right side and dyspnea was approved dramatically.

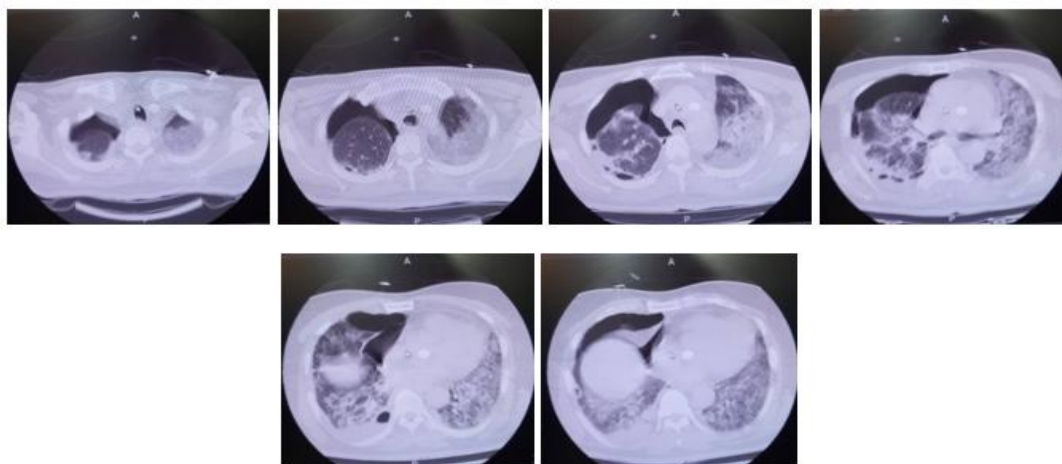


Figure 2. Chest CT without contrast on the 4th day of admission showing right hemi thorax Pneumothorax

As the patient's fever did not decrease after 48 hours, blood samples were obtained for Cytomegalovirus (CMV), Interferon-Gamma release assays (IGRA), Galactomannan, and Colistin and antifungal agents replaced the previous regimen. Referring to the obtained results showing CMV infection, which could explain the fever and even pulmonary involvements in absence of a positive RT-PCR for COVID-19, Ganciclovir was added to his treatments.

Nevertheless, four days after insertion of the chest tube, dyspnea deteriorated again and the 3rd chest CT illustrated leftside pneumothorax. [Fig3] Although the second Chest tube was inserted immediately, and both chest tubes were working properly, no improvement was achieved in the volume of the Pneumothorax and O₂ Saturation level. Thoracic surgery department consultation advised to apply a Negative Pressure set up to reduce the Pneumothorax more effectively. It was also advised to utilize Pigtail Catheterization in case of a persistent Pneumothorax. Eventually, the Pneumothorax could not be controlled and he expired due to Bradycardia after 14 days of hospitalization.

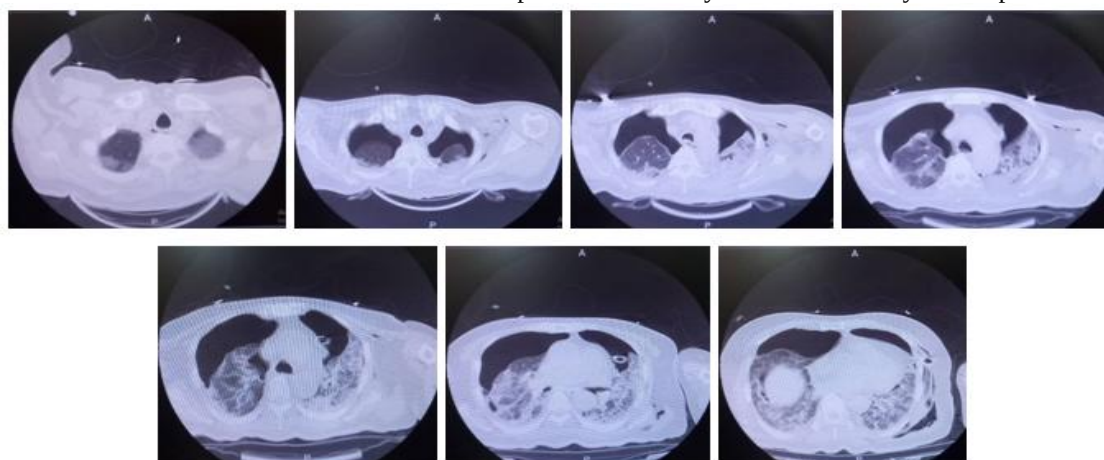


Figure3. Chest CT without contrast showing bilateral Pneumothorax on the 8th day

Conclusion

To summarize our report, delayed pneumothorax in individuals with history of COVID-19 infection may occur even in absence of positive RT-PCR for COVID-19. It can be whether a late sequel of the infection on injured lung tissues or an insidious parallel infection like CMV which can hit a susceptible person with inflamed pulmonary parenchyma receiving Immunosuppressive agents. Therefore, further studies are needed to have a better sight on the manifestations of the new disease in order to take appropriate measurements to prevent lung tissue injury during involvement and spread of other infections as well.

References

- [1] Cevik, M., Bamford, C., & Ho, A. (2020). COVID-19 pandemic—a focused review for clinicians. *Clinical Microbiology and Infection*, 26, 842-847.
- [2] Khosravi, M. (2019). COVID-19 Pandemic: What are the Risks and Challenges for Schizophrenia? *Psychiatry*, 27, 171-178.
- [3] Tahaghoghi-Hajghorbani, S., Zafari, P., Masoumi, E., Rajabinejad, M., Jafari-Shakib, R., Hasani, B., & Rafiei, A. (2020). The role of dysregulated immune responses in COVID-19 pathogenesis. *Virus Research*.
- [4] Gupta, R., & Misra, A. (2020). Contentious issues and evolving concepts in the clinical presentation and management of patients with COVID-19 infection with reference to use of therapeutic and other drugs used in Co-morbid diseases (Hypertension, diabetes etc). *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 14(3), 251-254.
- [5] Khosravi, M. (2020). The challenges ahead for patients with feeding and eating disorders during the COVID-19 pandemic. *Journal of Eating Disorders*, 8(1), 1-3.
- [6] Farrokhpour, M., Rezaie, N., Moradi, N., Rad, F.G., Izadi, S., Azimi, M., & Yadollahzadeh, M. (2021). Infliximab and Intravenous Gammaglobulin in Hospitalized Severe COVID-19 Patients in Intensive Care Unit. *Archives of Iranian Medicine*, 24(2), 139-143.
- [7] Izquierdo-Dominguez, A., Rojas-Lechuga, M.J., Mullol, J., & Alobid, I. (2020). Olfactory dysfunction in the COVID-19 outbreak. *Journal of Investigational Allergology and Clinical Immunology*, 30(5), 317-326.
- [8] Villapol, S. (2020). Gastrointestinal symptoms associated with COVID-19: impact on the gut microbiome. *Translational Research*, 226, 57-69.
- [9] Quincho-Lopez, A., Quincho-Lopez, D.L., & Hurtado-Medina, F.D. (2020). Case Report: Pneumothorax and Pneumomediastinum as Uncommon Complications of COVID-19 Pneumonia—Literature Review. *The American journal of tropical medicine and hygiene*, 103(3), 1170-1176.
- [10] Noppen, M. (2010). Spontaneous pneumothorax: epidemiology, pathophysiology and cause. *European Respiratory Review*, 19(117), 217-219.
- [11] Al-Shokri, S.D., Ahmed, A.O., Saleh, A.O., AbouKamar, M., Ahmed, K., & Mohamed, M.F. (2020). Case Report: COVID-19–Related Pneumothorax—Case Series Highlighting a Significant Complication. *The American journal of tropical medicine and hygiene*, 103(3), 1166-1169.