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TREATMENT AND RESOLVING SEVERE, POTENTIAL LIFE-THREATENING COMPLICATIONS (PNEUMOMEDIASTINUM, PNEUMATOCELES, PULMONARY FIBROSIS) COVID 19 PATIENT (CASE REPORT)

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Abstract

SARS-CoV-2 sometime is associated with potential life-threatening rare complication, more specifically, pneumomediastinum, pneumatoceles, cyst formations, and very often pulmonary fibrosis.

Our patient was 35 years old with main complaints: dry cough. chest pain, fatigue. She experienced a severe form of COVID 19, which resulted in complications of pneumomediastinum, pneumatocell, and pulmonary fibrosis. During the treatment of six months there is an almost complete withdrawal of the complications. She now feels well, able to work, and is still under our control.

Physicians should be aware and careful in COVID 19 patients with severe clinical form given ventilator support, that such complications are possible and before a discharge from the hospital to do an X-ray or CT scan of the lungs. Especially when advising procedures such as postural drainage.

***Key words*:** COVID19, pneumomediastinum, pneumatocella, pulmonary fibrosis

Introduction

There are a multitude of effects that severe forms of COVID-19 can have on lungs from ARDS to pneumothoraces [1]. The long-term effects of COVID-19 can include persistent fibrosis and as a result, many patients remain symptomatic for months after discharge. The first reports of a novel coronavirus SARS-CoV-2 came from Wuhan, China, in December 2019 [2].

As this highly transmissible virus spread rapidly across the globe, it quickly overwhelmed medical and critical care resources, becoming a leading cause of morbidity and mortality worldwide [2].

COVID-19 is the disease caused by SARS-CoV-2, the coronavirus that emerged in December 2019. COVID-19 can be severe, and has caused millions of deaths around the world as well as lasting health problems in some who have survived the illness. The coronavirus can be spread from person to person. It is diagnosed with a laboratory test. X-ray and CT scans are essential in the diagnosis of pulmonary complications [3].

COVID-19 vaccines have been authorized for emergency use by the U.S. Food and Drug Administration, and vaccination programs are in progress across of the world. Prevention involves physical distancing, mask-wearing, hand hygiene. Patients with SARS-CoV-2 infection can experience a range of clinical manifestation: asymptomatic or presymptomatic infection, or individuals who test positive for SARS-CoV-2 using a virologist test (i.e., a nucleic acid amplification test: (one is: Reverse transcription polymerase chain reaction-RT-PCR or an antigen test) but who have no symptoms that are consistent with COVID-19. [1]

Mild Illness: individuals who have any of the various signs and symptoms of COVID-19 (e.g., fever, cough, sore throat, malaise, headache, muscle pain, nausea, vomiting, diarrhea, loss of taste and smell) but who do not have shortness of breath, dyspnea, or abnormal chest imaging. Moderate Illness: Individuals who show evidence of lower respiratory disease during clinical assessment or imaging and who have an oxygen saturation (SpO2) ≥94% on room air at sea level. Severe Illness: Individuals who have SpO2 <94% on room air at sea level, a ratio of arterial partial pressure of oxygen to fraction of inspired oxygen (PaO2/FiO2) <300 mm Hg, a respiratory rate >30 breaths/min, or lung infiltrates >50%. Critical Illness: Individuals who have respiratory failure, septic shock, and/or multiple organ dysfunction [4].

Complications in COVID 19 severe infection: Pneumomediastinum is a rare complication of COVID-19 pneumonia, which may or may not be associated with invasive ventilatory support. Therefore, the report and findings associated with its evolution can be of great contribution in the management of this unknown disease. Cystic lesions, pneumatoceles, and subsequently pneumothoraxes likely to result from prolonged SARS-CoV-2 pneumonia causing air leaks likely to result from prolonged SARS-CoV-2 pneumonia causing air leaks [5].

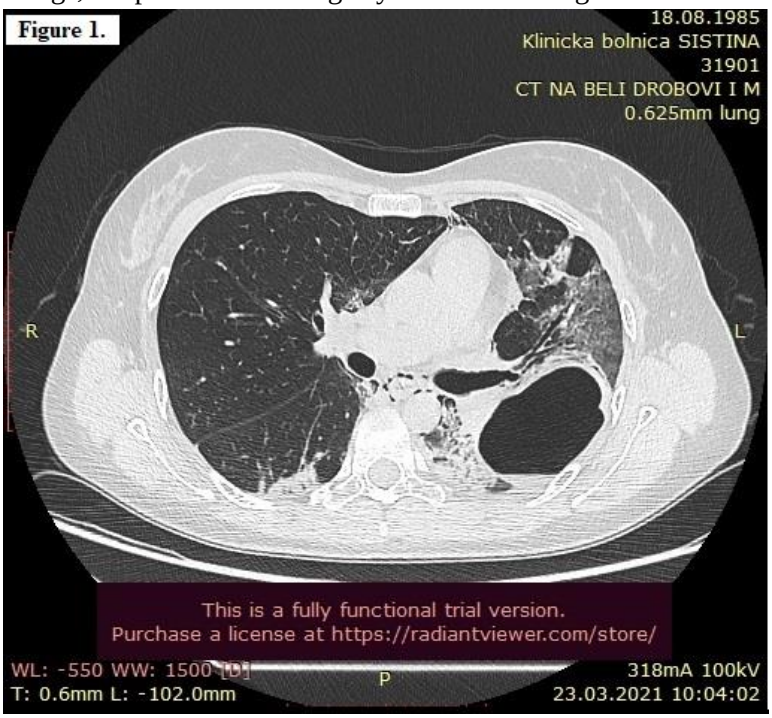
The burden of fibrotic lung disease following SARS-CoV-2 infection is likely to be high; therefore, given the scale of the pandemic, the global burden of fibrotic lung disease will probably increase considerably. Progressive fibrotic lung disease is one of the possible consequences of COVID-19 pulmonary pneumonia, and it is one of the most worrying long-term complications [6].

Case presentation

Female patient, 35 years old. Main complaints: dry cough. chest pain, fatigue.Current illness: Two months before hospitalization, the patient underwent a urine infection. After about two weeks of treatment, a new urine culture was performed (under Nitrofurantion therapy) and this time Proteus and E. coli was isolated and treated with Nitrofurantion (10 days 4x100 grams. She has high fever and on 21.02.2021 was positive for SARS-COV-2 and the next day she developed a fever of 39 C. Ciproflocsacine per os was administered, but without change in febrile. A few days later she was replaced by Tbl. Spectracef and Amp.Sumamed (5 days i.v.) with a slight drop in temperature.

On March 5, 2021, she was hospitalized in private Clinic Sistina due to the deterioration of her condition with high levels of IL-6, and two doses of Tozilizumab was ordinated, also Meropenem i.v. During the first week of hospitalization, the patient underwent High-Flow Oxygen Therapy, and occasionally was in prone position. For the entire duration of the hospitalization, she underwent percussion drainage, twice a day (15 days), and it was continued at home. She was discharged from a private hospital in improved condition, but fatigue and cough persisted.

During one of the percussion drainage at home, the she felt a sharp pain that started in the neck and extended to the lower part of the chest. Computer tomography examinations showed, among other things, the presence of a large cyst in the left lung.



CT of the lungs-23.03.21: (figure 1.) Bilaterally diffuse dominantly left in the upper and lower pulmonary lobes and right dorsally in the right pulmonary lobe followed by several irregular and different-sized consolidation zones with inhomogeneous ground -glass density, and small tracheal consolidations corresponding to interlobaris. Larger tracheal zones of consolidation are followed, which are suitable for adhesions. Moderate wall thickening and moderate dilatation of part of the peripheral bronchial branches are observed, especially the left basal. Such changes are responsible for post-inflammatory and fibrous changes. In the left projection of the oblique interlobium is followed a large oval collection of air and a small amount of fluid with a hydroaeric level with dimensions 120x48 mm. Performs light compression of the left lower lung lobe.

This finding is suspicious of emphysematous bull. A small amount of free air is monitored in the mediastinum — pneumomediastinum. In some of the segmental and subsegmental branches of the right pulmonary artery for the right and left lower lung lobes, several small focal hypodense shadows follow that easily reduce it. Suspected of small blood clots. This finding is suspected of thromboembolism. Several slightly enlarged lymph nodes with a diameter of 9 mm are monitored medially. Trachea and main bronchi tidy. No pericardial effusion is detected. Neat morphology of the thyroid gland. (figure 1.)

She was admitted at the Clinic of Pulmonology and Allergology on 29.3.2021, for further diagnosis and treatment. *Past diseases:* Renal calculosis, first registered 4 years ago, in 32 years, from

a second regularly controlled pregnancy. Laser lithotripsy treatment was performed. *Personal history:* Woman aged 35, medical staff employed.

The patient is a non-smoker. She is allergic of penicillin. *Family history*: denied diseases of interest. *Epidemiological anamnesis:* on 21.02.2021. positive PCR test of SARS-KOV-2 test. Contact at work from a colleague positive for SARS-KOV-2, also possible transmission from the husband (due to time overlap of symptoms). OMG, neat. Skin and visible mucous membranes with normal turgor and elasticity without skin changes, takes an active position in bed, leaving the impression of moderately severely ill. Head and neck: normal configuration and mobility.

Thorax: normosthenic, symmetrical, respiratory equally mobile. Lungs: fremitus pectoralis: neat. Percussive sonorous tone. On auscultation: on the whole left lung weakened vesicular breathing with a finding of crepitations, especially in the medium and basal parties, also on the right lung in basal parties finding crepitations. Heart: rhythmic heartbeat, vaguely audible tones, with one extrasystole during one minute of auscultation as an accompanying finding. Abdomen: at chest level. Blood count: Hb = 117 g / L, Hct = 0.34 % Er = 3.97 x10 ^ 12 / L, Leu = 15,3..20 x10 ^ 9 / L, Tr = 400 x10 ^ 9 / L, Glycaemia: 5 mmol / L, Ionogram Na = 139 mmol / L,K = 3.9 mmol / L, Ca = 2.3 mmol / L, Fe = 15 umol / L, Urea = 5.7 mmol / L, Creatinine = 48 umol/l, Proteinogram: Total protein =68 g / L, Albumin = 46 g / L , Globulin = 21g / L, GGT = 96U / L, LDH =197 U / L, ALT = 19 U / L, AST =18U / L, Total bilirubin = 6.4umol / L, CRP:1,0 ng / ml. Urine: yellow, cloudy; spec. weight = 1.018; pH = 6.5, Procalcitonin = <0.05ng / L ..<0.05 ng /L. Urine culture - Sterile. Microbiological analysis of sputum-01.04,21= No pathogenic bacteria are isolated. PCR test of SARS-COV-2: Negative (01.04.21). Gas analysis: pH =7.42 , PaO2 = 8.2.. 10.1..9.2 kPa, O2sat = 91.5.. 94.4% , HCO3=21.5 mmol /L. ECG: sinus rhythm,frequency 70/min, normoponized axis, with normal T waves. QRS complexes with normal configuration, with normal T weivs. Lung echo - 30.03.21 = Right free f-k sinus with no signs of fluid. Left layered and uneven pleura basal and lateral, part of the change seen on CT. Echo of the abdomen - 08.04.21: Liver, gallbladder, biliary trunk, pancreas, spleen and both kidneys tidy. In the lower parts of the abdomen, in the region of the right adnexa, a cystic formation with a diameter of 5 cm is seen. Echocardiography - 04.04.21:Neat dimension of the left ventricle, neat global systolic function, neat kinetics in peace. Neat valvular apparatus. Neat right cavities, quite light TR. Pericardium pointed, thickened.

She was treated with corticosteroid, antibiotic, anticoagulant, gastroprotecriv and other symptomatic therapy, and oxygen therapy 4-5 l / min, with a nasal cannula. Fearing the pneumomediastinum a week later a new CT scan was performed.

CT of the lungs-06.04.21: Sequential, axial CT scans of the lungs and mediastinum: from the base of the neck to the proximal abdomen, native and post-contrast series with i.v. application. In the upper lobe of the left lung, a cavitary lesion with a maximum diameter of 97x32 mm is observed with a smaller amount of fluid with a density of dense content, which may be in favor of an abscess change. A pneumonic reaction is observed around the lesion in the apical parties.

Regression zones with fibrous reticular changes that support the post-COVID-19 infection changes are also superimposed on the posterobasal parties. The heart is of normal size without pericardial effusion. The aorta and main blood vessels are of normal caliber and without signs of dissection. The central pulmonary arteries are neatly delineated, patent, with no obvious emboli. No significant mediastinal, hilar, or axillary lymphadenopathy is present. The trachea and central airways have a free lumen. The esophagus has a preserved direction and caliber.

She was discharged from hospital in an improved general condition with regression of subjective and objective complaints, with the following recommendations: Tbl. Clindamycin a 300 mg 2x1, Tbl. Decortin H of 20 mg 1x1 (days), 3/4 (4 days), 1/2 (5) and 1/4 (10 days) to be taken in the morning after eating .Tbl.Aspirin protect a 100mg 1x1 per day; Vitamin (Vit.C and Vit.D3); Recommendation for oxygen therapy 3L / min. Control after one week. Until control to be on sick leave. Consultation with a hematologist and transfusiologist. If necessary, consultation with a thoracic surgeon was recommended.

The patient was monitored regularly, every month, over the last 4-5 months, and her condition gradually improved.

CT of the lungs (figure 2.) 23.07.21: to the left the lung parenchyma as a whole and to the upper one reduced reduction transparency is seen. Ground glass zones of opacifications are present. Zones of interstitial fibrosis are seen to the right, in the pulmonary parenchyma to the lower lobe, predominantly to the posterior subpleural regions, fibrous and reticular changes are seen.

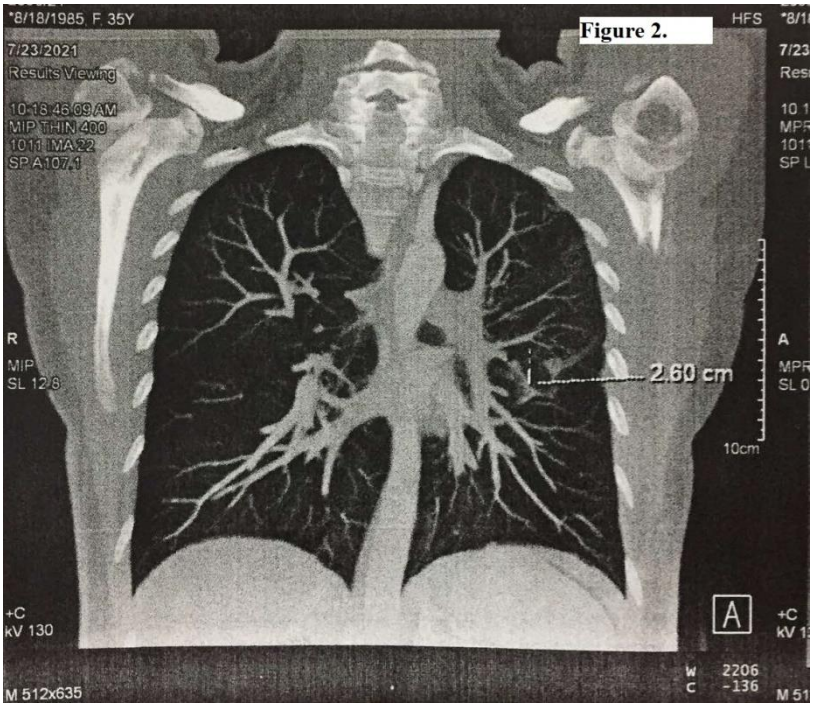


Figure 2.

Several smaller subpleural consolidations with identical features are seen toward the upper lobe. A projection of the oblique interlobium on the left shows an emphysematous bull measuring 26x8 mm, compared to the finding of 6.4.21 with significant volume reduction. No pleural effusions, no pneumomediastinum.

The patient currently is in good condition, going to work, receiving inhaled corticosteroid therapy, and is under constant monitoring. The next CT is planned to be done after 6 months or maybe one year, depending on her condition and the values of her gas analyzes.

Discusion

SARS-CoV-2 infection is known to cause a cytokine storm causing intense inflammatory reaction. A significant number of patients will be at risk for long-term complications following and the need for mechanical ventilation [1]. The understanding of long-term pulmonary disease in COVID-19 survivors is limited at present time, but increasingly emerging as top priority for the medical community [7].

Our patient unfortunately had all three of the most serious, life threatening complications as a result of COVID 19.

Cystic lesions, pneumatoceles, and subsequently pneumothoraxes are likely to result from prolonged SARS-CoV-2 pneumonia causing air leaks. To ensure pneumatoceles are diagnosed and tracked in anticipation of spontaneous pneumothorax, we recommend that patients with post-COVID-19 pneumonitis, especially those given ventilator support, are assessed radiographically before hospital discharge and within two weeks after discharge [8].

This will lead to early detection of pneumatoceles and will provide an insight into a sub-group of COVID-19 patients that may be at risk for multiple pathological pulmonary events after COVID-19 hospitalization. This means physicians have to be aware regarding this sub-group of patients, who could benefit from more stringent monitoring [9,10].

Furthermore, larger studies are warranted to distinguish between Long COVID/Post-acute sequelae and Post-COVID-19 pneumonitis, as well as the complications related to both these conditions [11,12].

In the case of our patient percussion drainage was the cause of pneumatocele and pneumomediastinum, due to severe massive bilateral, especially left side pneumonia, and, of course, pneumonia was a cause of pulmonary fibrosis.

As described by Brahmbhatt and colleagues, COVID-19 can result in significant lung injury and, of course, pulmonary fibrosis leading to substantial morbidity. Brahmbhatt and colleagues highlights a novel finding in the presence of pneumatoceles.The development of spontaneous pneumothoraces are just starting to be reported. Brahmbhatt and colleagues'finding also suggests that a substantial percentage of COVID-19 pneumothoraces may actually be as of a result of cystic or

pneumatocele rupture. Their team treated the pneumato-celes with computed tomography–guided pig-tail insertion. This may not the first choice of treatment, however, as pneumatocelles are usually treated by observation alone.[13]

While observation works in a majority of cases, it may not be appropriate in patients with COVID-19, especially withthe high likelihood of respiratory and oxygenation status deterioration. Whilen observation works in a majority of cases, it may not be highlights a novel finding in the presence of pneumatoceles. The development of spontaneous pneumothoraces are just starting to be reported [13].

Risk factors for fibrosis in COVID 19, according some dates were higher C-reactive protein (CRP) and lower lymphocytes. In one study of COVID-19 survivors, pulmonary fibrosis was diagnosed based on extensive fibrotic changes on follow-up CT.

This cohort was more commonly male, and their lab differences included leukocytosis, neutrophilia, eosinopenia, and elevated D-dimer [14,15].

In our case we consulted with thoracic surgeons at the very beginning, but he did not accept any kind of intervention.

Conclusion

Pneumomediastinum, pneumatocelles, and subsequently pneumothoraxes are likely to result from prolonged SARS-CoV-2 pneumonia causing air leaks. To ensure pneumatoceles are diagnosed and tracked in anticipation of spontaneous pneumothorax, we recommend that patients with post-COVID-19 pneumonitis, especially those given ventilator support, are assessed radiographically before hospital discharge and within two weeks after discharge. This will lead to early detection of this complications and will provide an insight into a sub-group of COVID-19 patients that may be at risk for multiple pathological pulmonary events after COVID-19 hospitalization. This means that physicians have to be aware regarding this sub-group of patients, who could benefit from more stringent monitoring.

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