

Lung Cancer with COVID-19: Symptom and Imaging Analysis-A Dilemma of Managing Multiple Comorbidities

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

According to the World Health organization worldwide Covid -19 related infection is 500 million with 6 million deaths. However, Covid-19 cases and deaths has continued to decline since the end of March 2022, a 24% and 12% decline respectively [1]. The most common symptoms of COVID-19 patients are coughs, colds, fevers, flu-like symptoms, and severe pneumonia [2]. In addition, our patient presented with complications from his Co-morbidities, such as diabetes leading to diabetic foot and emphysematous osteomyelitis. The patient was diagnosed as COVID-Positive during his regular follow-up. Meanwhile, the patient developed respiratory symptoms with CT scan findings of presumptive lung cancer. It was a diagnostic dilemma to treat the current infections or treat the patient as having severe COVID-19 pneumonia. However, continuing antibiotics and planning for further workup on lung cancer were helpful in our case. Our follow-up parameters have monitored arterial blood gas, calcitonin level, and other inflammatory markers to exclude COVID-related causes. We present this case to establish the best possible treatment plan for symptomatic COVID patients with other extreme co-morbidities and respiratory symptoms.

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1. INTRODUCTION

According to the WHO (World Health Organization), Covid 19 (Coronavirus disease) is an infection caused by the SARS-CoV-2 (Severe acute respiratory syndrome Coronavirus-2) virus which causes mild symptoms in most of the cases. Globally during the week of April 11 through 17 2022, over 5 million cases and over 18,000 deaths reported [1]. However, lung cancer with Covid-19 infection usually presented with severe respiratory disease due to an immunocompromised state from disease pathogenicity or its therapy. During this pandemic period, it was evident that lung cancer patients are suffering from increased mortality due to less available respiratory treatment resources or delay in the diagnosis due to a lack of regular primary care [2]. Considering Covid-19 infection in the context of lung cancer is creating a dilemma to provide appropriate cancer-specific treatment such as immunotherapy, chemotherapy, radiation, or targeted therapy. According to several systemic meta-analyses, smoking-related damage of alveolar structures and immunologic response of smokers' lungs are susceptible to severe covid-19 infection (Relative Risk=2.4, Confidence Interval: 1.43-4.04) [2]. It is also obvious that symptoms of long term-covid and lung cancer are usually overlapped with ongoing cough, dyspnea, fatigue, and pleuritic chest pain. We are presenting a case of a diabetic and hypertensive 65-years old male who presented with fever, dyspnea, and non-healing leg ulcer for 5 days was eventually tested positive for Covid and a pulmonary lesion on initial investigations.

The chronic wound prevalence is more among diabetic and older than 65 years old patients due to underlying atherosclerosis, diabetic neuropathy and age-related delayed immune response which increases susceptibility to infections [3,4]. Recently with Covid-19 pandemic chronic wound patient are more susceptible to get infected with SARS-Cov-2 with no obvious contact history due to essential hospital or urgent care visit. After literature search, there are no evidence that Covid-19 causes chronic ulcer or treatment of Covid -19 improves outcome of patient with chronic ulcer. However, the outcome of a patient with chronic ulcer depends on several Co-morbidities such as Diabetes, Hypertension with Covid-19 [5].

2. CASE PRESENTATION

We are presenting a case of a 65-years-old male with a past medical history of Diabetes, Hypertension, Dyslipidemia, Methadone dependence who presented with increased severity of chronic cough for 2 weeks. However, there is no history of chest pain, shortness of breath, sore throat, or fever. He didn't mention any history of loss of consciousness, weight loss, blood in sputum, or contact with tuberculosis or Covid patients in the last six months. He also mentioned having chronic non-productive cough early in the morning with no changes in the last 3 years. He is a former smoker with a history of smoking for 40 years with 20 packs/year.

Patient provided history of increased amount of foul-smelling discharge from his chronic non-healing ulcer for the last 7 days. He is allergic to fish-derived products with a history of moderate to severe allergic reactions 25-years ago. He lives alone in an apartment with no available social contact at this point. There is no history of recent travel, contact with covid patients, or covid symptoms for the last 6 months. Additionally, the patient received all vaccinations including booster doses of covid, pneumococcal, and flu vaccine in the last 2 years.

Our patient was diagnosed and treated for a diabetic foot ulcer and had undergone subsequent amputation of all toes of the left foot two months ago. He was also admitted and treated with intravenous antibiotics for two weeks for his diabetic foot and suspected osteomyelitis. However, discharge from his foot ulcer increased last week with leg edema and discomfort. According to the patient, discharge is blood-stained and foul-smelling with an amount of 10-15 ml per day. He has been suffering from difficulty in walking due to leg edema for the last six weeks.

He also has a past surgical history of back injury from a fall from the height treated with rods and screw device spanning from T9-L4 for spinal reconstruction with lumbar instrumentation.

2.1 On Examination

The patient was alert, conscious, atraumatic, normocephalic, in acute distress for his leg pain and chronic cough on general examination. His Blood pressure was recorded at 119/63, Pulse:

87/min, Respiratory rate 18/ min, Heart sound: S1+S2, no added sound, Lung- clear, mild crackles over the upper lobe of the left lung, dull on percussion with reduced breath sound.

Foot Examination: Plantar aspect of the midfoot is ulcerated approximately 10x8 cm, with erythema and subcutaneous edema throughout the hindfoot and midfoot. There are also foul-smelling discharge with visible necrotic tissue. On palpation, the ulcer is tender, no bleeding on touch.

2.2 Laboratory Reports

His routine blood work was showing WBC count normal with neutrophilia, hemoglobin is low, but reticulocyte count is 2.21%; Serum creatinine and other metabolic panels were in normal level except low albumin level. However, he was tested positive for covid 19 on Day 1, and on Day 3 of his admission, he developed non-anion gap respiratory alkalosis. All screening tests including HIV, Hepatitis B, Respiratory syncytial virus, influenza A and B were negative.

Table 1. Laboratory test report

Laboratory test	Reference level	Jan 5, 2022 Day 1	Jan 7, 2022 Day 3	Jan 10, 2022 Day 5	Comments
<u>CBC</u>					
WBC	4.5-11.0 10x3/uL	8.8	9.9	10.1	Increased
RBC	3.8-5.3 10x6/uL	3.34	3.05	2.78	Decreased
HBG	11-15	8.5	7.8	7.8	Decreased
HCT	35-46%	27.2	24.7	24.3	Decreased
MCV	75.2	81.2	81.0	81.3	Normal
RDW	11.5-15.1	17.9	18.3	17.7	Increased
Platelet	130-400 10X3 u/L	298	314	273	Normal limit
<u>Differentials</u>					
Neutrophils	40-70%	6.80	7.50	7.70	Increased
Lymphocytes	22-48	0.80	0.90	0.80	Decreased
Reticulocyte Count%	0.5-2%			2.21	Increased
<u>Gen Chem</u>					
Glucose	80-115	123	98	119	Increased
BUN	9.8-20.1	7.5	10.8	10.6	Normal
Creatinine	0.57-1.11 mg/dl	0.87	0.81	0.79	Normal
Sodium	136-145 mmol/L	138	137	136	Normal
Potassium	3.5-5.1 mmol/L	4.4	4.1	3.9	Normal
Chloride	98-107 mmol/L	100	98	96	Normal
CO2	23-31 mmol/L	31	33	30	Increased
Calcium	8.8-10 mg/dl	8.6	8.5	8.7	Decreased
Anion gap	12	7.00	6.00	10.00	Normal
Phosphorus	2.3-4.7 mg/dl	2.6	2.5	2.3	Normal
Albumin	2.9-4.5 g/dl	2.2	2.1	2.0	Decreased
Bilirubin	0.2-1.2 mg/dl	0.7	0.8	0.5	Normal
ALT	10-55 U/L	12	10	10	Normal
Alk phos	40-150 U/L	46.6	41.4	41.7	Normal
LD	140-280 U/L			455	Increased
Creatinine kinase	24-198 U/L			22.9	Decreased
<u>Arterial Blood gas</u>					
pH	7.35-7.45	Day 1 7.38	Day 7 7.38	Day 10 7.40	Normal
pCO2	35.0-45.0	52.0	51.9	38.9	Normal
pO2	80.0-100.0	52.3	130.0	108.0	Normal
HCO3 Arterial	22.0-28.0	29.5	29.7	23.3	Normal
O2 Sat	92-98.5%	86.1	98.9	98.6	Normal
Total CO2	19-25	31.4	31.3	24.5	Increased
RT-PCR of Covid 19 test		Positive	Positive	Positive	

Laboratory test	Reference level	Jan 5, 2022 Day 1	Jan 7, 2022 Day 3	Jan 10, 2022 Day 5	Comments
D-Dimer(ng/ml)		4856	<500		
ESR(mm/hr)		50	0-22		
CRP (mg/L)		5	<3		
Procalcitonin(ng/ml)		0.06	0.00-0.08		
Creatine kinase U/L		37	30-200		



Fig. 1. Chest X-ray: Day 1: There is a 7 mm mass in the left upper lung field (Arrow). The figure also shows Lumbar spine instrumentations that stabilize the spine during fusion after corrective surgery for a back injury

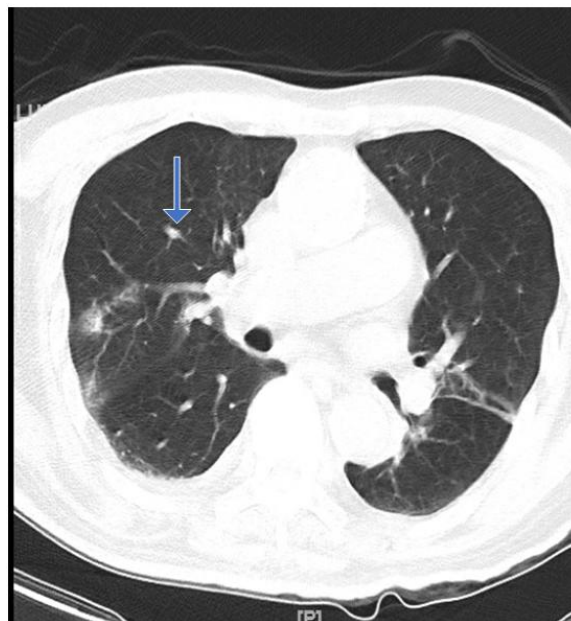


Fig. 2. CT Scan: On Day 1: There is a Heterogeneous irregular soft tissue density mass, measuring at least 5.5x4.3x5.2 mm (Arrow)

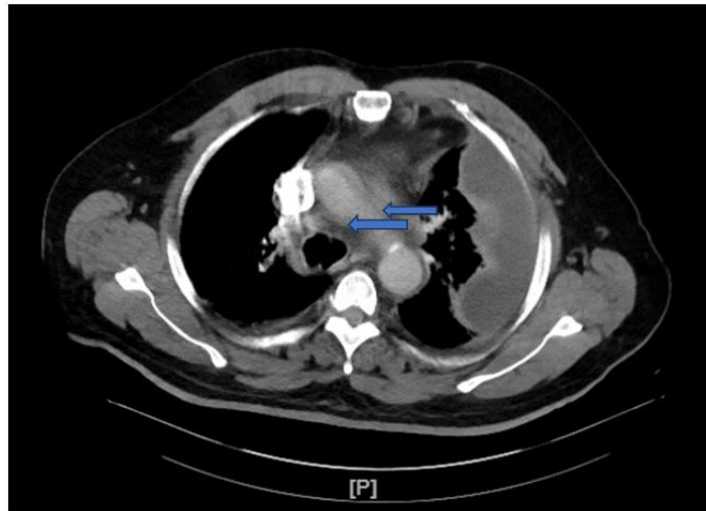


Fig. 3. CT angiogram chest with contrast showing large loculated left pleural effusion (Blue Arrows)

CT scan of left lower extremity without intravenous contrast: There are erosive/destructive changes at the base of the 5th metatarsal as well as within the cuboid, cuneiforms, and anterior calcaneus, extensive scattered areas of gas throughout the hindfoot and midfoot with cellulitis; suggestive of emphysematous osteomyelitis. Echocardiogram: Left ventricular systolic dysfunction with lateral wall hypokinesia Ejection fraction of 40-45%. Mild tricuspid regurgitation. Large pleural effusion.

On the hospital day of 13, CTPA was performed in the view of increasing shortness of breath that concluded no acute pulmonary embolism or aortic dissection but Interval development of large loculated left pleural effusion and no significant interval changes noted in the left upper lobe and Lingula along with tiny right pleural effusion. Pleural fluid aspiration study confirmed malignant cells present in cytological analysis.

2.3 Further Plan and Management

The patient was admitted two months ago for osteomyelitis and was treated with intravenous antibiotics; however, his last chest x-ray 2 months ago had shown 1.5 cm of hilar mass. The patient had readmission after 2 weeks due to an increased amount of foul-smelling discharge from the left plantar surface. We have found his last LDH was 2.38, ESR 114, and WBC 25.2, and repeat LDH and complete blood count were ordered. We have decided his working diagnosis would be emphysematous osteomyelitis with

lung carcinoma and covid with h/o substance abuse such as cocaine and opiates.

The patient was initiated with 2L of normal saline as per sepsis protocol. In addition, we have started with broad-spectrum antibiotics such as Vancomycin, Piperacillin/Tazobactam, and Metronidazole. Infectious disease and Orthopedic surgery were involved in his care. The plan was to continue antibiotics, hydration, and debridement of the necrotic tissue as much as possible. The pulmonologist recommended doing an interventional radiologist-guided biopsy of the lung mass, but the patient refused to do due to low back pain and difficulty in lying prone position. The patient was advised to follow a diabetic diet and Lantus prescribed 10 units with regular monitoring of blood glucose during fasting, 2 hours after breakfast, and before bedtime to control blood sugar. The coming plan is to use VeNodyne boots as venous thromboembolism prophylaxis after surgery. In addition, he is also diagnosed with anemia of chronic disease which needs close monitoring and transfusion if needed before surgery.

After 5 days of treatment, the patient deteriorated and was admitted to ICU for further management of his severe respiratory distress (SpO₂=93%, Respiratory rate: 26/ min) as well as sepsis. The patient was on antibiotic therapy and viral pneumonia excluded with monitoring of D-Dimer, CRP, ESR, Ferritin, Procalcitonin, LDH level, and regular CBC count. On day 11, the patient's symptoms improved, and he was discharged to follow up in the outpatient facility.

3. DISCUSSION

Covid-19 patients usually present with respiratory symptoms, however our patient presented with sepsis from leg ulcer. According to evidence-based medicine we have provided treatment of sepsis and management of leg ulcers. We have found that atypical presentations of Covid -19 positive with no respiratory presentation or history of contact or past exposure could present with predominant co-morbidity. It is obvious to follow up his lung lesion, infection of left foot and provide proper glycemic control.

In the literature, Covid 19 patient presented with higher mortality with lung cancer [6] due to delay in diagnosis and compromised lung condition. In our case, patient also presented with sepsis related respiratory distress, however treating the most relevant condition improves outcome. It was evident from all literature that the fatality rate of lung cancer with SARS-CoV-2- significantly rise steadily with age more than 65 years [7]. Several recommendations regarding lung cancer treatment with Covid-19 prioritize to follow evidence-based treatment protocol for symptomatic management. These recommendations are helping to make informed decisions and reducing mortality related to Covid-19 and comorbidity [8,9]. Currently only one medication (Remdesivir) FDA approved to treat Covid-19 hospitalized adult patients and children above 12 years old who needs oxygen supplementation. Most of the cases mild to moderate covid is treated with rest, fluid, cough medication and acetaminophen or ibuprofen. A recent approval of FDA for mild to moderate Covid is Paxlovid (Nirmatrelvir) [10]. Despite several recommendation of anti-viral medications for patient with cancer and co-morbidities, in our case patient was approached with traditional symptomatic management and improved gradually.

Several reported skin lesions and chronic ulcer related with Covid is due to vascular vasoconstriction due to Angiotensin Converting Enzyme-2 down regulation (ACE-2 receptor) which leads to accumulation of angiotensin-2. The viral activity can cause vasculitis, vessel thrombosis, and immune dysregulation. Lower extremity lesions are livedo reticularis, pressure ulcer, painful pernio-like lesions are common findings [11,12,13]. However, diabetic foot ulcer is 7.5 times more common than other causes in a diabetic patient and the recommendation is to

follow up every 2-weeks and more frequent debridement to reduce complications [14].

4. CONCLUSION

Treating Covid-19 infection with critical comorbidities is challenging. Our case report may contribute to the evolving experience of Covid infection in terms of its variant association. In this case, lung carcinoma was an association making the management plan complicated. It is obvious from our case that a patient with Covid-19 positive with lung cancer had progressive deterioration of conditions due to other comorbidities rather than Covid-19. Regarding treatment and management plan, other comorbidities is the priority rather than positive Covid-19 or viral pneumonia. In our case we didn't consider any Covid related treatment rather than symptomatic management and the patient gradually improved.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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