

# Coronavirus Disease 2019 Severity in Patients with Adenocarcinoma of the Left Lung: A Case Report

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## ABSTRACT

Patients with cancer are the most vulnerable population against coronavirus disease 2019 (COVID-19), as they need continuous medical care and regular contact with hospital environments, which put them at risk of COVID-19 disease. We describe a case of a 62-year-old male patient presented with severe COVID-19 who is being admitted to our intensive care unit (ICU) and diagnosed with adenocarcinoma of the posterobasal segment in the left lower lobe of the lung. For lung cancer (Ca lung) patients, refined and individualized management is needed during the COVID-19 epidemic to maximize benefits.

**Keywords:** Coronavirus disease 2019, Intensive care unit, Lung cancer, Mortality.

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## INTRODUCTION

Healthcare infrastructure and technical systems of almost all countries are being challenged in the COVID-19 pandemic and millions of people already sacrificed their precious life.

Based on the severity and immune response of the host, every organ system is affected by this systemic viral disease. Urgent attention and utmost medical care are needed in patients associated with malignancy, especially during COVID-19. This viral disease has put these patients at greater risk at the time of visits during the hospital environment for regular checkups. Any patient diagnosed with Ca lung with COVID-19 always have a worse outcome. Following the use of immunosuppressants and anticancer drugs, the immune system of these patients is compromised. So, healthcare systems and infrastructures following this pandemic possess a huge challenge due to the complex pathophysiology of this disease. Data for COVID-19 and its association with malignancy is limited data. The risk of infection to COVID-19 is always greater in patients with malignancy. However, vaccines have been shown to decrease the risk of hospitalization and death from COVID-19, even among people with cancer. Routine patient care at hospitals is compromised due to the shifting of existing resources in an emergency situation like the COVID-19 pandemic, especially in patients with chronic diseases in resource-limited countries like India.<sup>1</sup>

## CASE DESCRIPTION

A 62 year-old-male tested COVID-19 positive was admitted to our ICU with an altered sensorium with a Glasgow Coma Scale of 9/15 (E2V2M5), shortness of breath, fever, and productive cough. About 10 months back he was diagnosed with adenocarcinoma of the posterobasal segment in the left lower lobe of the lung. The patient has completed six cycles of chemotherapy which included pemetrexed 800 mg and carboplatin 450 mg. He has also received two doses of radiotherapy (RT) 3 mi Ci. Our patient has not received any doses of the COVID-19 vaccine. The initial whole-body positron emission tomography-computed tomography (PET-CT) showed a 5.4 × 4.6 cm metabolically active mass at the left lower

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lobe of the lung in the posterobasal segment which was abutting the lung fissure and descending aorta at some places. It also showed a metabolically active left supraclavicular mass. All other parts of the body were negative for metastasis. The lymph node sample was further evaluated for tumor markers and was found to be epidermal growth factor receptor, anaplastic lymphoma kinase, and ROS 1 negative. The functional Eastern Cooperative Oncology Group score was 1. All previous biochemical parameters were within normal limits. The previous magnetic resonance imaging revealed about 10 mm enhancing suprasellar lesion at the infundibulum of the pituitary (brain metastasis/benign Rathke's cleft cyst). The postchemo-RT showed a reduction in tumor size from 5.4 × 4.6 cm to 2.5 × 1.6 cm on a whole-body PET scan.

At the time of admission to our ICU, his oxygen saturation was 88% on room air. So, he was kept on a nonbreathing facemask at a flow of 10 L/minute which improves the saturation to 98%. The blood pressure was around 130/90 mm Hg. An urgent noncontrast CT scan of the brain showed mild prominence of the ventricular system. He has KDIGO stage 1 acute kidney injury features with a serum creatinine of 3.28 mg/dL and blood urea nitrogen of 88 mg/dL, hypernatremia (163 mEq/L). The correction for hypernatremia was started with a target of 10 mEq/day. The possible explanation of

hypernatremia in our case was volume depletion [due to low oral intake, insensible fluid loss because of fever, and increased respiratory rate (RR)]. This volume depletion along with COVID-19 acute respiratory distress syndrome may activate the renin-angiotensin-aldosterone system, leading to hypernatremia. At the time of ICU admission, his initial inflammatory COVID-19 parameters like serum ferritin, serum lactate dehydrogenase (LDH), serum C-reactive protein (CRP), serum interleukin 6 (IL-6), serum procalcitonin, serum activated thromboplastin time (APTT), prothrombin time-international normalized ratio (PT-INR) were shown in Table 1. So based on clinical presentation, increase in oxygen requirement, and high inflammatory parameters levels we made the diagnosis of severe cytokine storm syndrome. The rest of other biochemical parameters were within normal limits. On the 3rd day after ICU admission, the patient was desaturated to 78% and their RR was >35 rate/minute, for which he was kept off high flow nasal cannula at 45 L/minute at a fraction of inspired oxygen (FiO<sub>2</sub>) of 0.6. However, on the 9th day, he was placed on pressure controlled (PC) mode ventilation with PC 20 cm H<sub>2</sub>O, positive end-expiratory pressure of 10 cm H<sub>2</sub>O, FiO<sub>2</sub> 100%, flow trigger 2 L/minute, RR 18/minute because of deranged arterial blood gas analysis Ph 7.28 arterial oxygen pressure 48 mm Hg, partial pressure of arterial carbon dioxide 40 mm Hg, bicarbonate 17, and lactate 1.9. On the 11th day, we were not able to maintain mean

arterial pressure (MAP) of >65 so noradrenaline was started at 2–5 µg/kg/minute to keep MAP of >65 mm Hg, but it was not maintained. On the same day, our patient went into bradycardia followed by asystole. In our case, the probable reason for bradycardia and arrest was refractory hypoxemia (secondary to COVID-19 and Ca lung) which was accompanied by refractory shock and multiorgan dysfunction. Cardiopulmonary resuscitation was initiated promptly per advanced cardiovascular life support protocol all reversible causes including tension pneumothorax, cardiac tamponade, and electrolyte/metabolic disturbances were ruled out. However, the patient was not revived and was declared dead. We obtained written informed consent from the patient’s relatives for this case report.

**DISCUSSION**

In the current COVID-19 situation, the best management of Ca lung patients remains unknown, and the role of oncology specialists in spreading awareness to decrease cancer and infection-related mortality is very crucial. There are challenges in the management of a patient with Ca lung as their feature mimics COVID-19 in terms of radiologic findings, respiratory symptoms, and the presence of underlying immunosuppression. Most data suggest a greater prevalence of COVID-19 in patients with cancers, highest among

**Table 1:** Day-wise biochemical parameters

Parameters	Normal references	At admission (day-0)	Day-1	Day-2	Day-3	Day-4	Day-5	Day-6	Day-7	Day-8
Hemoglobin	12–15 g/dL	13.5	13.1	10.7	13.1	13.8	13.9	12.9	12	12.3
TLC	4–10 × 1000/µL	12.69	13.45	16.20	9.90	6.95	9.31	10.24	15.51	14.28
NLR	1–3	48	43	46	18	23	47	24	48	48
		Moderate								
Platelet	150–450 × 1000/µL	0.91	0.98	1.10	0.97	0.90	0.75	0.82	1.07	1.15
Total bilirubin	0.3–1.2 mg/dL	1.09	1.02	0.37	0.34	0.24	0.67	0.46	0.60	0.39
Direct–indirect	<0.3 mg/dL	0.62	0.57	0.12	0.12	0.03	0.20	0.12	0.27	0.18
	<1 mg/dL	0.47	0.45	0.22	0.22	0.21	0.47	0.34	0.33	0.21
SGPT (ALT)	13–35 U/L	37.9	37.2	27.5	29.1	27.7	21.8	19	15	17
SGOT (AST)	<37 U/L	33.3	32.7	27.6	25.2	29.1	22.3	79	19.7	13.5
ALP	100–290 U/L	117.4	110.6	100.7	91.6	92.8	162.2	88.8	82	88
Total protein	6.4–8.3 gm/dL	5.51	5.18	4.84	5.24	5.03	5.41	5.10	4.69	4.45
Serum urea	13–43 mg/dL	16.5	45.9	104.7	143.5	139.4	112.5	124.1	183.8	165.1
Serum creatinine	0.7–1.3 mg/dL	1.24	1.32	1.53	1.73	1.44	1.08	2.50	1.95	1.31
Serum calcium	8.6–10 mg/dL	9.2	8.8	7.7	8.5	8.3	8.4	7.0	8.6	8.2
Serum sodium	135–145 mEq/L	139.7	125.9	157.6	163.2	157.3	148.8	143.5	143.4	146.5
Serum potassium	3.5–5 mEq/L	4.6	4.8	4.7	4.6	5.1	5.3	5.5	5.9	5.9
PT	<14 seconds	16.5	-	19.30	-	-	-	17.30	-	16.60
APTT	30–40 seconds	39.72	-	38.83	-	-	-	37.89	-	36.57
INR	0.8–1.0	1.24	-	-	1.29	-	-	1.23	-	1.10
D-dimer	<0.2 mg/mL	11.6	-	-	9.67	-	-	6.08	-	5.97
CRP	0–5 mg/L	220	-	198	-	165.8	-	136.5	-	128
Procalcitonin	0.02–0.2 ng/mL	22.9	-	19.3	-	10.9	-	3.85	-	3.11
Serum ferritin	22–322 ng/mL	925.7	-	1003	-	-	1189	-	1650	-
Serum LDH	230–460 U/L	614.36	-	-	809.5	-	926.7	-	-	1132.8
Serum IL-6	<6.4 pg/mL	5500	-	5100	-	-	4900	-	1616	-

ALP, alkaline phosphatase; APTT, activated partial thromboplastin time; CRP, C-reactive protein; IL-6, interleukin-6; INR, international normalized ratio; LDH, lactate dehydrogenase; NLR, neutrophil-leucocyte ratio; PT, prothrombin time; SGOT, serum glutamic oxaloacetic transaminase; SGPT, serum glutamate pyruvate transaminase; TLC, total leucocyte count



hematological cancers, and Ca lung. Additional risks include older age and comorbidities.<sup>2,3</sup>

Among individuals with cancer, those with advanced and/or progressive cancer tend to have a worse prognosis than compared with localized/remitting cancers.<sup>4,5</sup>

Liang et al.<sup>6</sup> concluded that frequent ICU admission and ventilatory management are required in patients with malignancy as they have nearly four times more risks of infections. These patients are more vulnerable to death as compared to non-cancer patients.

During COVID-19 disease the presence of proinflammatory states (i.e., level of IL-6) indicates a worse prognosis.<sup>7</sup> Luo et al.,<sup>8</sup> reported a greater rise in IL-6 levels in Ca lung patients with COVID-19. Similarly, in our case also the initial IL-6 values were 5000 pg/mL. These patients may need IL-6 inhibitors (Tocilizumab®) as one of the management strategies for COVID-19.

Our patient also seemed to be severely immunocompromised as he had received chemotherapy 10 months back, making him susceptible to developing severe COVID-19 and making him stay infectious for >20 days after the onset of symptoms. These may remain infectious even up to 60 days after the onset of symptoms.

There is not much known about the effects of COVID-19 on the immune system, and continuing chemotherapy for this malignancy is very challenging. The American Society of Oncology recommends the evaluation of every case individual with precaution.<sup>9</sup>

There is not enough evidence for RT is seen in COVID-19. However, the latest American Society of Clinical Oncology recommendations<sup>10</sup> are against RT during active COVID-19 infections. We found it difficult to assess the severity of the disease since the COVID-19 panel inflammatory markers are nonspecific and may be elevated due to the existing Ca lung. Therefore, in such cases, carcinoembryonic antigen, cytokeratin 19 fragment, neuron specific enolase, and Pro-gastrin related peptide are useful clinical markers, good indicators of disease extent, and may have important prognostic value.<sup>11</sup> Any patients receiving antitumor therapy for Ca lung with respiratory symptoms need to be differentiated. Our case highlights the challenging management of cytokine storm syndrome in adenocarcinoma lung and the early use of tocilizumab to counter the proinflammatory state, which determines the severe COVID-19 disease course in patients with Ca lung.

## CONCLUSION

In summary, epidemic prevention is the most important aspect, especially for Ca lung patients, infected with COVID-19. These groups of patients most of the time may present with severe

symptoms and a high mortality rate. For Ca lung patients, refined and individualized management is needed during the COVID-19 epidemic to maximize benefits.

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