



## COVID-19 and Pulmonary Aspergillus

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### **HISTORY**

**Chief Complaint:** Increasing shortness of breath in a patient recently diagnosed with COVID-19.

66-year-old white male admitted to the hospital for COVID-19 pneumonia with a two-week history of worsening shortness of breath, fevers, myalgias, anosmia, nausea and poor oral intake. He received dexamethasone and tocilizumab and was discharged home in a stable condition. Within 24 hours of discharge, he was readmitted with worsening tachypnea and hypoxia. He was placed on high flow nasal cannula initially but ultimately required intubated and admission to the ICU. While he did not meet criteria for remdesivir, he received convalescent plasma and continued on dexamethasone. The patient had a prolonged ICU stay of greater than one month complicated by mechanical ventilation dependence due to hypoxemic respiratory failure, persistent fevers with leukocytosis, and MSSA bacteremia. He then developed acute worsening of hypoxia and leukocytosis and was treated for presumed Enterobacter ventilator-associated pneumonia without clinical improvement. Additional laboratory specimens and diagnostic tests were requested.

### **Medical Hx**

Obstructive sleep apnea on CPAP  
Obesity (BMI 35.1 kg/m<sup>2</sup>)  
Hypertension  
Hyperlipidemia

### **Family Hx**

Mother: Hypertension  
Sister: Diabetes  
Brother: Hypertension

### **Surgical Hx**

None

### **REVIEW OF SYMPTOMS:**

#### **Present**

Shortness of breath  
Productive cough  
Generalized weakness

#### **Not Present**

Chest pain, palpitations  
Fevers, chills, headaches  
Nausea, vomiting, diarrhea, constipation  
Numbness, tingling  
Rash, skin lesions  
Dysuria, hematuria

Myalgias, arthralgias

**MEDICATIONS** – at admission

Lisinopril 40mg daily  
Rosuvastatin 20mg daily  
Pantoprazole 40mg daily

**PHYSICAL EXAMINATION:**

General: Alert, awake. Well-developed, well-nourished male in mild respiratory distress.  
Skin: Warm, dry, no rashes over trunk and extremities.  
Head: Normocephalic, atraumatic.  
Eye: EOMI, normal conjunctiva. PERRL.  
Ears, nose, mouth and throat: Oral mucosa moist, No oropharyngeal lesions identified.  
Cardiovascular: Regular rate, Regular rhythm. No murmurs, rubs or gallops. Well-perfused extremities with 2+ distal pulses. No peripheral edema noted.  
Respiratory: Lungs clear bilaterally. Increased work of breathing, on high flow nasal cannula.  
Gastrointestinal: Normoactive bowel sounds. Soft, non-distended, non-tender to palpation.  
Musculoskeletal: Normal muscle bulk and tone. No gross deformity.  
Neurological: Alert and oriented to person, place, time, and situation, No gross focal neurological deficit.  
Psychiatric: Cooperative, anxious and tearful.

**ADMISSION LABS:**

**CHEMISTRY/METABOLIC PANEL**

Na: 136 mEq/L  
K: 4.5 mEq/L  
Cl: 102 mEq/L  
CO2: 24 mEq/L  
BUN: 23 mg/dL  
SCr: 1.19 mg/dL  
Glucose: 122 mg/dL  
Calcium: 8.5mg/dL  
Total protein: 7.1 g/dL  
Albumin: 3.7 g/dL  
AST: 47 U/L  
ALT: 27 U/L  
Alk Phos: 66 U/L  
T bili: 0.3 mg/dL

**CBC**

WBC: 16.8 thous/mm<sup>3</sup>  
RBC: 4.96 million/mm<sup>3</sup>  
HGB: 10.9 g/dL  
HCT: 35.3%

MCV: 22.5 pg  
MCH: 32.1 g/dL  
RDW: 19.1%  
PLT: 323 thous/mm<sup>3</sup>

#### **Other labs**

Troponin I: <0.010 ng/mL  
BNP: 19.0 pg/mL  
Ferritin: 118.2 ng/mL  
CRP: 1.060 mg/dL

### **What are probable/possible diagnoses?**

- Post COVID Inflammatory Syndrome
- Ventilator-Associated Pneumonia
- Invasive Fungal Infection
- Pulmonary MAC
- Pneumocystis Pneumonia

### **Microbiology/Diagnostic Tests Performed:**

- BAL Bacterial Cx: Klebsiella (Enterobacter) aerogenes
- BAL KOH smear: Negative
- BAL Fungal Cx: No growth
- BAL Galactomannan: 4.721 (normal < 0.500)
- Serum Aspergillus Ag: 0.156 (normal < 0.500)
- Serum B-D Glucan: < 31 (normal)
- Legionella Ag: Negative

**CTA Chest:** Severe bilateral lower lobe consolidations with scattered small consolidations in the remaining lobes. Extensive patchy ground glass opacities and septal thickening throughout all lobes. Small bilateral pleural effusions. Atelectatic changes in the dependent lungs.



Image 1. CTA Chest, coronal view. Extensive bilateral ground glass and septal thickening visible.

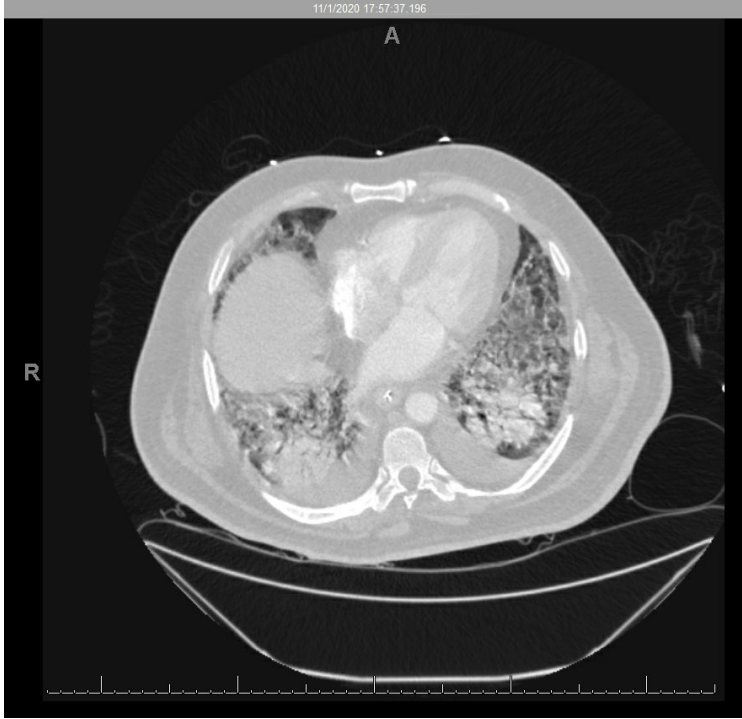
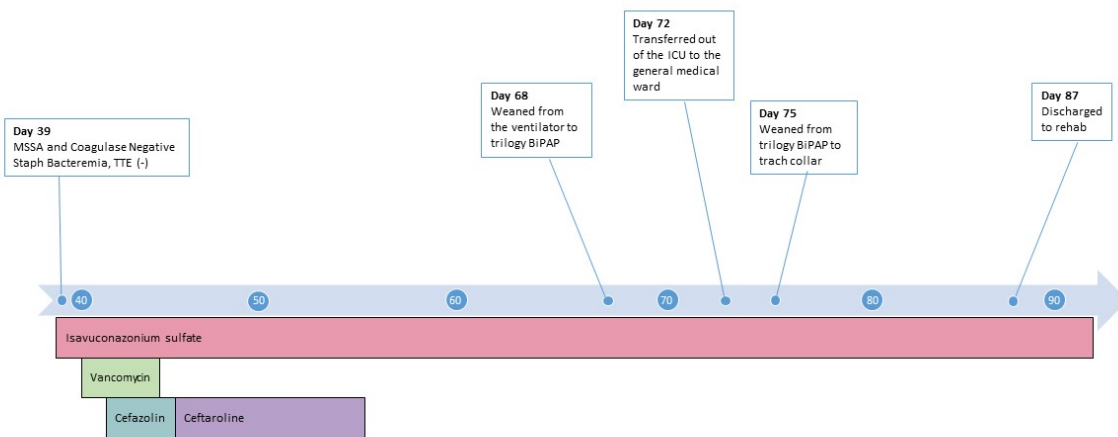


Image 2. CTA Chest, axial view.  
Extensive ground glass opacities again  
visible with bilateral pleural effusions.

# TIMELINE OF HOSPITAL COURSE/ JPEG IMAGES



### **WHAT DID YOU FIND MOST CHALLENGING ABOUT THIS CASE?**

The most challenging part of this case was the sheer complexity of the patient's hospital course and his nontraditional risk factors for invasive fungal disease. Prior to being diagnosed with COVID-19 pneumonia, he did not have any significant immunosuppression that would routinely predispose him to invasive fungal disease. Additionally, he had a very protracted hospital course secondary to his refractory hypoxemia, with numerous bacterial complications including a recently diagnosed *Enterobacter aerogenes* pneumonia. Despite what should have been adequate treatment for the bacterial pneumonia, his fevers persisted. While continued fevers can be associated with severe COVID-19 disease alone, in this patient's case, it was a marker of yet unidentified underlying fungal disease.

As such, the diagnosis of COVID-19 associated pulmonary aspergillosis in this case required providers to maintain a broad differential and to be mindful of the specific risk that COVID-19 carries for development of invasive mold infections.

### **WHAT DO YOU SEE AS THE BIGGEST UNMET EDUCATIONAL NEED IN MANAGING COVID-19-ASSOCIATED INVASIVE FUNGAL INFECTIONS?**

Over the course of the COVID-19 pandemic, Invasive Pulmonary Aspergillosis (IPA) has been increasingly identified in otherwise immunocompetent patients admitted with COVID-19 pneumonia worldwide, termed COVID-19-Associated Pulmonary Aspergillosis (CAPA). Prior to the pandemic, the concern for IPA would usually be low in a previously immunocompetent patient. Cases of invasive pulmonary aspergillosis are increasingly being identified in patients admitted with COVID-19 with no preceding immunocompromising conditions. This may be attributed to the immunosuppressing drugs used for COVID-19 or an inherent characteristic of COVID-19 disease itself. It is not yet clear what subset of the population admitted with COVID-19 is at highest risk of developing IPA, especially given variable reported incidence rates. This is a major opportunity to educate providers to ensure that IPA is maintained on the differential in patients with COVID-19 disease, as it has high mortality within the critically ill population and requires clinicians to be timely in its diagnosis and treatment. Similarly, given its relatively novel nature, there are no strict guideline recommendations for the optimal duration of therapy. As such, providers will need to closely monitor patients for the duration of treatment and tailor therapy based on the individual patient's clinical improvement and any ongoing immunosuppression.