A case of viral pneumonia and acute respiratory distress syndrome during the COVID-19 pandemic

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Our mission

Above all else, we are committed to the care and improvement of human life.

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Patient presentation

- Age: 67
- Chief complaint: dyspnea
- Vitals:
  - SpO2 of 83% on room air
  - Heart rate of 123
- Examination:
  - Moderate respiratory distress
  - Crackles in left lower lung field

Past medical history

- Chronic obstructive pulmonary disease without use of chronic oxygen therapy
- Valvular atrial fibrillation from mechanical mitral valve on anticoagulation
- Former smoker with >90 pack year history and quit 3 years prior to presentation

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Figure 1

Initial chest x ray showing extensive left sided infiltrates consistent with community acquired pneumonia

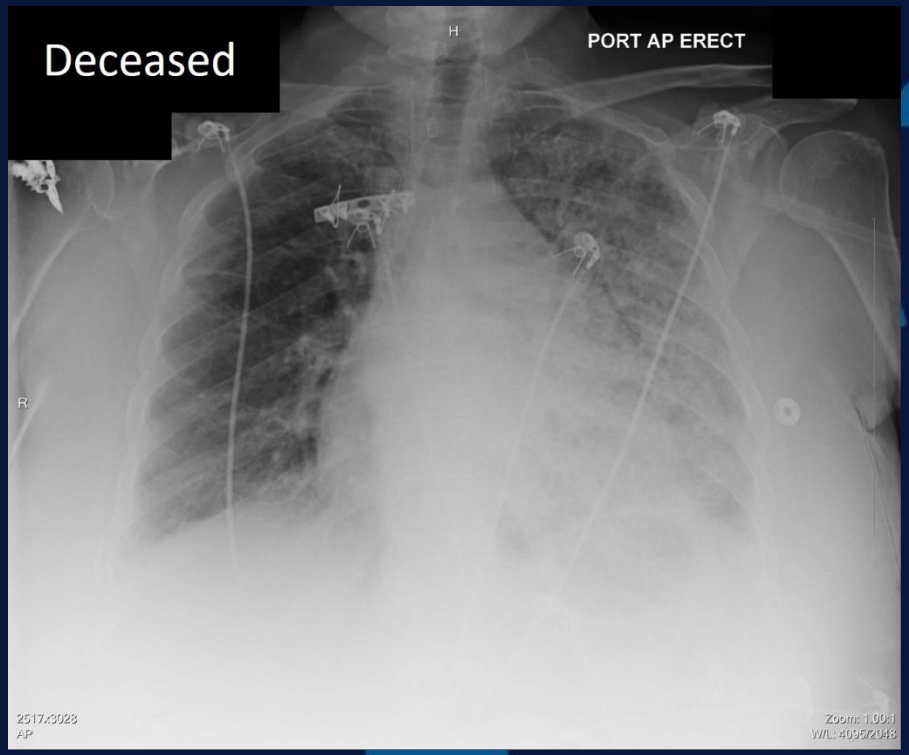

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Table 1. Hospital course overview from day 0-5

Time Point	Key Clinical Event	Oxygen Requirements
Hospital day 0	Admission Started on community acquired pneumonia treatment	2L via nasal cannula
Hospital day 2	Echocardiogram obtained showing EF of 40-45%	3L via nasal cannula
Hospital day 5	Successful direct current cardioversion of atrial flutter to sinus rhythm	3L via nasal cannula

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Figure 2

CT chest without contrast showing extensive left sided pulmonary infiltrates and mediastinal adenopathy confirming multifocal pneumonia

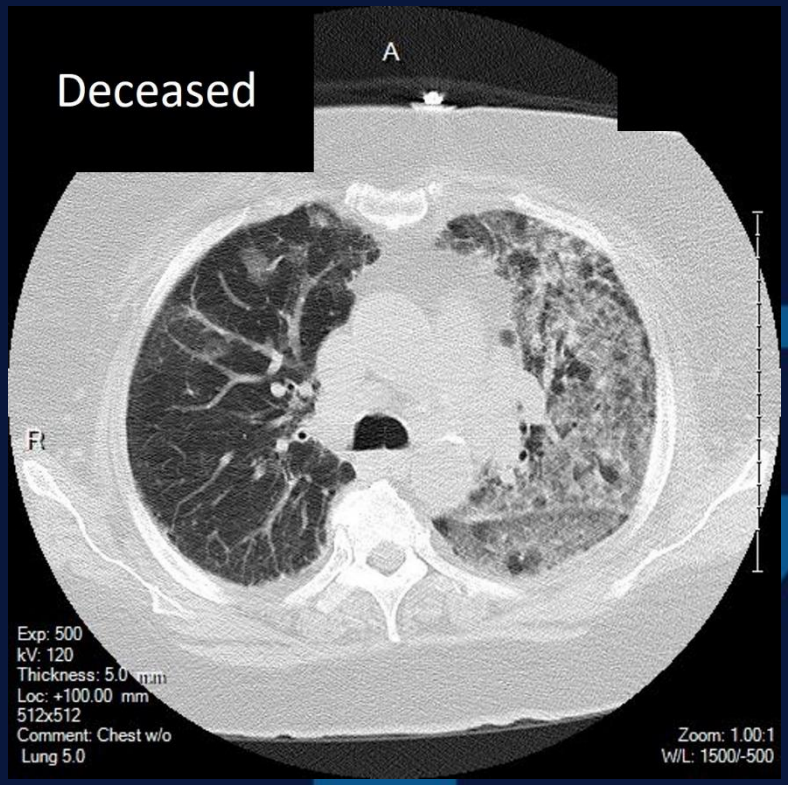

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Table 2. Hospital course overview from day 9-11

Time Point	Clinical Event	Oxygen Requirements
Hospital day 9	Admitted to the intensive care unit for continuous BiPAP Start hospital-acquired pneumonia treatment	BiPAP at 95% FiO2
Hospital day 11	Extensive serologic testing was unrevealing for source of pneumonia	BiPAP at 70% FiO2

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Table 3. Results of serologic testing

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Test	Result
Adenovirus DNA	Negative
Blastomyces antibody	Negative
Boca virus PCR	Negative
Chlamydia pneumoniae DNA PCR	Negative
Coccidioides IgG antibody	0.2
Coccidioides IgM antibody	0.5
Coronavirus PCR	Negative
SARS-CoV-2 PCR	Negative
Histoplasma antigen	< 0.5
Urine histoplasma antigen	< 0.5
Human metapneumovirus PCR	Negative
Influenza A H1 PCR	Negative
Influenza A H3 PCR	Negative
Influenza type A antigen	Negative
Influenza type A PCR	Negative
Influenza type B antigen	Negative
Influenza type B PCR	Negative
Urine Legionella antigen	Negative
Mycoplasma pneumonia IgG	**106 (<100)**

Test	Result
Mycoplasma pneumonia IgM	< 770
Mycoplasma pneumonia DNA	Negative
Parainfluenza 1 PCR	Negative
Parainfluenza 2 PCR	Negative
Parainfluenza 3 PCR	Negative
Parainfluenza 4 PCR	Negative
Pneumocystis carinii/jiroveci PCR	Negative
Aspergillus flavus antibody	Negative
Aspergillus fumigatus antibody	Negative
Aspergillus niger antibody	Negative
RSV PCR	Negative
Rhinovirus PCR	Negative
Rickettsia IgG antibody	Negative
Rickettsia IgM antibody	0.4
Typhus fever group IgG	< 1:64
Typhus fever group IgM	< 1:64
SARS-CoV-2 RNA rapid NAAT	Negative
SARS-CoV-2 antibody total	Negative
Urine Strep. pneumonia antigen	Negative
Beta-(1,3)-glucan	36

Table 4. Hospital course overview of day 15

Time Point	Clinical Event	Oxygen Requirements
Hospital day 15	Repeat CT chest showing progression of pneumonia to right sided infiltrates	Heated high flow nasal cannula on 60L flow and 90% FiO2

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Figure 3

CT chest on hospital day 15 showing worsening of left sided infiltrates and evolution to bilateral infiltrates consistent with bilateral pneumonia and pulmonary edema

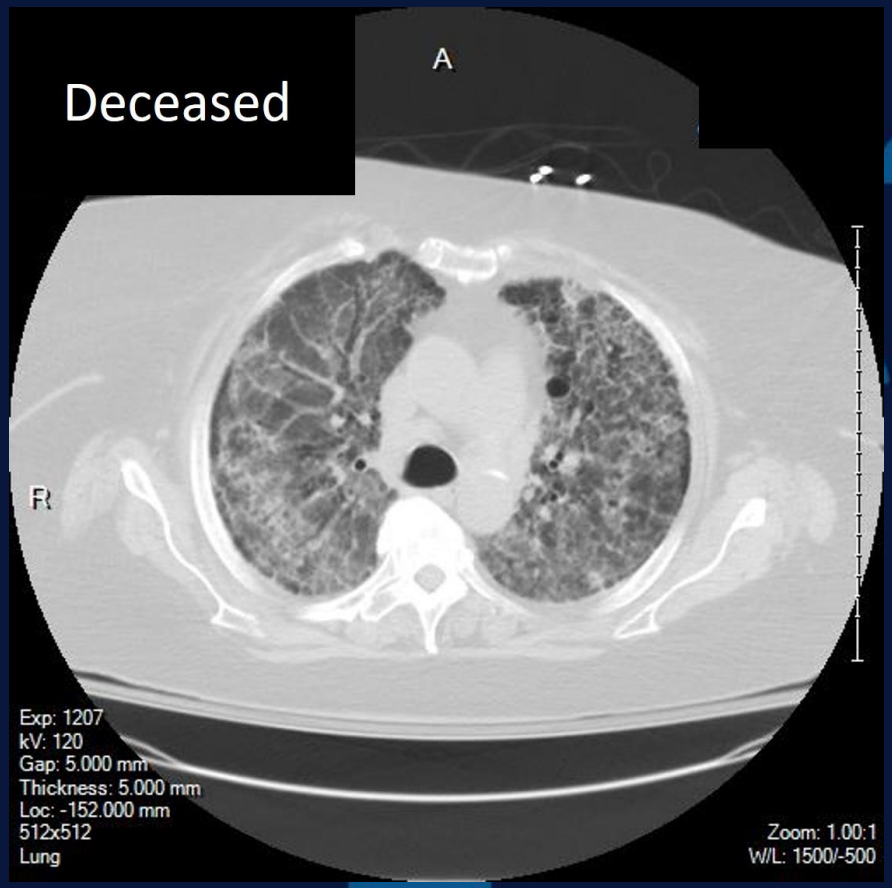

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Table 5. Hospital course overview from day 17-26

Time Point	Clinical Event	Oxygen Requirements
Hospital day 17	Bronchoscopy performed	BiPAP at 95% FiO2

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Figure 4

Final chest x-ray on hospital day 32 after intubation and bronchoscopy showing bilateral diffuse nodular infiltrates consistent with acute respiratory distress syndrome

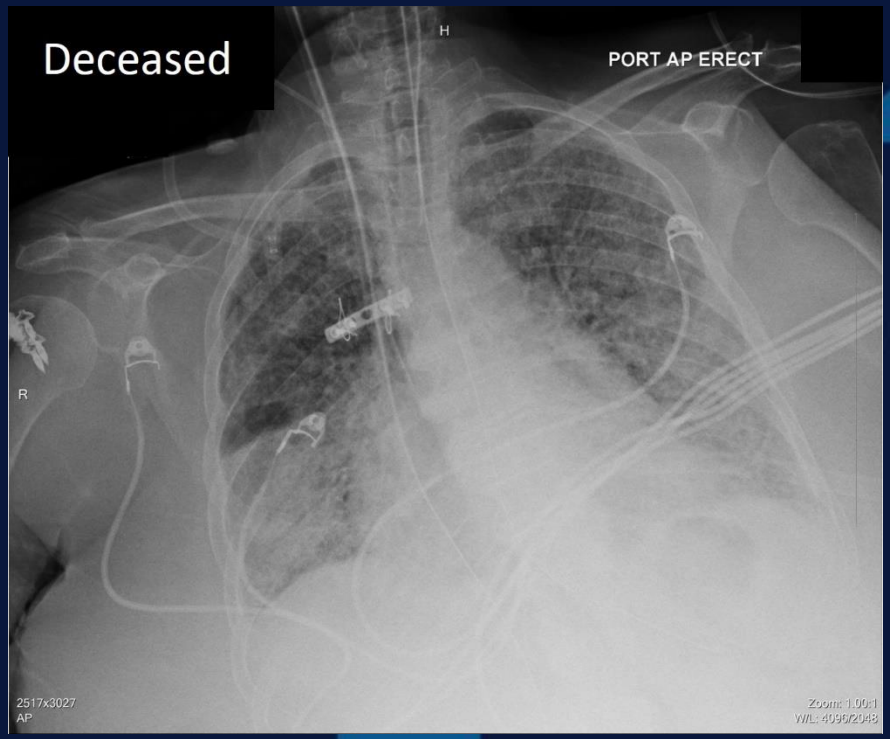

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Table 6. Hospital course overview from day 31-34

Time Point	Clinical Event	Oxygen Requirements
Hospital day 31 Ventilator day 10	General surgery consulted for tracheostomy and percutaneous endoscopic gastrostomy placement	Mechanical ventilator at 70% FiO2
Hospital day 33 Ventilator day 13	Started on treatment for ventilator associated pneumonia	Mechanical ventilator at 100% FiO2
Hospital day 34 Ventilator day 14	Husband and family elected for withdrawal of care and terminal extubation	Mechanical ventilator at 100% FiO2

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Background

- Earliest reports of association with pulmonary disease in 1949

- Patient populations
  - Trauma
  - Major surgery including cardiopulmonary bypass
  - Smokers
  - Burns
  - Chemoradiation therapy

- Infection
  - Lower respiratory tract
  - Pneumonia
  - Necrotizing pneumonitis

- Incidence
  - 0.5% in the general population
  - 13-64% of ICU patients

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Diagnosis

- Difficult as HSV infections may be a marker rather than a mediator
- No standardized diagnostic criteria
  - Cost prohibitive
  - Impractical
- Serology alone is unsatisfactory
- Clinician driven diagnosis
  - Clinical findings
  - Radiographic imaging
  - Laboratory findings
  - Histopathologic findings

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Treatment

- Systemic acyclovir
  - Improves time to death in the ICU (8 vs 22 days, p = 0.014)
  - Reduce hazard ratio for ICU death (HR = 0.31, 95% CI 0.11–0.92, p = 0.035)
- Systemic corticosteroids
  - Prevents development of fibrosis
  - Increases risk of HSV infection with other infectious sources
- 40-60% mortality rate

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Future investigation

- Literature review is limited due to the composition of articles available
  - Primarily case studies
- Most retrospective studies are limited to small sample sizes
  - N = <50-100 patients
- Elucidation of causal vs correlational relationship in the ICU

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References

1. Jellinge ME et al. Herpes Simplex Virus Type 1 Pneumonia-A Review. *J Intensive Care Med*. 2021 Dec;36(12):1398-1402.
2. Schuller D. Lower respiratory tract reactivation of herpes simplex virus. Comparison of immunocompromised and immunocompetent hosts. *Chest*. 1994;106(1 Suppl):3S-7S; discussion 34S-35S.
3. Schuierer L et al. Impact of acyclovir use on survival of patients with ventilator-associated pneumonia and high load herpes simplex virus replication. *Crit Care*. 2020 Jan 10;24(1):12.
4. Luyt CE et al. Herpes simplex virus lung infection in patients undergoing prolonged mechanical ventilation. *Am J Respir Crit Care Med*. 2007;175(9):935-42.
5. Van den Brink JW et al. Respiratory herpes simplex virus type 1 infection/colonisation in the critically ill: marker or mediator? *J Clin Virol*. 2004;30(1):68-72.
6. Chang WJ et al. Outcomes of Herpes Simplex Virus Pneumonitis in Critically Ill Patients. Viruses. 2022;14(2):205.

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