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Vaping Associated Lung Injury Requiring Bilateral Lung Transplant in an Adolescent

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Vaping Associated Lung Injury Requiring Bilateral Lung Transplant in an Adolescent

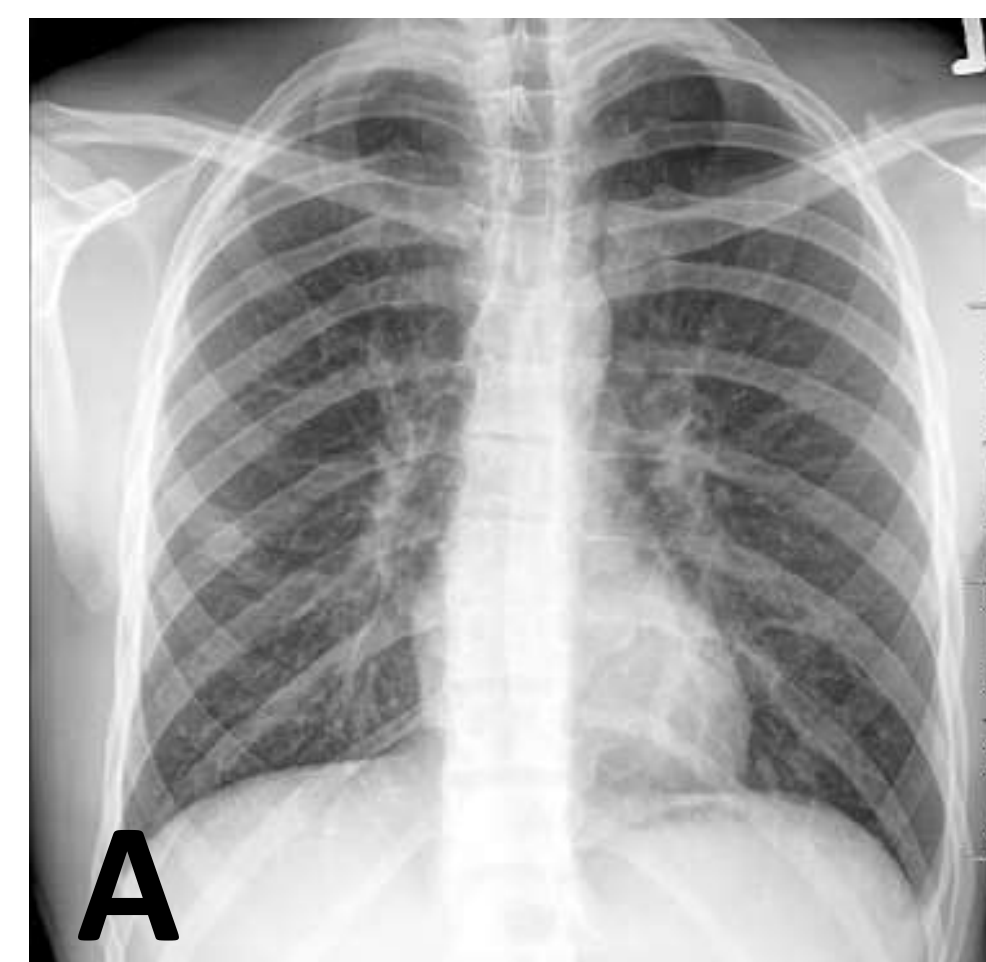
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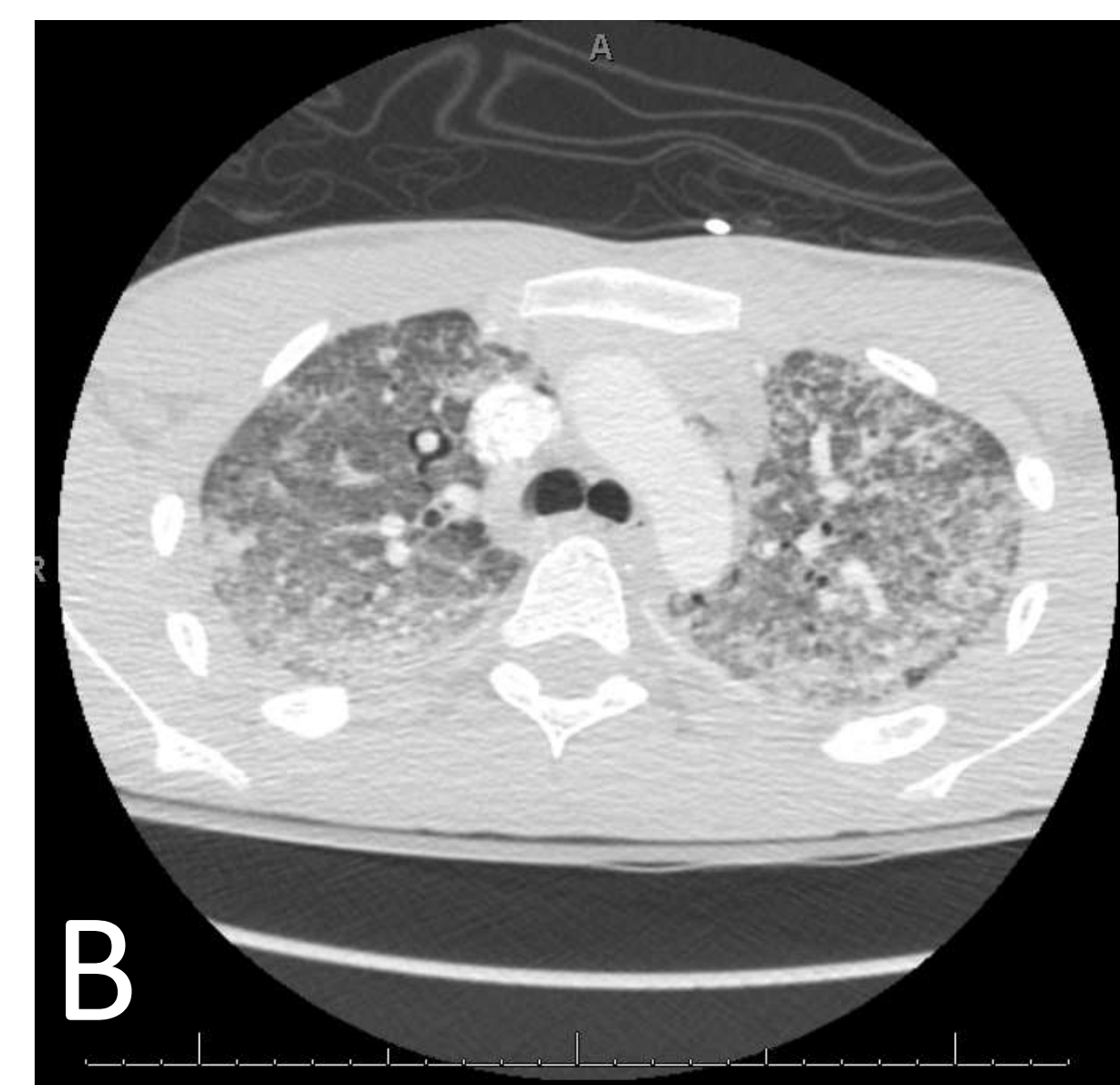
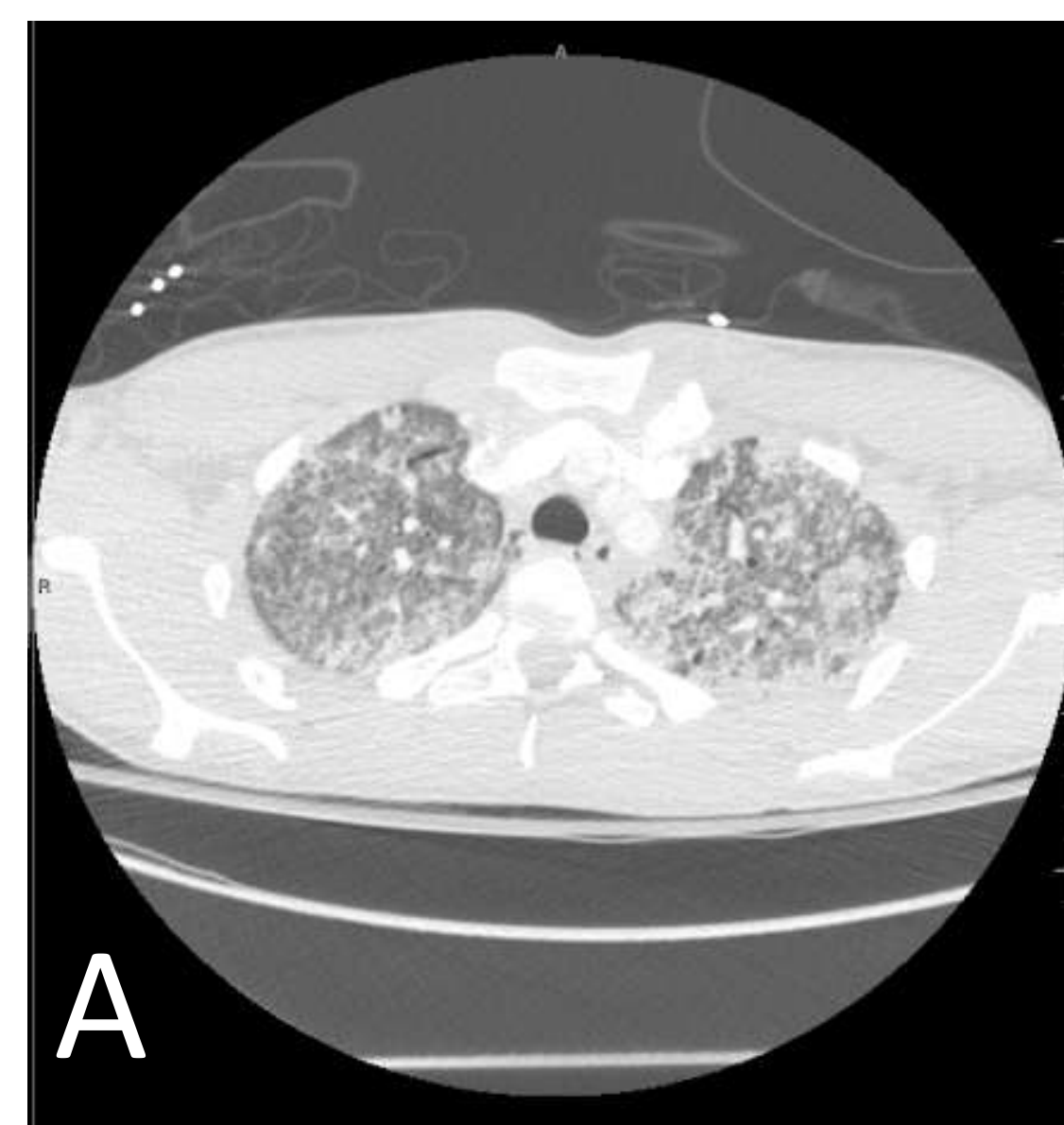
Case Report

16 year old previously health male with a two year history of vaping presented to an outside hospital for dyspnea and nonproductive cough. He was initially treated with antibiotics for community acquired pneumonia without clinical improvement. Bronchial alveolar lavage, microbiology studies and autoimmune panel were negative for an infectious or autoimmune etiology. Repeat chest imaging demonstrated significant worsening of airspace disease. Patient's condition continued to decline requiring intubation and subsequent ECMO support. He was transferred to our tertiary care center for bilateral lung transplant. Histopathology of the explanted lungs described predominant acute necrotizing and granulomatous bronchopneumonia with areas of organizing pneumonia.

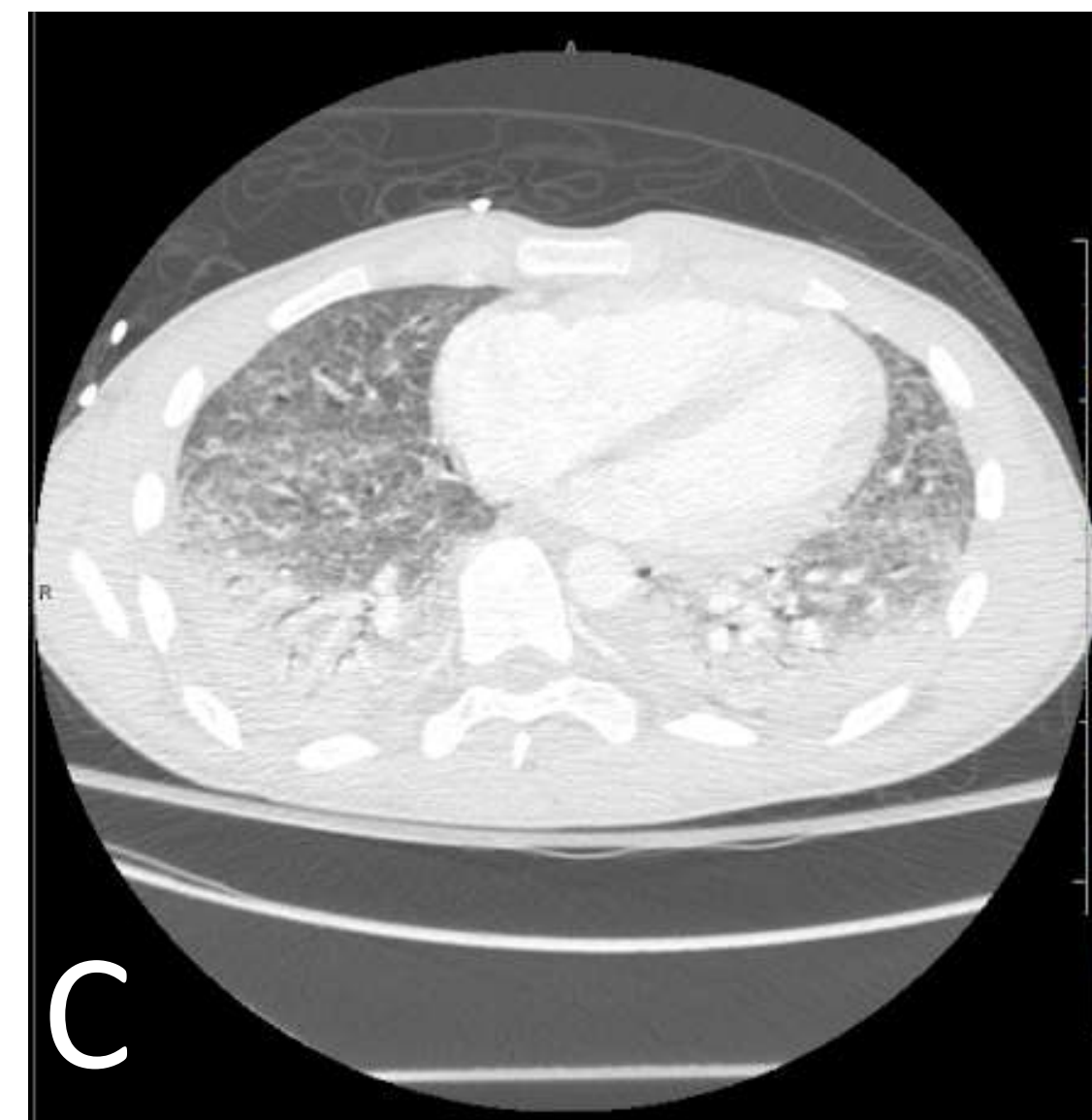
Imaging



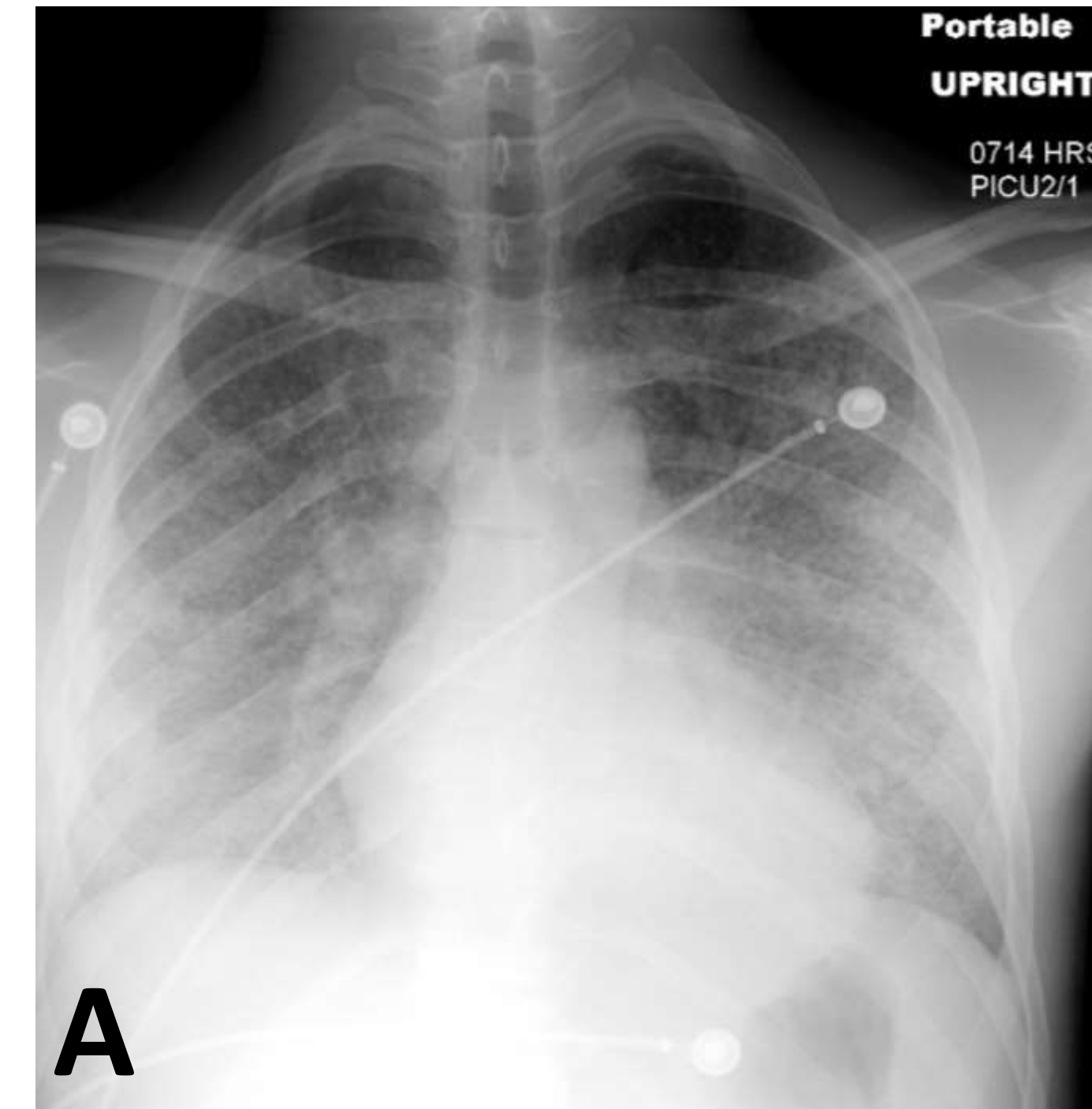
Admission CXR
Posteroanterior (A) and lateral (B) radiographs demonstrate no significant airspace disease. Incidental old right anterior fourth rib fracture.



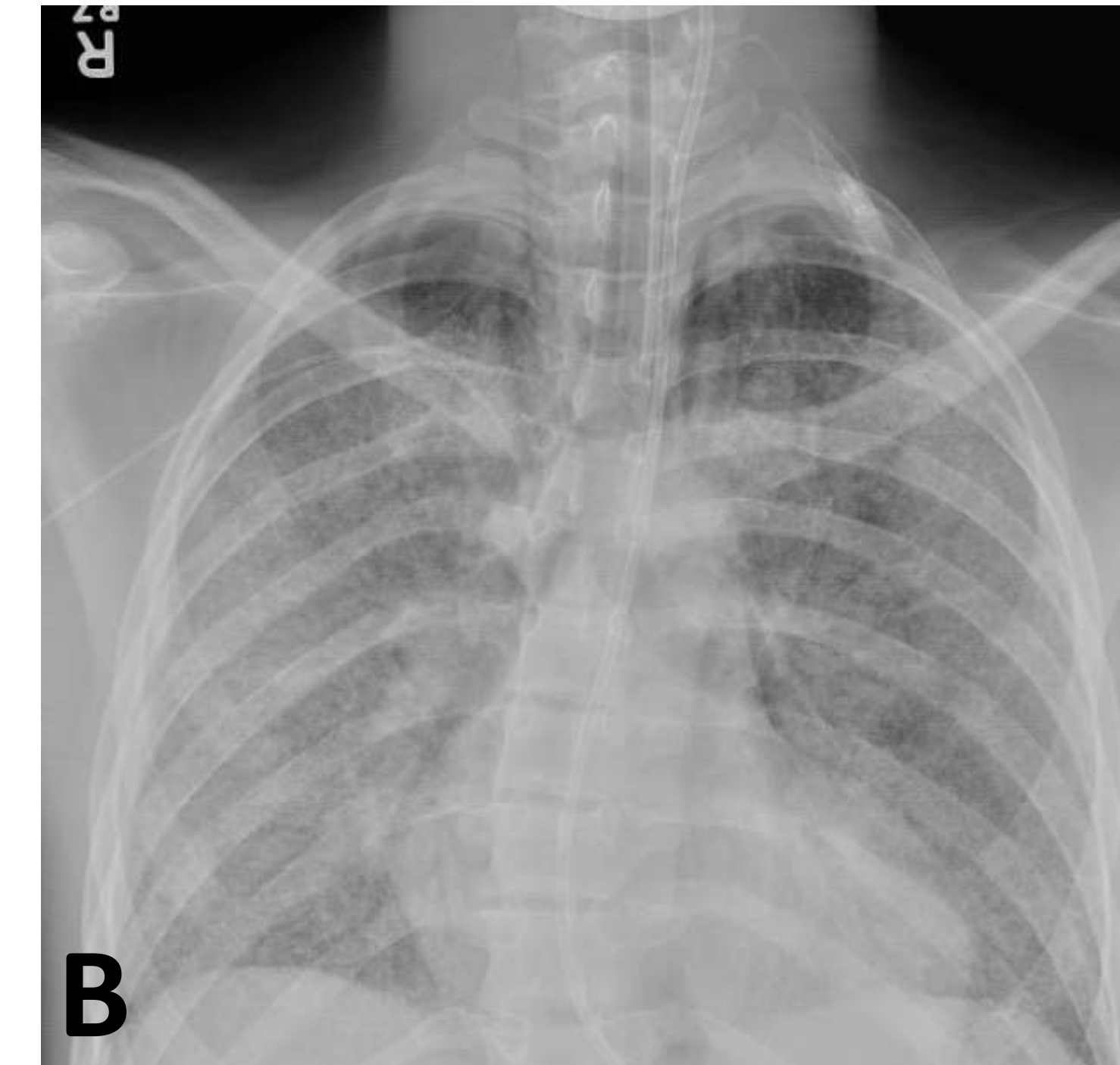
Day 7 Contrast enhanced Chest CT
Sequential axial CT images of the chest (A, B, C) demonstrate increased bilateral GGO with new diffuse patchy nodular opacities. Consolidation within the basilar and dependent portions of bilateral lungs with air bronchograms (C). Pneumomediastinum is present.



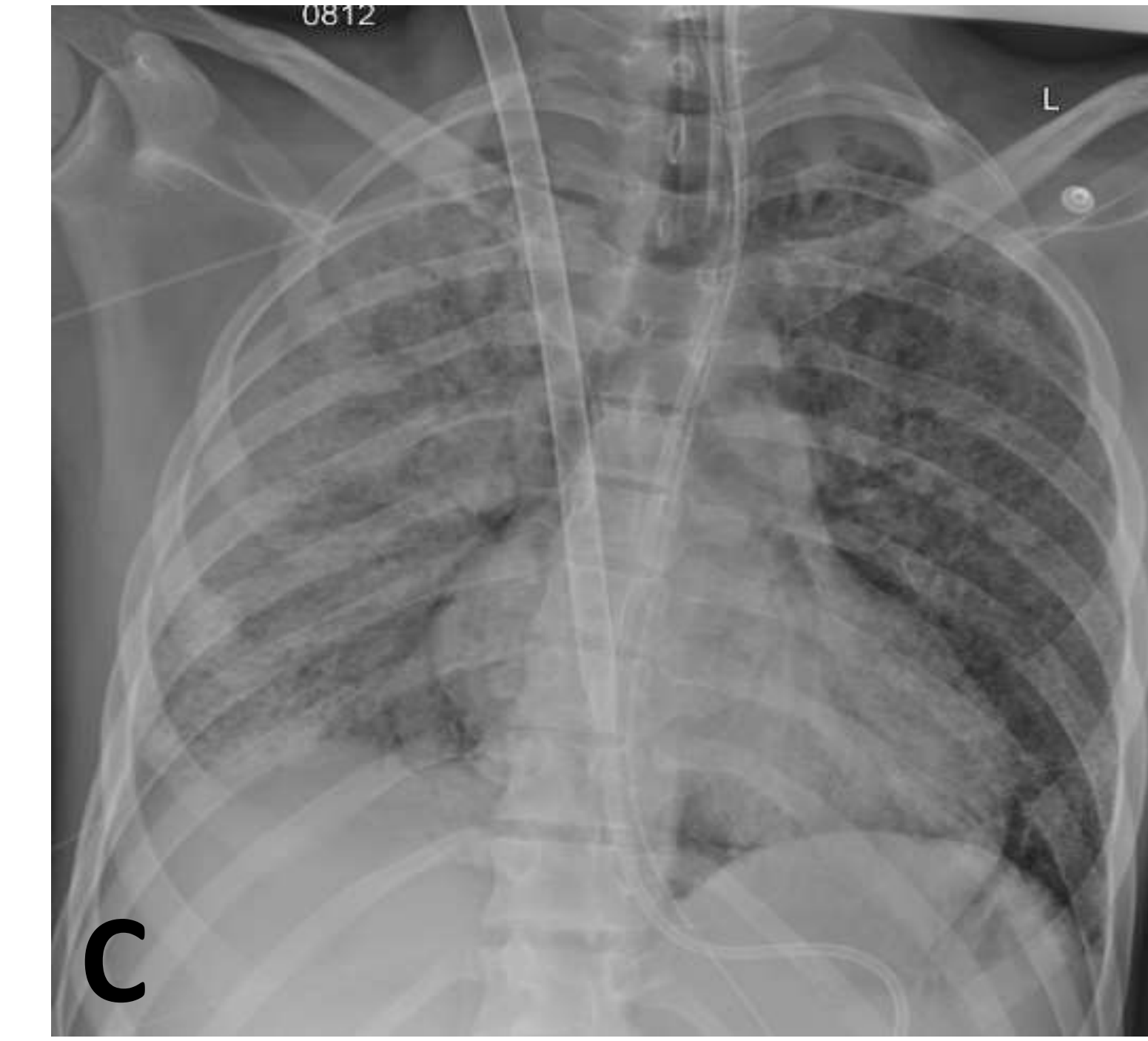
Progressive Chest Radiographs



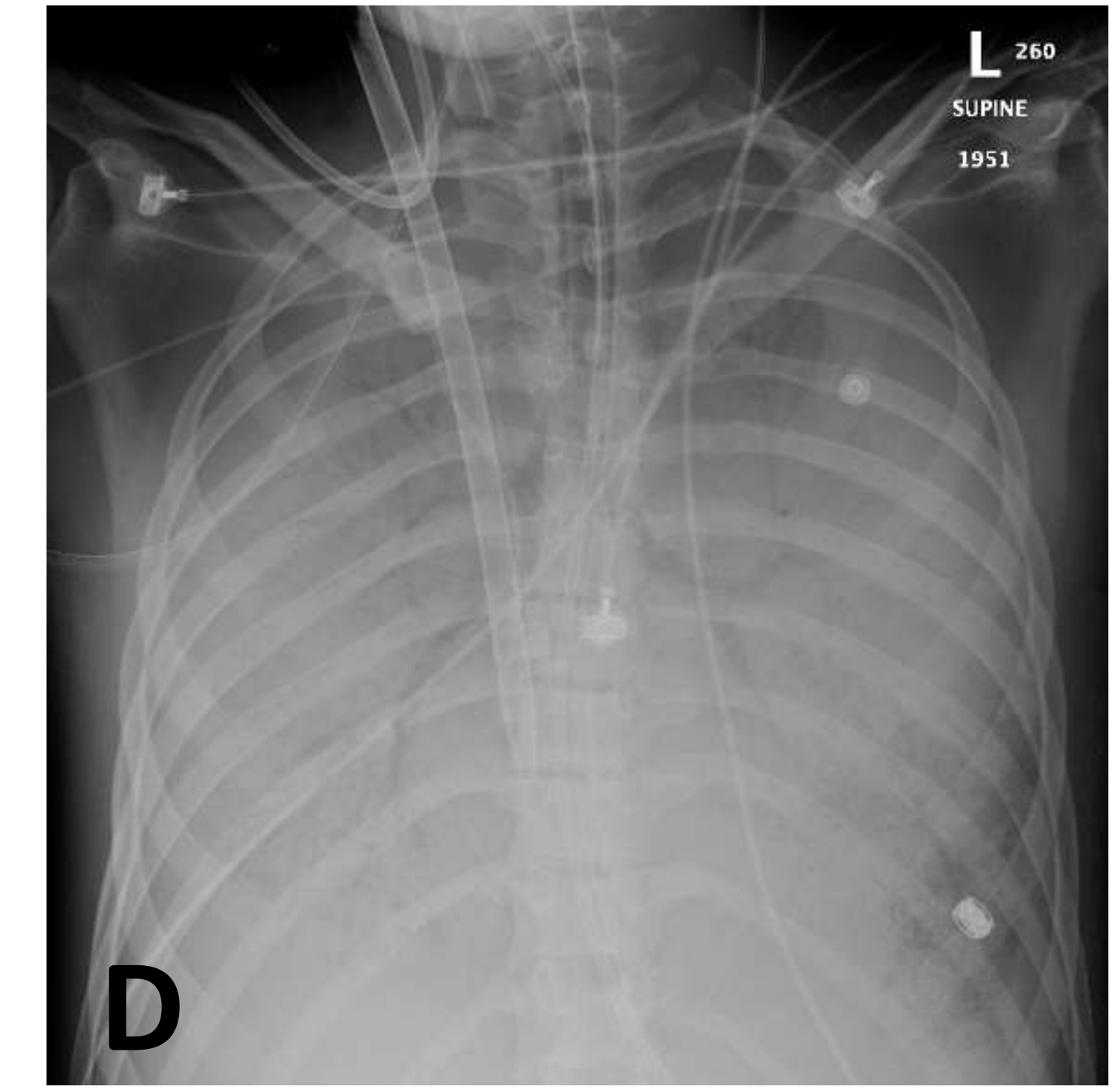
Day 5



Day 12

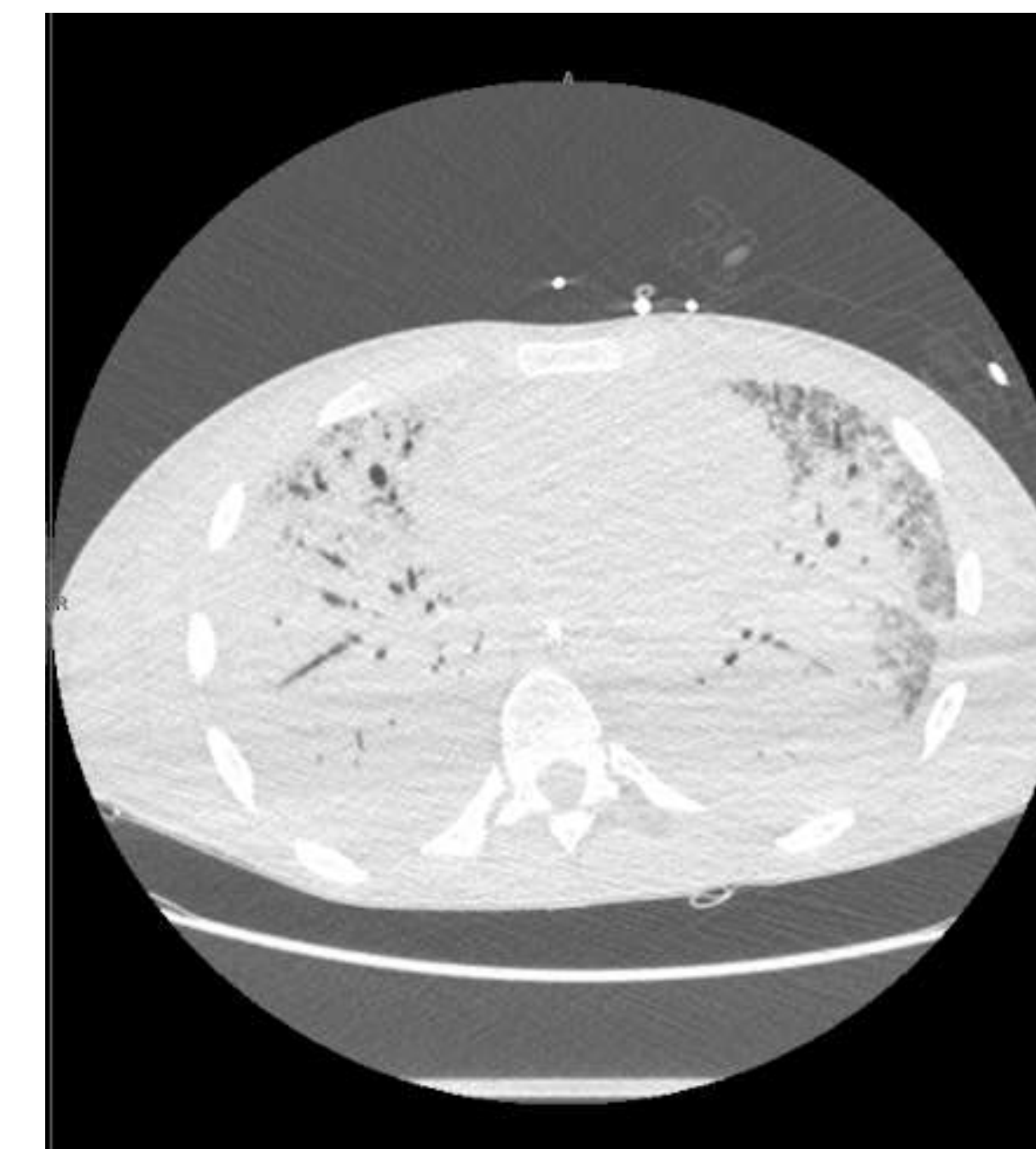
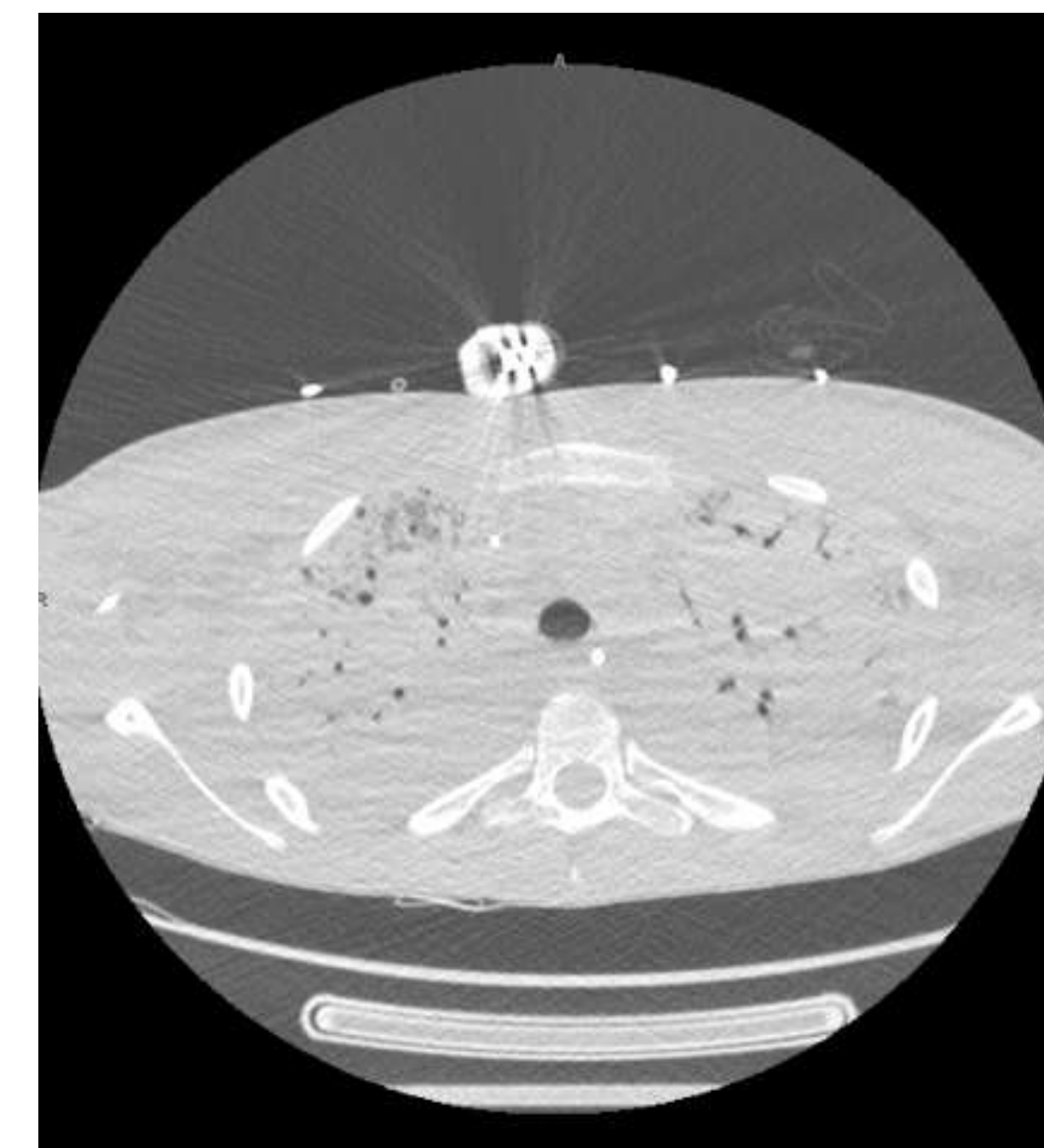


Day 22



Day 28

Day 5 radiograph (A) demonstrates diffuse bilateral interstitial and nodular opacities. Day 12 radiograph (B) demonstrates worsening airspace opacities with pneumomediastinum and endotracheal tube in place. Day 22 radiograph (C) reveals air bronchograms, worsening pneumomediastinum and large bore ECMO cannula terminating in the right atrium. Day 28 radiograph (D) demonstrates near complete consolidation of the lungs with the patient requiring maximal ECMO support



Day 31 Contrast enhanced Chest CT
Diffuse consolidation with air bronchograms and residual ground glass opacities in the anterior lung fields. Small bilateral effusions were present but are not depicted.

Conclusion

- Consider EVALI in patients with a history of E-cigarette use who have a negative infectious and autoimmune work up presenting with severe respiratory symptoms and airspace disease on chest imaging.
- As the popularity of these inhalational products evolves, radiologists must be informed of the emerging radiographic appearances of EVALI

Discussion

- E-cigarettes have been marketed as benign alternatives to tobacco cigarettes and have gained widespread popularity among adolescents.
- According to the Center for Disease Control (CDC), over 2000 cases of E-cigarette vaping associated lung injuries (EVALI) have been reported and 60 deaths have been confirmed as of January 14, 2020.
- Epidemiology: 66% male, median age of patients is 24 years old, range from 14-85 years. 82% reported using THC containing products. 78% acquired products only from informal sources (friends, dealers, online).
- The CDC currently considers EVALI a diagnosis of exclusion with a confirmed case requiring:
 - ❖ Use of an e-cigarette 90 days before symptom onset
 - ❖ Pulmonary infiltrates on chest imaging
 - ❖ Absence of pulmonary infection
 - ❖ No other plausible diagnoses (cardiac, rheumatologic or neoplastic process).
- Various radiologic imaging patterns for EVALI have been described including: Organizing Pneumonia, Lipoid Pneumonia, Hypersensitivity Pneumonitis, Diffuse Alveolar Hemorrhage and Acute Lung Injury
- In a midwestern teenage EVALI population, centrilobular nodules, ground glass opacities with subpleural sparing were predominate features.
- Vitamin E acetate has been associated with the EVALI outbreak. Vitamin E acetate has been found in E-cigarettes and in patient lung fluid samples tested by the CDC.

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