Post Tuberculosis Lung Disease: Pulmonary Blebs: A Complication of Pulmonary TB in an Adolescent

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New Directions in TB
April 1 – 2, 2024
Houston, Texas

Jeffrey R. Starke, MD has the following disclosures to make:

- No conflict of interests
- No relevant financial relationships with any commercial companies pertaining to this educational activity

Childhood Tuberculosis Case Conference "Letting the Air Out of Tuberculosis"

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Texas Children's Hospital

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Case Information

- 14 year old female diagnosed with pulmonary TB in Mexico in April, 2020. Few details known.
- Symptoms were decreased stamina during physical activities, some SOB and 3 kg weight loss over “a couple of months”.
- Not sure of medications but was taking 3 different ones. Grandmother called, meds were daily INH 225 mg, RIF 450 mg, and PZA 1200 mg, EMB 900 mg. Wgt = 38 kg. No DOT.
- Intermittently stopped medications for a few days for “gastritis”.

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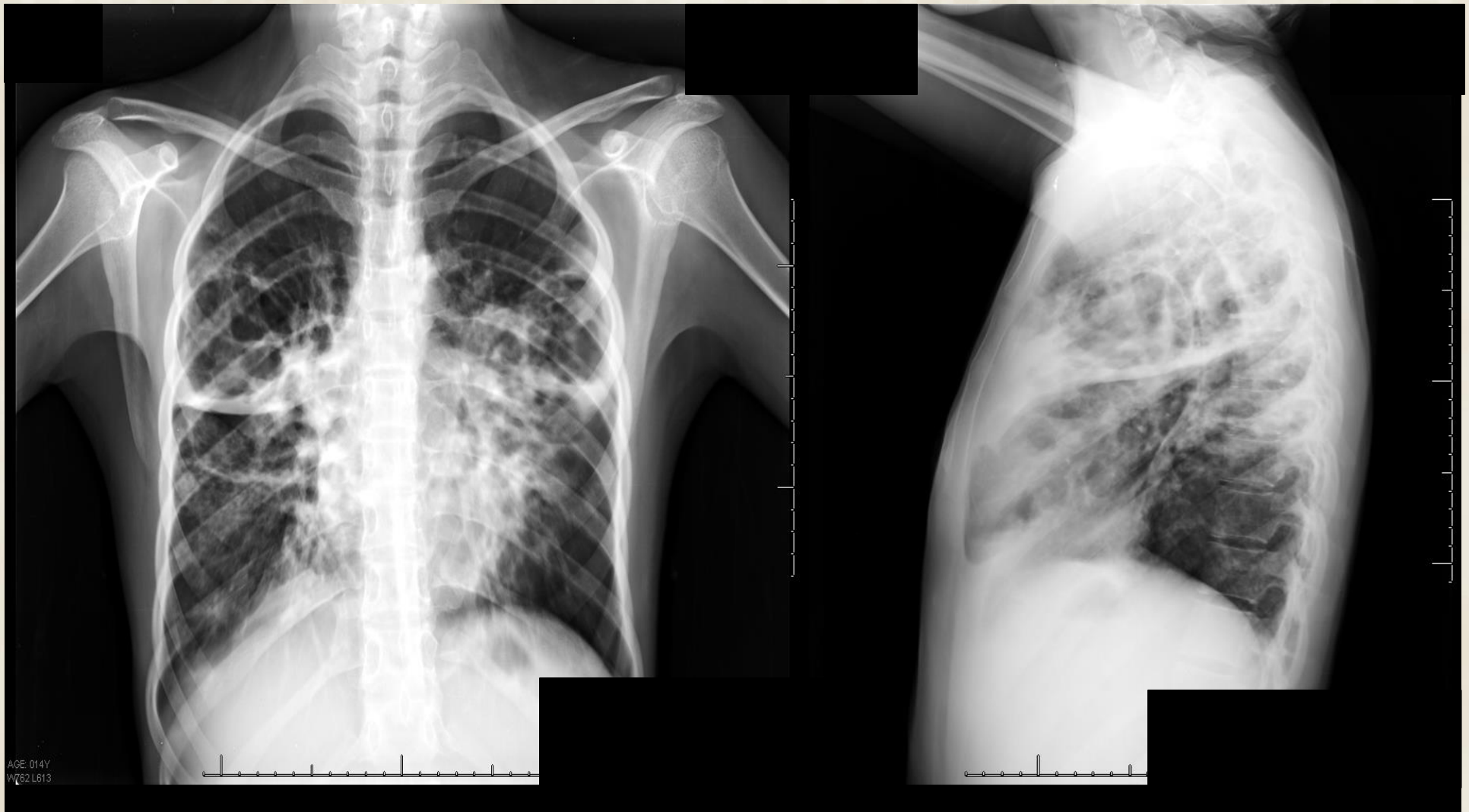
4/24/2020



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Case Information

- Began getting medications in the U.S. in May, 2020. Began to feel better.
- New doses: INH 300 mg, RIF 900 mg, PZA 1500 mg, EMB 900 mg. Now DOT on weekdays, SAT on weekends, but took over an hour to take all the medications on many days.
- Had mild elevation of AST/ALT, meds held for “a few days”.
- Had positive sputum cultures on 4/24, 4/25, and 4/26 – all pan-susceptible.
- Negative sputum cultures in May, June and July 2020.

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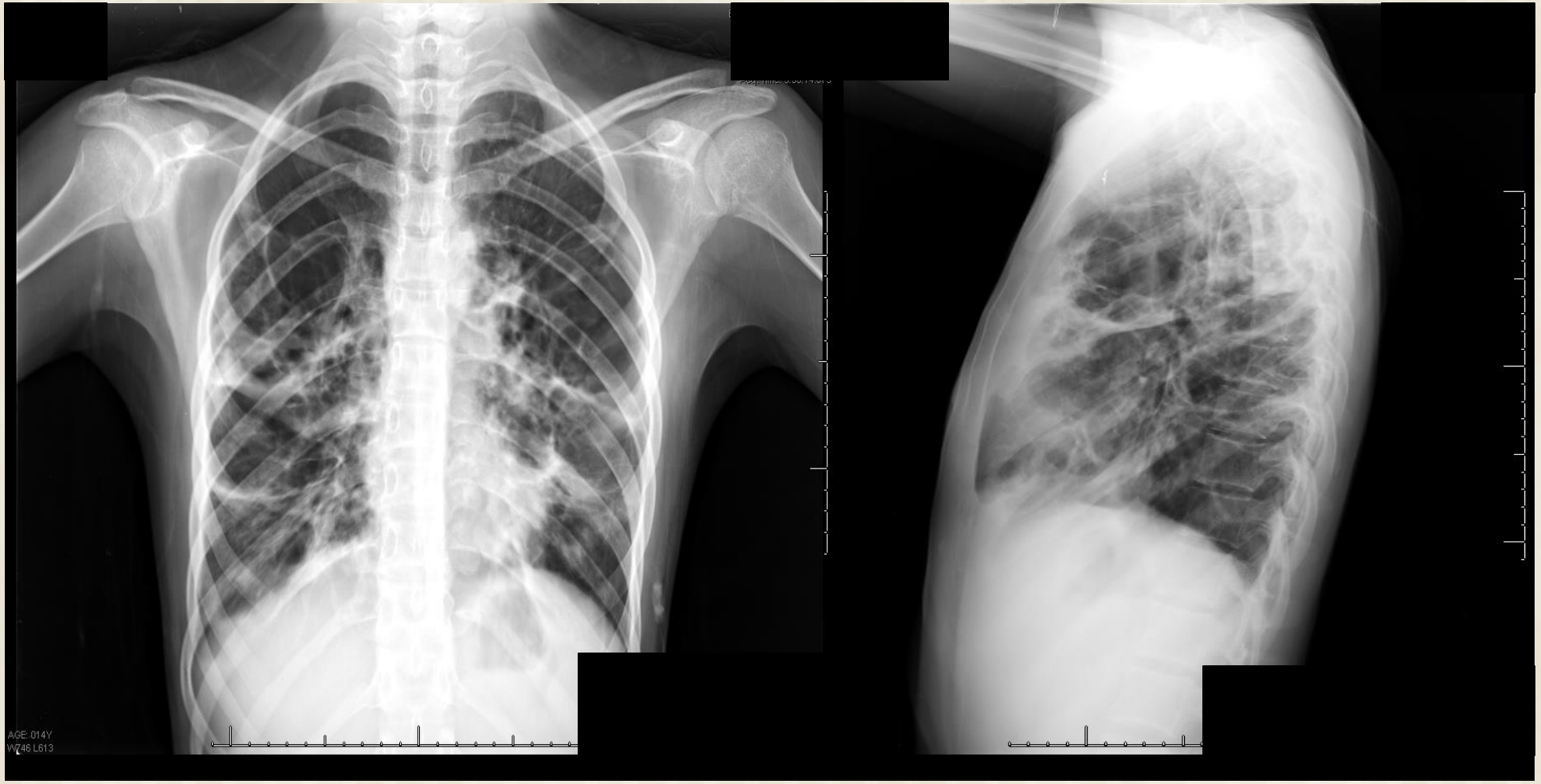
8/4/2020



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Case Information

- She was born in Texas but her mother lives in Reynosa, Mexico. She visited her mother but mostly lived with her grandmother in southern Texas, where she got most of her TB treatment.
- Stopped taking one medication in November, 2020 due to “a liver problem”, but it was resumed in December, 2020
- Again developed SOB and dyspnea in January, 2021
- CXR showed…

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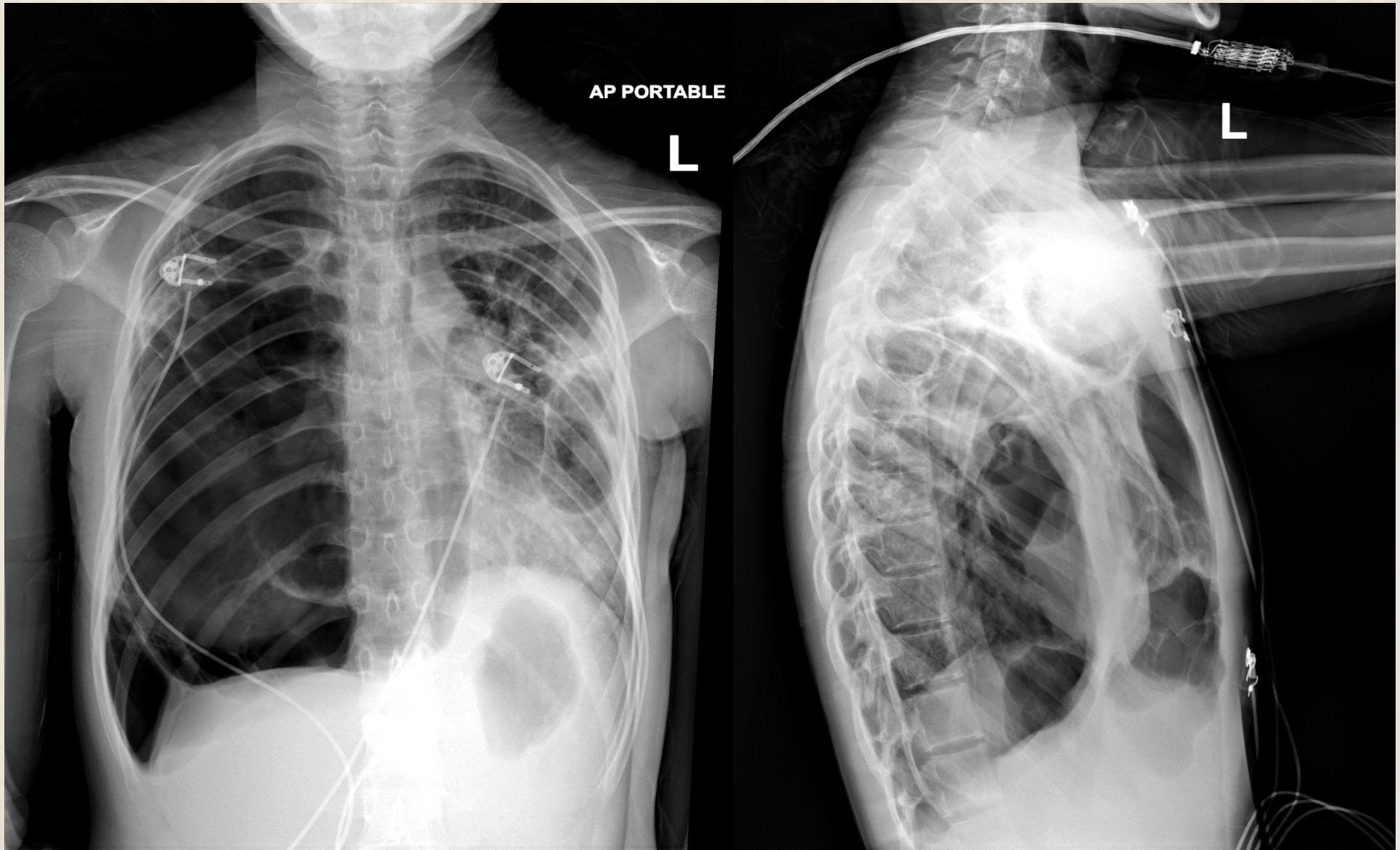
1/3/2021



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Case Information

- ? Needle decompression at the OSH. The medical record states this, but the patient and her GM denied that it was done
- She is transferred to Texas Children's Hospital on January 9, 2021.
- Upon arrival, she was not in distress and her RR was 16, pulse oxygen was 100% on 2L/min oxygen by nasal cannula
- She had diminished breath sounds on the right and coarse breath sounds throughout
- Her CXR showed…

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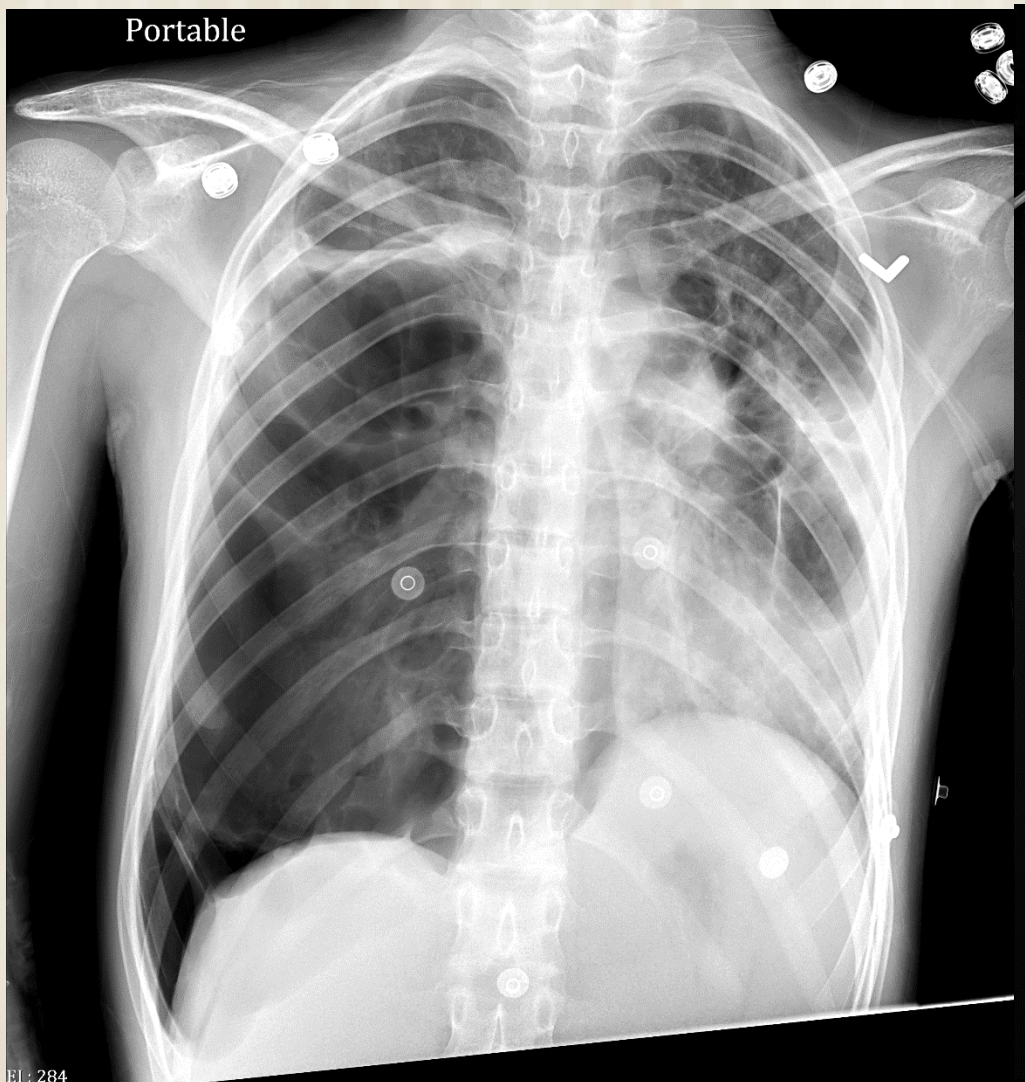
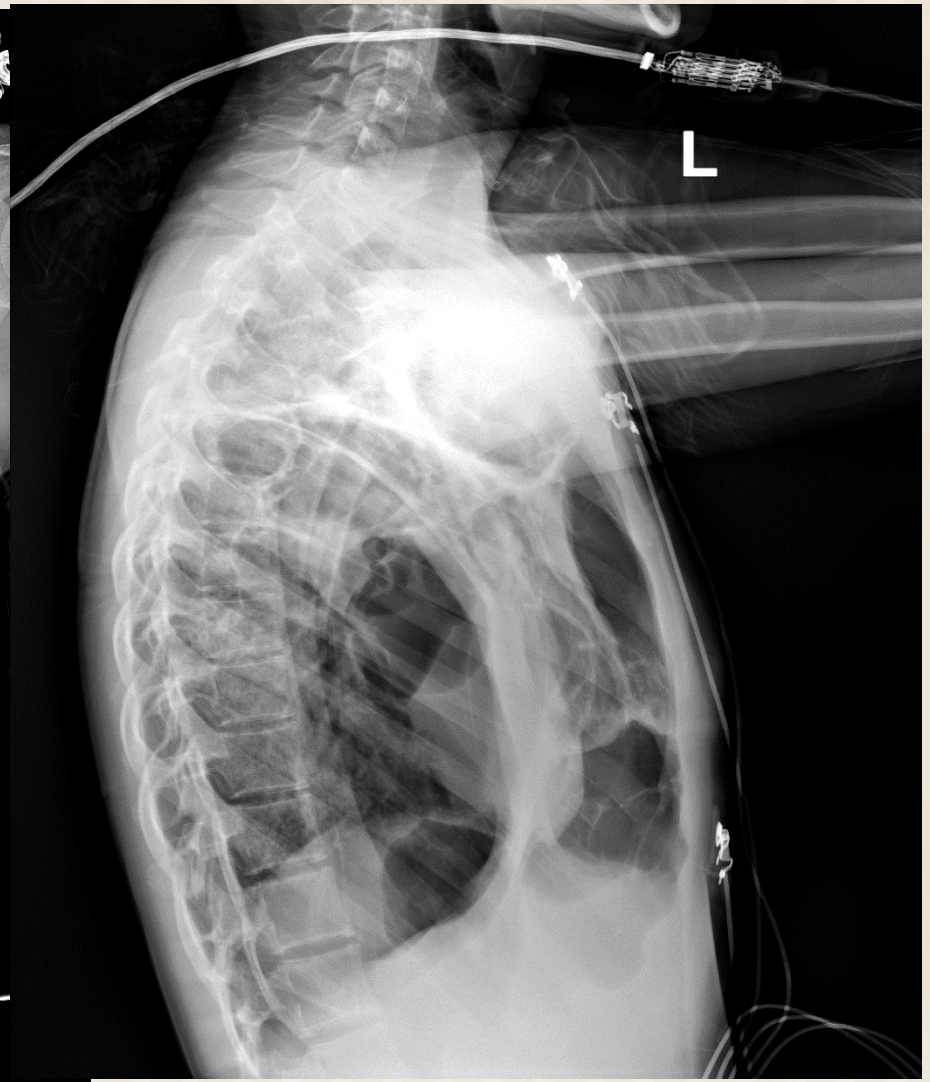
1/9/21: Hospital Admission





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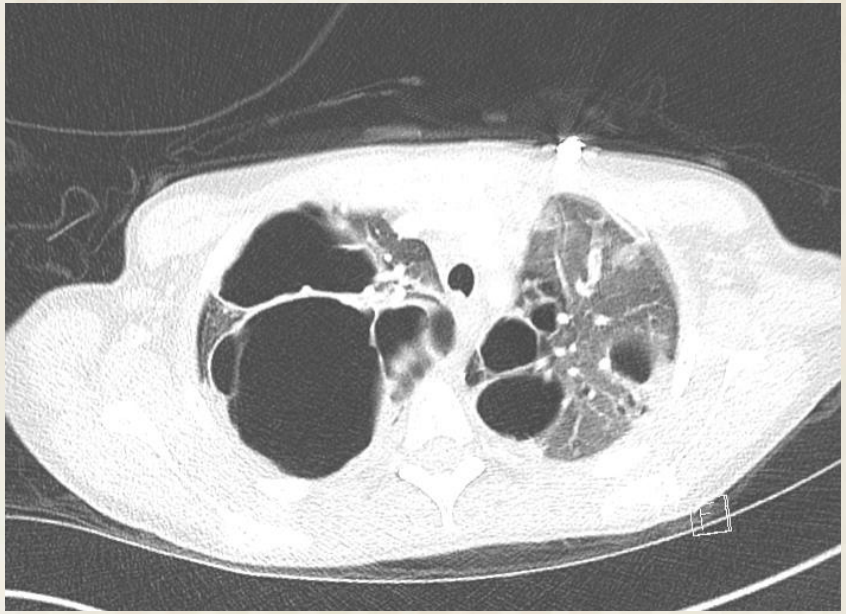
Interpretation of the OSH CT Scan of the Chest

Lungs and airways: There are **numerous cavitary lesions of varying sizes scattered throughout both lungs**, some of which are thin-walled and others which have thick walls, with the majority of the right lung replaced by these cavitary lesions. **The right middle lobe is collapsed**. In addition, there is architecture distortion, bronchiectasis with associated retraction of the mediastinal structures leftward and rostrally. There are fibronodular opacities scattered throughout both lungs, predominantly involving the lung apices. There are **tree-in-bud opacities** noted throughout the mid and lower left lung, likely reflecting **endobronchial spread of infection**. There is a pneumothorax lateral to the right lung as seen on image 31 of series 4. Additional areas of loculated pneumothoraces versus postinfectious pneumatoceles/bullae on the right are difficult to differentiate.



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Initial Physical Exam

- **GEN**: awake, alert, and interactive and appears ill but non toxic
- **VS:** HR = 100; RR = 16; BP = 83/50 – 101/66; Wgt = 38 kg; BMI = 3rd %
- **HEENT**: Normocephalic and atraumatic, pupils equal, round and reactive to light, extraocular movements intact, OP clear with moist mucous membranes.
- **Neck**: full range of motion
- **Chest**: breathing comfortably on NC; diminished breath sounds in the right lung fields with coarse breath sounds bilaterally
- **Cardiovascular**: regular rate and rhythm and no murmur, rub or gallop
- **Abdomen**: abdomen is soft, nontender, and non-distended without hepatosplenomegaly or masses
- **Musculoskeletal/Extremities**: no joint or extremities swelling or effusion
- **Skin**: no rashes or lesions
- **Lymph Nodes**: No significant lymphadenopathy appreciated
- **Neurological**: grossly nonfocal and mental status normal

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Initial Laboratory Values

- WBC = 8.14 with 70 S, 17 L, 9 M, 3 E
- H/H = 10.4/32.3 Platelets = 415K
- NA = 136; CO2 = 31; BUN = 12; Creatinine = 0.48
- AST/ALT = 40/15; GGT = 18; A Phos = 93; lipase = 64
- Glucose = 98; Albumin = 4.0
- SARS-CoV-2 PCR – Negative
- CRP = 4.8; ESR = 86
- Sputum Gram stain – few WBCs, many GPCs in clusters, mod. GPR, mod GNR, few GN diplococci
- Sputum culture: mixed respiratory flora
- Sputum AFB stain X 3: negative

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Some Concerns

- Poor adherence with TB therapy
- Poor absorption of TB meds
- MDR-TB
- Alternate infectious disease diagnosis
- Superinfection of TB
- Underlying lung disease
- Immunodeficiency
- Just lung damage from TB

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More Tests

- T.SPOT.*TB*: 11/6 spots
- HIV antibody and RNA: negative
- Histoplasma antigen [urine]: negative
- Coccidioides antigen [urine]: negative
- Fungitell: negative
- Aspergillus galactomannan: negative
- Fungal CF titers: negative
- IgA = 409; IgG – 1,890; IgM = 119
- Humoral immunity panel: several low values for pneumococcal serotypes

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Serum Drug Levels – 1/13/21

RIF 2 hrs: 1.28 [8-24]

RIF 6 hrs: 13.96

INH 1 hr: 1.02 [3-5]

INH 6 hrs: 0.57

PZA 1 hr: 20.37 [20-60]

PZA 6 hrs: 23.45

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Immunology Testing

- **Immunology studies:**
- T, B, NK cell basic assay**: decreased number and percentage of total CD3 cells with decreased total CD4 cell count on 1/14; improving number and percentage of total CD3 cells with normal total CD4 cell count on 1/29**
- RTE, naive, memory T cell panel: **normal ratio of RA: RO and appropriate RTE for age**
- Neutro oxidative burst assay: **normal**
- Lymphocyte proliferation panel: **decreased T cell function with poor mitogen response; repeated 3/1/21 with slight improvement**
- Humoral immunity panel: **protective D/T titers but some non-protective pneumococcal titers**

- **Genetic Testing:**
- MSMD panel: not suggestive of MSMD
- GATA2 gene sequencing: negative

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What Would You Have Done Next?
Any experience with TB and pneumothorax?

- She was restarted on INH 300 mg, RIF 600 mg and PZA 1000 mg daily
- 1/17/21: small pneumothorax, resolved spontaneously over 2 days
- 1/26/21: some respiratory distress and slight right-sided chest pain: large likely pneumothorax and right middle lobe collapse requiring transfer to the ICU and emergent chest tube placement

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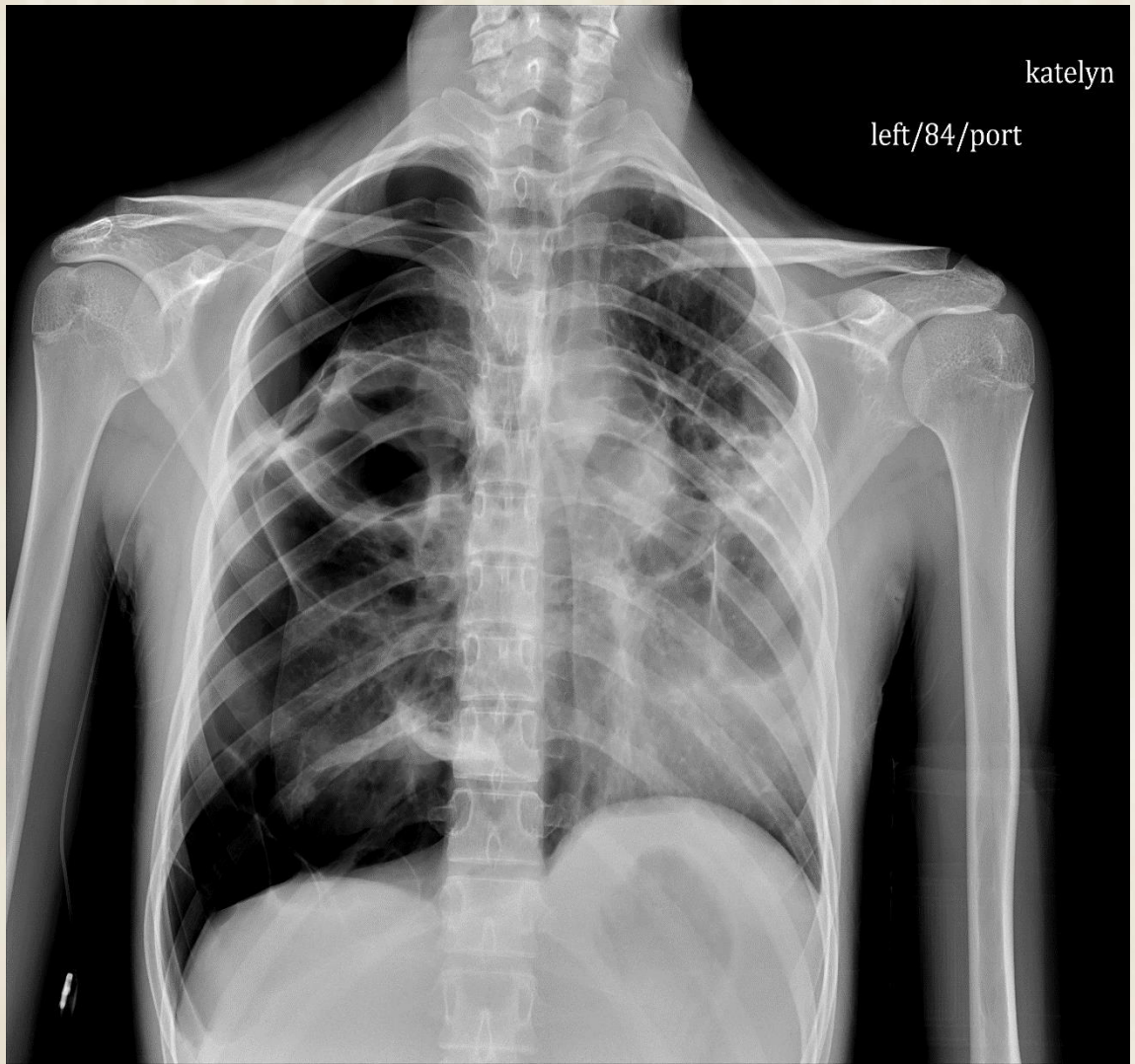
CXR 1/26/2021 – Before chest tube



"Large right pneumothorax has not changed significantly but collapse of the right lung has increased when compared with 1/23/2021. Findings otherwise are unchanged."

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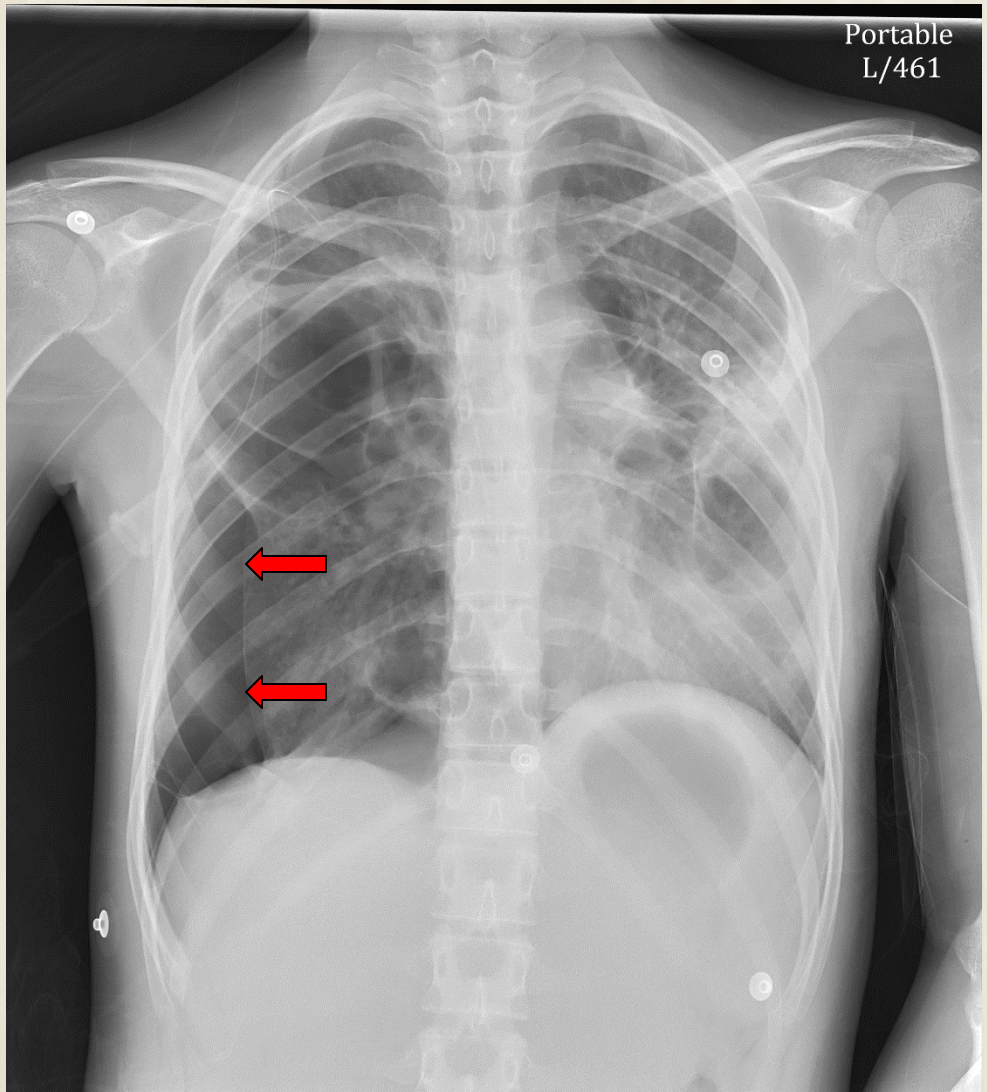
CXR 1/26/2021 – After chest tube



"Interval reduction in volume of the right-sided pneumothorax with a residual pneumothorax component residing along the lateral aspect of the right mid to lower hemithorax with intrapleural distance of approximately 2.8 cm. The pneumothorax component along the right apical region has resolved. Redemonstration of multiple cystic locules on both lungs. No appreciable left pneumothorax. Interval partial reexpansion of the right lung with persistent partial collapse of the right lower lungs."

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What Do We Need Now?

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The Literature

- Indications for Surgery in TB
  - “Serious complications”
  - Profuse hemorrhage
  - Tension pneumothorax

Eur Respir J. 2011 Jul;38(1):126-31.
Clin Infect Dis. 2016 Apr 1;62(7):887-895.
Eur J Cardiothorac Surg. 2017 Oct 1;52(4):673-678.
Thorac Surg Clin. 2019 Feb;29(1):37-46.

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Surgical Considerations

- Risk/Benefit profile
  - Bronchopleural fistula
- Thoracoscopy vs. Thoracotomy (safety first)
- Parenchymal preservation
- “The enemy of good is better”

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What Was Done in the OR

- Right thoracotomy
- Lung isolation (DLETT)
- Parenchymal preserving segmental resection
- Mechanical pleurodesis
- Fibrin sealant
- Two chest tubes

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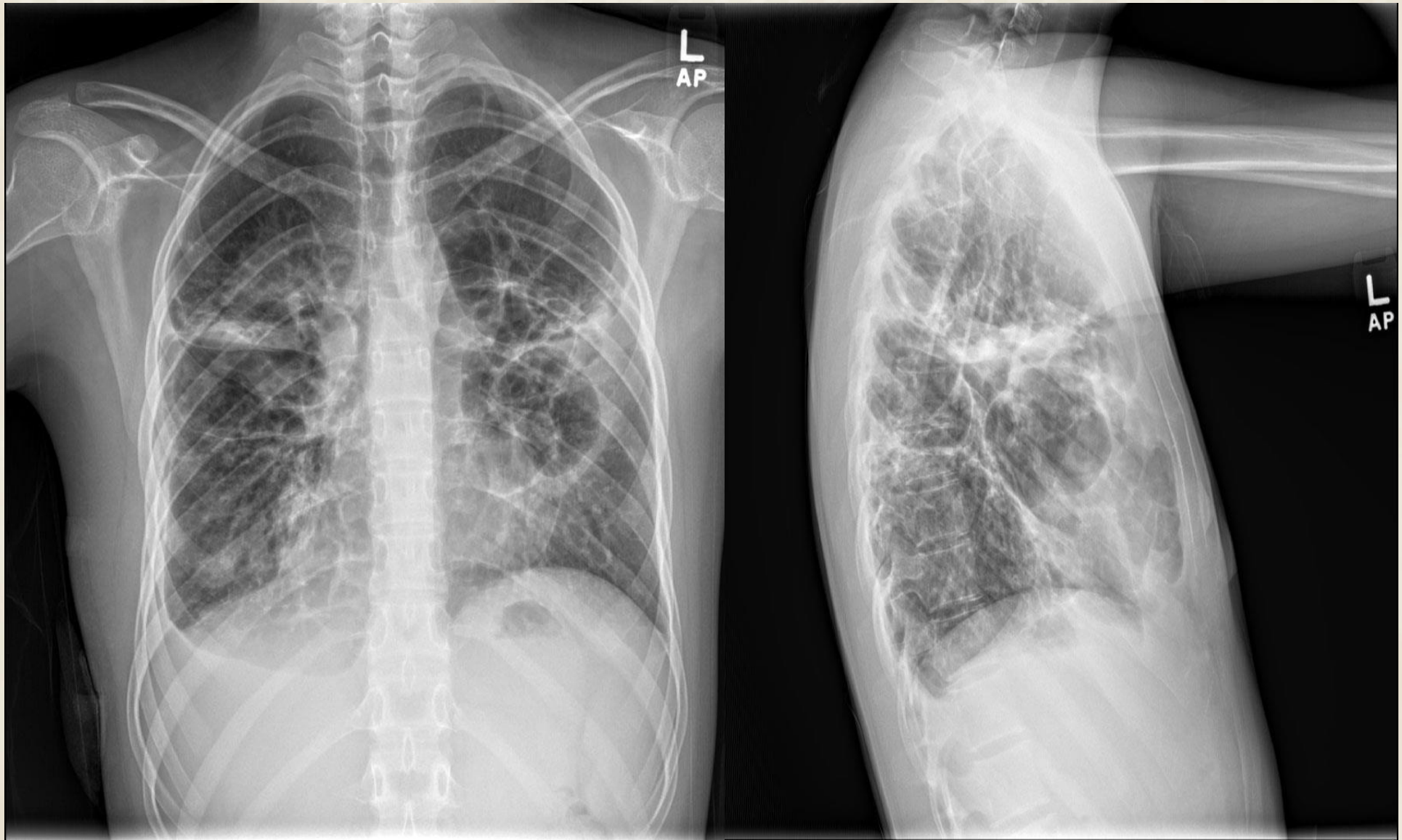
3/11/2021 – post discharge



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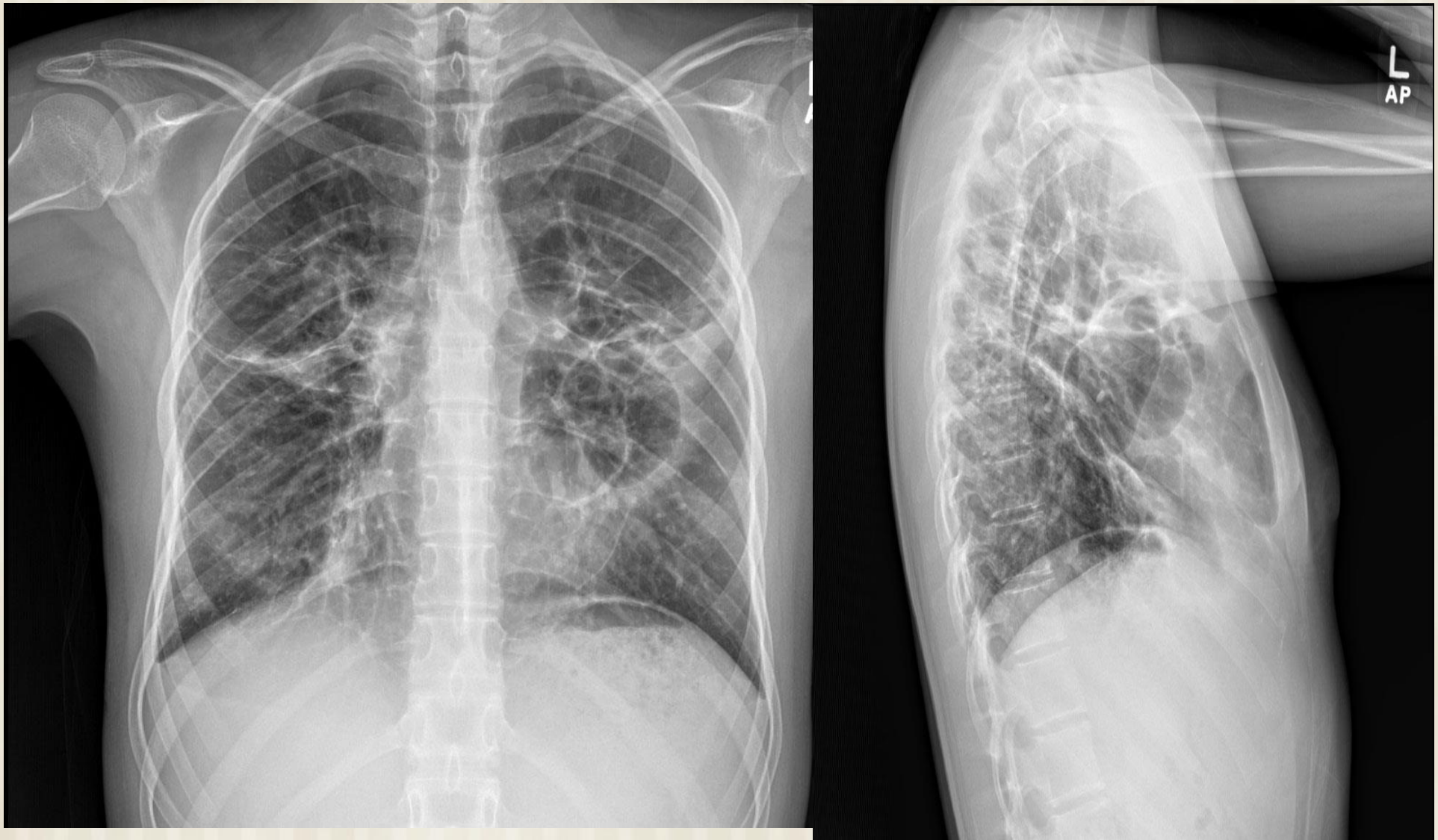
6/23/2021



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