Chest X-Ray Case Studies on view boxes

AAPA 2022

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Steps to Reading CXR

Type of Exam / Image

Clinical History

Comparison (if available)

Technique

Findings

Impression

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Case Study #1

46 yo female presents to the ED with cough / congestion. She was diagnosed with community acquired PNA (CAP) and started on levaquin@ antibiotic. Her condition worsened with increasing oxygen needs, increasing work of breathing and she was transferred to the ICU where she was placed on mechanical ventilation.

- Describe her CXR
- What is your differential diagnosis?

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Case Study #1 cont

- Describe the CXR
  - Bilateral diffuse alveolar infiltrates
  - ET tube placed
    - What happens if the ET tube is too high or too low?
  - No cardiomegaly seen
  - No pleural effusions seen
- Differential Diagnosis / Which is the most likely diagnosis?
  - ARDS / ALI (acute lung injury)
  - Pulmonary Edema/Flash Pulmonary Edema
    - TRALI
  - Diffuse Alveolar Hemorrhage
  - Acute CHF

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Case Study #1 cont

ARDS

Diagnosis of exclusion

- Rapid onset with severe SOB / low oxygenation
  - Within 6-72 hours
- Treatment – treat the underlying cause
  - Mechanical Ventilation
  - Prone position
  - Fluid management / ECMO
- Mortality – 26-58% per Up-to-Date
- Can develop pulmonary fibrosis in severe cases
- Post ICU complications include delirium / physical deconditioning

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Case Study #2

LH is 78 yowf with PMHx of stage IV breast CA presents to ER with worsening SOB over the past several days

- Initial CXR
- Describe the CXR
- What is your differential diagnosis?
- What is your next step?

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Case Study #2 cont

Describe the CXR:
- Blunting of the right costophrenic angle c/w large pleural effusion

Differential Diagnosis:
- Volume overload (CHF)
- recurrent malignant effusion
- Empyema
- parapneumonic effusion

Next Step:
- Decubitus CXR (since this case is OLD)
- Bedside Ultrasound preferred if available

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Case Study #2 cont

- Bilateral Decubitus CXR
  - Describe the image // Is the fluid loculated or layering?
- Approximately how much fluid is present (in cm)?
- What is the most logical next step for diagnosis and treatment?
  - 1. Watch the fluid with serial CXR
  - 2. Diuresis with Lasix
  - 3. Ultrasound guided Thoracentesis
  - **4. Indwelling pleural catheter placement // Pleurx catheter**

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Case Study #2 cont

- Is the fluid loculated or layering?
  - Layering
- Approximately how much fluid is present (in cm)?
  - 5 cm
  - What is the most logical next step for diagnosis and treatment?
  - 1. Watch the fluid with serial CXR
  - 2. Diuresis with Lasix
  - 3. Ultrasound guided Thoracentesis
    - Will quickly improve patient's s/sx
  - 4. Indwelling pleural catheter placement // Pleurx catheter
    - Recent study in CHEST Feb 2018 states repeat thoracentesis for recurrent malignant effusions have high risk of complications to patient therefore strongly consider indwelling pleural catheter placement

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Case Study #2 cont

What is the most likely cause of the pleural effusion?

- 1. Malignancy
- 2. Infection
- 3. Volume overload
- 4. Parapneumonic effusion

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Case Study #2 cont

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- Patient ended up having thoracentesis and cytology showed atypical cells consistent with metastatic adenocarcinoma. The pleural fluid returned within 3 days and discussion with patient and family about indwelling pleural catheter placement.
- Patient was discharged to hospice

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Case Study #3

DK is a 51 yowf who presents with atypical CP and dry cough. She was recently seen by a cardiologist and told her "heart was fine."

Unremarkable PMHx except anxiety

- Initial CXR
  - Describe this CXR

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Case Study #3 cont

After reviewing the CXR, the most likely cause of the patient's symptoms are:

1. Pneumonia
2. Esophageal dilatation
3. Decompensated CHF
4. Pneumothorax

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Case Study #3 cont

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Case Study #3 cont

Patient was seen by a GI specialist, underwent an EGD and was found to have extensive esophageal candidiasis.

Must rule out underlying immunocompromised state with esophageal candidiasis

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Case Study #4

Patient is a 67 yo female with chronic progressive SOB presents to the ED with worsening dyspnea and non-productive cough. She is not on oxygen at home. Lifelong non-smoker, no pets, no occupational exposures.

She was recently seen in the clinic and a CXR was obtained.

Patient had bilateral crackles and clubbing on PE

VS: HR 102 BP 134/78 R 22 Pulse ox 84% on RA (room air)

Describe the CXR

What is your differential diagnosis?

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Case Study #4 cont

- Describe the CRX:
  - Diffuse interstitial infiltrates
  - Ground glass opacities bilaterally
  - Blunting of the left costophrenic angle consistent with a small pleural effusion
  - Heart size is within normal limits
  - *** Radiologist was able to compare CXR to film several days prior and showed worsening infiltrates

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Case Study #4 cont

- Differential Diagnosis:
  - Interstitial Lung Disease
    - Idiopathic Pulmonary fibrosis
    - Sarcoidosis
    - Connective Tissues Disease
    - Medications (amiodarone)
    - Cryptogenic Organizing Pneumonia
    - Hypersensitivity pneumonitis
    - RB – ILD (respiratory bronchiolitis – seen in smokers)
  - Congestive Heart Failure
  - TB
  - Occupational Lung Disease
  - Sarcoidosis

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Case Study #4 cont

Given pt's history of lifelong non smoker and progressive infiltrates on CXR what would be your next step?

High Resolution CT chest with contrast
- Evaluation for Interstitial lung disease / LAN

Hypersensitivity pneumonitis panel

CTD workup / Serology

Complete PFTs

Bronchoscopy

Open Lung Biopsy

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Case Study #5

85 yo female presents to the ED with sudden onset right sided chest pain and SOB

Describe the initial CXR:

What is the most likely cause of the finding on CXR?

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Case Study #5 cont

Describe the initial CXR:
- Right Apical pneumothorax measuring approx. 2 cm
- Right basilar atelectasis
- Pacemaker present L chest

Look at the other 2 CXRs
- Describe any changes . . .

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Case Study #5 cont

Describe the second and third CXRs

- CXR # 2
  - Persistent small right apical PTX (pneumothorax)
  - New small right pleural effusion
- CXR 3 #
  - Persistent small right apical PTX
  - Blunting of both costophrenic angles consistent with pleural effusions
  - RLL atelectasis

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Case Study #5 cont

What would be your next step for treating a persistent pneumothorax?

- Consider chest tube placement d/t persistent PTX
- Consider pleuradesis

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Case Study #6

Patient is a 63 yo female with PMHx of COPD presents to the clinic with worsening SOB and non-productive cough, fevers, dyspnea and malaise over the past 7 days. Patient smokes 1 ½ ppd x 45 years. She is not on any oxygen at home.

PE – crackles noted

Here is her initial CXR:

Differential Diagnosis:

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Case Study #6

Differential Diagnosis:

- Community Acquired Pneumonia
- Hypersensitivity pneumonitis / Idiopathic Pulmonary Fibrosis
- Fungal pneumonia / eosinophilic pneumonia
- BOOP(bronchiolitis obliterans organizing PNA)/ COP (cryptogenic organizing PNA)
- Malignancy
- COPD Acute Exacerbation
- MAC (mycobacterium avium complex)/ MAI
- TB
- Diffuse Alveolar Damage / ARDS

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Case Study #6 cont

Patient was placed on PO antibiotics to cover community acquired pneumonia

Her s/sx didn't improve on the antibiotics and she represented to the clinic and had a follow up CXR.

Describe the follow up CXR:

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Case Study #6 cont

After reviewing the follow up CXR, what is your next step in diagnosis and treatment?

- HRCT scan chest
- PFTs – typically show restrictive ventilatory defect with decrease in DLCO
- Bronchoscopy with TBBX (transbronchial biopsies)

The bronchoscopy /TBBX showed

- Organizing pneumonia, no malignant cells present, purpose is to also exclude other causes
- Option: Open Lung Biopsy:

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Case Study #6 cont

Patient was diagnosed with BOOP (bronchiolitis obliterans organizing pneumonia) or COP (cryptogenic organizing pneumonia)

What is COP ?

- Idiopathic form of organizing pneumonia
- Diffuse ILD which affects the distal bronchioles / alveoli
- Associated with CTD / drugs / malignancy
- No specific labs associated with COP
- Up to 50% patients have "recurrent / migratory pulmonary opacities"

Treatment:

- mild stable disease: watch (spontaneous remission can occur / re-eval 8-12 weeks)
- moderate disease: macrolides (3-6 months) or systemic steroids
- Persistent /worsening disease: systemic steroids – Prednisone (.75-1 mg/kg/day - IBW) for 4-6 weeks, taper off after 3-6 months
  - Routine CXR / PFTs q 2-3 months
- Need to watch for relapses when taken off steroids

Prognosis: Complete clinical / radiologic recovery in 66% patients

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Case Study #7

AB is a 32 yowm who presents to the ER with worsening SOB, fevers and hypoxemia. He admits to having had a "cold" for the past few days.

Unremarkable PMHx except obesity / ½ ppd smoker / social Etoh

Describe the initial CXR

- What is your differential diagnosis?
  - Empyema
  - Community Acquired PNA
  - Pulmonary Abscess
  - Acute Lung Injury/ Sepsis

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Case Study #7 cont

After seeing this CXR, all of the following are correct in the diagnosis/treatment of this patient ***except:***

- 1. Admit and place on broad spectrum antibiotics
- 2. CT scan chest
- 3. Discharge home on PO antibiotics
- 4. Ultrasound guided thoracentesis

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Case Study #7 cont

After seeing this CXR, all of the following are correct in the diagnosis/treatment of this patient ***except:***

- 1. Admit and place on broad spectrum antibiotics
- 2. CT scan chest
- 3. Discharge home on PO antibiotics
- 4. Ultrasound guided thoracentesis

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Case Study #7 cont

Patient was admitted to the hospital, placed on broad spectrum antibiotics. A right sided ultrasound guided thorocentesis was attempted but unable to be completed d/t loculated fluid. Thoracic surgery was consulted.

Patient's condition worsened and here is a follow up CXR

Describe the CXR

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Case Study #7 cont

After describing the CXR, what is the most likely diagnosis?

- 1. empyema / loculated pleural effusion
- 2. decompensated CHF
- 3. pulmonary contusion
- 4. flash pulmonary edema

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Case Study #7 cont

After describing the CXR, what is the most likely diagnosis?

- 1. empyema / loculated pleural effusion
- 2. decompensated CHF
- 3. pulmonary contusion
- 4. flash pulmonary edema

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Case Study #7 cont

Patient developed respiratory failure and was placed on mechanical ventilation d/t severe sepsis from a right sided empyema. The patient underwent VATS decortication

Here is the post op CXR:

Please describe:

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Case Study #7 cont

Empyema / complicated parapneumonic Effusion

- Exudative
- Bacterial infection in the pleural space / fluid
- Pleural fluid: pH < 7.2 and glucose < 60
  - Need drainage
- Empyema = pus in pleural space

- Treatment:
  - Broad spectrum antibiotics including anaerobic coverage
  - Chest tube placement - with administration of TPA and Dnase BID x 3 days
  - Routine imaging with CT chest
  - VATS decortication

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Case Study #8

JV is a 56 yo male who presents to the clinic with progressive shortness of breath and intermittent wheezing worsens with activity. He admits to smoking 1 ppd x 30 years. Currently unemployed.

He admitted to being hospitalized for COPD twice over the past 6 months and was given 2 inhalers but he can't afford them.

CXR obtained / Review and describe the findings:

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Case Study #8 cont

Chest XR Finding:

- Hyperinflation / barrel chest
- Widened rib spaces
- Flattened diaphragms

What would be the next step in making the diagnosis?

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Case Study #8 cont

What would be the next step in making the diagnosis?

- Spirometry, which is required to make a diagnosis of COPD
  - Per GOLD Guidelines 2017
- Spirometry showed:
  - FEV1 17% post BD
  - Ratio 32%
  - Consistent with GOLD Grade 4, Group D Acute Exacerbation
  - He was treated for COPD AE and discharged home on LAMA/LABA/ICS and albuterol rescue inhaler

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THE END

UPDATED 4/2019

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