

Adult Cardiopulmonary Case Presentations

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This Presentation is Approved for
1 CRCE Credit Hour

Learning Objectives

- > Presented with patient scenarios, including relevant data, identify important diagnostic findings & explain their implications

Case One

- > 67 YO male
- > Hx
 - ❖ Current smoker
 - ❖ 60 pk/yr hx of smoking
 - ❖ Father died of emphysema

Case One

- > 67 YO male
- > P_x
 - ❖ Cachectic (skinny)
 - ❖ Hypertrophied sternocleidomastoids
 - ❖ BS: diminished
- > ABGs (FiO₂ = 0.21)
 - ❖ PO₂ 62
 - ❖ PCO₂ 65
 - ❖ pH 7.37

Case One

Please pause the video and examine the diagnostic image

See links below for chest x-ray

Case One

- > Diagnosis: bullous emphysema
 - ❖ Hyperlucent lung fields
 - ❖ Small-normal heart size
 - ❖ Flattened diaphragm

Case Two

- > 23 YO female drug overdose
- > Ventilator TV set to 500mL, but TV_E noted to be 300mL
 - ❖ Ventilator output is accurate
 - ❖ No ETT cuff leak
 - ❖ No chest tube
 - ❖ Ventilator changed out, just in case, with same result

Case Two

Please pause the video and examine the diagnostic image

See links below for chest x-ray

Case Two

- > Gastric tube is located in lung: TV lost through gastric suctioning

Case Three

- > 53 YO male
 - ❖ Severe, persistent asthma
 - ❖ Required systemic steroids
 - ❖ Current exacerbation
 - ❖ Fever
 - ❖ Malaise
 - ❖ Recent onset of hemoptysis

Case Three

Please pause the video and examine the diagnostic image

See links below for chest x-ray

Case Three

- > Aspergillosis with mycetoma (fungus ball)
- > Aspergillosis more likely with immunosuppression
- > May exacerbate asthma
- > May erode through blood vessel
- > Difficult to treat

Case Four

- > Ventilator patient
 - ❖ Just repositioned
 - ❖ $FiO_2 = 40\%$, $SpO_2 = 83\%$
 - ❖ Increased peak inspiratory pressure
 - ❖ Decreased static compliance
 - ❖ Absent breath sounds on left
 - ❖ Tachycardia
 - ❖ BP WNL

Case Four

Please pause the video and examine the diagnostic image

See links below for chest x-ray

Case Four

- > ETT in right mainstem bronchus
- > Tube needs to be repositioned & secured

Case Five

- > 67 YO, anxious male
- > Short of breath
- > Chest pain
- > Hemoptysis
- > Wheezing on right
- > ECG - right axis deviation
- > $FiO_2 = 1.0$, $PaO_2 = 65$ mm Hg
- > $PaCO_2 = 42$ mm Hg, $PetCO_2 = 24$ mm Hg

Case Five

Please pause the video and examine the diagnostic images

See links below for chest x-ray, angiogram, perfusion scan, & CT scan of a patient with the same problem

Case Five

- > Chest x-ray is inadequate to diagnose embolus
- > Angiogram shows blocked vessel
- > Perfusion scan shows non-perfused area

Case Five

- > Clinical signs: pulmonary embolus

- > $P(a-et)CO_2 = (42 - 24) = 18 \rightarrow$

$$VD/VT = \frac{PaCO_2 - PetCO_2}{PaCO_2}$$

$$V_D / V_T = 0.43$$

- > What is the significance of the V_D / V_T ratio?

Case Five

- > The V_D / V_T ratio signifies increased alveolar dead space. This is caused by blockage of pulmonary circulation resulting in alveoli that are ventilated but not perfused.
- > The normal $V_D / V_T =$ about 0.3

FYI see links below for more info on V_D / V_T

Case Six

- > 67 YO female
- > Congestive heart failure
- > $FiO_2 = 80\%$, $PaO_2 = 92$ mm Hg
- > SvO_2 (mixed) = 80%
- > Developed hemoptysis after first occlusion pressure measurement

Case Six

Please pause the video and examine the diagnostic image

See links below for chest x-ray

Case Six

- > Pulmonary artery catheter placed distally
 - ❖ Balloon ruptured artery: hemoptysis
 - ❖ Catheter occludes artery: can cause infarction
 - ❖ Elevated mixed venous saturation due to arterial blood from left side

Case Six

- > Additional PA catheter problems
 - ❖ Knotting
 - ❖ Fragments from broken catheter

Please pause the video and examine the diagnostic images

See links below to view chest x-ray & PA catheter fragment on chest x-ray

Case Six Addendum

FYI see links below for more on interpretation of the ICU chest film

Case Seven

- > Ventilator patient: distressed
- > Pressure limiting
- > Respiratory rate = 40 / min
- > Heart rate = 140 / min
- > Blood pressure = 80 / 38
- > SpO₂ = 76%

Case Seven

- > No breath sounds on left
- > Intercostal bulging on left
- > Tracheal shift to right

Case Seven

- > Should an x-ray be obtained?

Case Seven

Please pause the video and examine the diagnostic image

See links below for chest x-ray

Case Seven

- > An acute tension pneumothorax is life-threatening & should be vented without delay
- > The patient can develop shock, cardiac arrest or die while waiting for an x-ray

Case Eight

- > 60 YO male
- > Hx of CHF
- > Orthopnea
- > Tachypnea
- > Accessory muscle usage
- > Wheezing, crackles, rhonchi
- > PAOP = 32 mm Hg
- > On disposable non-rebreather, SPO₂ = 84%

Case Eight

Please pause the video and examine the diagnostic image

See links below for chest x-ray

Case Eight

- > Cardiogenic pulmonary edema
- > History & clinical signs
- > Chest x-ray
 - ❖ Alveolar pattern
 - ❖ Cardiomegaly
- > PAOP > 25 mm Hg → cardiogenic

Case Nine

- > 65 YO chronic bronchitic
- > Acute respiratory failure: ventilated with BiPAP for three days (non-humidified)
- > SPO₂ = 79%, FiO₂ = 0.4
- > Breath sounds absent on left, present on right
- > Dullness to percussion on left
- > Normal blood pressure

Case Nine

Please pause the video and examine the diagnostic image

See links below for chest x-ray

Case Nine

- > Left lung collapsed
- > Leftward mediastinal shift
- > Probable mucous plug from dry air
- > Bronchoscopy to remove plug

FYI see links below to view right-sided atelectasis

Case Ten

- > 54 YO ICU patient
- > Primary diagnosis: mesothelioma
- > Moderate desaturation
- > Normal vital signs
- > Breath sounds absent at right base

Case Ten

Please pause the video and examine the diagnostic images

See links below for PA chest x-ray, lateral decubitus chest x-ray, & chest x-ray of loculated pleural effusion

Case Ten

- > Fluid in pleural space usually moves with gravity
- > Supine x-ray: fluid spreads over posterior chest
- > Erect film shows fluid layer
- > Lateral decubitus layers fluid laterally
- > Loculated effusion requires CT or ultrasound to locate

Case Eleven

- > 35 YO with HIV
- > SpO₂ = 92% on 2 L/min nasal O₂
- > Respiratory rate= 28/min
- > Diffuse crackles

Case Eleven

- > Pneumocystis carinii pneumonia

Please pause the video and examine the diagnostic image

See links below for chest x-ray

Case Twelve

- > 47 YO female
- > Chief complaint: shortness of breath
- > Respiratory rate = 32
- > SpO₂ = 90% on 3L/min nasal O₂
- > Temperature = 39C°
- > WBC = 18,000; 87% neutrophils
- > Crackles, diminished BS on right, inferior to nipple line

Case Twelve

- > RML pneumonia

Please pause the video and examine the diagnostic image

See links below for chest x-ray

Case Thirteen

- > 46 YO male
- > Hx chronic ETOH abuse
- > Cardiac arrest: resuscitated successfully
- > Coffee ground return from NG tube
- > Wheeze, localized to right side

Case Thirteen

Please pause the video and examine the diagnostic image

See links below for chest x-ray

Case Thirteen

- > Tooth in right mainstem bronchus, removed with bronchoscopy
- > Common among drug / alcohol abusers who pass out while supine, then aspirate
- > Patient developed klebsiella pneumonia. Chest radiograph taken after recovery.

Case Thirteen

- > Patient developed a lung abscess from the pneumonia
- > Fluid level apparent in abscess: pus

Please pause the video and examine the diagnostic image

See links below for chest x-ray

Case Fourteen

- > 35 YO
- > Postal worker from Trenton, NJ
- > Previously healthy
- > Symptoms
 - ❖ Fever, chills
 - ❖ Chest pain
 - ❖ Shortness of breath
- > SpO₂ = 88% (RA)

Case Fourteen

Please pause the video and examine the diagnostic image

See links below for chest x-ray

Case Fourteen

- > Pulmonary anthrax
 - ❖ Occupation, location
 - ❖ Flu-like symptoms
 - ❖ Widened mediastinum on CXR

Case Fifteen

- > 35 YO female
- > S/P 2 units fresh frozen plasma
- > Extubated in OR, with uneventful recovery

Case Fifteen

- > 6 H Postop
 - ❖ SPO₂ decreases, despite increasing FiO₂
 - ❖ Tachycardia
 - ❖ Dyspnea, retractions, abdominal paradox
 - ❖ Diffuse crackles
 - ❖ PAOP = 12 mm Hg
 - ❖ PAP (mean) = 20 mm Hg

Case Fifteen

- > Emergent intubation, ventilation
 - ❖ TV = 500 mL, f = 20, FiO₂ = 100%
 - ❖ PaO₂ = 78 mm, PaCO₂ = 32, pH = 7.38
 - ❖ CST = 0.020 L/cm H₂O

Case Fifteen

Please pause the video and examine the diagnostic image

See links below for info & chest x-ray

Case Fifteen

- > Diffuse alveolar infiltrates
- > Transfusion related lung injury (TRALI): rare pulmonary reaction to blood products

Case Sixteen

- > 60 YO male
 - ❖ Ambulatory
 - ❖ Overweight
 - ❖ Never smoked
 - ❖ Salesman
- > C/O increasing SOB, cough
- > Px
 - ❖ HR 85, RR 24, BP 158/97, SpO₂ 92% (RA)
 - ❖ Wheezing and crackles

Case Sixteen

- > Pulmonary function tests
 - ❖ Lung volumes 83%pred
 - ❖ Flow rates 95%pred
 - ❖ DLCO 84%pred

Case Sixteen

Please pause the video and examine the diagnostic image

See links below for chest x-ray of BOOP

Case Sixteen

- > CXR shows pattern resembling bronchiolitis obliterans organizing pneumonia
- > BAL: inflammatory cells, no pathogens
- > BOOP is confirmed by lung biopsy
- > Cause? Idiopathic?

Case Sixteen

- > Patient asked about dietary habits, stated that he ate 2 bags of butter-flavored popcorn per day
- > BOOP caused by inhalation of diacetyl fumes from popcorn

FYI see links below for more info on popcorn lung

Case Seventeen

- > 55 YO female, scheduled for bowel surgery
- > No apparent distress
- > Distant breath sounds
- > Dull to percussion

Case Seventeen

Please pause the video and examine the diagnostic image
See links below for chest x-ray

Case Seventeen

- > History of pneumonectomy was not documented on medical record
- > Breath sounds from opposite side are often transmitted across the chest

Case Eighteen

- > Retired coal miner
- > Progressive dyspnea with activity
- > Room air SpO₂ = 88%, decreases to 75% after short walk

Case Eighteen

Please pause the video and examine the diagnostic image
See links below for chest x-ray

Case Eighteen

- > Coalworker's pneumoconiosis (severe)
- > Diffusion block causes decreased SpO₂ during activity