THE RADIOGRAPHIC MANIFESTATIONS OF LUNG CANCER

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LUNG CANCER

• Also known as bronchogenic carcinoma
• Broadly classified into two types
  – Small cell lung cancers (SCLC)
  – Non-small cell lung cancers (NSCLC)
SMALL CELL LUNG CANCER

- Approximately 10% to 15% of lung cancer
- Most aggressive and most rapidly growing
- Very strongly related to cigarette smoking
- Metastasize rapidly to many sites
- Often discovered after they have spread

NON-SMALL CELL LUNG CANCER

- The most common type of lung cancer
- Accounts for 85% to 90% of lung cancers
- Three main types:
  - Adenocarcinomas: Most common type – Approx 40%
  - Squamous cell carcinomas: Approx 25% of cases
  - Large cell carcinomas: Approx 10% - 15%

ADENOCARCINOMAS

- The most common type of NSCLC
- Associated with smoking, but is also seen in non-smokers, especially women who develop lung cancer
- Most adenocarcinomas arise in the outer, peripheral areas of the lung
ADENOCARCINOMAS

- Have a tendency to spread to the lymph nodes
- Bronchioalveolar carcinoma is a subtype of adenocarcinoma that spreads along the alveolar walls and may resemble a pneumonia on CXR
  - Not unusual to see this type of CA in non-smoking women and in the Asia population

SQUAMOUS CELL CARCINOMAS

- Account for about 25% of NSCLC
- Also known as epidermoid carcinomas
- Arise most frequently in the central portion of the chest and in the bronchi
- Not unusual for this type of cancer to stay within the lung, grow quite large, and form a cavity

LARGE CELL CARCINOMAS

- Also known as undifferentiated carcinomas
- Accounts for 10% to 15% of lung cancers
- Has a high likelihood to spread to the lymph nodes and to distant sites
LUNG CANCER

- Most start in lining of the bronchi
- Thought to develop over many years
- Smoking is number one cause
- Most common cancer related cause of death
- Over 200,000 new cases projected in US in 2015
- Over 160,000 deaths estimated

LUNG CANCER

- Accounts for about 27% of all cancer deaths
- Black men more likely to develop lung cancer than white men
- Rate about the same in black women and white women

LUNG CANCER SYMPTOMS

- Chronic cough
- Coughing up blood
- Wheezing
- Chest pain
- Hoarseness
- Weight loss
- Loss of appetite
- Shortness of breath
- Fever of unknown origin
RADIOGRAPHIC FINDINGS IN LUNG CANCER

- Volume loss
- Unilateral enlargement of hilum
- Mediastinal widening
- Apical density w or w/o rib destruction
- Solitary pulmonary cavity
- Pneumonitis that does not clear
- Large parenchymal mass
- Solitary pulmonary nodule

RADIOGRAPHIC FINDINGS INDICATING METASTASIS OR LOCAL INVASION

- Pleural effusion
- Lymphatic spread
- Hematogenous spread
- Pleural mass
- Diaphragmatic elevation
VOLUME LOSS AND MASS EFFECT

VOLUME LOSS
Ipsilateral structures shifted TOWARD the side of the abnormality
Contralateral structures overexpanded

RADIOGRAPHIC FINDINGS OF VOLUME LOSS ON CXR
Heart, trachea, and mediastinum shifted toward the side of the abnormality
Ipsilateral diaphragm elevated
Contralateral lung overexpanded
Ipsilateral lung smaller
Contralateral rib spaces wider
MASS EFFECT

Occupies space
All structures are pushed AWAY from the mass

MENISCUS SIGN

RADIOGRAPHIC FEATURES

• Smooth contour
• Wedged shaped, reverse “V”, triangular
• Lies along dependent portion of lung
• Indicates UNCOMPLICATED fluid
PLEURAL EFFUSION

GENERAL
• A small amount of fluid is normally present to lubricate the surfaces of the pleura
• A pleural effusion occurs when an excessive amount of fluid accumulates between the layers of tissue that line the lungs
• At least 200-300 cc of fluid must be present before visible on an upright Chest X-Ray
  – Decubitus views of chest may show smaller amounts of fluid

PLEURAL EFFUSION

SYMPTOMS
Chest pain
  Usually sharp
  Worse with cough or deep breath
Dyspnea
Cough
Hiccups
Tachypnea
Shortness of breath
Sometimes no symptoms
PLEURAL EFFUSION

- Different types of fluid can accumulate in the pleural space
  - Serous fluid (hydrothorax)
  - Blood (hemothorax)
  - Chyle (chylothorax)
    Occurs when thoracic duct is disrupted
    Lymphoma, trauma, thoracic surgery most common causes
  - Pus (pyothorax or empyema)

PLEURAL EFFUSION

TRANSUDATE

EXUDATE

- Caused by fluid leaking into the pleural space
- Caused by systemic factors
- Factors that alter the balance of formation and absorption of pleural fluid such as an increase in capillary hydrostatic pressure or a decrease in colloid oncotic pressure
- Types of transudative pleural effusions
  - CHF
  - Cirrhosis
PLEURAL EFFUSION

EXUDATE

- Usually caused by pleural inflammation, infection, injury or lymphatic obstruction
- Caused by alterations in local factors that influence formation and absorption of pleural fluid
- Types of exudative pleural effusions
  - Bacterial pneumonia
  - Cancer
  - Pulmonary embolism
  - Viral infection
  - Trauma
  - Collagen Vascular Disease
    - Rheumatoid Arthritis
    - Systemic Lupus Erythematosus

MALIGNANT PLEURAL EFFUSION

MALIGNANT PLEURAL EFFUSION

Occurs when cancers cause an abnormal accumulation of fluid in the layers of tissue (pleura) lining the outside of the lung and the wall of the chest cavity
Lung cancer and breast cancer account for approximately 50% to 65% of malignant pleural effusions
MALIGNANT PLEURAL EFFUSION

Malignant effusions are exudates
A low pleural fluid pH is associated with poorer survival
Ultrasound has a sensitivity of approx 73% of distinguishing malignant pleural effusions from other causes of pleural effusions
CT guided biopsy has a sensitivity of approx 87%

LUNG CANCER

METASTATIC DISEASE
RADIOGRAPHIC FINDINGS INDICATING METASTASIS OR LOCAL INVASION

- Pleural effusion
- Lymphatic spread
- Hematogenous spread
- Pleural mass
- Diaphragmatic elevation

LUNG CANCER
Metastatic Disease
Most common metastatic sites
- Brain
- Liver
- Adrenal Glands
- Bone

LUNG CANCER
Metastatic Disease to Brain
Most common cancer that metastasizes to brain
Up to 40% or more of patients with lung cancer will develop brain mets sometime during disease
LUNG CANCER
Metastatic Disease to Brain
Symptoms:
Headache
Seizures
Loss of balance

LUNG CANCER
Metastatic Disease to Brain
Symptoms:
Difficulty speaking
Vision changes
Loss of memory

LUNG CANCER
Metastatic Disease to Brain
Symptoms:
Personality changes
Weakness on one side of body
Fatigue
Etc
LUNG CANCER
Metastatic Disease to Liver
Symptoms:
There may be no symptoms

LUNG CANCER
Metastatic Disease to Liver
When present, symptoms include:
Pain
Loss of appetite
Nausea
Jaundice

LUNG CANCER
Metastatic Disease to Adrenals
Does not usually cause any sx
Most often discovered incidentally when a scan is done for some other reason
METASTATIC DISEASE TO BONE

LUNG CANCER
Metastatic Disease to Bone
Approx 30 to 40% of patients
Usually spine, pelvis, humerus, and femur
Most common symptom is pain
Pathologic fractures can occur

METASTATIC DISEASE TO BONE

- Far more common than primary bone tumors
- Most common: Lung, Prostate, Breast, Kidney, Thyroid
- Two thirds of breast cancer patients will eventually have mets
- Axial skeleton most common
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