Lecture 3

Inflammatory Processes

• Process:
  – Increased vascular permeability
    • Water and cellular infiltrations
  • Results:
    – Abscess, ulceration, cavitation
      • Penetration, perforation and fistula formation
    – Scarring, strictures
Inflammatory Processes

- Lungs and pleura
- Gastrointestinal tract
- Soft tissues of extremities
- Brain

Inflammatory Lung, Mediastinal and Pleural Diseases

- Bronchitis
  - Acute
  - Chronic
- Pneumonia
  - Infective
  - Chemical
**Inflammatory Lung, Mediastinal and Pleural Diseases**

- Pulmonary abscess
- Pleuritis
- Empyema
- Lymphadenopathy

**Pulmonary Air Space Pattern**

(Consolidation or Infiltration)

- Alveoli filled with pus, water, blood, cells, protein
- Appearance- fluffy, ill defined margins
- Single (segmental or lobar), multiple, or diffuse distribution
- Rapid development
Pulmonary Air Space Pattern
(Consolidation or Infiltration)

- Air bronchograms – fluid filled alveoli surround air filled bronchi
- Butterfly shadow
  - E.G. Pneumonia, alveolar pulmonary edema

LUL
Lingular Pneumonia

- Obliterated left cardiac border
LUL
Lingular Pneumonia Lateral
• Consolidation anterior to the major fissure
• Compare to PA exam
LLL Pneumonia

- Air space disease left lower lobe
- Density behind heart
- Obliteration of left diaphragm at edge of heart
- Left heart border preserved

LLL Pneumonia

- Note obliteration of the posterior portion of the left diaphragm (arrows)
- Right diaphragm clearly seen
RLL Pneumonia

- Density at the right lateral diaphragm
- Obliteration of lateral diaphragm border

RLL Pneumonia

- Density at the mid diaphragm
- Sharp margination at the major fissure (arrows)
Lung Abscess

- Thick walled irregular cavity RUL
- Fluid level representing partial evacuation of necrotic material via airway
Pulmonary Interstitial Pattern

- Fluid or cells in the pulmonary interstitial space
  - e.g. Peribronchial tissue and bronchial wall, perivascular space and vessels, lymphatic structure
- Alveoli aerated

Pulmonary Interstitial Pattern

- Appearance:
  - Linear, lattice-like, or multiple small nodules
- Examples:
  - Cystic fibrosis, bronchiectasis, asbestosis, silicosis, and other pneumoconiosis
**Cystic Fibrosis**

- Bronchial wall thickening
- Ring shadows and parallel bronchiole walls of bronchiectasis
- Ill-defined linear lesions
- Obstructive airway with low diaphragms

**Interstitial Edema CHF**

- Bilateral central interstitial linear lattice pattern
- Small nodular lesions
- Ill-defined enlarged hila
- Septal lines (Kerley’s)
- Multiple horizontal lines near costophrenic angles (Kerley B)
Interstitial Edema CHF

- Variation in another patient
- Cardiomegaly
- Pulmonary vascular changes as on prior patient

Classic Pulmonary Edema

- Batwing or butterfly appearance
- Smoke inhalation
Pleural Inflammatory Lesion

- Pleural effusion (hydrothorax due to exudate, transudate, blood, etc.)
- Pleural thickening, adhesion, calcification resulting from prior inflammatory process
- Usually associated with concurrent lung disease

Right Pleural Effusion

- Fluid density right base
- Upward concave border extends along the right lateral chest wall
- Some lower lung obscured
- Incidentally noted implanted infusion device (arrow)
Pleural Effusion

- Blunting of both costophrenic angles (arrows)
- Loss of lower heart margins

Pleural Effusion - Plaque

- Calcified plaque along both lateral chest walls (arrows)
- Result of Asbestos exposure
- Some plaque along diaphragm
Pleural Effusion - Plaque

- Calcified plaque along both posterior chest walls (arrows)
- Result of asbestos exposure

Esophageal Inflammatory Disease

- Esophagitis commonly due to infection
  - Bacteria
  - Virus
  - Fungus
- Gastroesophageal reflex
Esophageal Inflammatory Disease

• Chemical substance corrosion
• Radiologic manifestations of different causes of esophagitis are similar
• No radiologic abnormalities when degree of inflammation is mild

Normal Esophagus

• Barium in esophagus
• Smooth indentation anterior wall upper third from the aortic arch
• Focal ‘ring’ distal esophagus at gastric junction
Esophageal Candidiasis

- Multiple oval filling defects along the esophageal mucousa
- Plaques of candida along the esophagus (filling defects in barium coating)

Gastrointestinal Inflammatory Disease

- Mucosal changes
  - Swelling: local or diffuse enlargement of mucosal folds
  - Defect: ulceration
    - Penetration, perforation and abscess formation (ULCER CRATER)
  - Scarring: stricture
- Need to use contrast (barium) study to illustrate the lumen and inner wall of GI tract
Gastric and Duodenal Ulcers

- Benign ulcer:
  - Ulcer projects beyond lumen
  - Sharp margin, round barium dot viewed en face
  - Edematous halo around ulcer in acute stage
  - Mucosal folds radiate out like spokes of wheel in sub-acute or chronic stage

Normal Gastrointestinal Study

- Gas in fundus of stomach
- Opacification of stomach, duodenum and jejunum
- Peristalsis in the distal duodenal bulb
Normal Barium Enema

• Single contrast exam
• Notice the normal haustrations
• Competent ileocecal valve

Normal Barium Enema

• Double (air) contrast
• Supine image
• Coating of mucosa and distended with gas
• Appendix is filled with barium
Development And Its Anomalies

Embryo Milestones Detected by Ultrasound

- Gestation sac: 4.5-5 weeks
- Yolk sac: 5 weeks
- Embryo: 5-6 weeks
- Placenta: 8 weeks
Early Gestation

- Longitudinal scan
- Anechoic structure
- Echogenic rim
- Gestational sac
- Cervix

Embryo

- Endovaginal scan, more detail, resolution
- Gestational sac, embryo (cursors), yolk sac
- Gestational age 8 weeks 4 days
Yolk Sac

- Yolk sac indicated by two white arrows
- Amniotic membrane visible as faint curvilinear echoes in sac

Embryonic Heart
12 Week Fetus

- Longitudinal scan
- Fetal head in profile
- Placenta located anterior

Fetal Head 30 Weeks

- Normal head axial view level of ventricles
- Central echogenic line = third ventricle line
- Ventricle(s)(hypechoic) and choroid plexus(echogenic)
- Gray echogenic area=parenchyma
- Outer echogenic rim=calvarium
Normal Fetal Chest

- Four chamber heart view
- Heart chambers labeled

Fetal Chest and Abdomen

- Sagittal view
- Rib shadows
- Abdominal contents
Normal Fetal Abdomen

- Axial at level of kidneys
- Echogenic dots above represent spine (arrow)
- Kidneys (arrowhead)

Normal Fetal Pelvis

- Section through level of bladder
- Oval hypoechoic area represents bladder (arrow)
- Femurs parallel linear echogenic (A)
- Sacrum under arrow
Normal Fetal Spine

- Sagittal view C, T, L spine
- Parallel row of dots represent ossification centers of pedicles and bodies
- Note: images not true sagittal

Normal Fetal Spine

- Axial view
- Level of cervical, thoracic and lumbar vertebrae
- Ossification centers triangular arrangement
- Body in center, pedicles lateral
- * At the center of each spinal canal
Fetal Femur

- Transverse abdomen
- Cord insertion midline
- White represents doppler evaluation of blood flow in cord

Fetal Cord Insertion
3 Vessel Cord