Carcinoma of Lung & Esophagus Radiology

Dr Sanjay Thulkar

Associate Professor of Radiology

Dr BRA IRCH, AIIMS

Lung Cancer: Imaging Modalities

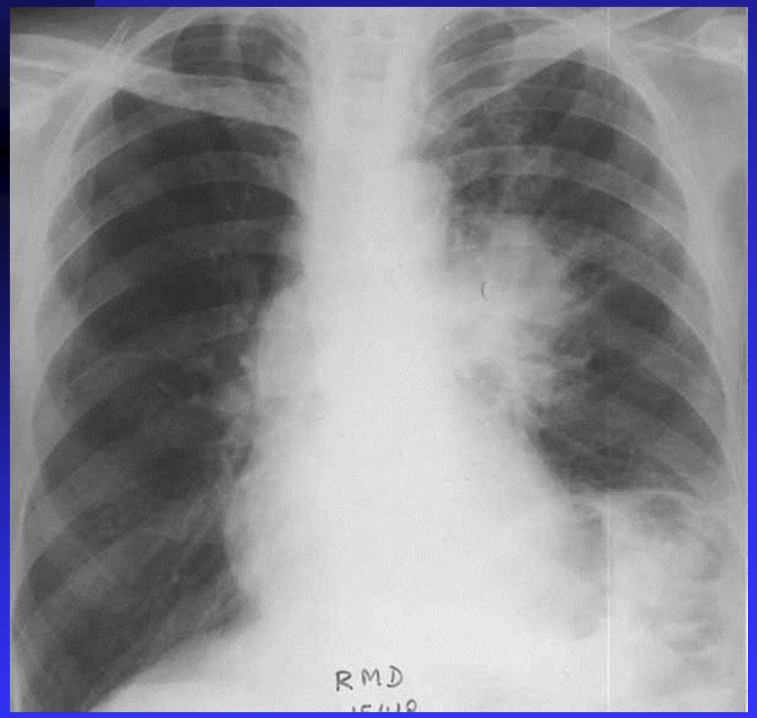
- Primary
  - Chest x-ray PA view
  - CT
- Occasionally required
  - MRI
  - USG
  - Radionuclide scan, PET
- Image guide biopsy

Imaging Features of Lung Cancer

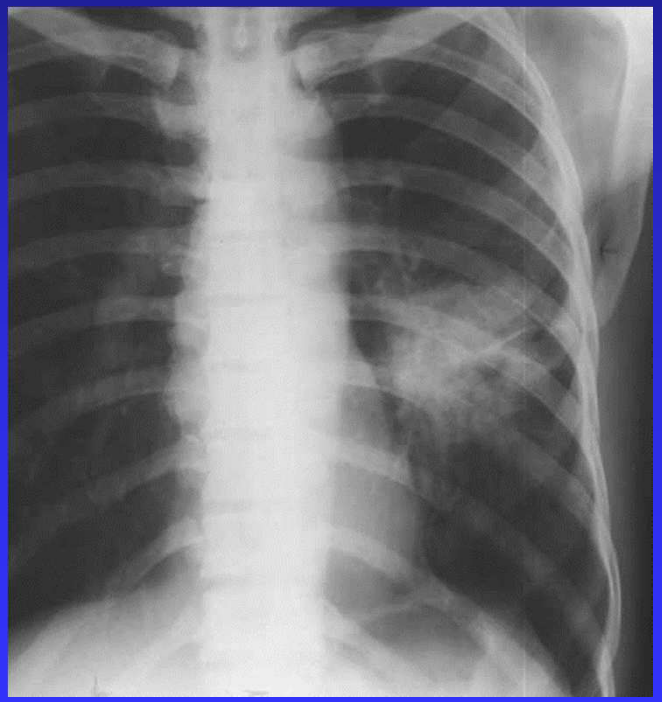
- Central tumour
- Peripheral tumour
- Atypical findings

Lung Cancer: Typical

- Central mass

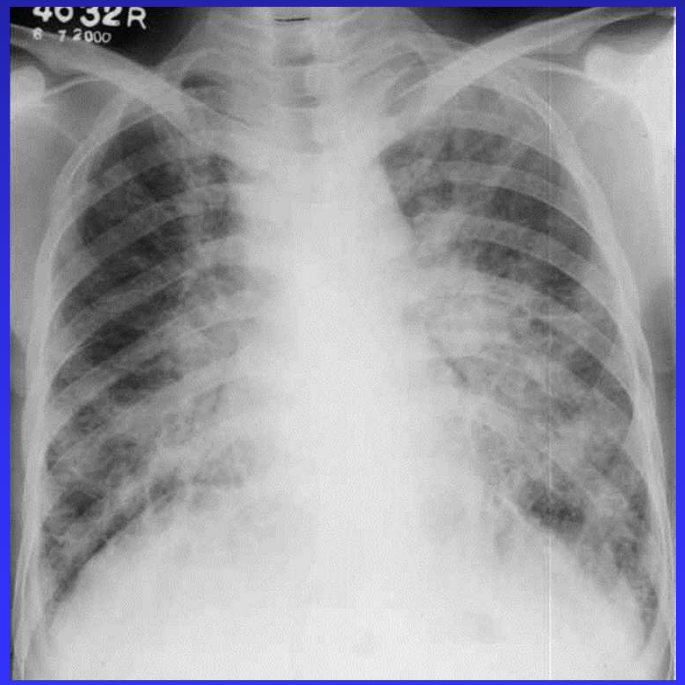


- Peripheral mass

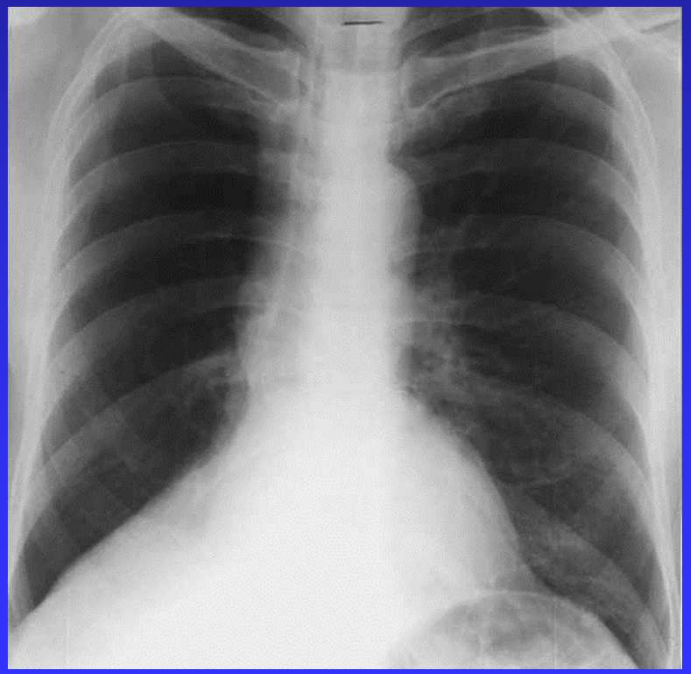


Lung Cancer: Atypical

- Non resolving/ atypical pneumonia

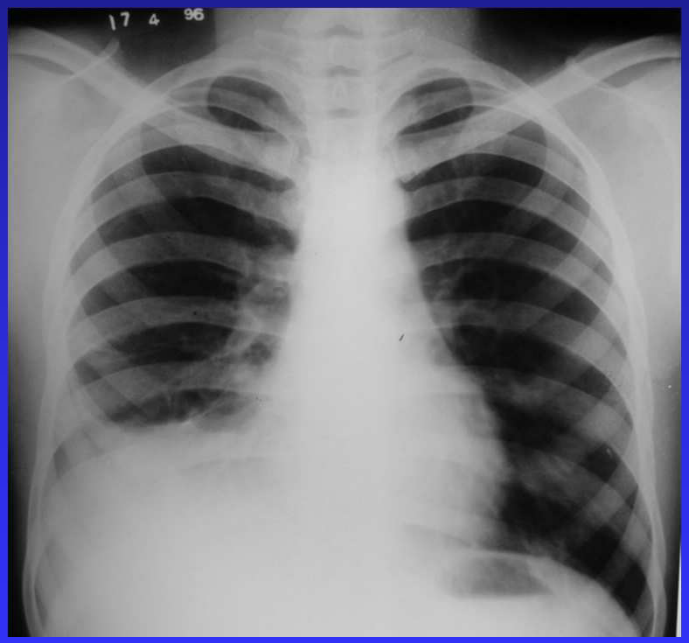


- Collapse

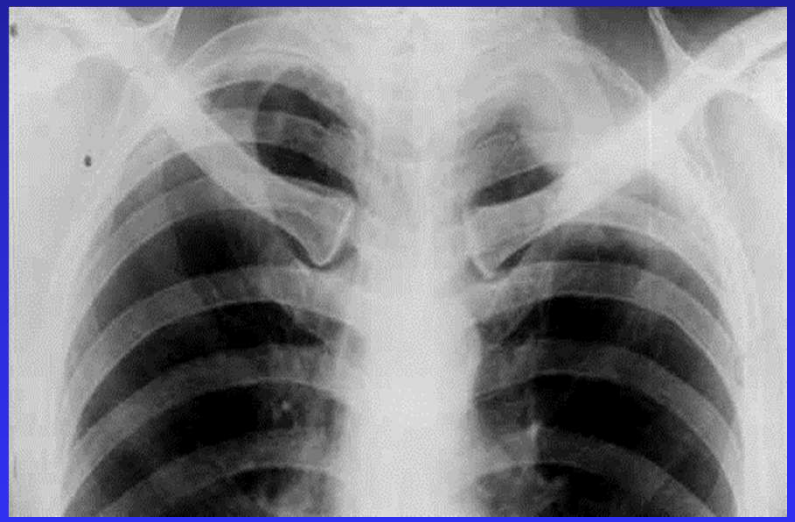


Lung Cancer: Atypical

- Pleural effusion

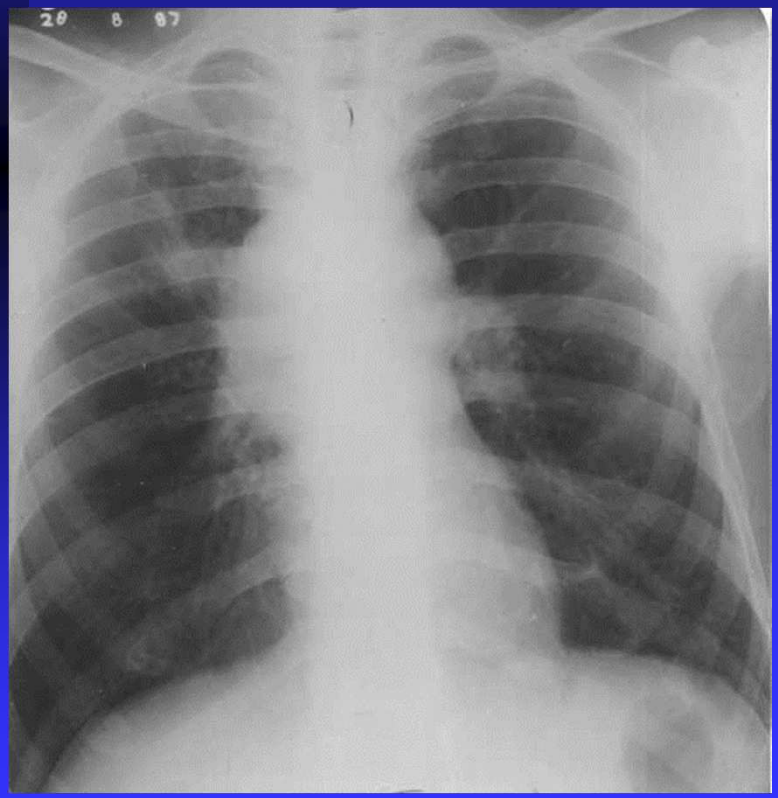


- Pleural thickening

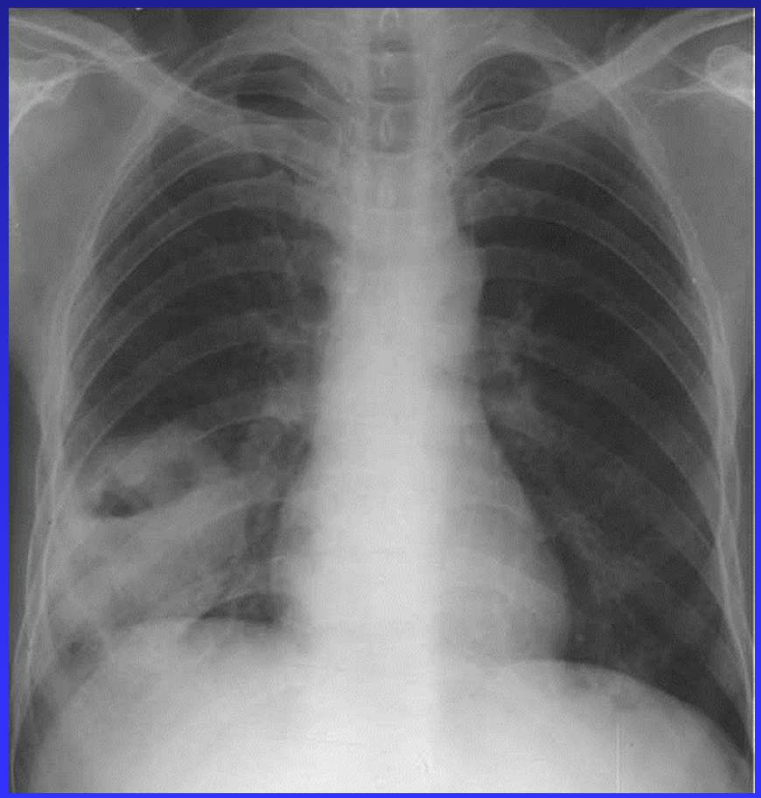


Lung Cancer: Atypical

- Lymphadenopathy

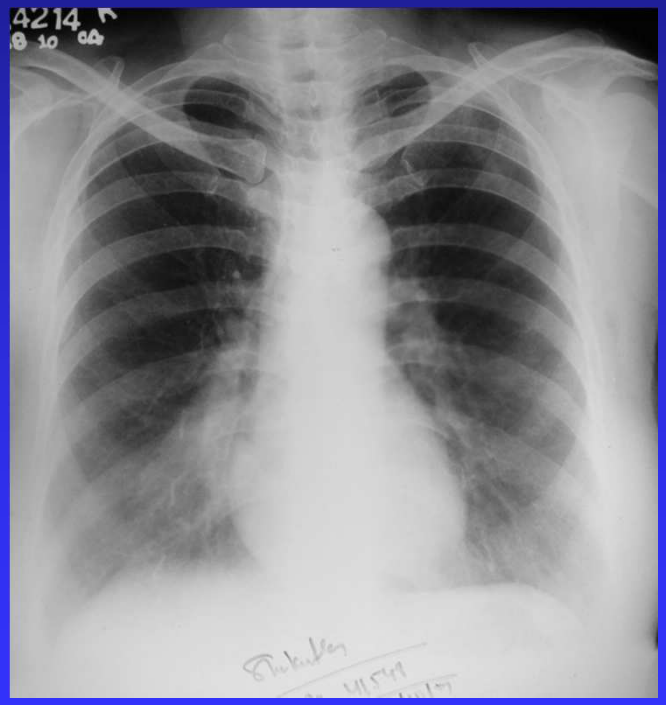


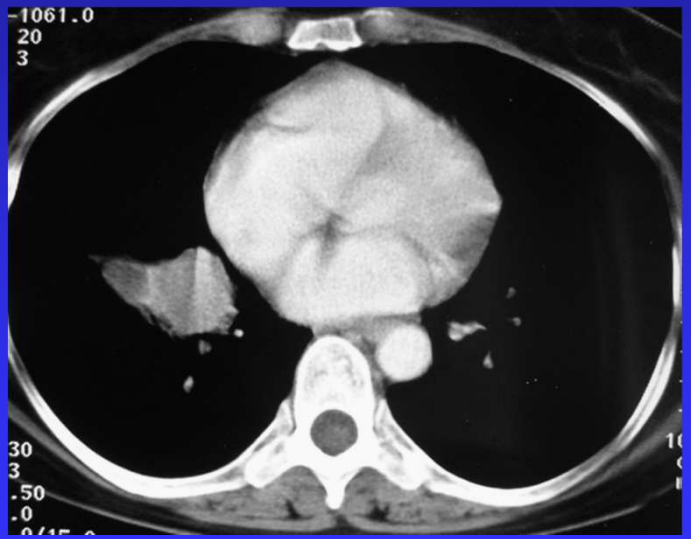
- Atypical cavity



Lung Cancer: Atypical

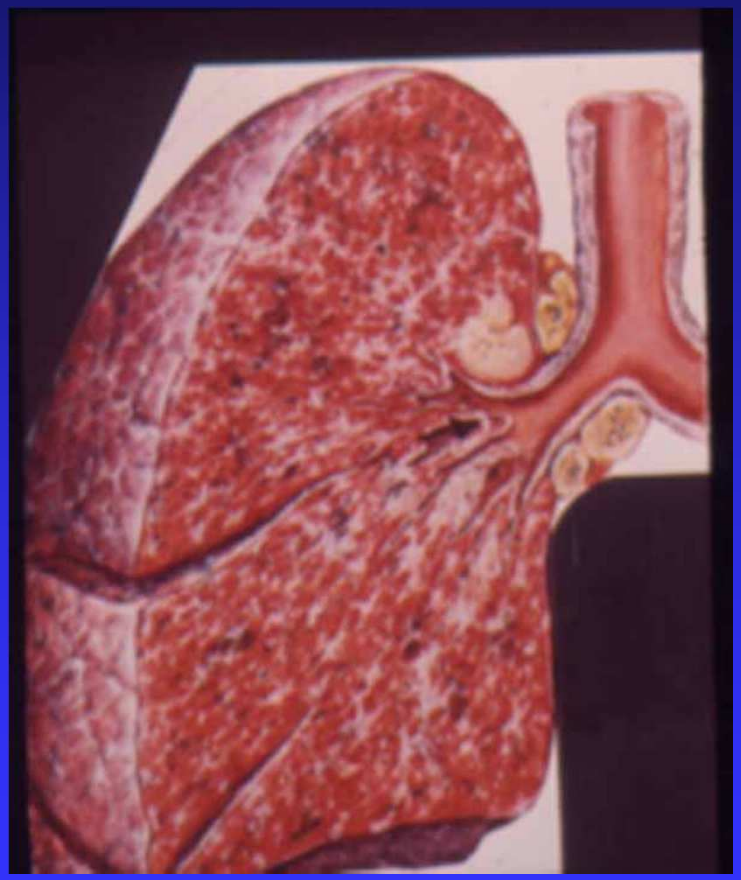
- Mucoid impaction



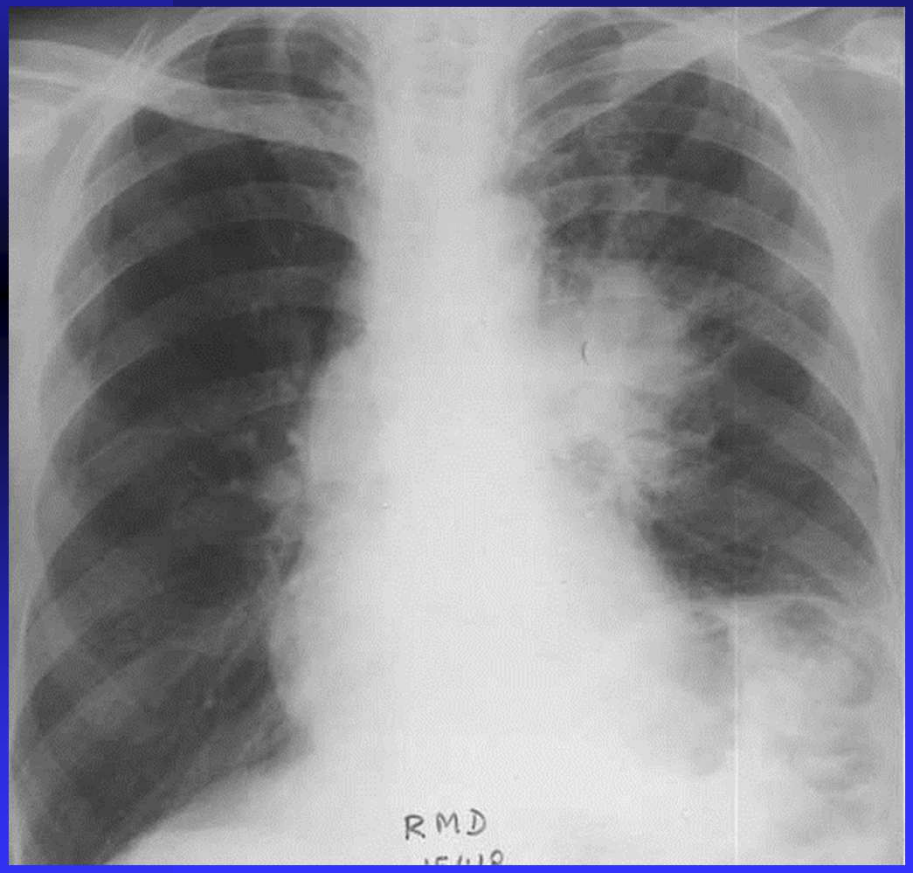


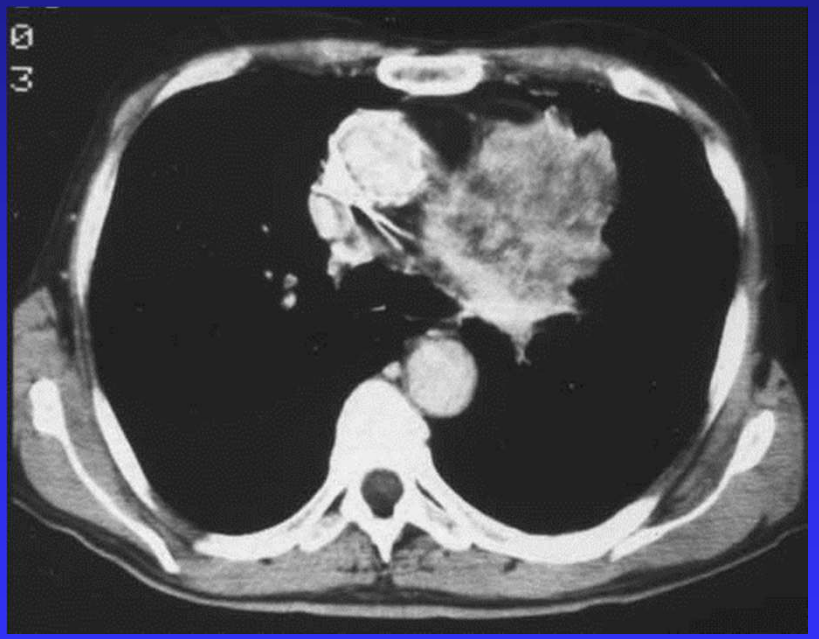
Squamous Cell Ca: Radiology

- Central mass
  - With bronchial narrowing
- Lobar collapse
- Solitary pulmonary nodule
- Cavity

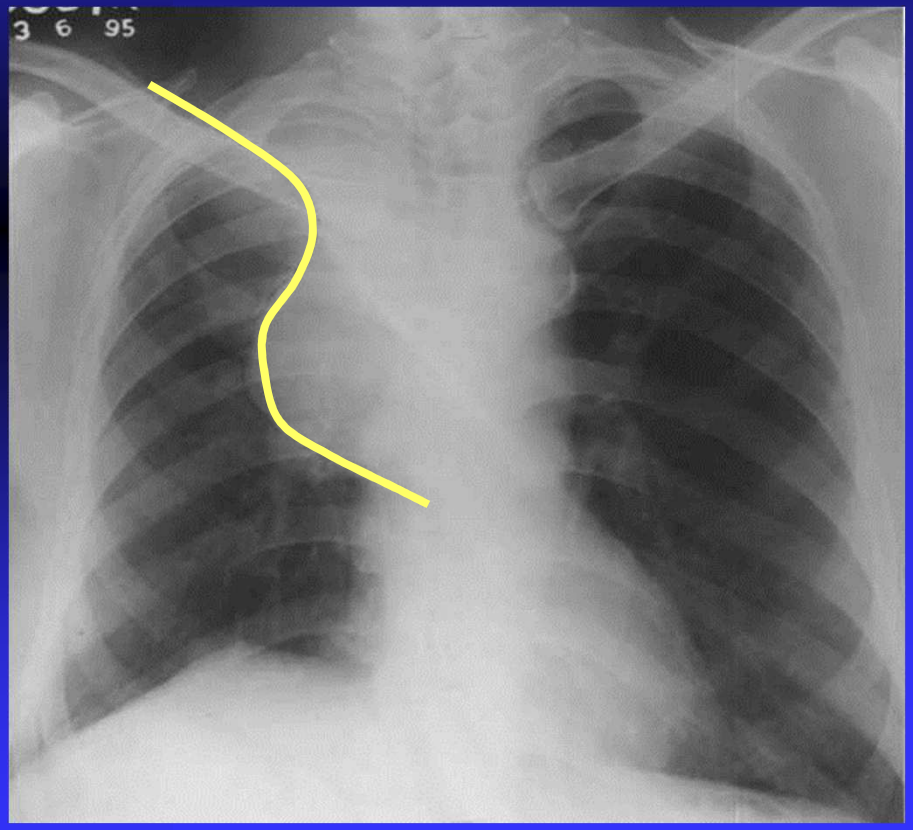


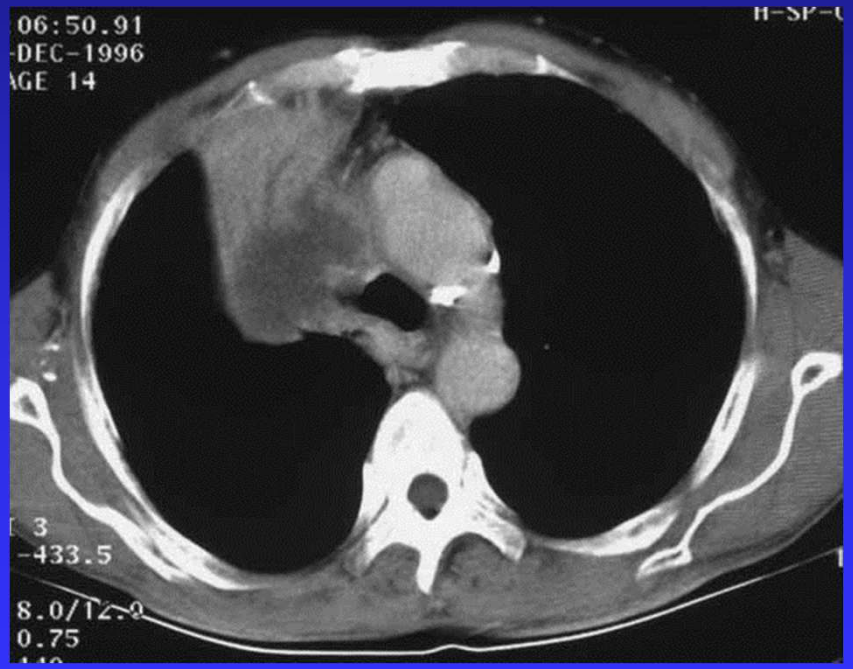
Central Mass



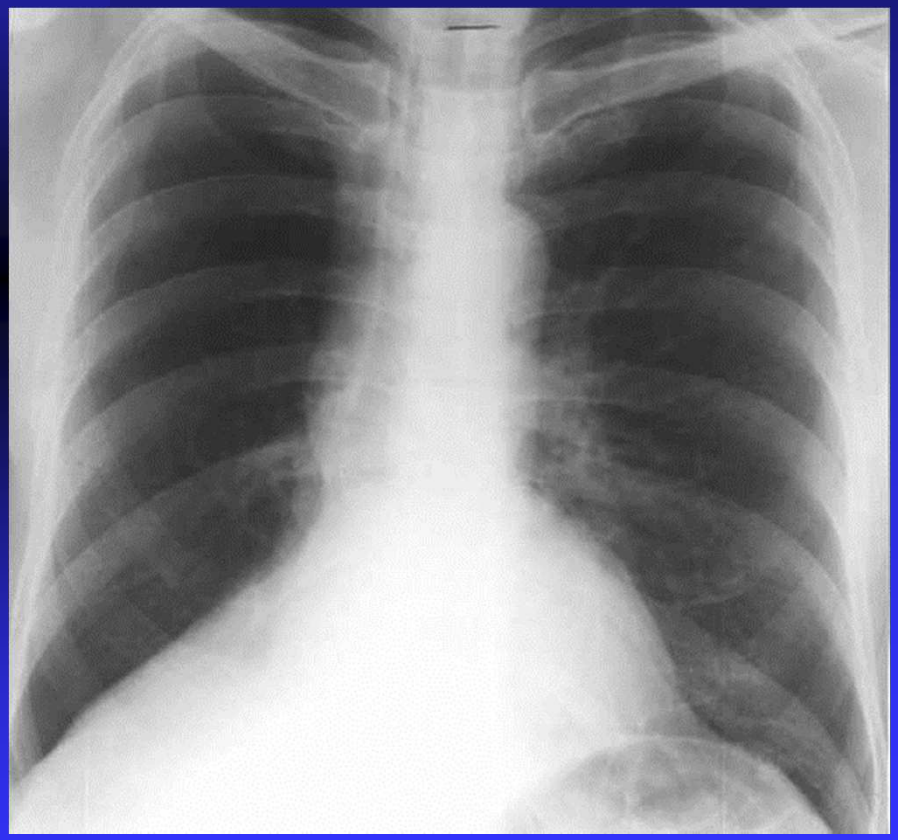


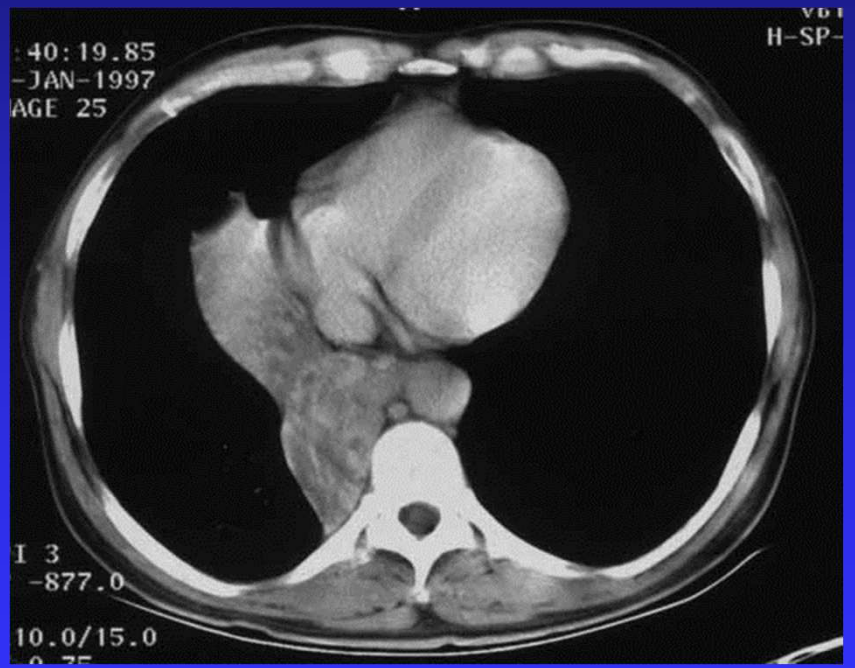
Central Mass With Collapse





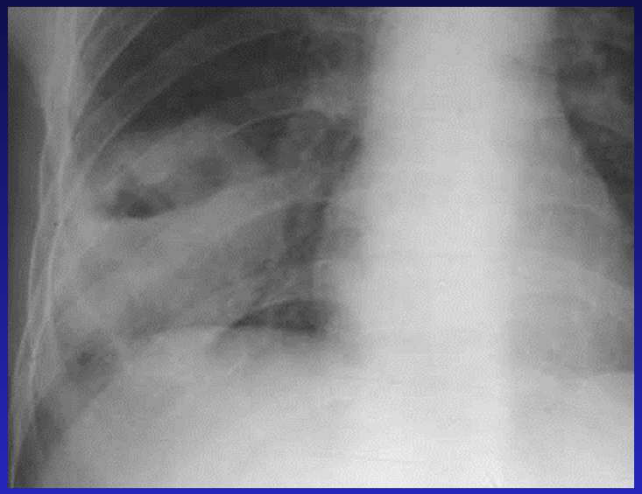
Collapse, no mass on imaging

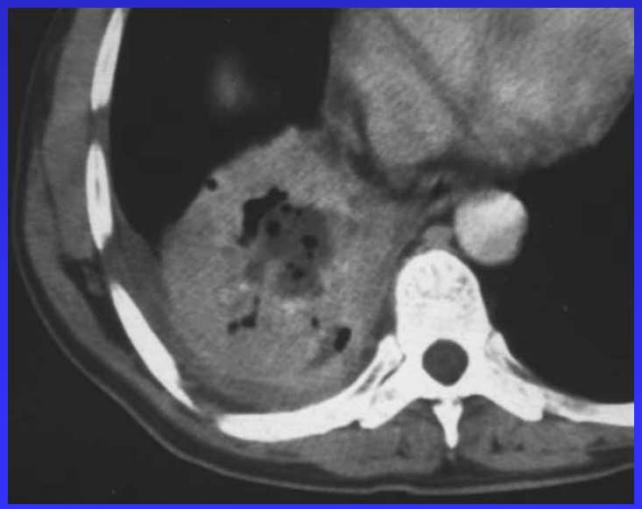




Cavity

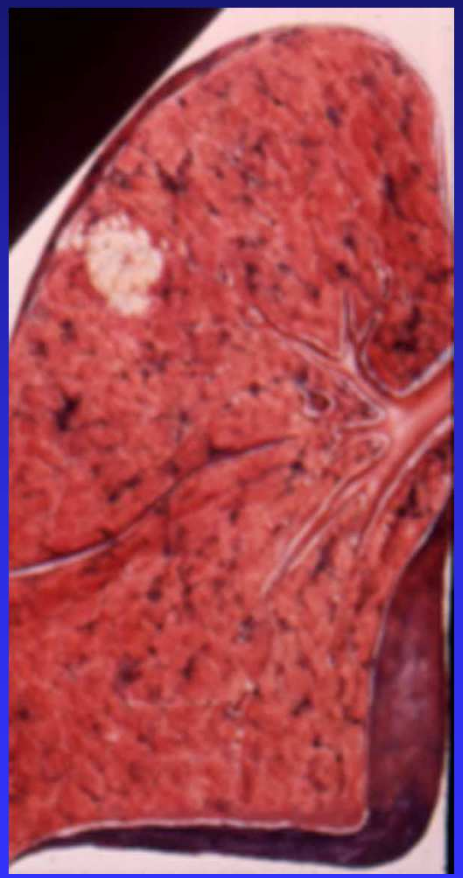
- Eccentric
- Thick wall
  - >8 mm
  - >15 mm diagnostic
- Shaggy margin



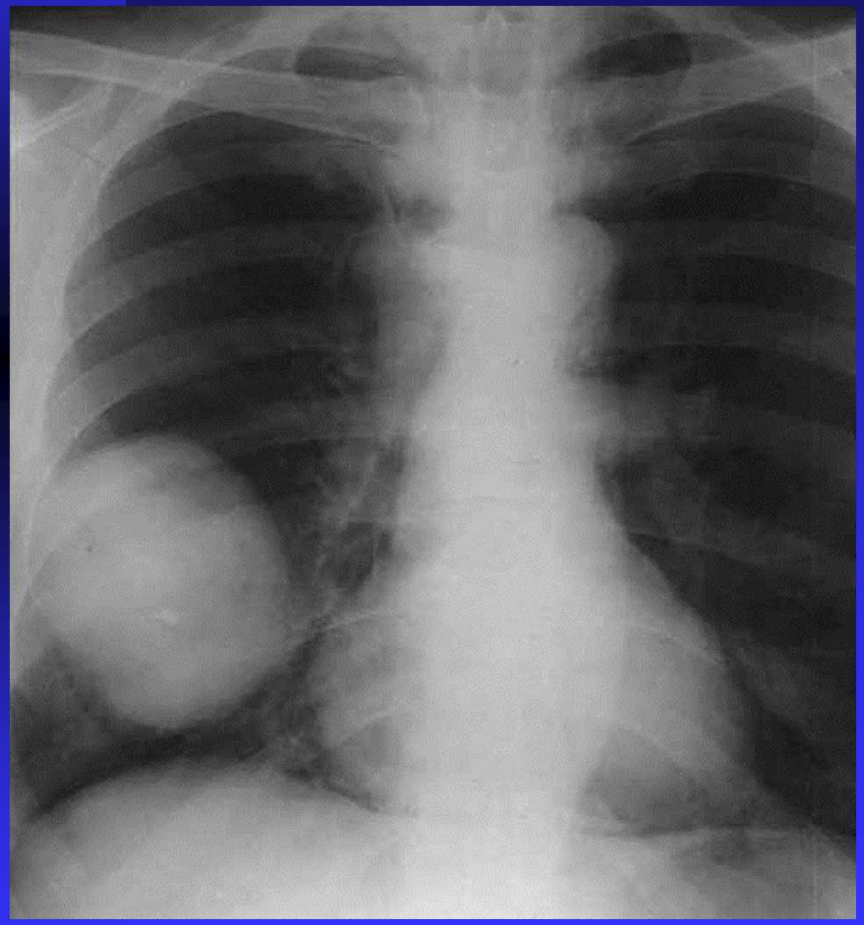


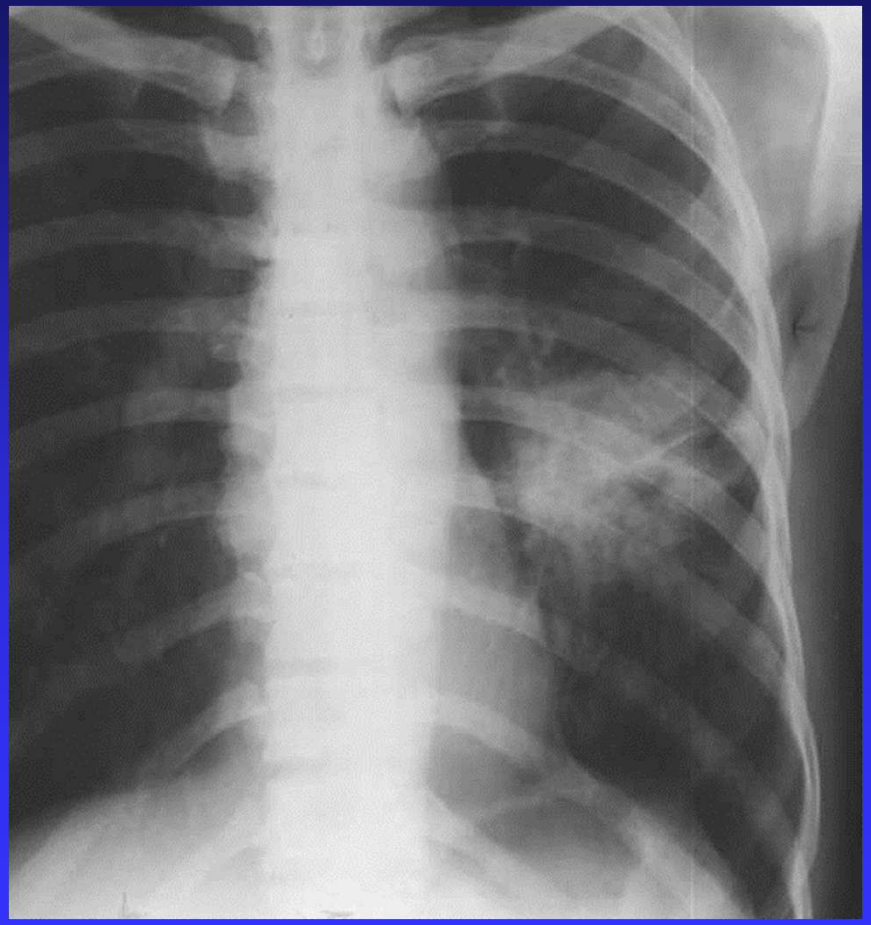
Adenocarcinoma

- Peripheral mass
- Incidental discovery in asymptomatic
- Large and with metastases when symptomatic



Adenocarcinoma





Adenocarcinoma

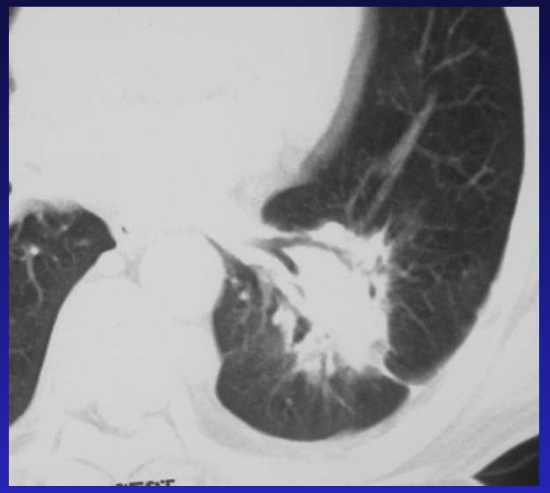
- Invade pleura and cause puckering
- Later gross pleural spread with encasement of the lung may occur

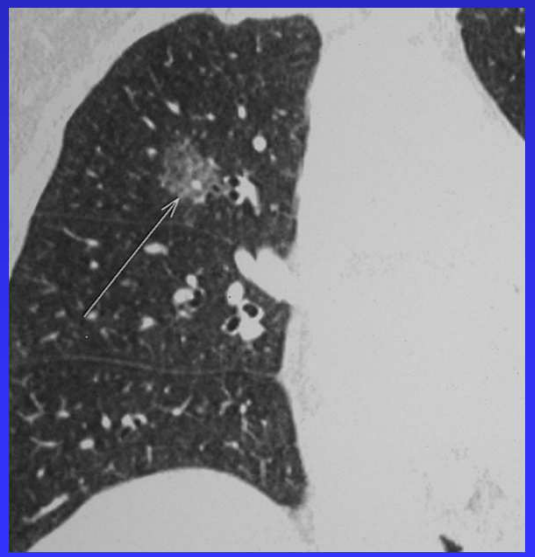
Broncho-Alveolar Cell Carcinoma

- Slow growing
- Solitary pulmonary nodule
  - Most common
- Pneumonic pattern

BAC: SPN

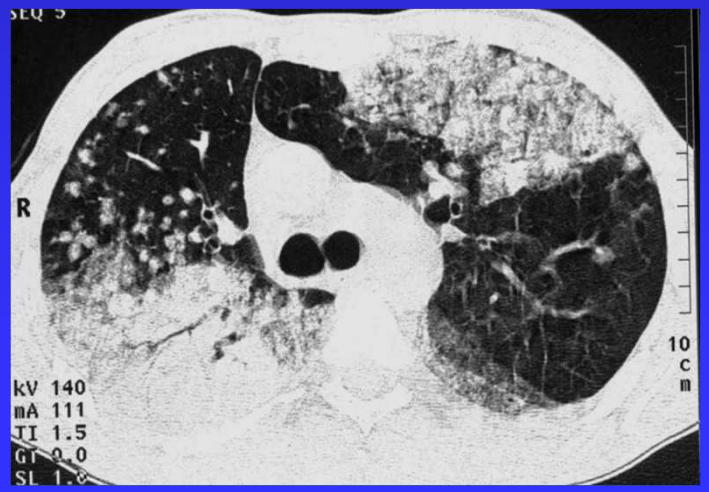
- Usually subpleural
  - Solid
  - Ground glass
- Pleural tail/ tethering
- Patent bronchi/ vessels within nodule
  - Air bronchogram/ CT angiogram sign

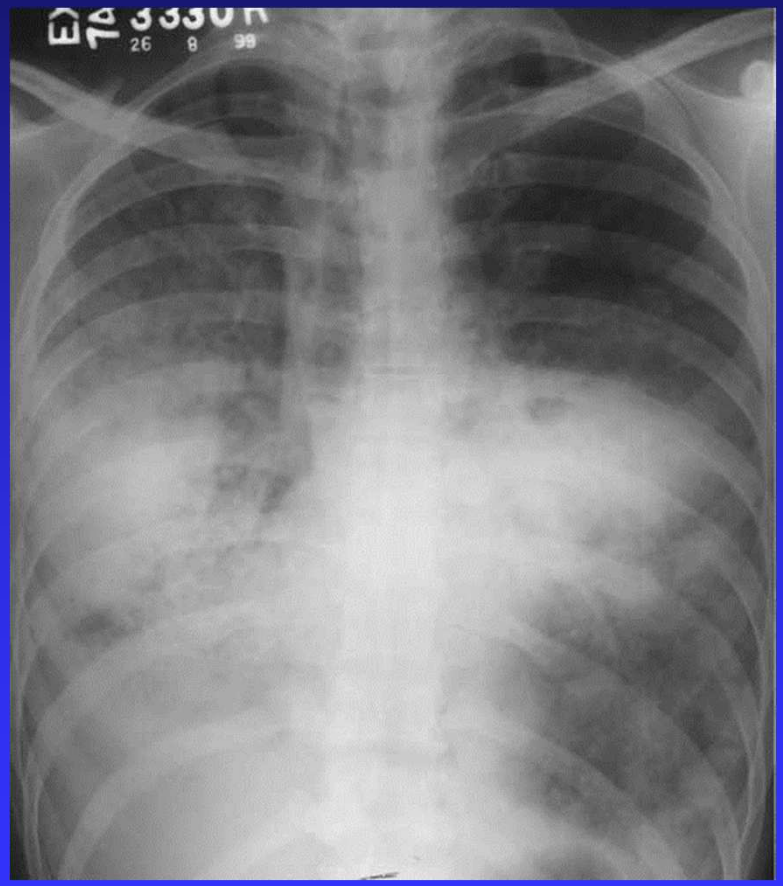




BAC: Pneumonic pattern

- Alveolar filling of tumor without invasion
- Nodular consolidation with air bronchogram

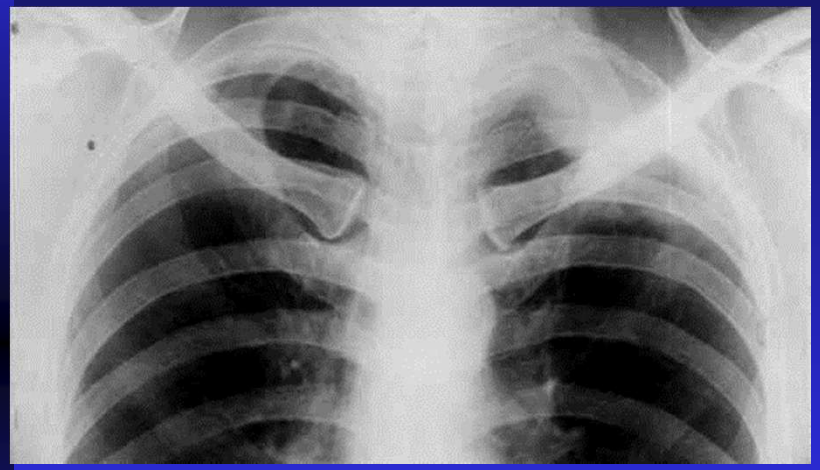


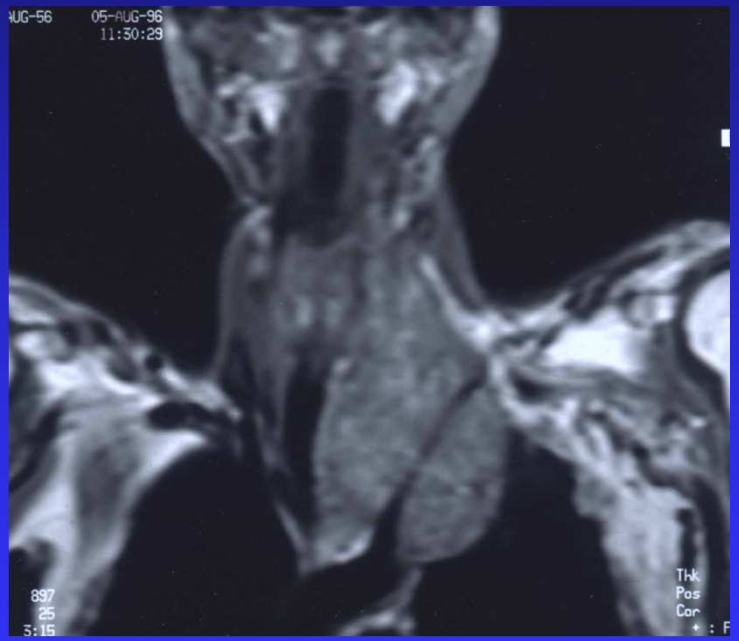


Pancoast/ Superior Sulcus Tumor

- Any histology
- Arise near/at apical pleura and grows into
  - Chest wall - chest/ shoulder pain
  - Neck
  - Stellate ganglian –Horner's syndrome
  - Brachial plexus – plexopathy
- Invasion of spine, brachia plexus, subclavian vessels - unresectable

Pancoast Tumor



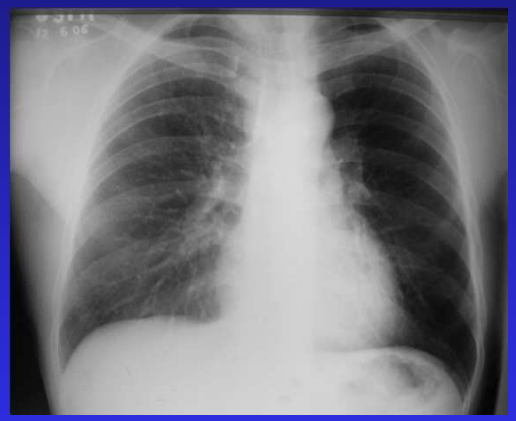


Carcinoid

- <5 % of all lung cancers
- Low malignant potential, good prognosis
- Majority are central
- Lobar/ segmental bronchi

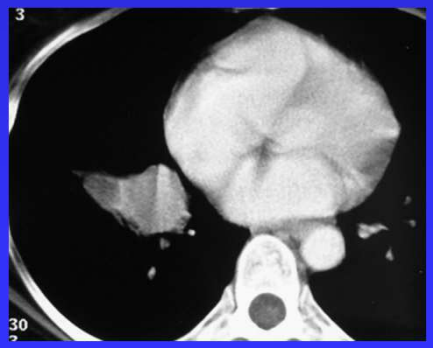
Carcinoid

- Air trapping



- Collapse

- Mucoid impaction



Carcinoid (vs Carcinoma)

- CT
  - Usually difficult
  - Very high contrast enhancement
  - Calcification
- Somatostatin Receptor Scintigraphy (SRS)
  - Most sensitive and accurate investigation
- PET with 11C-5HTT

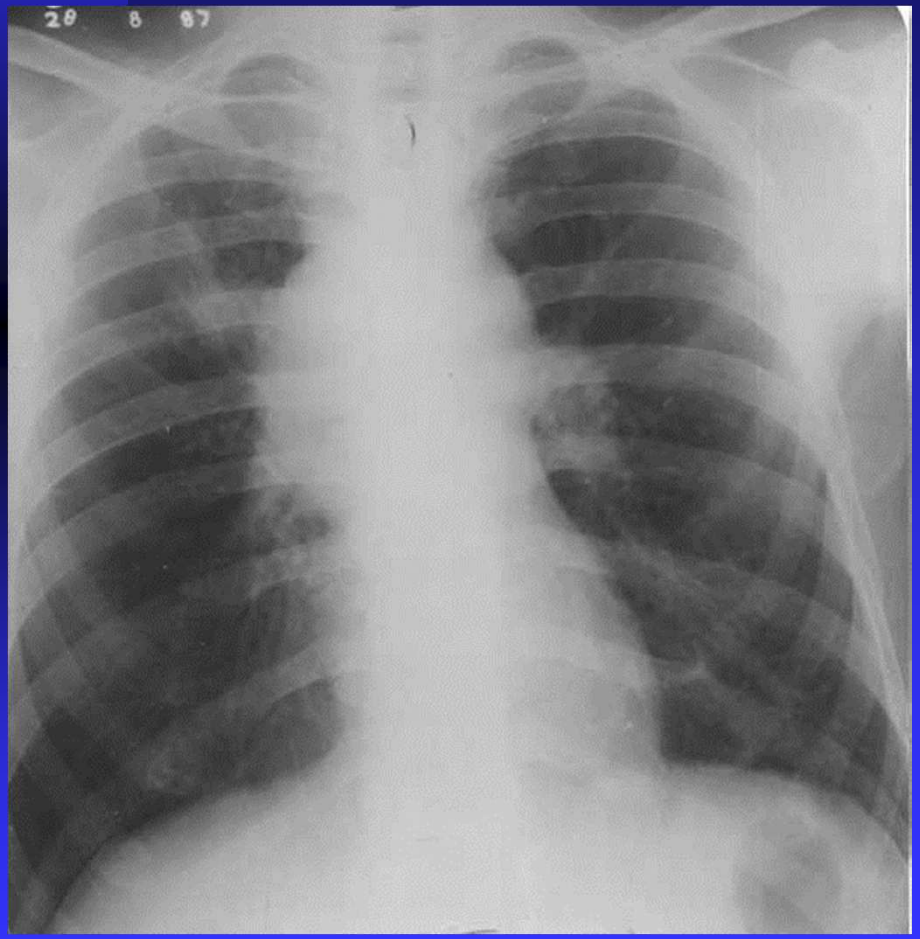
Small Cell Lung Cancer

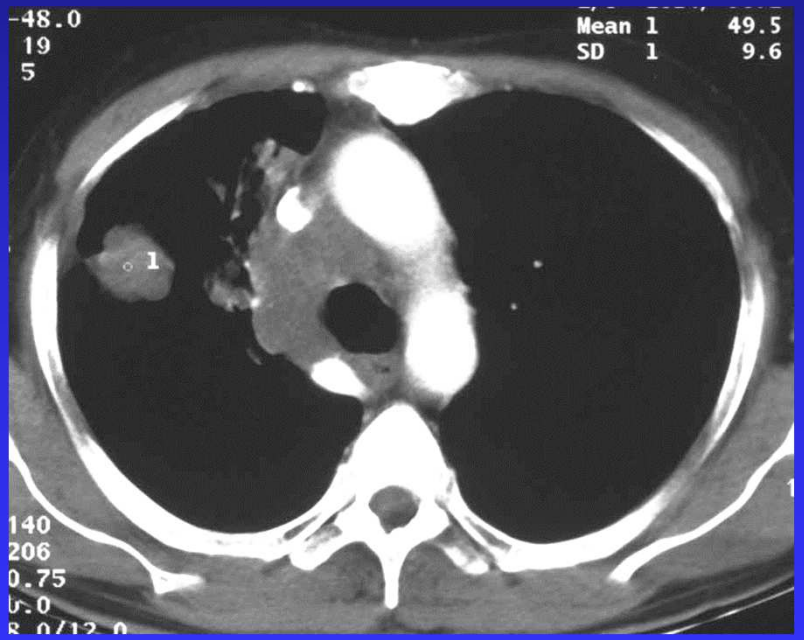
- Most aggressive lung cancer
- Spreads to vessels and LNs without bronchial invasion
- 90% have extrathoracic disease at presentation
  - Bone marrow involvement, brain metastases
  - Considered a systemic disease

Small Cell Lung Cancer: Imaging

- Hilar and mediastinal lymphadenopathy, often bilateral and extensive
- LN pathy may obscure central primary lesion
- SPN – do not cavitate

SCLC





Lung Cancer: Screening

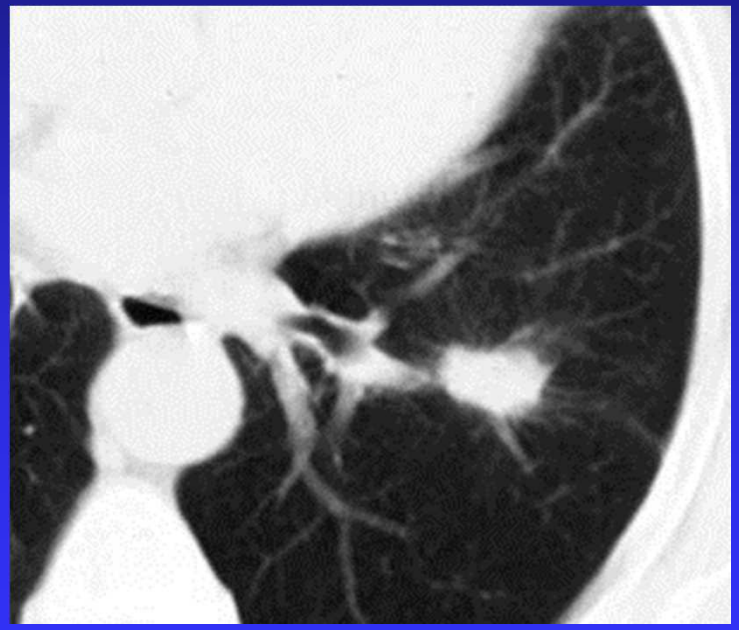
- Low dose helical CT
  - Many randomised and non-randomized projects in USA, Europe and Japan
- Benefits not proved
- Present consensus (American Cancer Society, American College of Radiology)
  - Primary prevention (ban on smoking) is more effective than secondary prevention (screening)

Staging of NSCLC

- Tumor
  - Size, location, margin & adjacent structures
- Lymph nodes
  - Involvement & location
- Distant metastases
  - Present/ absent

T1

- Size less than 3 cm
- Surrounded by lung parenchyma only



T2

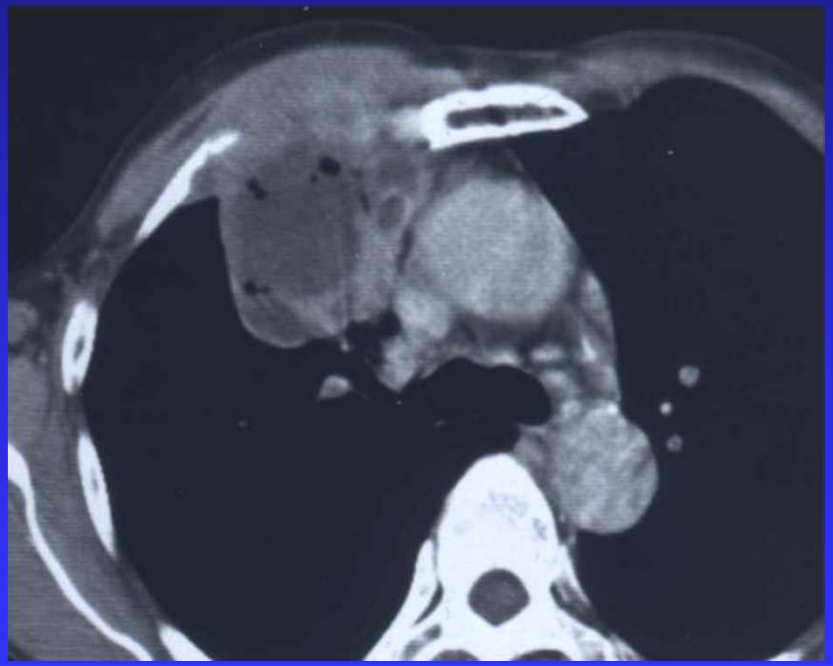
- ≥ 3cm
- Invasion of visceral pleura
- ≥ 2 cm from carina
- Small collapse/ consolidation of affected lobe

T3

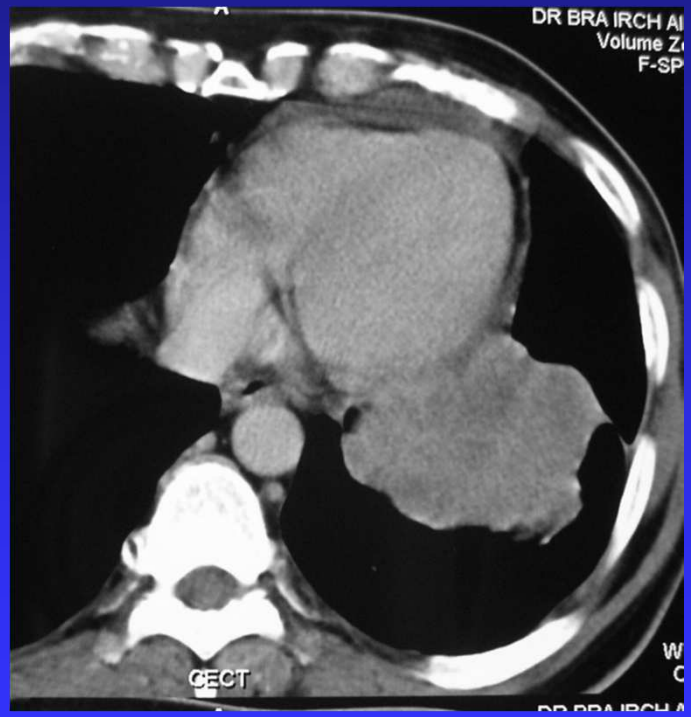
- Invasion of pleura, pericardium, chest wall, diaphragm
- < 2 cm from carina (carina is free)
- Collapse/consolidation of entire lobe

T3

- Chest wall

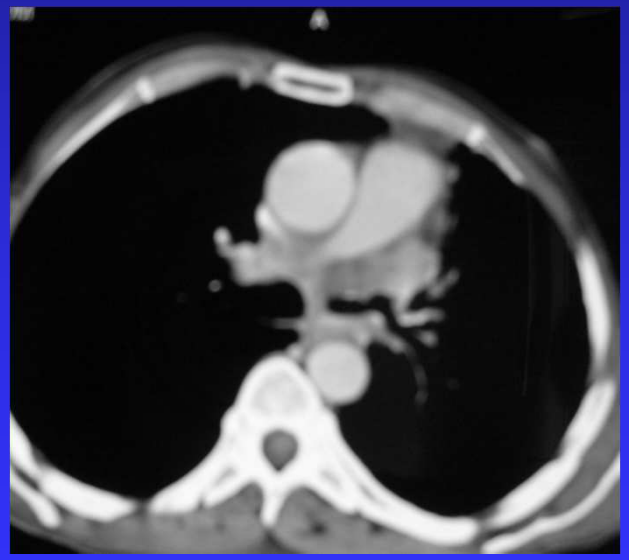


- Pericardium/ pleura

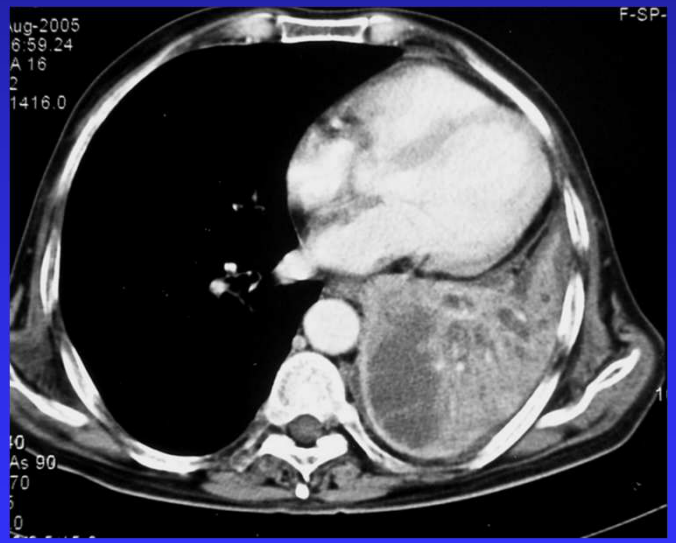


T3

- <2cm from carina

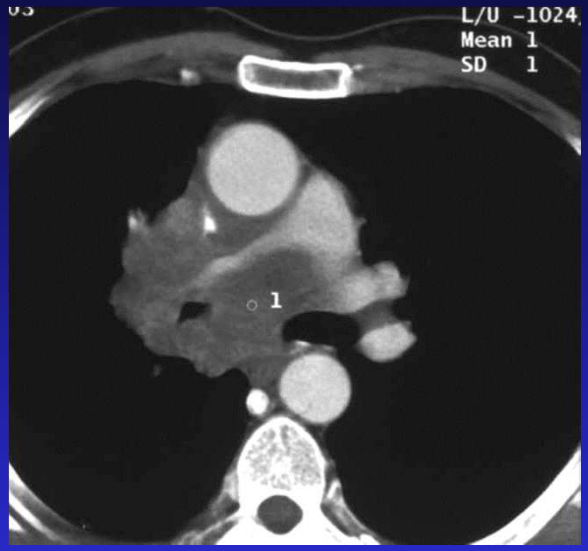


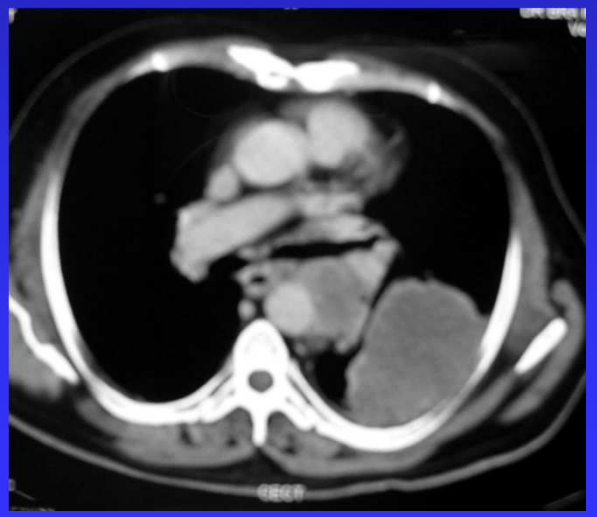
- Consolidation/ collapse of entire lobe



T4

- Invasion of mediastinum
  - Heart, great vessels
  - Esophagus
  - Vertebra
  - Trachea/carina
- Malignant pleural/ pericardial effusion
- Satellite nodule in same lobe





N Staging

- CT sensitivity & specificity ~ 65%
- Mediastinoscopy is the gold standard
  - Controversial
  - Some surgeons do in all
  - Some in N2 disease only

M Staging

- Type of lung cancer
  - SCLC > adeno ca > sq cell ca
- Sites (at presentation)
  - Adrenal (20%)
  - Brain (18%)
  - Bone (13%)
  - Liver
  - Extra thoracic LNs

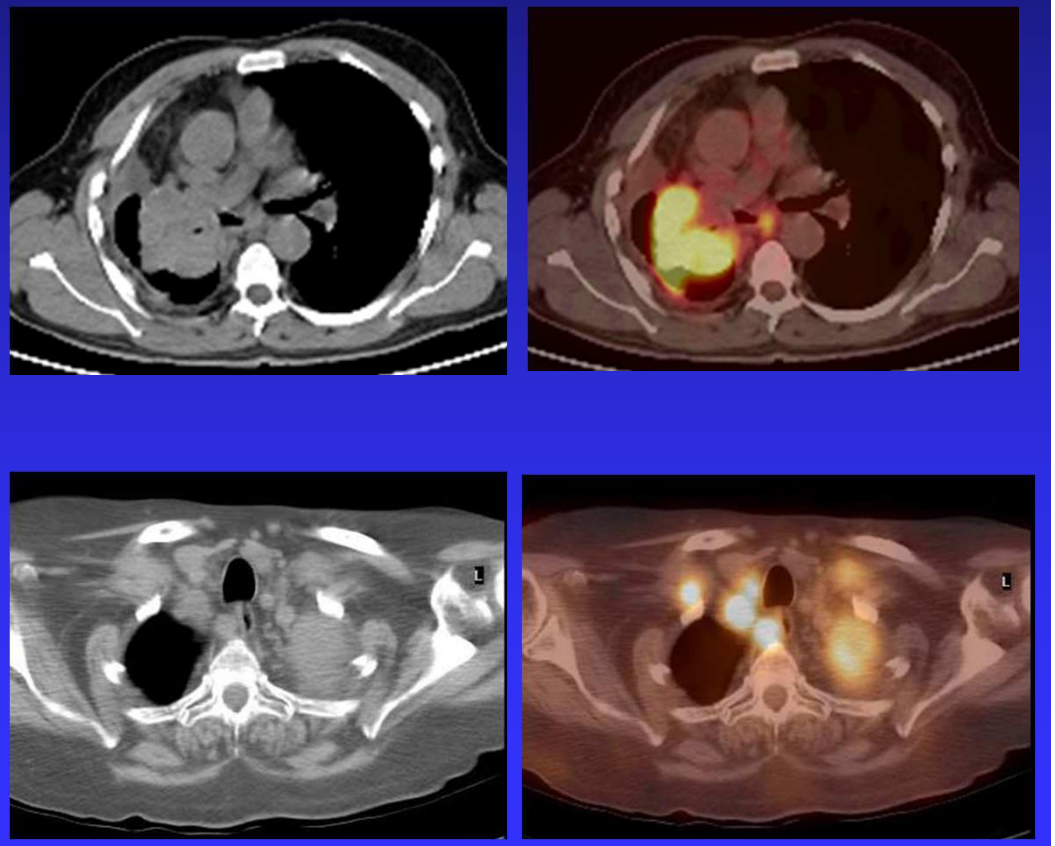
M- Staging

PET in Lung Cancer Staging

- Excellent for N and M staging
  - Changes management in up to 40% patients
- Not useful for T staging
  - Size < 5mm
  - BAL ca (false –ve in 40%)
  - Brain metastases
  - Inflammation, diabetes

PET: N Staging

- Sensitivity 90%
- Specificity 94%



Staging of Small Cell Lung Cancer

- Only two stages
  - Whether the disease can be included in single RT field
- Limited disease (LD)
  - Ipsilateral lung/ pleural disease, ipsi/ contra lateral LN
- Extensive disease (ED)
  - Contralteral lung/ pleural disease
  - Any extrathoracic disease

Carcinoma of Esophagus

Ca Esophagus

- Endoscopy and biopsy
  - Mainstay of diagnosis
- Imaging
  - Barium swallow
  - CT

Ca Esophagus

- Upper third
  - Up to aortic arch
- Mid third
  - Up to inferior pulmonary vein
- Lower third
  - Below that

Ca Esophagus: Pathology

- Squamous cell carcinoma
  - 50% mid esophagus, rest upper and lower
- Adenocarcinoma
  - 90% around GE junction

Ca Esophagus: Barium Swallow

- Infiltrative
- Ulcerative
- Polypoid
- Mixed

Ca Esophagus: Barium Swallow

- Early
  - Small polyp/ ulcer
  - Mucosal plaque
- Advanced
  - Luminal narrowing
  - Mucosal irregularity
  - Ulceration
  - Shouldering

Ca Esophagus: Mucosal irregularity

Ca Esophagus: Strictures

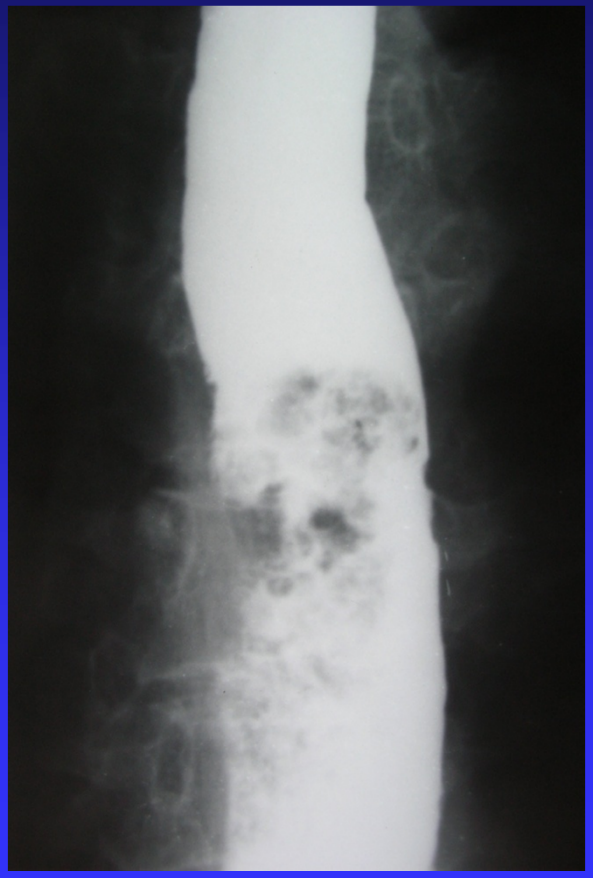
Benign

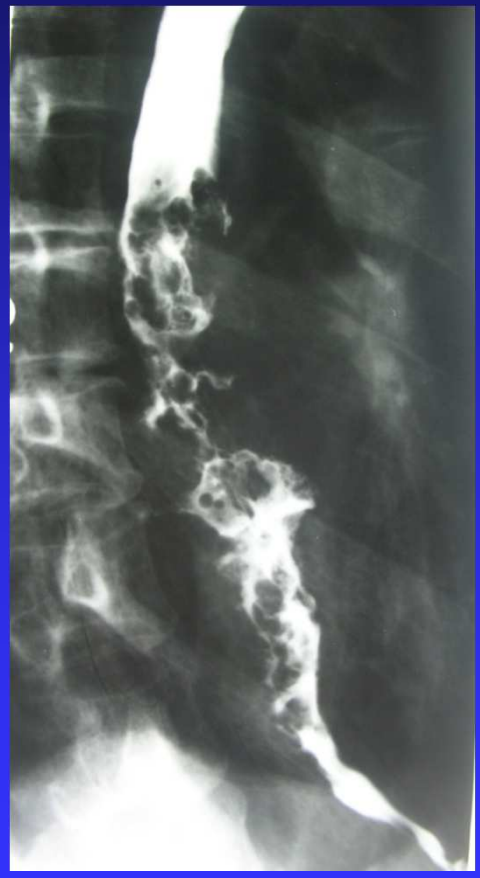
Malignant

Ca Esophagus: Strictures

- Abrupt
- Eccentric
- Shouldering
- Mucosal irregularity

Ca Esophagus: Polypoid



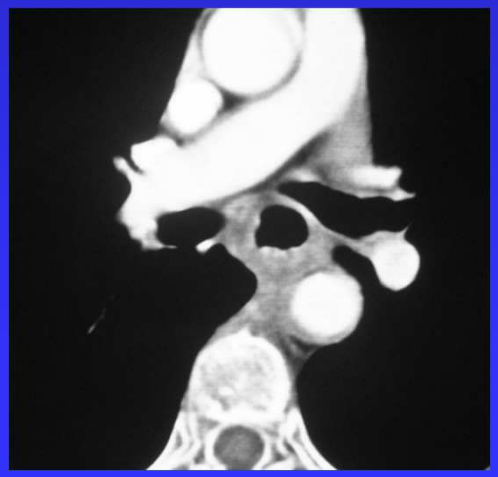


Ca Esophagus: CT

- Staging work-up
  - Invasion of adjacent structures
  - Lymph node enlargement (mediastinal/RP)
  - Metastases
- Technique
  - CECT of Chest and upper abdomen
  - Oral and IV contrast

Ca Esophagus: CT

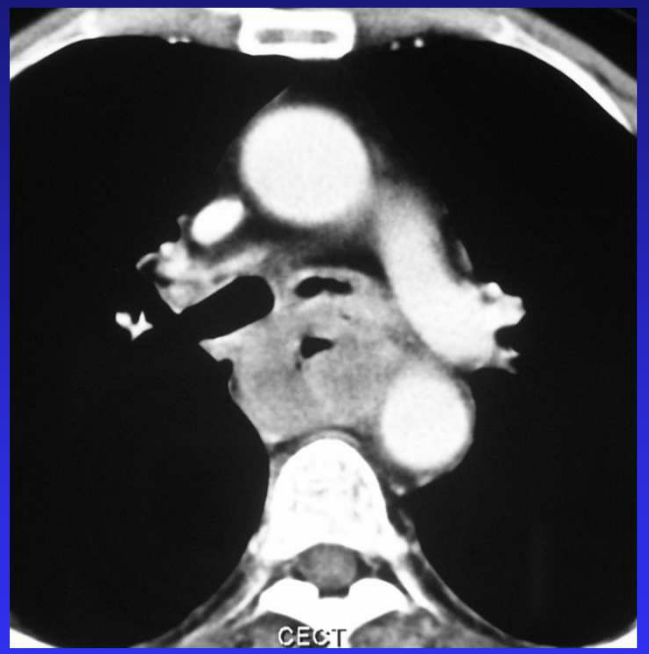
- Aortic invasion
  - Uncommon
  - Loss of fat plane – especially fatty triangle
  - Angle of contact
    - <45 degree: free
    - >90 degree: highly suspicious
    - Rest: indeterminate



Ca Esophagus: CT

Tracheo-bronchial invasion

- Early signs
  - Convex bulge in lumen of trachea/ bronchi
    - Not useful in cervical trachea
  - Loss of fat plane
- Specific but late signs
  - Luminal extension of tumor
  - Fistula formation



Ca Esophagus: CT

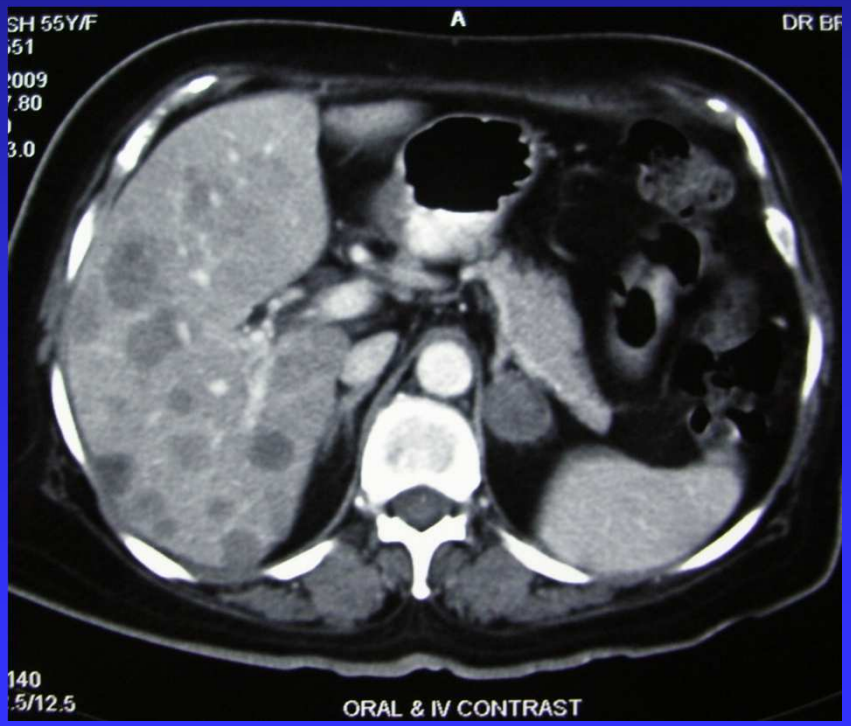
- Lymph node metastases
- Enlargement
  - Mediastinum/ RP >10 mm
  - Retrocrural,
    Supraclavicular > 6mm
- Central necrosis
- High false positive and negatives on CT

Ca Esophagus: Metastases

- Liver
- Lung
- Adrenal
- Peritoneum

Ca Esophagus: Liver Metastases

- Hypodense, hypovascular

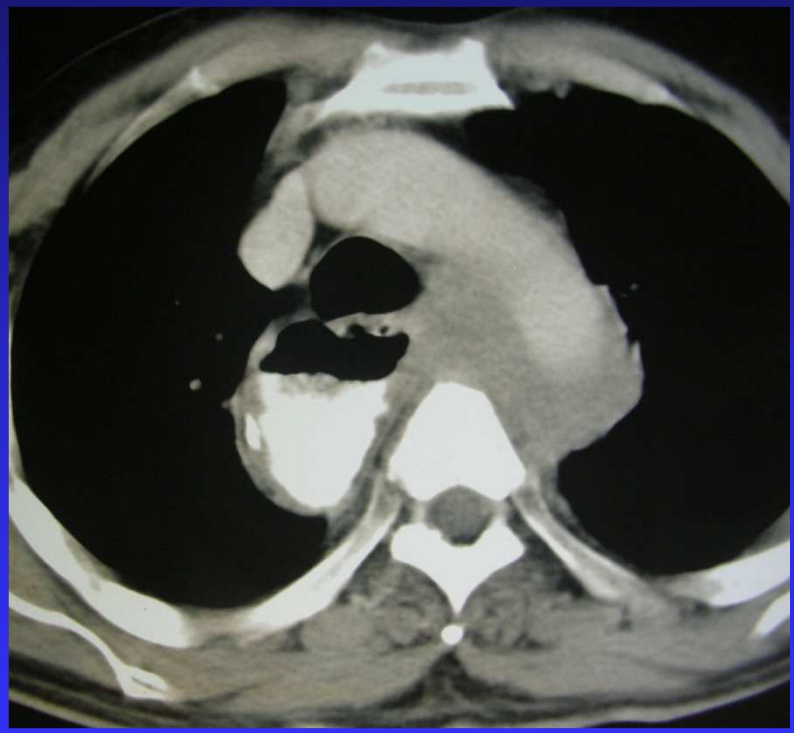


Ca Esophagus: Endoscopic ultrasound

- More suitable for T staging
  - All layers can be indentified
  - Depth of mural penetration (T stage) assessed with accuracy of 90%
  - Accurate assessment of periesophageal lymph nodes
  - Not suitable for distant lymph nodes or metastases

Ca Esophagus: Recurrence

- Local
- Nodal
- Metastatic



Thank You