Radiology Pathology Conference

Sharlin Johny Kutty, MD, Cytopathology Fellow
Sara Majewski, MD, Radiology Resident

Friday, August 28, 2009
52-year-old female with bilateral pulmonary nodules with recent chest pain.

Differential diagnosis for this cavitary nodule?
CASE 1: Differential Diagnosis for This Lesion

- Lung Primary - Non-Small Cell Carcinoma/Squamous Cell Carcinoma
- Infection
  - Septic emboli
  - Fungal
  - TB
- Metastases
- Vasculitis/Wegener’s Granulomatosis
Intensely hypermetabolic 3 x 2.7 cm spiculated cavitary lesion in left upper lobe lung (SUV up to 16.8).

Does this change your differential?
*1.2 x 1.1 cm spiculated hypermetabolic pulmonary nodule in the right lower lobe (SUV 3.9)
*Low-grade FDG uptake in a sclerotic lesion in the anterior left fifth rib (SUV 2.9)

Would this change your differential?
Pathology
Case 1
Lung, left middle lobe, CT-guided FNA: Diff-Quik stain, 20x
Lung, left middle lobe, CT-guided FNA: Diff-Quik stain, 40x
Lung, left middle lobe, CT-guided FNA: Papanicolaou stain, 40x
Lung, left middle lobe, CT-guided FNA:
Cell Block, H & E stain, 20x
Lung, left middle lobe, CT-guided FNA: Cell Block, H & E stain, 40x
Lung, left middle lobe, CT-guided fine needle aspiration:

Malignant tumor cells present derived from poorly differentiated non-small cell carcinoma.

Comment: Immunohistochemical stains are positive for p63 and negative for cytokeratin 7 and TTF-1. These findings are consistent with a squamous cell carcinoma.

Cell block and cytologic preparations examined.
Lung, left middle lobe, cell block: p63 Immunostain, 20x
Lung, left middle lobe, cell block: TTF-1 Immunostain, 20x
CASE 1: Key Facts about Non-Small Cell Carcinoma

- Usually solitary pulmonary nodule or mass, often spiculated
- Can have mediastinal/hilar lymphadenopathy
- Staging TNM recently revised
Multiple lytic bone lesions associated with soft tissue masses with additional lesions in vertebral bodies and ribs. Differential diagnosis?
49-year-old male who had excision skin of a skin lesion on his right shoulder in 2003.

Same CT slice. Does this narrow your differential diagnosis?
CASE 2: Differential Diagnosis

- Metastases
  - Lung
  - Renal
  - Thyroid
  - Melanoma

- Multiple Myeloma
- Atypical Lymphoma
- Rarely atypical infection
  - TB
  - Syphilis
Bone, iliac, left, CT-guided FNA: Diff-Quik stain, 20x
Bone, iliac, left, CT-guided FNA: Diff-Quik stain, 40x
Bone, iliac, left, CT-guided FNA: Papanicolaou stain, 20x
Bone, iliac, left, CT-guided FNA: Papanicolaou stain, 40x
Bone, iliac, left, cell block: Hematoxylin and eosin stain, 20x

Cell block: 40x
Bone, iliac, left, cell block: HMB45 Immunostain, 20x
Bone, iliac, left, cell block:
S-100 Immunostain, 20x
Bone, iliac, left, CT-guided fine needle aspiration:

Malignant tumor cells present derived from metastatic malignant melanoma.

Comment: Immunohistochemical stains show that the tumor cells mark strongly with S-100 and HMB45. They do not mark with cytokeratin 7, cytokeratin 20, PSA, TTF-1 or RCC. These staining results support a melanocytic differentiation.

Cell block and cytologic preparations examined.
Skin, right neck, excision:

Biopsy site and residual melanoma.

Examined margins are free of involvement.
Skin, right neck, excision: H & E stain, 20x
Skin, right neck, excision: H & E stain, 40x
CASE 2: Key Facts about Metastatic Melanoma

- **PET/CT:** Scan from vertex of head through proximal thigh. Negative PET does not exclude lesions < 1 cm in size.

- **Local Spread**
  - At or near previous excision site

- **Metastatic Disease**
  - In-transit nodal metastases: Between primary & regional lymph nodes
  - Regional lymph nodes
  - Common sites: Spine, brain, lung, liver, spleen and bowel
72-year-old with history of cough.

Dense opacification of the lingula with enlargement of the bilateral hila. Next test?
Mass with associated consolidation of the left upper lobe with multiple adjacent nodules and septal thickening, as well as associated mediastinal lymphadenopathy.
CASE 3: Differential Diagnosis

- Non-Small Cell Lung Carcinoma
- Small Cell Lung Carcinoma
- Lymphoma
- Metastases
  - Breast
  - Head & neck
  - Renal Cell
  - Melanoma
How can you minimize the risk of pneumothorax with biopsy?

By going through the parasternal or transsternal region. Also beware of internal mammary vessels.
Pathology
Case 3
Lung, left, CT-guided FNA: Diff-Quik stain, 20x
Lung, left, CT-guided FNA: Diff-Quik stain, 40x
Lung, left, CT-guided FNA:
Papanicolaou stain, 20x
Lung, left, CT-guided FNA: Papanicolaou stain, 40x
Lung, left, CT-guided fine needle aspiration:

Malignant tumor cells present derived from small cell carcinoma.
Lung, left anterior mediastinal mass, biopsy:

Small cell carcinoma with extensive necrosis.

Comment: Immunohistochemical stains are positive for CD56 and synaptophysin and are negative for CK 7, CK 20, TTF-1 and chromogranin supporting the diagnosis of small cell carcinoma.
Lung, left anterior mediastinal mass, biopsy: H & E stain, 20x
Lung, left anterior mediastinal mass, biopsy: H & E stain, 40x
Lung, left anterior mediastinal mass, biopsy: CD 56 Immunostain, 20x
Lung, left anterior mediastinal mass, biopsy: Synaptophysin Immunostain, 20x
Lung, left anterior mediastinal mass, biopsy: TTF-1 Immunostain, 20x
CASE 3: Key Facts about Small Cell Carcinoma

- Large mediastinal mass
- Arises in proximal airway
- Extends to at least one hilum in 85%
- Endobronchial obstruction
- Mass envelops pulmonary arteries, aorta, great vessels
- Compresses/invades SVC in 10-15%
- Presents as solitary pulmonary nodule in 5%
71-year-old female with right neck and occipital pain.

CT demonstrates osteolytic lesion of right occipital condyle with extension to adjacent portions of right occipital bone. Differential?
CASE 4: Differential Diagnosis

- Metastasis
- Plasmacytoma
- Lymphoma
- Chondrosarcoma
- Jugular Mass
  - Neurogenic tumor, paraganglioma
What differential diagnosis is more likely now?
Pathology
Case 4
Bone, skull base, CT-guided FNA: Diff-Quik stain, 20x
Bone, skull base, CT-guided FNA: Diff-Quik stain, 40x
Bone, skull base, CT-guided FNA:
Papanicolaou stain, 20x
Bone, skull base, CT-guided FNA:
Papanicolaou stain, 40x
Bone, skull base, cell block:
Hematoxylin and eosin stain, 20x

Cell block: 40x
Bone, skull base, CT-guided fine needle aspiration:

Malignant tumor cells present derived from adenocarcinoma consistent with pulmonary primary.

Comment: Immunohistochemical stains are strongly positive for cytokeratin and TTF-1. There is focal marking with CD138. They do not mark with LCA. The staining results support an adenocarcinoma of pulmonary origin.

Cell block and cytologic preparations examined.
Bone, skull base, cell block: TTF-1 Immunostain, 20x
Bone, skull base, cell block:
Cytokeratin Immunostain, 20x
Bone, skull base, cell block: CD 138 Immunostain, 20x
Bone, skull base, cell block:
LCA Immunostain, 20x
CASE 4: Key Facts about Metastatic Adenocarcinoma, Lung Primary

• Metastases usually to regional lymph nodes, local metastases, adjacent organs

• PET/CT demonstrates these bone metastases much better than other imaging
54-year old woman with a history of lung cancer status post right lower lobectomy and mediastinal lymphadenectomy on followed by chemotherapy and radiation therapy.

Does this narrow your differential?
CASE 5: Differential Diagnosis

- Metastases
- Infection
  - Septic emboli
- Granulomatous Disease
- Primary Bronchogenic Carcinoma with metastases
Pathology
Case 5
Lung, left, CT-guided FNA: Diff-Quik stain, 40x
Bone, iliac wing, CT-guided FNA: Papanicolaou stain, 20x
Lung, left, CT-guided FNA:
Cell block, H & E stain, 20x
Lung, left, Cell block:
TTF-1 Immunostain, 20x
Lung, left, CT-guided fine needle aspiration:

Malignant tumor cells present derived from poorly differentiated adenocarcinoma.

Immunohistochemical stains are positive for TTF-1 and cytokeratin 7 and negative for p63.
Lung, right lower lobe, lobectomy and lymph node biopsies:

Pleomorphic carcinoma with poorly differentiated adenocarcinoma and giant cell carcinoma components.

Immunostains are positive for CK7 and TTF-1. Focal staining is present in CD56, synaptophysin and p63. Mucin stain is positive. Chromogranin and CK5/6 are negative.

Tumor size: 5.6 x 5.4 x 3.6 cm

Margins: Invasive carcinoma is focally present at the bronchial resection margin.

Lymph nodes, level 7, biopsy: Metastatic adenocarcinoma present in 1/12 lymph nodes. All other level lymph nodes are negative.
Lung, right lower lobe, lobectomy: H & E stain, 20x
Lung, right lower lobe, lobectomy: H & E stain, 40x
Lung, right lower lobe, lobectomy: Cytokeratin 7 Immunostain, 20x
Lung, right lower lobe, lobectomy: TTF-1 Immunostain, 20x
Lymph node, level 7, biopsy: H & E stain, 20x
CASES

• CASE 1: MRN 2179469; Poorly differentiated non-small cell carcinoma.
• CASE 2: MRN 1590270; Metastatic melanoma.
• CASE 3: MRN 0648921; Small cell carcinoma.
• CASE 4: MRN 0132750; Adenocarcinoma compatible with lung primary.
• CASE 5: MRN 0403078; Poorly differentiated adenocarcinoma.
End