63 y.o male presenting for annual lung cancer screening

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Patient Presentation:

63 y.o male presenting for annual lung cancer screening.

Past medical history include essential hypertension, COPD, ILD, pulmonary emphysema, hyperlipidemia, diabetes mellitus type 2, nonischemic cardiomyopathy EF 35%, iliac artery stenting and left superficial femoral to below-knee popliteal artery bypass, long term smoking, GERD.

Social history: active smoker with 44 pack-year smoking history, 12 standard drink of alcohol per week, prior cocaine use, exposure to mold and asbestos.
USPSTF 2021 recommendation for Lung Cancer Screening

Annual screening for lung cancer with low-dose computed tomography (LDCT) in adults aged 50-80 years who have a 20 pack-year smoking history and currently smoke or have quit within the past 15 years.

Stop screening once a person has not smoked for 15 years or has a health problem that limits life expectancy or ability to have lung surgery.

Figure 1. Low dose CT scan performed for lung cancer screening. CDC. https://www.cdc.gov/cancer/lung/basic_info/screening.htm
Benefits of lung cancer screening

National Lung Screening Trial (NLST)
• NLST showed a 20% decrease in lung cancer mortality in patients using low-dose CT screening compared to single view posteroanterior radiography.

Dutch-Belgian randomized lung cancer screening trial (NELSON)
• NELSON showed a 24% reduction in lung cancer-related mortality with low-dose CT in men and 33% reduction in lung cancer-related mortality in women with low-dose CT screening
Figure 2. Low-dose CT scan (LDCT).
Figure 3. LDCT scan showing (A) mediastinal adenopathy and (B) a 1.9 cm solid nodular opacity in the left upper lobe medially (arrow).
Standardizes reporting and management recommendations for lung cancer screening low-dose CT.

0: Incomplete

1: Negative:
  - no nodule
  - nodule with benign features

2: Benign nodule:
  - juxtapleural
  - solid
  - part solid
  - nonsolid
  - airway

Comparison to prior chest CT, additional lung cancer screening CT screening, or 1–3-month LDCT, depending on the reason the study is considered incomplete

12 month screening LDCT
3: Probably Benign nodule:
- solid
- part solid
- non-solid
- atypical pulmonary cyst

6-month LDCT

4A: Suspicious nodule:
- solid
- part solid
- airway
- atypical pulmonary cyst

3-month LDCT;
PET/CT if solid nodule or solid component ≥ 8 mm (≥ 268 mm^3)

S: Significant or potentially significant finding unrelated to lung cancer (added to 0-4)

Finding specific
## Lung-RADS® v2022 Category and Management

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Management</th>
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<tr>
<td>4B</td>
<td><strong>Very Suspicious</strong>&lt;br&gt;Estimated Population Prevalence: 2%&lt;br&gt;<strong>Airway nodule</strong>, segmental or more proximal - stable or growing (see note 11)</td>
<td>Referral for further clinical evaluation</td>
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<td><strong>Solid nodule:</strong>&lt;br&gt;• ≥ 15 mm (≥ 1767 mm²) at baseline OR&lt;br&gt;• New or growing ≥ 8 mm (≥ 268 mm²)</td>
<td>Diagnostic chest CT with or without contrast; PET/CT may be considered if there is a ≥ 8 mm (≥ 268 mm²) solid nodule or solid component; tissue sampling; and/or referral for further clinical evaluation</td>
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<td><strong>Part solid nodule:</strong>&lt;br&gt;• Solid component ≥ 8 mm (≥ 268 mm²) at baseline OR&lt;br&gt;• New or growing ≥ 4 mm (≥ 34 mm²) solid component</td>
<td>Management depends on clinical evaluation, patient preference, and the probability of malignancy (see note 13)</td>
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<td><strong>Atypical pulmonary cyst:</strong> (see note 12)&lt;br&gt;• Thick-walled cyst with growing wall thickness/nodularity OR&lt;br&gt;• Growing multilocular cyst (mean diameter) OR&lt;br&gt;• Multilocular cyst with increased loculation or new/increased opacity (nodular, ground glass, or consolidation)</td>
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<td><strong>Slow growing solid or part solid nodule</strong> that demonstrates growth over multiple screening exams (see note 8)</td>
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<td>4X</td>
<td>Estimated Population Prevalence: &lt; 1%&lt;br&gt;Category 3 or 4 nodules with additional features or imaging findings that increase suspicion for lung cancer (see note 14)</td>
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Figure 4. Follow-up LDCT scan 2 months later.
Figure 5. Follow-up LDCT scan 2 months later showing increased size of the solid, spiculated mass-like opacity measuring 3.5 x 1.5 cm in the LUL. Additional findings include emphysematous changes and 9 mm groundglass nodule in the right upper lobe (not shown).

Lung-RADS 4B
Herder model

Predicts the risk of malignancy in solid pulmonary nodules with FDG uptake. Based on British Thoracic Society the FDG uptake is categorized as:

- no uptake
- faint uptake, less than or equal to mediastinal blood pool
- moderate uptake, greater than mediastinal blood pool
- intense uptake, uptake 3x mediastinal blood pool

Figure 6A-C. PET/CT showing left upper lobe nodule is hypermetabolic with SUVmax 6.0; Herder calculation of 95.3% probability of malignancy.

Figure 6D. PET/CT MIP image demonstrating no hypermetabolic regional adenopathy or distant metastases.
Cytology:
LUL nodule FNA: squamous cell carcinoma
LUL nodule mini-BAL: squamous cell carcinoma
Bronchial brushings: suspicious of squamous cell carcinoma
Lymph nodes at stations 11R, 4R, 7, 4L and 11L: negative for malignancy
Bronchial washings: negative for malignancy

Pathology:
Transbronchial biopsies LUL nodule: squamous cell carcinoma, moderately differentiated
**Left Upper Lobe Lobectomy Procedure and Findings**

**Procedure:** flexible bronchoscopy, robotic assisted left VATS, left upper lobe lobectomy, mediastinal lymph node dissection (left).

**Findings:** LUL lung mass, enlarged lymph nodes
Figure 7. Squamous carcinoma of the lung low view (A), high view (B), p40 marker (C), TTF-1 marker (D).

Immunohistochemical marker P40 positive for squamous carcinoma
Figure 8. Adenocarcinoma of the lung (A), adenosquamous carcinoma interphase (B), p40 marker (C), TTF-1 marker (D).

Immunohistochemical marker TTF-1 positive for adenocarcinoma
Diagnosis

Adenosquamous Carcinoma pT Category: pT2a and pN Category: pN2

• Diagnosis of adenosquamous carcinoma is made based on WHO 2015 Classification when both components are ≥10%.

• Staging is made accordingly to 8\textsuperscript{th} edition of the tumor-node-metastasis (TNM) criteria.

• Lung adenosquamous carcinoma is a rare malignant tumor detected in 0.4\%–4\% of patients with lung cancer.
Follow up with Radiation Oncology and Hematology & Medical Oncology.

Treatment according to NCCN Guidelines and Lung ART trial:

- Chemotherapy and adjuvant chemotherapy consisting of 4 cycles of carboplatin and paclitaxel.
- No pemetrexed due to squamous component.
- Molecular testing and PD-L1 status testing for EGFR targeted therapy vs immunotherapy.
- Radiation therapy to the left aortopulmonary area.