INCIDENTAL LESIONS OF THE CHEST: NODULES, LYMPH NODES, AND THYROID

What to do with them

Richard M. Gore, MD
SCBT-MR Summer Practicum
Williamsburg, Virginia
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8:00-8:30
NODULES ON SCREENING CHEST CT

- 1500 people
- 4500 patient years of screening
- 70% had nodules
- 2831 uncalcified indeterminate nodules

NODULES ON SCREENING
CHEST CT

- 2831 nodules
- 90% < 8 mm in diameter
- 98% were benign

### Guidelines for Management of Small Pulmonary Nodules Detected on CT Scans: A Statement from the Fleischner Society

Heber MacMahon, MB, BCh, BAO, John H. M. Austin, MD, Gordon Gamsu, MD, Christian J. Herold, MD, James R. Jett, MD, David P. Naidich, MD, Edward F. Patz, Jr, MD and Stephen J. Swensen, MD

<table>
<thead>
<tr>
<th>Nodule Size (mm)*</th>
<th>Low-Risk Patient†</th>
<th>High-Risk Patient‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤4</td>
<td>No follow-up needed§</td>
<td>Follow-up CT at 12 mo; if unchanged, no further follow-up¶</td>
</tr>
<tr>
<td>&gt;4–6</td>
<td>Follow-up CT at 12 mo; if unchanged, no further follow-up¶</td>
<td>Initial follow-up CT at 6–12 mo then at 18–24 mo if no change‖</td>
</tr>
<tr>
<td>&gt;6–8</td>
<td>Initial follow-up CT at 6–12 mo then at 18–24 mo if no change</td>
<td>Initial follow-up CT at 3–6 mo then at 9–12 and 24 mo if no change</td>
</tr>
<tr>
<td>&gt;8</td>
<td>Follow-up CT at around 3, 9, and 24 mo, dynamic contrast-enhanced CT, PET, and/or biopsy</td>
<td>Same as for low-risk patient</td>
</tr>
</tbody>
</table>
WHEN YOU DO YOUR FOLLOW UP CT SCAN

- I seem to always find additional pulmonary nodules when F/U a lesion seen on abdominal CT
- Find new nodules when F/U the F/U study
- What do we do with them?
ADDITIONAL PULMONARY NODULES ON F/U

When confronted with one or more additional nodules during SPN evaluation, it is prudent to consider each nodule individually, rather than assuming that the additional nodules are either metastatic or benign.
RECOMMENDATIONS

- Evaluation of Patients With Pulmonary Nodules: When Is It Lung Cancer?*
- ACCP Evidence-Based Clinical Practice Guidelines (2nd Edition)
- Michael K. Gould, MD, FCCP; James Fletcher, MD; Mark D. Iannettoni, MD, FCCP; William R. Lynch, MD; David E. Midthun, MD, FCCP; David P. Naidich, MD, FCCP and David E. Ost, MD, FCCP

ATYPICAL ADENOMATOUS HYPERPLASIA

- Bronchoalveolar proliferation
- Considered premalignant
- Incidental in 5.2% resections for lung cancer
MEDIASTINAL LYMPH
NODE SIZE

- Glazer AJR 144: 261-265, 1984
- Quint AJR 147: 469-472, 1986
- Kiyono AJR 150: 771-776, 1988
# Mediastinal Lymph Node Size

- Jornal Brasileiro de Pneumologia
- J bras pneumol 33:133-140, 2007
- Mediastinal lymph node distribution, size and number: definitions based on an anatomical study
- Aurelino Fernandes Schmidt Júnior; Olavo Ribeiro Rodrigues; Roberto Storte Matheus; Jorge Du Ub Kim; Fábio Biscegli Jatene
### Table 2 - Maximum standard size per area (long axis and short axis).

<table>
<thead>
<tr>
<th>Region</th>
<th>Area (mm²)</th>
<th>Long</th>
<th>Short</th>
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<tbody>
<tr>
<td>1</td>
<td>117.73</td>
<td>16.23</td>
<td>10.66a</td>
</tr>
<tr>
<td>2L</td>
<td>80.17</td>
<td>13.53a</td>
<td>8.71</td>
</tr>
<tr>
<td>2R</td>
<td>149.17</td>
<td>17.79</td>
<td>10.78a</td>
</tr>
<tr>
<td>3a</td>
<td>188.51</td>
<td>23.42</td>
<td>11.42a</td>
</tr>
<tr>
<td>3p</td>
<td>112.99</td>
<td>15.35a</td>
<td>10.59</td>
</tr>
<tr>
<td>4L</td>
<td>124.29</td>
<td>17.74</td>
<td>10.31a</td>
</tr>
<tr>
<td>4R</td>
<td>268.76a</td>
<td>29.54</td>
<td>15.87</td>
</tr>
<tr>
<td>5</td>
<td>165.13</td>
<td>19.75</td>
<td>11.68a</td>
</tr>
<tr>
<td>6</td>
<td>116.77</td>
<td>17.20</td>
<td>9.56a</td>
</tr>
<tr>
<td>7</td>
<td>348.56a</td>
<td>33.30</td>
<td>19.02</td>
</tr>
<tr>
<td>8</td>
<td>164.04</td>
<td>23.63</td>
<td>10.67a</td>
</tr>
<tr>
<td>9L</td>
<td>145.77</td>
<td>18.76</td>
<td>10.53a</td>
</tr>
<tr>
<td>9R</td>
<td>106.55</td>
<td>17.31</td>
<td>9.19a</td>
</tr>
</tbody>
</table>

*Values with lower coefficients of variation.
LAD present in 81% of patients with ejection fraction < 35%

63% of enlarged nodes were pretracheal in location with a SAD of 1.3 cm

42% of patients with left heart failure showed LAD. 62% showed regression with treatment.

LAD group showed lower EF (34% vs 43%), larger R superior pul vein, more peribronchovascular thickening.

Chabbert *Eur Radiol* 14: 481-489, 2004
MEDIASTINAL LAD AND CHRONIC INFILTRATIVE LUNG DISEASE

- 67% with CILD had LAD
- UIP, IPF, CVD, BOOP, EAA

Niimi JCAT 20: 305-308, 1996
44.7% with PAH had LAD
Associated with pleural and pericardial effusions
? Due to increased lymphatic flow caused by right heart failure
PULMONARY ARTERY HYPERTENSION

- Dyspnea
- Fatigue
- Dizziness
- Chest pain
- Tachycardia
- Palpitations
- Syncope
- Lower extremity edema
- Cyanosis
INCIDENTAL PULMONARY EMBOLISM IN INPATIENTS

- PE in 5.7%
- 9.2% > 70 years
- 16.7% > 80 years
- Most are peripheral >30% missed initially

INCIDENTAL PULMONARY EMBOLI ON NON PE MDCT

- 4.0% inpatient prevalence
- 0.9% outpatient prevalence
- 70.0% with unsuspected emboli had cancer
- Wide window settings allow for better embolus detection

Shetty AJR 184: 264-2167, 2005
INCIDENTAL PULMONARY EMBOLISM

- PE in 3.4%
- 4% in inpatients
- 0.9% in outpatients

Storto AJR 62: 464-467, 2005
INCIDENTAL BREAST MASSES: CARCINOMA

- Irregular border
- High-density
- Spicules
- Calcifications
- Contrast enhancement
- Cutaneous thickening
- Nipple retraction
INCIDENTAL BREAST MASSES: METS

- Melanoma
- Lymphoma
- Lung cancer
- Carcinoid
- Primary site generally known
INCIDENTAL BREAST MASSES: METS

- After age 40 breast is no longer a favorite site of hematogenous mets because of fibrous tissue and diminishing blood supply
- Mets bilateral, multiple, superficial
- Round, well defined margins due to centripetal growth
- Not associated with spiculations, microcalcifications, and architectural distortion

THE THYROID NODULE PANDEMIC

- 4-8% adults by palpation
- 41% adults by ultrasound
- 50% adults at autopsy
- 25,690 new cases annually
- 1,460 annual mortality
INCIDENTAL THYROID LESIONS SEEN ON NECK CT AND MRI

- 16% incidence (6% prosp, 10% retrosp)
- Scintigraphy, sonography, TFT, FNA, lobectomy
- Mean cost of work up was $1,158

Yousem AJNR 18: 1423-1428, 1997
THYROID NODULES FOUND ON CAROTID DOPPLER

- 9.4% incidence of one or more thyroid nodules
- 7.7% ultimately had thyroidectomy

Steele Arch Surg 140: 981-985, 2005
EPIDEMIC OF NODULAR THYROID DISEASE

- Assume a cost of $1,500 for US-guided FNA and cytologic analysis
- Thyroid operations cost $20,000 each
INCIDENTAL THYROID NODULES ON NECK CT

- 3.9% prevalence of malignant nodules
- 7.4% prevalence of potentially malignant lesions
- Patients ≤ 35 y.o. have a significantly greater rate of malignancy
- CT underestimates the number of nodules relative to sonography

Shetty AJR 187: 1349-1356, 2006
INCIDENTAL THYROID NODULES ON NECK CT

- No distinguishing features on CT could confidently identify a lesion as malignant
- Features that warrant suspicion: punctate calcifications, larger size, younger patient

Shetty AJR 187: 1349-1356, 2006
PATIENT LIFE EXPECTANCY AND COMORBIDITIES

• Defer evaluation unless patient symptomatic or hyperthyroid
• For you who are about to die, we salute you
• Document the number and size of nodules
• Marked hypoechogenicity
• Intranodular vascularity
• Incomplete peripheral halo
• Irregular margin
• Central microcalcification
THYROID CANCER RISK EVALUATION

- History of radiation
- Personal or FH of endocrine neoplasms
- Male gender
- Hoarseness or dysphagia
- Adenopathy
- Thyroid function tests
NODULES < 8mm or 8-15 mm without worrisome features

- Risk factors
- Age
- Life expectancy and comorbidities
- Patient counseling to report any change
- Reevaluation with ultrasound in 6 months
In an asymptomatic patient with normal thyroid function, no history of radiation or other thyroid cancer risk factors, this lesion is statistically most likely benign.
NODULES 8-15 mm WITH
≥ 1 WORRISOME FEATURE

- Mural thickening
- Mural nodularity
- Calcification
- FNA with ultrasound guidance
NODULES > 15 mm

- FNA with ultrasound guidance