Differentiating Asthma from COPD: Role of History, Physical Examination, Laboratory Studies, and Lung Function Testing

Stephen P Peters, MD, PhD, FAAAAI
Professor of Medicine, Pediatrics and Translational Science
Associate Director, Center for Genomics and Personalized Medicine Research

Wake Forest University
School of Medicine
Objective: To review the role of History, Physical Examination, Laboratory Studies, and Lung Function Testing in distinguishing Asthma from COPD (Emphysema and Chronic Bronchitis)

Disclosure: Nothing to disclose for this topic
Program - Parts 2 and 3

- Dr. Bateman - Why Differentiating Asthma from COPD is Important

- Dr. Al Ameri - Case Studies in Asthma and COPD
We are all taught that the Medical History, Physical Examination, Laboratory Tests, and Specialized Tests are all important part of a medical evaluation.

True or False

Certain elements of the Medical History and/or Physical Examination are not only helpful but are ESSENTIAL for making the correct diagnosis of asthma versus COPD?
Key Elements of History

- Symptoms
  - Dyspnea, Dyspnea at Rest or on Exertion, Cough, Chest Tightness, Wheezing
  - Onset of Symptoms – Childhood vs Adult
  - Precipitating Events for Symptoms
- Associated Conditions – Rhinitis, Sinusitis, GERD, h/o Pneumonia, Bronchitis
- Exposures – Cigarettes, Environmental, Work
- Family History – Atopic Disorders, COPD, Cigarette-Related Illnesses
Certain elements of the Medical History and/or Physical Examination are not only *helpful* but are *ESSENTIAL* for making the correct diagnosis of asthma versus COPD?

**TRUE**

**Chronic Bronchitis - Clinical, Historical Diagnosis**

Cough productive of sputum

..... most days of the week

..... at least 3 months per year

..... for at least 2 years
Role of Physical Examination

- **Major** - Attempt to confirm presence of airway obstruction (airflow limitation)
  - Wheezing, Prolonged Expiration, Decreased Breath Sounds, Rhonchi

- **Minor** - Search for Ancillary Findings
  - Allergic Shiners, Nasal Crease
  - Clubbing, Cyanosis, Yellow Fingers, Cachexia
Discussion Question 2

- What other disorders are associated with airway obstruction?
Other Diseases Which Could Present with Airflow Limitation

- Bronchiectasis
- Cystic Fibrosis
- Tumors [Laryngeal, Tracheal]
- Tracheomalacia
- Endobronchial Diseases
  - Sarcoidosis
  - Amyloidosis
Discussion Question 3

- What is the major role of laboratory and radiologic testing in Asthma and COPD?

- What tests might be unusually informative?
What is the major role of laboratory and radiologic testing in Asthma and COPD?
- To rule out other disease entities
- To suggest atypical variants of these diseases

What tests might be unusually informative?
- CXR/CT Chest – R/O Interstitial Processes, Lower Lobe Emphysema [α-1-AT]
- Total IgE - Very high (>1000) [ABPA]
Discussion Question 3

- Can spirometry alone always differentiate Asthma from COPD?
Simplified Algorithm – PFT Interpretation

Diagnosing Airway Obstruction (Airflow Limitation)

Diagram:

1. **FEV₁/VC ≥ LLN**
   - Yes
   - VC ≥ LLN
   - **TLC ≥ LLN**
     - Yes
     - Obstruction
     - No
     - **Mixed defect**
   - No

No
Types of Ventilatory Defects and Their Diagnoses

Obstruction

- FEV1/VC <5th percentile of predicted
  - A decrease in flow at low lung volume is not specific for small airway disease in individual patients
  - A concomitant decrease in FEV1 and VC is most commonly caused by poor effort, but may rarely reflect airflow obstruction. Confirmation of airway obstruction requires measurement of lung volumes
  - Measurement of absolute lung volumes may assist in the diagnosis of emphysema, bronchial asthma and chronic bronchitis. It may also be useful in assessing lung hyperinflation
  - Measurements of airflow resistance may be helpful in patients who are unable to perform spirometric manoeuvres

Restriction

- TLC <5th percentile of predicted
  - A reduced VC does not prove a restrictive pulmonary defect. It may be suggestive of lung restriction when FEV1/VC is normal or increased
  - A low TLC from a single-breath test should not be seen as evidence of restriction

Mixed

- FEV1/VC and TLC <5th percentile of predicted

Distinguishing Asthma (Chronic Bronchitis) from Emphysema

### Severity of Spirometric Abnormality

<table>
<thead>
<tr>
<th>Degree of severity</th>
<th>FEV1 % pred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>&gt;70</td>
</tr>
<tr>
<td>Moderate</td>
<td>60–69</td>
</tr>
<tr>
<td>Moderately severe</td>
<td>50–59</td>
</tr>
<tr>
<td>Severe</td>
<td>35–49</td>
</tr>
<tr>
<td>Very severe</td>
<td>&lt;35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Components of Severity</th>
<th>Classification of Asthma Severity (youths ≥12 y of age and adults)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intermittent</td>
</tr>
<tr>
<td></td>
<td>Mild</td>
</tr>
<tr>
<td>Impairment</td>
<td></td>
</tr>
<tr>
<td>Normal FEV₁ / FVC:</td>
<td></td>
</tr>
<tr>
<td>8-19 y 85%</td>
<td>≤2 d/wk</td>
</tr>
<tr>
<td>20-39 y 80%</td>
<td>≤2x/mo</td>
</tr>
<tr>
<td>40-59 y 75%</td>
<td>≤2 d/wk</td>
</tr>
<tr>
<td>60-80 y 70%</td>
<td>None</td>
</tr>
<tr>
<td>Impairment</td>
<td></td>
</tr>
<tr>
<td>Nighttime awakenings</td>
<td>≤2x/mo</td>
</tr>
<tr>
<td>SABA use for symptom control (not prevention of EIB)</td>
<td>≤2 d/wk</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>None</td>
</tr>
<tr>
<td>Lung function</td>
<td></td>
</tr>
<tr>
<td>Normal FEV₁ between exacerbations</td>
<td>• FEV₁ &lt;80% predicted</td>
</tr>
<tr>
<td>FEV₁ &gt;80% predicted</td>
<td>• FEV₁/FVC normal</td>
</tr>
<tr>
<td>FEV₁/FVC normal</td>
<td></td>
</tr>
<tr>
<td>Risk</td>
<td>0-2/y</td>
</tr>
</tbody>
</table>

Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time for patients in any severity category.

Relative annual risk of exacerbations may be related to FEV₁.

<table>
<thead>
<tr>
<th>Stage</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severity</td>
<td>FEV₁/FVC &lt;0.70</td>
<td>FEV₁/FVC &lt;0.70</td>
<td>FEV₁/FVC &lt;0.70</td>
<td>FEV₁/FVC &lt;0.70</td>
</tr>
<tr>
<td></td>
<td>FEV₁ ≥80% predicted</td>
<td>50% ≤ FEV₁ &lt;80% predicted</td>
<td>30% ≤ FEV₁ &lt;50% predicted</td>
<td>FEV₁ &lt;30% predicted or FEV₁ &lt;50% predicted plus chronic respiratory failure</td>
</tr>
<tr>
<td>Typical symptoms</td>
<td>Chronic cough and sputum production</td>
<td>Stage I symptoms + dyspnea</td>
<td>Progressive dyspnea</td>
<td>Stage III symptoms + respiratory failure, right heart failure, weight loss, arterial hypoxemia</td>
</tr>
</tbody>
</table>

Flow Volume Curves

- Normal
- Moderate Airflow Limitation
Normal

Variable extra-thoracic upper airway obstruction.
Simplified Algorithm – PFT Interpretation

The severity of pulmonary function abnormalities is based on FEV1 % pred. This does not apply to upper airway obstruction. In addition, it might not be suitable for comparing different pulmonary diseases or conditions.

FEV1 may sometimes fail to properly identify the severity of a defect, especially at the very severe stages of the diseases.

FEV1 % pred correlates poorly with symptoms and may not, by itself, accurately predict clinical severity or prognosis for individual patients.

Lung hyperinflation and the presence of expiratory flow limitation during tidal breathing may be useful in categorising the severity of lung function impairment.