Respiratory System

Overview

As with cardiovascular system disease, respiratory system disease presents with the common symptoms of cough, shortness of breath, and chest pain. Once again, the clinician’s careful history often allows differentiation of the cause of the patient’s symptoms.

Respiratory system disease can result from obstruction, infection, and mechanical causes. Airway obstruction or bronchoconstriction in asthma can lead to shortness of breath. The obstructive character of a pulmonary embolus or a malignant lesion also causes shortness of breath. Viral, bacterial, parasitic, or fungal organisms can cause the cough of pneumonia. These different etiologies demonstrate varying degrees of fever, productive cough, and character of the sputum. The alveolar destruction in chronic obstructive pulmonary disease (COPD) causes the patient to be short of breath and results in a specific breathing pattern. Finally, the fluid in a pleural effusion can impair gas exchange and at times diaphragmatic excursion, also leading to shortness of breath.

Asthma

Presenting complaint

Can you actually obtain a history from the patient? If the patient cannot talk in sentences, you have identified a medical emergency and you must seek help. However, the most common presentations include episodic wheeze, shortness of breath, or a (nocturnal) cough.

History of present illness

If the patient presents with an acute attack, investigate this attack in detail. Obtain a systematic, chronological account of the recent deterioration, focusing on:
- Severity: try to quantify in simple terms (e.g., unable to perform vigorous exercise, difficulty climbing stairs, unable to speak a complete sentence, being kept awake at night).

Past medical history

Baseline asthma control

It is helpful to gain an awareness of the background control. In addition to allowing an assessment of disease severity, it may reveal information about the patient’s understanding of the disease. Ask about:
- Usual exercise tolerance. Try to quantify as described above. (Young patients should have unlimited exercise capacity. Older patients often have coexisting morbidity.)
- Frequency of attacks.
- Best recorded peak expiratory flow rate (PEFR). Ideally all asthma patients should have their own peak flow meter and know their baseline PEFR.

An acute asthma attack is often frightening for both the patient and the attending physician. The patient is often too dyspneic to provide much history. The priority is to make a rapid assessment and institute effective therapy. A more detailed history can be obtained once the patient is stable.
• Usual precipitating factors (e.g., pollen, stress, exercise, dust, pollution).
• Usual medication (see below).
• Usual response to therapy during exacerbations. For example, ask “Is this the worst attack you’ve ever had?” “Would you normally expect your asthma attacks to get better after using a nebulizer?”
• Previous hospital admissions. For example, ask “Have you ever been admitted to hospital with asthma?” “Have you ever needed to be put on a ventilator?”
• Symptoms suggestive of poor baseline control. This is very important and underrecognized (e.g., “morning dips,” poor sleep, nocturnal cough, time off work or school). An example of a peak flow chart from a child with poor control is illustrated in Fig. 5.1.

Other atopic conditions
Ask about other atopic conditions such as eczema, hay fever, urticaria.

Coexisting respiratory disease
Coexisting respiratory disease is particularly important in patients who present later in life, as it may be hard to distinguish asthma from chronic obstructive pulmonary disease (COPD) on the basis of the history.

Drug history
Obtain a full list of medication. Ask specifically:
• Does the patient have a nebulizer at home?
• Does the patient use bronchodilators?
• Does the patient take steroids, inhaled or oral?

Ask patients to demonstrate their inhaler technique. It is possible to quantify inhaler techniques as in Fig. 5.2. Find out whether pulmonary function tests have been performed to assess airway reversibility, and responses to different agents, especially for older patients for whom it may be difficult to define the relative components of asthma and COPD to the overall morbidity. Consider medication that may aggravate the symptoms (e.g., beta-blockers, aspirin).

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Social history
Review how the asthma is interfering with lifestyle for both older and young patients (e.g., school activities, absenteeism from work, limitation in sports, difficulty walking to the shops).

History of risk-taking behavior
Always specifically inquire about smoking. During an exacerbation, it is timely to offer sensitive advice about smoking! Ask whether anyone in the patient’s household is a smoker.

• Any hospital admissions in the last year for COPD.
• Has the patient been seeing his/her primary care physician with the problem.

Obtain a thorough history of baseline function, trying to be as objective as possible. For example, ask:
• “How far can you walk?”
• “Can you climb one flight of stairs easily?”
• “Do you get short of breath dressing?”

It is typical for a patient with COPD to have a pattern of chronically deteriorating exercise tolerance punctuated with acute declines during an infective exacerbation (Fig. 5.3). These may be seasonal, with an increased frequency in the winter months.

Sputum production and cough are characteristic. Try to quantify the usual amount per day and its characteristics (e.g., a teaspoonful, a cupful).

Fig. 5.3 Exercise tolerance in a patient with COPD.

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Review of systems
Focus on other diseases that may limit exercise tolerance, especially cardiovascular, respiratory pathology, and arthritis.

Remember that asthma is a potentially fatal disease. The morbidity and mortality rates are high but can be overcome by better supervision, objective assessment, better patient understanding and participation in his or her management, and appropriate use of steroids.

Chronic obstructive pulmonary disease

History of present illness
Obtain a detailed history of chest symptoms. In an acute exacerbation, patients usually present following a cold with a deterioration of dyspnea in association with a productive cough and discolored sputum. Outline a detailed history of the present attack following the usual systematic approach to explore:
• Time course.
• Treatment given and effects.
• Functional impact on lifestyle.

Chronic bronchitis is defined on the basis of the history of cough productive of sputum on most days for 3 consecutive months for at least 2 years. Emphysema is a pathological diagnosis of dilatation and destruction of the lungs distal to the terminal bronchioles. In practice, these conditions coexist.
Consider the possibility of cor pulmonale in a patient with severe disease who describes ankle swelling.

Ascertain aggravating factors (e.g., cold weather, pollution, exertion).

Many patients with COPD have a reversible component to their disease. This is underrecognized but can be uncovered by a formal trial of steroids.

Find out whether a satisfactory attempt has been made to establish the diagnosis:
• Have lung function tests been performed to assess airway reversibility?
• Have arterial blood gases been performed when the patient is well?

Blood gases for assessment of COPD should be taken 3 months after any acute illness.

Past medical history
These patients may have multiple medical problems, which should be recorded, but specifically ask about:
• Previous hospital admissions with acute exacerbations of COPD. Record the frequency, especially within the last year.
• Other smoking-related diseases (e.g., ischemic heart disease, peripheral vascular disease, strokes, hypertension).
• Other causes of lung disease (e.g., occupational exposure to dusts, bronchiectasis due to previous tuberculosis, childhood whooping cough).
• Asthma. There may be a reversible component to the disease.

Drug history
Review medication prescribed for COPD:
• Bronchodilators (inhalers and nebulizers).

• Home oxygen. Who initiated therapy and on what evidence? How many hours a day is it being used? Oxygen therapy should be used for 16 hours per day to prevent cor pulmonale. It is not for improving oxygen saturations per se.
• Steroids. Does the patient have a record of use?
• Review inhaler technique.

Social history
This is particularly important for these patients as they often have significant limitation of exercise tolerance and rely heavily upon support from family, friends, and state. Ask, for example, whether the patient is receiving any benefits. Consider all aspects of daily living.

History of risk-taking behavior
Obtain a detailed smoking history as this is undoubtedly a smoking-related disease in the vast majority of patients. Remember that the patient must not smoke if they are using home oxygen!

A detailed occupational history may be important if there is any doubt about the patient’s ability to continue working or the etiology of the lung disease. For example:
• Exposure to inorganic dusts (coalminer’s lung, silicosis, asbestosis).
• Occupational asthma (isocyanates, rosin fumes).
• Extrinsic allergic bronchiolar alveolitis (farmworkers, hypersensitivity pneumonitis).

Review of systems
Many patients with COPD have multiple pathologies related to their smoking, so a thorough review of their symptoms may raise suspicions of previously unrecognized conditions (e.g., ischemic heart disease, malignancy, renal disease, peripheral vascular disease).

Meticulous and realistic assessment of baseline function is essential. Without this, it is impossible to make difficult decisions about appropriate treatment and to set realistic goals of therapy.
Perform a detailed inquiry about presenting symptoms, adopting a methodical approach. Ask specifically about symptoms referable to the respiratory tract as follows:

- **Cough**: duration, whether productive or dry.
- **Sputum production**: quantity, color, recent changes if the patient has a productive cough.
- **Dyspnea**: obtain a quantitative account of exercise tolerance at baseline and during the current illness.
- **Wheeze**.
- **Pleuritic chest pain**: a common feature of pneumonia, but be aware of the possibility of a pulmonary embolus.
- **Fever**.

If symptoms are prolonged, recurrent, or associated with weight loss, consider the possibility of an underlying malignancy, especially in a smoker.

Ask about associated symptoms that have immediately preceded or coincided with the illness (especially gastrointestinal). These may give additional clues to the infecting organism causing pneumonia. Figure 5.4 illustrates how a detailed history may help to identify the microbiological cause of a pneumonic illness.

**Fig. 5.4** Clues to the underlying cause of pneumonia. Asterisks denote the more common organisms.

<table>
<thead>
<tr>
<th>Organism</th>
<th>Features from history</th>
</tr>
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<tbody>
<tr>
<td><em>Streptococcus pneumoniae</em></td>
<td>most frequent identifiable infecting organism in community-acquired pneumonia; associated with herpes labialis, commonly prominent fever and pleuritic pain; often abrupt onset in previously fit individual</td>
</tr>
<tr>
<td><em>Mycoplasma pneumoniae</em></td>
<td>occurs in epidemics with a 3-4-year periodicity; usually occurs in previously fit people, often young adults; may be preceded by a prodromal illness with headache and malaise; may be prominent extrapulmonary features (e.g., nausea, vomiting, myalgia, rash)</td>
</tr>
<tr>
<td><em>Hemophilus influenzae</em></td>
<td>most common bacterial pneumonia following influenza; associated with underlying lung disease (especially COPD)</td>
</tr>
<tr>
<td><em>Legionella pneumophila</em></td>
<td>associated with institutional outbreaks (e.g., hospitals, hotels); may be associated with mental confusion or gastrointestinal symptoms; typically causes a dry cough</td>
</tr>
<tr>
<td><em>Coxiella burnetii</em></td>
<td>contact with farm animals</td>
</tr>
<tr>
<td><em>Chlamydia psittaci</em></td>
<td>contact with infected birds (“Do you have a sick parrot?”)</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>associated with preceding influenza, intravenous drug abusers, patient is often very ill</td>
</tr>
<tr>
<td>Gram-negative organisms</td>
<td>hospitalized patients; may be community-acquired in elderly or diabetics; <em>Branhamella catarrhalis</em> is associated with exacerbations of COPD</td>
</tr>
<tr>
<td><em>Pneumocystis carinii</em>, cytomegalovirus, <em>Nocardia asteroides</em>, <em>Mycobacterium avium intracellulare</em></td>
<td>acquired immunodeficiency syndrome (AIDS); transplant recipients; chemotherapy</td>
</tr>
<tr>
<td><em>Mycobacterium tuberculosis</em></td>
<td>weight loss, chronic cough, foreign travel, infected family member</td>
</tr>
</tbody>
</table>
**Drug history**
Ask specifically about antibiotics used to treat this and any recent episode and the duration of use as the response to therapy may give a clue to the infecting agent as well as the likelihood of obtaining a positive blood culture. For example:
- Resistance of *Mycoplasma* to penicillin.
- Resistance of tuberculosis or *Pneumocystis* to repeated courses of antibiotics.

Find out if the patient is taking immuno-suppressive medication (e.g., those taking steroids, transplant recipients) (Fig. 5.4).

**Social history**
Relevant clues may be provided by a travel history and details of hobbies (e.g., involving pets) and occupation. Clearly it is important to assess the functional impact of the disease on patients and their families so that appropriate therapeutic and management decisions can be made.

**History of risk-taking behavior**
- Risk factors for HIV infection.
- Smokers are more likely to decompensate earlier in the course of the illness.