Symptoms and signs

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Abstract

The aim of history and examination is to facilitate clinical diagnosis.

Using the hypothetico-deductive method of diagnosis based upon Bayes' theorem, a detailed history and competent examination skills are essential for accurate diagnosis.

The key symptoms of respiratory disease are breathlessness, chest pain, wheeze, cough and associated sputum production. However, non-respiratory conditions may produce such symptoms. Furthermore, the lungs can also produce non-respiratory symptoms (e.g. paraneoplastic syndromes).

A systematic approach to history-taking should include all primary symptoms, with their time-course, characteristics and severity. A review of non-respiratory associations, drug exposure and historical aspects of respiratory symptoms is followed by a thorough examination. Further clarification of clinical features, and assimilation of information allows formulation of a differential diagnosis.

On examination, there are a few classical patterns of the most important focal abnormalities, yet there may be an absence of clinical signs.

Keywords Bayes' theorem; breathlessness; chest pain; cough; haemoptysis; respiratory signs; respiratory symptoms; sputum expectoration; stridor; wheeze

Introduction

The aim of history and examination is an accurate clinical diagnosis. Of the methods in use, the hypothetico-deductive method based upon Bayes' theorem is favoured.[1] This method considers diagnostic hypotheses and evaluates clinical data based upon history, examination and tests. These strengthen the hypothesis, at the expense of more implausible ones, or lead to new hypotheses. Sequential revision leads to a likelihood of diagnosis that is either strong enough to act upon or weak enough to abandon consideration of the disease. Hence the importance of eliciting symptoms and signs effectively.[2]

Symptoms

The main symptoms of respiratory disorders are breathlessness, chest pain, wheeze and cough, which may be productive. Non-respiratory conditions may produce such symptoms (e.g. cardiac causes of cough, breathlessness due to anaemia or metabolic acidosis). Lung disorders may also produce non-respiratory symptoms, such as the paraneoplastic symptoms of lung malignancy. To determine the origin and significance of symptoms, an understanding of their anatomical and mechanistic basis is important.[3]

Further history considers pulmonary risk factors, and associations of the primary symptoms, which are crucial to the synthesis of a differential diagnosis. The history should include childhood illness (e.g. whooping cough), immunizations (BCG), occupation, environmental factors, travel (e.g. tropical diseases), medication (pneumotoxic, including recreational drugs), smoking, nasal symptoms (e.g. post-nasal drip), rheumatological or connective tissue conditions, dermatological conditions (e.g. allergic eczema), sleep-disordered breathing (e.g. daytime hypersomnolence, snoring), HIV risk factors, family history (atopy) and social history.

Breathlessness

Breathlessness (dyspnoea) is the perception of inadequate air movement by the lungs. The experience derives from interactions among multiple physiological, psychological, social and environmental factors, and may induce secondary physiological and behavioural responses.[4]

Patients describe difficult, painful, laboured or inadequate breathing and use terms such as 'air hunger', chest tightness, choking, and suffocation. Breathlessness can be a frightening experience.[5]

Breathlessness may vary with time, position and exertion.[6] Exercise tolerance should be documented in terms of everyday achievable tasks, distance or number of stairs.

Mechanisms of breathlessness

Although poorly understood, two key elements are:

- A central drive to breathe, which involves sensory input from chemosensors, mechanoreceptors and higher cerebral cortical modulation.
- The 'sense of respiratory effort' (i.e. work of breathing) associated with ventilation. Efferent motor signals to respiratory muscles are accompanied by messages to the cortex, governing conscious modulation. A discrepancy between the urge to breathe and the sense of respiratory effort is perceived as breathlessness.

Breathlessness may result from obstruction, restriction, or respiratory muscle weakness. It may also occur when the sensory effort for ventilation is greater than the need for gas exchange, as in hyperventilation.[4]

Characteristics of breathlessness

Speed of onset: sudden dyspnoea without an obvious cause suggests pulmonary embolism (PE) or pneumothorax. Acute asthma may have associated wheeze. Progressive breathlessness with fever, cough and purulent sputum is more in keeping with pneumonia (Table 1).

Duration: suggests the rate of disease progression, for which exercise tolerance is a good descriptor.

Timing: recurrent early morning waking, associated with wheeze or cough is typical of asthma.

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Causes of breathlessness classified by speed of onset

Instantaneous
- Pulmonary embolism
- Pneumothorax

Acute (minutes to hours)
- Airways disease (e.g. asthma)
- Pulmonary embolism
- Parenchymal disease (e.g. pneumonia)
- Heart disease (e.g. LVF, MI)
- Hyperventilation syndrome
- Metabolic acidosis

Gradual (days)

Many of the above and
- Lobar collapse (e.g. lung cancer)
- Pleural effusion
- SVC obstruction

Chronic (months to years)

Some of the above and
- COPD
- Diffuse parenchymal disease (e.g. UIP)
- Bronchiectasis
- PVD (e.g. chronic thromboembolism, PHT)
- Hypoventilation (e.g. chest wall deformity)
- General (e.g. anaemia, thyrotoxicosis)

COPD, chronic obstructive pulmonary disease; LVF, left ventricular failure; MI, myocardial infarction; PHT, pulmonary hypertension; PVD, pulmonary vascular disease; SVC, superior vena cava; UIP, usual interstitial pneumonitis.

Table 1

Position: orthopnoea (breathlessness when supine) can indicate severe chronic lung disease, left ventricular failure (LVF) or, rarely, bilateral diaphragmatic paralysis.

Severity: breathlessness is effort dependent. Dyspnoea can be quantified, using validated breathlessness scales (e.g. Borg Scale), questionnaires (e.g. St George's Respiratory Questionnaire) and exercise tests (e.g. 6 minute walk, shuttle walk).[7–9]

Chest pain

Chest pain may arise from a number of structures in the thorax. It may lead to hypoventilation, atelectasis or retention of secretions, and is often associated with breathlessness. Pleuritic pain occurs with the respiratory cycle, exacerbated by deep inspiration, coughing, and movement (Table 2). Cardiac and oesophageal causes should also be considered, particularly as acute chest pain is synonymous with myocardial injury.[10]

Mechanisms of chest pain

Pain arises from the musculoskeletal system, parietal (not visceral) pleura, major airways, diaphragm and mediastinum, but not the lung parenchyma. The phrenic nerve (C3, 4, 5) innervates the central diaphragm, with pain being referred to the ipsilateral shoulder.

Localized constant chest pain (with or without tenderness) occurs with rib fractures, pleural infection (e.g. empyema), chest wall malignancy, costochondritis, benign asbestos pleural disease, or connective tissue diseases (e.g. systemic lupus erythematosus, SLE). 'Boring' constant pain is characteristic of malignant infiltration (e.g. mesothelioma, lung cancer).

Chest wall pain may arise from musculoskeletal (e.g. spinal osteoarthritis, costochondritis), rheumatic (e.g. rheumatoid arthritis, ankylosing spondylitis), non-rheumatic (e.g. sickle cell crisis), skin or sensory nerve pathology.[11] Chest wall pain is associated with local tenderness and exacerbated by movement. Neuropathic pains include herpes zoster infection (shingles). Visceral pain occurs in many cardiovascular, gastrointestinal (e.g. oesophagitis) and psychological (e.g. hyperventilation syndrome) disorders. Tracheobronchitis is described as a raw substernal discomfort, exacerbated by breathing. Pericardial pain is often relieved on sitting forward, whilst myocardial pain is classically 'crushing' central pain, with other associated symptoms.

Causes of pleuritic chest pain

- Pulmonary embolism/infarction
- Viral pleurisy
- Pneumothorax
- Pericarditis
- Collagen vascular disease (i.e. systemic lupus erythematosus, mixed connective tissue disease)
- Rheumatic diseases
- Inflammatory bowel disease
- Familial Mediterranean fever
- Radiation pneumonitis

Table 2

Cough

Cough can be classified by its duration; acute (<3 weeks), subacute (3–8 weeks) or chronic (>8 weeks).[12] Compared with men, women are more likely to present with chronic cough and some evidence of a heightened cough reflex sensitivity.

Mechanism

Cough occurs through a reflex arc initiated by chemico- and mechano-cough receptors in the respiratory epithelium, pericardium, oesophagus, diaphragm, and stomach. Diminished cough, due to central depression, pain, muscle weakness, laryngeal or respiratory disease, can result in retained secretions, infection and their consequences (i.e. bronchiectasis if recurrent).

Characteristics of cough

Acute cough is usually due to an acute respiratory tract infection. Other causes are acute exacerbations of asthma and chronic pulmonary disease, pneumonia, pulmonary embolism, and gastro-oesophageal reflux.

Subacute cough is frequently post-infectious, often persisting after other infective symptoms, but usually resolving spontaneously.

Up to 90% of cases of chronic cough in non-smokers without other respiratory conditions is caused by upper airway cough