



The assessment of dyspnoea

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Dyspnoea, a cortical perception of abnormal work of breathing, is non-specific and its severity in any patient may not correlate well with other markers of disease severity such as cardiac output or arterial oxygen tension. Although dyspnoea is generally associated with respiratory and cardiac causes, it may also arise from anxiety, hyperventilation, respiratory and other muscle weakness, anaemia and metabolic causes (e.g. diabetic ketoacidosis). The history and examination offers clues to aetiology but further investigation is often needed to clarify the diagnosis and severity.

Part of the difficulty is that many conditions that cause dyspnoea can co-exist and interact. Respiratory disease can exacerbate cardiac disease and vice versa, diabetes is often linked with cardiac disease, and hyperventilation syndrome can often be associated with pulmonary vascular disease (PVD) or asthma.

Working from the history

Exertional dyspnoea, and the level of exertion required to manifest dyspnoea, are important clues to an organic cause. Exertional dyspnoea that worsens after stopping exercise (before improving later) may indicate exercise-induced asthma. In contrast, dyspnoea not exacerbated by exercise at all is more suggestive of anxiety and hyperventilation, which is often accompanied by feelings of air hunger and the need to yawn and sigh frequently.

Orthopnoea, and to a lesser extent paroxysmal nocturnal dyspnoea, are more suggestive of left heart disease than lung disease, especially early in its natural history. Prominent fatigue and lethargy, although non-specific, are more common in conditions in which there is left or right heart dysfunction (including PVD) and/or in patients with obstructive sleep apnoea.

Cough, with or without sputum and wheeze, are more common with respiratory conditions.

Physical examination

Normal examination may not reliably exclude significant cardiac, respiratory or pulmonary vascular disease, particularly where there is a fluctuating course. However, it is important to look for key physical signs:

- JVP, dependent oedema, tender hepatomegaly, crackles – suggesting cardiac impairment.
- Wheeze (may only be present with forced expiration), fine inspiratory crackles, clubbing, hyperinflation (tracheal tug and shortening, ptosed liver, increased AP diameter of chest) – suggesting respiratory causes.
- Sighing and yawning – suggesting hyperventilation

Investigations

A myriad of investigations assist when diagnosis and severity is in doubt, provided each is performed and interpreted correctly (see Table). An ECG and spirometry with measurement of bronchodilator response are easy to do and applicable in almost all patients. Knowing when to request more complex investigations is important.

Echocardiography. This assesses left and right ventricular function, valvular and other

structural abnormalities, and pulmonary arterial systolic pressures.

Full lung function tests help assess the type, pattern and severity of respiratory disease. For example, low lung volumes and reduced transfer factor are characteristics of interstitial lung disease (ILD) or PVD. High corrected transfer factor is typical of chest wall disease. Bronchial provocation testing (e.g. Aridol testing) can help diagnose asthma including the cough variant and exercise-induced asthma.

Exercise tests. Not only do these help quantify the degree of exercise limitation, combined cardiopulmonary exercise testing helps differentiate poor conditioning from dyspnoea due to cardiac, respiratory and/or pulmonary vascular causes. The 6-minute walk test, combined with oximetry, is a simple reproducible measure that quantifies the degree of exercise limitation and severity of disease. Exercise testing combined with echocardiography (+/-biomarkers) increases the diagnostic yield.

Imaging. Chest x-ray (CXR) can diagnose major abnormalities but its low sensitivity has led to increased use of CT scanning such as HRCT, helical CT, CTPA, coronary artery CT, etc. Nuclear imaging (e.g. VQ scanning, SPECT, cardiac nuclear imaging) may be particularly helpful in patients with musculoskeletal problems who cannot easily exercise. Cardiac MRI is a radiation-free but potentially expensive way of characterising cardiac and major vessel abnormalities.

When to seek assistance

Specialist guidance on the best type of imaging for a particular patient may optimise the diagnostic yield and limit radiation exposure.

Diagnostic dilemmas or co-morbidities throw up added challenges that may benefit from assessment at a multidisciplinary dyspnoea clinic. Contributing health professionals can include respiratory physician, cardiologist, lab technician, clinical/research nurse, exercise physiologist, physiotherapist, dietitian and clinical psychologist.

In this setting, improved diagnostic accuracy helps ensure that the right pharmacological and non-pharmacological treatments are applied, some of which may benefit from specialised know-how (e.g. breathing retraining, fitness conditioning, weight loss).

Key Points on Dyspnoea

- Dyspnoea is a cortical perception of abnormal work of breathing.
- Detailed history and examination are paramount in identifying a likely cause.
- Testing in dyspnoea is particularly helpful when diagnosis is in doubt or when more than one disease may be contributing. CXR and ECG have low sensitivity for detecting disease. Exercise testing can quantify the degree and cause of exercise-induced dyspnoea.

Some investigations for dyspnoea.

General

Arterial blood gas analysis; 6-minute walk test with oximetry. Haemoglobin or Hb.

Respiratory

Full lung function; bronchial provocation; cardiopulmonary exercise testing.

Cardiac

ECG; echocardiography +/- stress; cardiac stress test; cardiac catheterisation

Imaging

Radiology - CXR, HRCT, helical CT, CTPA, coronary CT.

Cardiac MRI; VQ scanning; Cardiac nuclear imaging; SPECT



■ Someone undergoing an exercise dyspnoea test, with combined exercise tolerance, respiratory and cardiovascular monitoring.