CHAPTER

18

Practical Approach to Breathlessness

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ABSTRACT

Breathlessness is one of the most common presenting symptoms encountered by clinicians. The causes of breathlessness can range from cardiac, pulmonary, anaemia, hysterical/psychogenic, infectious, traumatic, neuromuscular, haematological conditions among others. Dyspnoea has to be measured to assess it adequately. Instruments pertaining to dyspnoea measurement are classified as pertaining to domains of sensory–perceptual experience, affective distress, or symptom/disease impact or burden. Patients presenting with acute dyspnoea should be immediately evaluated and triaging should be done for signs of clinical instability. While evaluating a patient with dyspnoea, the following should be meticulously recorded: onset, duration, pattern, progression, severity, diurnal variation, relation to exercise, exertion, aggravating and relieving factors. A detailed history, thorough clinical examination, judicious use of laboratory investigations including imaging is essential for rational, scientific evaluation and management of patients presenting with dyspnoea.

INTRODUCTION

Dyspnoea is one of the most common presenting symptoms encountered by clinicians.[1,2] The causes of dyspnoea can be several and range from cardiac, pulmonary, anemia, obesity, hysterical/psychogenic, physical deconditioning, among others. As these causes are varied, it is essential to differentiate life-threatening causes causes from benign, self-limiting conditions.

EPIDEMIOLOGY

Dyspnoea has been reported in 50% of patients admitted to acute, tertiary care hospitals[3] and in 25% of patients in ambulatory settings.[4,5] Data from population-based studies have shown that the prevalence of mild to moderate dyspnoea ranged from 9%-13% in adults.[6-8] This figure ranged from 15%-18% in adults aged 40 years or older; and 25%-27% in persons aged 70 years or more.[7,9,10]

PATHOPHYSIOLOGICAL CORRELATES

A given disease/condition may result in dyspnoea by one or more mechanisms. The respiratory motor system is unique in having both automatic (brainstem) and voluntary (cortical) sources of motor command. Respiratory sensations are thought to be the consequence of interactions between the efferent motor output from the brain to the muscles of ventilation (feed-forward) and the afferent sensory input from chemoreceptors, mechanoreceptors and metaboreceptors (feedback) as well as the integrative processing of this information that is postulated to be occurring in the brain. This incongruity may be the consequence of increased metabolic demand, increased dead-space volume, decreased compliance or from other disorders.[11,12] In addition to the traditionally defined sensory afferents like chest wall receptors, pulmonary vagal receptors, chemoreceptors, among others, information on the state of respiration available from respiratory motor areas of the brain which send an ascending copy of their descending motor activity to perceptual areas (corollary discharge). The corollary discharge from these different sources is thought to give rise to different sensations.

DEFINITION

Several definitions for describing dyspnea have been postulated including "uncomfortable sensation of breathing",[13] "difficult, laboured, uncomfortable breathing",[14] "sensation of feeling breathless or experiencing air hunger".[15] The American Thoracic society (ATS) defined dyspnoea[11,12] as "subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity. The experience derives from interactions among multiple physiological, psychological, social, and environmental factors and may induce secondary physiological and behavioral responses." The ATS statement[11,12] also reiterates that dyspnoea per se can only be perceived by the person experiencing it. Therefore, adequate assessment of dyspnoea depends on self-report . Further, it is important to distinguish dyspnoea from the signs of increased work of breathing.

MEASUREMENT OF DYSPNOEA

Dyspnoea has to be measured to assess it adequately. Instruments pertaining to dyspnoea measurement are classified as pertaining to domains of sensory–perceptual experience (e.g., visual analogue scale, Borg scale), affective distress (single- / multi-item ratings), or symptom/disease impact or burden [unidimensional rating of disability or activity limitation like Medical Research Council (MRC) scale, multidimensional scales of quality of life/health status].[11,12]

DIAGNOSTIC APPROACH

Dyspnoea is a usual symptom related to disturbances in cardiovascular and respiratory systems; other potential causes that can cause dyspnoea include metabolic, infectious, traumatic, neuromuscular, haematological and other conditions (Table 1). Patients describe dyspnoea in

Table 1: Some of the common causes of acute onset dyspnoea in adults
Cardiac
Heart failure with reduced ejection fraction
Coronary artery disease, acute coronary syndromes
Arrhythmias
Pericarditis
Valvular heart disease
Respiratory
Chronic obstructive pulmonary disease
Bronchial asthma
Pneumonia, other respiratory infections (e.g., SARS)
Acute respiratory distress syndrome
Pneumothorax
Pulmonary embolism
Pleural effusion
Lung cancer, metastatic lung disease
Pulmonary oedema
Gastro-oesophageal reflux disease with aspiration
Restrictive lung disease
Interstitial lung disease (e.g., acute interstitial pneumonitis)
Upper airway obstruction
Epiglottitis
Foreign body
Croup
Central
Neuromuscular disease
Pain
Others
Anaphylactic reaction
Laryngeal spasm, laryngeal tumours
Anaemia
Metabolic acidosis
Drugs (e.g., aspirin overdosage)

SARS = severe acute respiratory sndrome

their own phrases and a focussed diagnostic approach is necessary for a clinician for ascertaining diagnosis and providing treatment.

Immediate evaluatoin

Patients presenting with acute dyspnoea should be immediately evaluated and triaging should be done for signs of clinical instability, such as: (i) suspected upper airway obstruction (e.g., stridor); (ii) tachypnoea (> 24 breaths/minute) or apnoea; (iii) gasping or breathing effort without movement of air; (iv) chest retractions or use of accessory muscles of respiration; (v) presence of hypotension; (vi) presence of hypoxaemia; (vii) unilateral or absent breath sounds; and (viii) altered consciousness.

Table 2: Causes of paroxysmal nocturnal dyspnoea
Left heart failure
Nocturnal episodes of asthma
Nocturnal episodes of recurrent minute pulmonary emboli
Postnasal discharge with attendant severe cough
Sleep apnea with arousal
Nocturnal angina with dyspnoea (angina equivalent)
Nocturnal aspiration in gastro-oesophageal reflux disease

History

While evaluating a patient with dyspnoea, the following should be meticulously recorded: onset, duration, pattern, progression, severity, diurnal variation, relation to exercise, exertion, aggravating and relieving factors. The terminology used by the patient can sometimes give a clue to the cause of dyspnoea: chest tightness or constricted breathing (bronchial asthma); smothering or suffocating sensation (heart failure, acute coronary syndromes); need to sigh (heart failure).

Onset

In adult patients presenting with sudden onset dyspnoea (Table 1), acute pulmonary thromboembolism, acute coronary syndrome or spontaneous pneumothorax, acute respiratory distress syndrome (ARDS), foreign body aspiration, psychogenic causes should be high in the list of differential diagnosis.

Duration

Common causes of dyspnoea that is slowly progressing over hours or days include bronchial asthma, chronic obstructive pulmonary disease (COPD), pleural effusion, pneumonia, congestive heart failure, small pulmonary emboli, interstitial lung disease or malignancy; psychogenic acuses; and cardiac diseases like coronary artery disease, congestive heart failure.[16]

Pattern

Prolonged bed rest prior to acute onset dyspnoea may indicate acute pulmonary embolism. Orthopnoea (dysnoea in supine position, relieved on assuming upright position) is classically seen in left heart failure but can also occur in COPD, bilateral diaphragmatic palsy, asthma triggered by gastric reflux, among others. Paroxysmal nocturnal dyspnea (PND) is not always diagnostic of left heart failure as nocturnal episodes of dyspnoea occur in variety of conditions (Table 2). Dyspnoea and deoxygenation upon assuming upright position is termed platypnoea-orthodeoxia and is seen in right-to-left shunting of blood (e.g., large patent foramen of ovale, hepatopulmonary syndrome). Dyspnoea in upright position, relieved in supine position is called platypnoea and it seen in left atrial myxoma or hepatopulmonary syndrome. Trepopnoea is dyspnoea in lateral decubitus position and is seen in unilateral pleural effusion.

Table 3: Differential diagnosis for some common presenting symptoms

Symptom	Differential Diagnosis
Wheeze	COPD/emphysema, asthma, allergic reaction, CHF (cardiac wheeze)
Pleuritic chest pain	Pneumonia, pulmonary embolism, pneumothorax, COPD, asthma
Fever	Pneumonia, bronchitis, TB, malignancy
Cough	Pneumonia, asthma, COPD/ emphysema
Haemoptysis	Pneumonia, TB, pulmonary embolism, malignancy
Oedema	Acute heart failure, pulmonary embolism (unilateral)
Pulmonary oedema	Acute and chronic heart failure, end-stage renal and liver diseases, ARDS
Tachypnoea	Pulmonary embolism, acidosis (including aspirin toxicity), anxiety

COPD= chronic obstructive pulmonary disease; CHF= congestive heart failure; TB = tuberculosis; ARDS = acute respiratory distress syndrome.

Table 4: Some of the common causes of chronic dyspnoea

Respiratory
Bronchial asthma
Chronic obstructive pulmonary disease
Interstitial lung disease
Chronic pulmonary thromboembolism
Pulmonary hypertension
Occupational lung disease
Cardiovascular
Coronary artery disease
Congestive heart failure
Valvular heart disease
Haematological
Anaemia
Others
Psychogenic conditions
Gastro-oesophageal reflux disease
Neuromuscular
Thyroid disease

Variations

Intermittent episodes of dyspnoea may be seen with bronchial asthma, heart failure, pleural effusion, recurrent pulmonary embolism, gastro-oesophageal reflux disease; aspiration. In addition to ardivascular diseases, exercise-induced dyspnoea is seen in exercise-induced asthma as well. Seasonal or diurnal dyspnoea is seen in bronchial asthma. Aggravation of dyspnoea during winter months may occur with COPD.

Other associated symptoms

Dyspnoea presenting with other associated symptoms may help in localizing the system involved and understanding the nature of disease. Dyspnoea associated with central chest pain, points to aortic dissection, pulmonary embolism or acute coronary syndrome. If the pain is sharp and aggrevated by cough or deep breathing it could be due to pleural irritation. Fever indicates an infectious cause. If anxiety precedes dyspnoea it could be a panic attack or pychogenic dyspnea. When dyspnoea is associated with cough, haemoptysis, pedal oedema, or wheeze most probable aetiological causes are shown in Table 3. Some of the common causes of chronic dyspnoea are shown in Table 4.[1,11,12]

Physical examination

A thorough physical examination helps the clinician to assess the severity, diagnose the cause and in prompt management of the patient. While a detailed account of physical examination findings and their clues to the origin of dyspnoea is beyond the scope of this chapter, some of the commonly encountered physical examination clues are described below.

Whether the patient is able to complete full sentences while talking is carefully observed. In acute severe asthma, patients cannot complete full sentences while talking. Use of accessory muscles of respirations, paradoxical breathing or sitting in tripod position, signs of pallor, cyanosis, clubbing and pedal oedema are looked for. Haemodynamic stability of the patient is checked by assessing the vital signs. Further, whether the patient is able to maintain saturation on room air is assessed using pulse oximetry. On measuring blood pressure pulsus paradoxus should be watched for as its presence points to pericardial disease, restrictive heart disease. On respiratory system examination, the symmetry of chest wall movements with respiration is observed. Percussion (e.g., dull note in pleural effusion, hyperresonant in tension pneumothorax) and auscultation (wheeze, crepitations, decreased or hyperreasonant sounds, bronchial breath sounds) give valuable clue to the aetiological diagnosis. On cardiovascular system examination signs of heart failure should be looked for. Elevated jugular venous pressure (JVP), peripheral oedema, S3 gallop rhythm, presence of murmurs are valuable clues to the aetiological cause. indicate that patient is in fluid over load secondary to heart failure. Paradoxical inward movement of abdominal muscles indicate weakness of diaphragm.

Laboratory testing

Electrocardiogram should be obtained immediately if history and physical examination are in favour of heart failure, acute coronary syndrome, cardiac arrhythmias, pulmonary embolism or pulmonary hypertension.

Chest imaging consisting of chest radiograph,

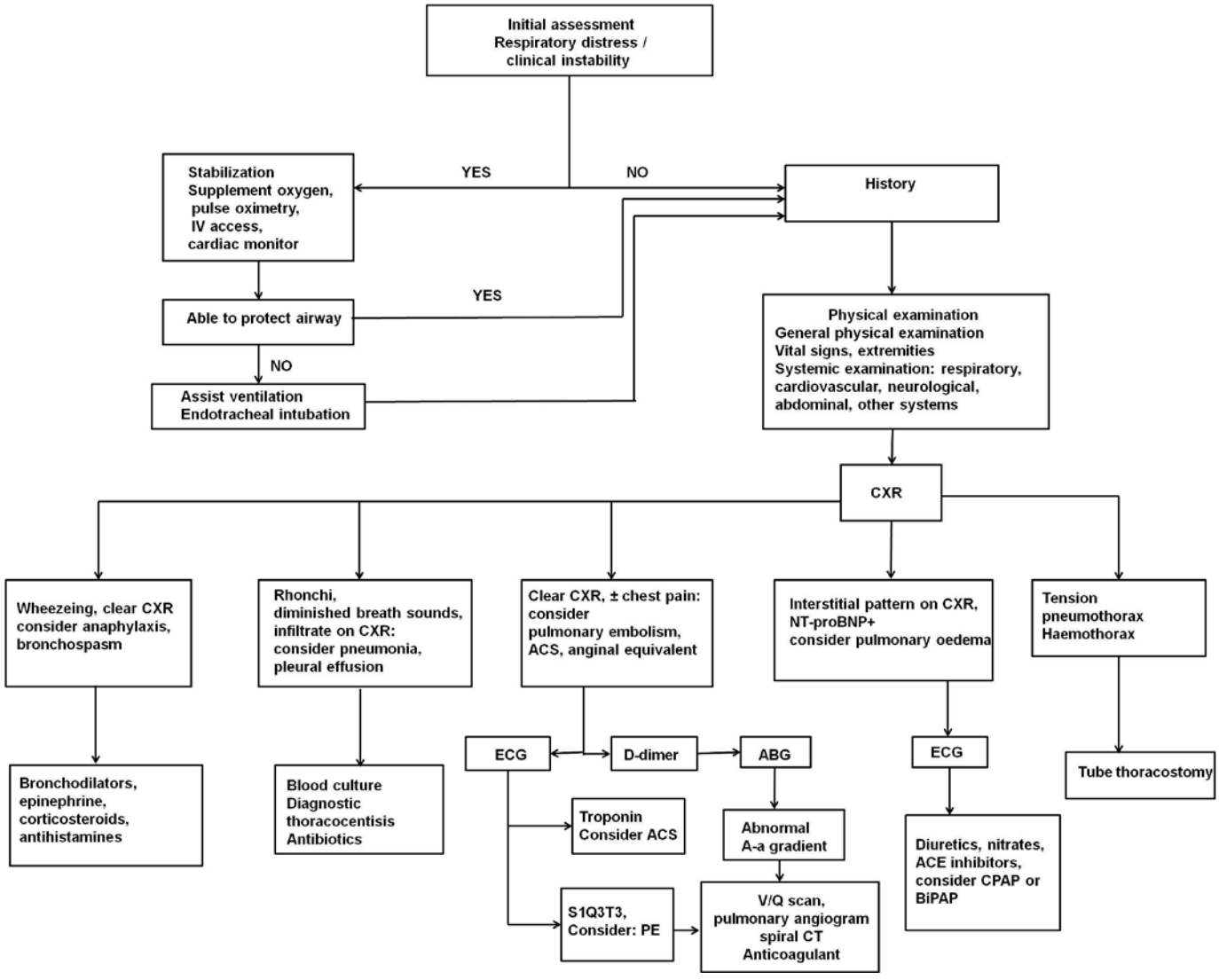

Fig. 1: Algorithm for evaluating an adult patient presenting with acute dyspnoea. CXR = chest X-ray; NT-proBNP = N-terminal pro-brain natriuretic peptide; ACS = acute coronary syndrome; ECG = electrocardiogram; ABG = arterial blood gas; A-a = alveolar-arterial; CT = computed tomography; PE = pulmonary embolism; RR = respiratory rate; V/Q = ventilation-perfusion ratio; ACE = angiotensin-converting enzyme; BiPAP = biphasic positive airway pressure; CPAP = continuous positive airway pressure. Adapted from reference 19

computed tomography of the chest, and bedside thoracic ultrasonography are helpful in diagnosing pleural effusions, pulmonary oedema, pneumothorax or consolidation. Thoracic ultrasonography is emerging as a point-of-care diagnostic test recently. It has been reported that lung ultrasonography improves diagnostic accuracy of acute dyspnoea when performed within 1 hour of admittance to emergency room (ER).[17] Further, it has also been observed that combination of lung ultrasonography with or without testing for N-terminal pro-brain natriuretic peptide (NT-proBNP) has high diagnostic accuracy for differentiating acute dyspnoea due to heart failure from COPD/bronchial asthma-related acute dyspnoea in prehospital/ER setting.[18]

Complete haemogram (anaemia) renal functions and serum electrolytes help in identifying kidney disease. Arterial blood gas (ABG) analysis will help in knowing the type of respiratory failure and also gives information about the acid-base state of the patient. Other laboratory tests that are useful include cardiac biomarkers like troponin, D-dimer, N-terminal pro-brain natriuretic peptide (NT-proBNP), exercise testing, pulmonary function testing including spirometry, reversibility testing, diffusion capacity of lung for carbon monoxide, among others are useful in appropriate situations. The diagnostic approach to an adult patient presenting with acute dyspnoea is shown in Figure 1.[19]

TREATMENT

Depending the initial aetiological clues, further diagnostic work-up is planned and the patient is administered appropriate specific treatment accordingly.

CONCLUSIONS

A detailed history, thorough clinical examination, appropriate "triage", judicious use of laboratory investigations including imaging is essential for rational, scientific evaluation and management of patients presenting with dysponea.

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