

The importance of coughs

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'Cough' is so common we sometimes do not realise just how important it can be. It is at best annoying to patients (and families) especially if nocturnal and, at worst, very distressing particularly if associated with dyspnoea, copious sputum and/or pain. It may be associated with many serious diseases including lung cancer and tuberculosis.

The cough mechanism is set off by the stimulation of irritant receptors, which occur in the nose and sinuses, around the vocal cords, carina and the larger airways, and also the eardrums, diaphragm, pericardium and stomach. These receptors have afferent nerves via the Vth, IXth and Xth cranial nerves to the brain. The efferent side of these reflexes leads to:

- a. inspiration,
- b. glottic closure,
- c. diaphragmatic relaxation,
- d. intercostal and abdominal muscle tension,
- e. rise of intrathoracic pressure up to 200mm Hg,
- f. glottic opening and
- g. invagination of the tracheobronchial membrane
- h. so narrowing the airway with
- i. rapid expulsion of air i.e. a cough
- j. carrying mucus with it.

In the light of this mechanism it is clear why so many conditions may be associated with a cough and how the cough mechanism, which is itself often protective to the airway, may be impaired. For example pain following abdominal surgery may reduce abdominal muscle tension, the force of a cough and so reduce mucus clearance predisposing to pulmonary infection.

Causes

There is an important rule to observe when considering the cause of a cough: if the cough has been present for three weeks or more always investigate for pulmonary tuberculosis. The differential diagnosis may be reviewed from knowledge of the cough receptor sites:

1. Upper respiratory tract:

- a. Viral infections are the commonest cause of cough which may last up to two months.
- b. Sinusitis.

- c. Allergic rhinitis
- d. Laryngeal lesions including inhalation of irritants.
- e. Wax or any foreign body against the tympanic membrane.

2. Pulmonary structures:

- a. Bronchial asthma.
- b. Inflammation: bronchitis, pneumonia, pertussis (whooping cough), bronchiectasis, smoke irritation, migrating larval stages of parasites (e.g. hookworm), malaria. Tuberculosis.
- c. Foreign bodies and tumours.
- d. Any cause of increased secretions.
- e. Heart failure with pulmonary oedema, pulmonary emboli and secondary tumours.
- f. Cystic fibrosis.
- g. Sarcoidosis.
- h. Any other cause of interstitial lung disease: collagen diseases (e.g. rheumatoid disease, systemic lupus erythematosus, scleroderma), drugs (e.g. nitrofurantoin, methotrexate, anticancer drugs, penicillins, non-steroidal anti-inflammatory drugs, amiodarone).

3. Other:

- a. Diaphragmatic, pericardial and gastric receptors are probably of little importance.
- b. Gastro-oesophageal reflux may lead to a cough by aspiration. This is probably the most important cause of chronic cough and should be excluded if no other obvious cause can be found. Also a trial of anti-reflux therapy may be worthwhile in any case of chronic persistent cough. It must be remembered that with reflux in patients already taking proton pump inhibitors there may not be heartburn because of the absence of acid but the enzyme pepsin may give rise to the cough.
- c. Psychogenic.

Diagnosis

Special points to note in the history

Times when the cough is worse: cough at night may indicate heart failure, bronchial asthma or aspiration from gastro-oesophageal reflux; cough at meal times may suggest aspiration. Also a cough after meals may suggest pharyngeal

pouch. A cough during a meal that includes a fizzy drink or acid vapours (as in lemon juice) may be due to bronchial hyper-reactivity or asthma.

1. Triggers:

- a. Exertion or laughing: interstitial lung disease or bronchial asthma.
- b. Environmental change: houses and pets: may suggest an allergic cause or asthma.
- c. Medication: angiotensin converting enzyme inhibitors and beta-blockers (ingested and as eye drops). Interstitial lung disease may be caused by many drugs (e.g. as above) and present with cough.

2. Sputum production: Post nasal drip and bronchitis often create morning sputum. Purulent sputum usually suggests bacterial infection but eosinophils in high numbers may give rise to similar appearances. Large volumes of persistent purulent sputum are an indication of probable bronchiectasis.

3. Haemoptysis: Tuberculosis, bronchiectasis, tumours, pulmonary embolism and bronchitis.

4. Sneezing and rhinorrhoea: allergic rhinitis.

5. Dry mouth, from mouth breathing, change or loss of sense of smell: chronic rhinitis.

6. Gastro-oesophageal reflux symptoms or dysphagia: oesophageal disease.

7. Joint pains and/or swelling: connective tissue disorders.

8. Pointers to acquired immunodeficiency: unexplained cough may be a presentation of *Pneumocystis jirovecii* (formerly called *carinii*) pneumonia.

Special points to note on examination.

1. Deep expiration precipitating the cough suggests bronchial asthma.

2. Types of cough:

- a. "Wet": bronchial asthma, bronchitis, bronchiectasis.
- b. "Brassy": tumour.
- c. Increasing cough during examination and clearing when the patient is not aware of being observed may suggest a psychogenic cause.

3. Impacted ear wax.

4. Nasal passages: polyps, mucopurulent discharge, signs of inflammation.

5. Tender maxillary sinuses.

6. Goitre and other neck masses.

7. Rales and rhonchi especially if localised. A unilateral fixed rhonchus may indicate a tumour.

8. Finger clubbing: malignancy, lung abscess, bronchiectasis.

9. Central cyanosis and/or anaemia.

Careful clinical assessment will provide a working diagnosis in most cases and special investigations often are not needed.

Sputum examination: Look at it!!! Are there any signs of blood? A rusty looking specimen may suggest a pneumococcal pneumonia. Microscopy will differentiate bacterial infection from eosinophilia: consider TB and fungi.

Chest x-ray: Bear in mind that a normal CXR does not exclude TB, tumour, foreign body or bronchiectasis.

Respiratory function tests: the simplest is to observe the patient exercising e.g. walking or climbing stairs. The inability to complete sentences without added inspirations during ordinary conversation is abnormal. Exercise may induce wheezing in bronchial asthma. Peak expiratory flow (PEF) measurement is helpful but spirometry is better. PEF meters are small, relatively inexpensive and the measurements at least give some quantitative idea of progression. Without such equipment ask the patient to blow out a lighted match from five inches and with the mouth open.

Treatment

It is not the purpose of this article to describe the treatment of all the causes of cough.

1. Treatment should be directed at the specific cause.
2. Removal of an allergen or irritant is usually very effective: cigarette smoking is an important example.
3. "Bronchitis" that does not respond to antibiotics could suggest an obstructing lesion.
4. A distressing cough with an irreversible cause (e.g. metastatic malignancy) should be suppressed using:
 - a. A simple linctus: honey for children with an acute cough is effective [1].
 - b. Humidified air (steam inhalation but care to avoid scalding) or
 - c. Codeine phosphate 30-60mg. 6-8 hourly.
 - d. Kindness and reassurance: a patient is often more afraid of the cause of the cough than the cough itself.

Reference

1. Oduwale. O, Meremikwu, M.M., Oyo-Ita, A and Udoh, E.E. Honey for acute cough in children. *Cochrane Acute respiratory Infections Group*. Published Online 14 March 2012. DOI: 10.1002/14651858.CD007094.pub3