

Team Medicine

Cough

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What is Cough?

'A Cough is a forced expulsive manoeuvre, usually against a closed glottis and which is associated with a characteristic sound'

Cough Reflex:

➤ Afferent Pathway

Vagus nerve is major afferent pathway

Stimuli arise from:

- Ear
- Pharynx
- Larynx
- Lungs
- Tracheobronchial tree
- Heart
- Pericardium
- Esophagus

➤ The Efferent pathway of the cough reflex consists of 4 phases:

1. Inspiratory Phase: inhalation ends before closure of the glottis

2. Compressive Phase: thoracic and abdominal muscles contract against a fixed diaphragm (modified Valsalva maneuver); intrathoracic pressure increases (≤ 300 mm Hg)

3. Expiratory Phase: glottis opens; air is rapidly (≤ 500 miles/hr!) expelled

4. Relaxation Phase: chest wall and abdominal muscles relax

Intrathoracic pressure increases up to 300mmHg , Expiratory velocity reaches 500mph.

Vital protective mechanism

Four steps:

- inspiratory gasp
- Valsalva maneuver
- expiratory blast as cords abduct
- post-tussive prolonged inspiration

Few things to note: Valsalva requires closed airway, therefore pt with trash or paralyzed cords can't cough very well

Inspiratory muscles= diaphragm & accessories
 Expiratory muscles= intercostals and abdominals
 Expiratory blast requires functional exp muscles, C6 quad loose this ability and have much less effective cough

Exp blast can reach 500mph!

Cough: What's it good for?

- Attract attention
- Signal displeasure
- Protect the airway from pathogens, particulates, food, other foreign bodies
- Clear the airways of accumulated secretions, particles

Impaired Cough: Consequences

- Aspiration of oropharyngeal or stomach contents (bacteria, food, other)
- Acute airway obstruction
- Pneumonia
- Lung abscess
- Respiratory failure/ ARDS
- Bronchiectasis
- Pulmonary fibrosis

Coughing helps to clear mucous BUT can cause complications

COMPLICATIONS

- headache
- dizziness
- musculoskeletal pain
- syncope
- urinary incontinence
- Rib fracture
-drives patient and everyone else crazy.

Classification of Cough:

Three Categories of Cough

- Acute Cough = < 3 Weeks Duration
- Sub acute Cough = 3 –8 Weeks Duration
- Chronic Cough = > 8 Weeks Duration

Diagnosis of cough:

1. Usually no tests are indicated in a patient with acute cough.
 2. CXR is indicated only if a pulmonary cause is suspected, if the patient has hemoptysis, or if the patient has a chronic cough. It also may be appropriate in a longterm smoker in whom COPD or lung cancer is a possibility.
 3. CBC if infection is suspected
 4. Pulmonary function testing if asthma is suspected or if cause is unclear in a patient with chronic cough
 5. Bronchoscopy (if there is no diagnosis after above workup) to look for tumor, foreign body, or tracheal web
- reference : step up , page 440**

Cough can be classified by its duration, character, quality, and timing.

The **duration** can be either *acute* (of sudden onset) if it is present less than three weeks, *subacute* if it is present between three and eight weeks, and *chronic* when lasting longer than eight weeks.

The **character** of a cough can be *non-productive* (dry) or *productive* (when sputum is coughed up).

It may occur *only at night* (then called nocturnal cough), during both *night and day*, or just *during the day*.

From 429 teamwork

❖ Acute Cough <3/52 Duration

Differential Diagnosis

1. Upper Respiratory Tract infections: Viral syndromes, sinusitis viral / bacterial
2. URTI triggering exacerbations of Chronic Lung Disease e.g. Asthma/ COPD
3. Pneumonia
4. Left Ventricular Heart Failure
5. Foreign Body Aspiration

Epidemiology

- Symptomatic URTI
 - 2-5 per adults per year
 - 7-10 per child per year
- 40-50% will have cough
- Self medication common -£24million per year
- 20% consult GP (2F:1M)
- Most resolve within 2 weeks

Managing Acute Cough

Identify High Risk groups

Acute Cough Can be 1st Indicator of Serious Disease

eg Lung ca, TB, Foreign Body, Allergy, Interstitial Lung disease

'Chronic cough always preceded by acute cough'.

🚩 Red Flags in Acute Cough

Symptoms

- Haemoptysis
- Breathlessness
- Fever
- Chest Pain
- Weight Loss

Signs

- Tachypnoea
- Cyanosis
- Dull chest
- Bronchial Breathing
- Crackles
- THINK : pneumonia, lung cancer, LVF >> GET a CHEST X-Ray

Acute transient cough is most commonly caused by viral lower respiratory tract infection, post-nasal drip resulting from rhinitis or sinusitis, aspiration of a foreign body or throat-clearing secondary to laryngitis or pharyngitis. When it occurs in the context of more serious diseases such as pneumonia, aspiration, congestive heart failure or pulmonary embolism, it is usually easy to diagnose from other clinical features.

Davidson page 652

Treatment of Simple Acute Cough

- Benign course -reassure
- Cough can distress
- Patients report OTC medication helpful
- Voluntary cough suppression -lozenges/ drinks
- Suppression of cough -dextromethorphan, menthol, sedating antihistamines & codeine

Which Anti-tussive?***Dextromorphan**

- ✓ eg Benilyn non-drowsy
- ✓ 1 meta-analysis
- ✓ high dose 60mg
- ✓ beware combinations eg paracetamol

***Menthol**

- ✓ Steam inhalation. Effect on reflex short lived

***Sedating Antihistamines**

- ✓ danger sleepy -nocturnal cough

***Codeine or Pholcodeine**

- ✓ No better than dextromorphan
- ✓ but more side-effects.
- ✓ Not recommended

❖ Sub-Acute Cough 3-8 weeks**Likely Diagnoses**

- Post infectious
- Bacterial Sinusitis
- Asthma
- Start of Chronic Cough
- Don't want to miss lung cancer

ACTIONS

- Examine Chest
- Chest X-Ray if signs or smoker
- Measure of airflow obstruction i.e. peak flow -one off peak flow -serial spirometry

❖ Post Infectious Cough

A cough that begins with an acute respiratory tract infection and is not complicated* by pneumonia

*Not complicated = Normal lung exam and normal chest X-ray

Post Infectious cough will resolve without treatment

Cause = Postnasal drip or Tracheobronchitis

❖ **Chronic Cough** > 8 weeks

Case Study -CP 2007

- 60yr ret'd Nurse
- Chest infection 2002 in Spain -mild SOB since
- Chest infection 2006 -hospitalised for 4/7 antibiotics / steroids
- SOB and dry cough since
- No variation
- 4 lots of AB and steroids from GP plus tiotropium & oxis -no help for cough
- Wt climbing
- More SOB over 9/12
- Ex-smoker 30 pack yrs
- FEV1 0.97 43%
- What else would you like to know?
- What causes can you think of?

Epidemiology

- Epidemiology difficult -acute vs chronic
- Cullinan 1992 Respir Med 86:143-9, n=9077
 - 16% coughed on >50% days of year
 - 13% coughed sputum on >50% days of year
 - 54% were smokers

Associations with:

- Smoking (dose related)
- Pollutants (particulate PM10) -occupation
- Environmental irritants (e.g. cat dander)
- Asthma
- Reflux
- Obesity
- Irritable bowel syndrome
- Female

Making the Diagnosis "Common Differentials"

- **Lung Disease**
 - ✓ normal CXR
 - ✓ abnormal CXR
- **Gastro-Oesophageal Reflux**
 - ✓ Post-nasal Drip
 - ✓ allergic rhinitis
 - ✓ bacterial sinusitis
- **Non-structural**
 - ✓ ACE-Inhibitor
 - ✓ Tobacco
 - ✓ Habit Cough

Causes of chronic cough :

_Most common but have normal CXR

- Cough-variant asthma
- Post-nasal drip
- GERD gastroesophageal reflux disease
- Non-asthmatic eosinophilic bronchitis

· _Less common but cause patients to go to hospitals more often; can have abnormal CXR

- Chronic bronchitis
- Bronchiectasis
- ACE inhibitors e.g. Lisinopril
- ILD
- Tuberculosis

from 430 team work

Cough Investigating in Chronic Cough

Purpose:

- To exclude structural disease
- To identify cause, how?
- ✓ History & Examination inc occupation & Spirometry

ALWAYS GET A CHEST X-RAY IN CHRONIC COUGH

Beware

Cough triggered by:

- change in temperature
- scent, sprays, aerosols and exercise

Indicate:

Increased cough reflex sensitivity
and Not just seen in Asthma.
Esp. GORD, infection and ACEI

❖ **ACE-Inhibitors and Chronic Cough**

Incidence: 5-20%

Onset: one week to six months

Mechanism

Bradykinin or Substance P increase
Usually metabolized by ACE)
PGE2 accumulates and vagal stimulation.

Treatment: switch to Angiotensin II Receptor Blockers (ARBs)

❖ **Gastro-oesophageal Reflux**

GORD accounts alone or in combination for 10-40% of chronic cough

Two Mechanisms

- a. Aspiration to larynx/ trachea
- b. Acid in distal oesophagus stimulates vagus and cough reflex

Symptoms

Cough Features

- Throat clearing
- Worse at night / rising
- On eating
- Reflex hypersensitivity
- CXR -normal or hiatus hernia
- Spirometry normal

GI Symptoms

- If Aspiration main mechanism
- Heart burn
- Waterbrash/ Sour taste
- Regurgitation
- Morning Hoarseness

If Vagal-NO GI symptoms

Gastro-esophageal reflux is Chronic symptoms of mucosal damage caused by *acid* reflux from the stomach into the *esophagus*. The chronic cough associated with it, is called **reflex cough**, caused by stimulation from the reflux (touching vocal cords) as a way to protect the airways from having acid coming to them (from pharynx to larynx).

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Reflux may be due to Medications or Food. Drugs that reduce lower esophageal sphincter (LES) pressure and can cause increased sphincter reflux include: Theophylline, Chocolate, Oral β -adrenergic agonists, Caffeine, NSAIDs, Peppermint, Ascorbic acid, Alcohol, Calcium Channel Blockers, Fat.

Reflux Investigation

- ✓ Esophageal pH monitoring for 24 hours(+diary)(Decreased pH means acid regurgitation).
- ✓ 95% sensitive and specific 95%
- ✓ Ba swallow not sensitive enough
- ✓ Endoscopy -may confirm but false -ve rate

Endoscopy can show GORD, but cannot confirm GORD as the cause of cough.

Treatment

- Trial of Therapy
- High dose twice daily PPI for min 8weeks
- +prokinetic e.g. domperidone or metoclopramide
- Eliminate contributing drugs.
- Baclofen rarely
- Improves in 75-100% of cases

❖ Post-Nasal Drip

Symptoms:

- 'something dripping'
- frequent throat clearing
- nasal congestion / discharge
- posture

Causes

- Allergic rhinitis
- Non-allergic rhinitis
- Vasomotor rhinitis
- Chronic bacterial sinusitis

Options:

- Exclude /treat infection
- Nasal steroid for 8/52
- Sedating antihistamines
- Antileukotrienes eg montelukast
- Saline lavage
- ENT opinion

❖ Lung Diseases inc Tobacco

Favouring Lung Disease

- Shortness of breath
- Wheeze
- Sputum production
- Haemoptysis
- Chest signs e.g. crackles

❖ Chest X-Ray and Differential of Cough

➤ Normal CXR

- Gastro-oesophageal reflux
- Post-nasal Drip
- Smokers cough/ Chronic Bronchitis
- Asthma
- COPD
- Bronchiectasis
- Foreign body

➤ Abnormal CXR

- Left ventricular failure
- Lung cancer
- Infection/ TB
- Pulmonary fibrosis
- Pleural effusion

Post-nasal drip (PND), also known as Upper Airway Cough Syndrome, occurs when excessive mucus is produced by the nasal mucosa. The excess mucus accumulates in the throat or back of the nose (worst on lying down) It can be caused by **rhinitis** (allergic or non-allergic), **sinusitis** (acute or chronic). Lying down → the nasal drip touches the larynx and vocal cords (very sensitive centers) → cough is generated. •

From 429 teamwork

The drip results in pharyngeal syndrome because once the cough is established it causes high velocity impact in the upper airways causing trauma, redness and hyperemia making the airways more sensitive thus causing a vicious circle.

• Nasal drip usually ends with a pharyngeal syndrome with irritation of upper airways.

From 430 teamwork

A man presents to you with coughing

WHAT WOULD YOU LIKE TO KNOW in history taking?

***Onset?**

Recent or long standing (Chronic)

***Duration?**

Chronicity

- Pertussis
- TB
- Foreign body
- Asthma
- Drugs
- Bronchiectasis
- ILD

***Character?** Change in character of a chronic cough should make you consider other pathology.

Brassy?

Pressure on the trachea?

- *Nocturnal? Asthma
- Also Early morning

***Precipitating factors?**

- Usually in asthma
- Emotion
- Weather
- Wind
- Rain
- Cold
- Dust
- Allergies
- Exercise
- Drugs

***Relieving factors?** Avoidance of precipitating factors!

***Sputum?** Presence?

- Colour
- Volume
- Consistency
- Pattern

Cough continuously productive of purulent sputum is suggestive of "chronic bronchitis"
Expectorated bloodstained sputum tends to be a complaint of patients with bronchogenic carcinoma, Pulmonary embolism and TB.
reference: Churchill's pocketbook of differential diagnosis , page 84

Consider :

- Infections
- COPD
- CF
- Bronchiectasis


***Haemoptysis?**

Presence?

- Colour
- Volume
- Consistency
- Pattern

***Association?**

- Breathlessness
- Sputum
- Chest pain
- Wheeze
- Hoarseness
- Post nasal drip

 19.5 Cough		
Origin	Common causes	Clinical features
Pharynx	Post-nasal drip	History of chronic rhinitis
Larynx	Laryngitis, tumour, whooping cough, croup	Voice or swallowing altered, harsh or painful cough Paroxysms of cough, often associated with stridor
Trachea	Tracheitis	Raw retrosternal pain with cough
Bronchi	Bronchitis (acute) and COPD Asthma Eosinophilic bronchitis Bronchial carcinoma	Dry or productive, worse in mornings Usually dry, worse at night Features similar to asthma but no airway hyper-reactivity (AHR) Persistent (often with haemoptysis)
Lung parenchyma	Tuberculosis Pneumonia Bronchiectasis Pulmonary oedema Interstitial fibrosis	Productive, often with haemoptysis Dry initially, productive later Productive, changes in posture induce sputum production Often at night (may be productive of pink, frothy sputum) Dry, irritant and distressing
Drug side-effect	ACE inhibitors	Dry cough

Davidson
page 652

Summary from step up

Cough

A. General characteristics

1. Cough can be divided into acute (less than 3 weeks duration) and chronic (more than 3 weeks duration).
2. If the cause is benign, cough usually resolves in a few weeks. If a cough lasts for longer than 1 month, further investigation is appropriate.

3. Causes

a. Conditions that are usually associated with other symptoms and signs

- Upper respiratory infections (URIs)—This is probably the most common cause of acute cough.
- Pulmonary disease—pneumonia, chronic obstructive pulmonary disease (COPD), pulmonary fibrosis, lung cancer, asthma, lung abscess, tuberculosis
- CHF with pulmonary edema

b. Isolated cough in patients with normal chest radiograph

- Smoking
- Postnasal drip—may be caused by URIs (viral infections), rhinitis (allergic or nonallergic), chronic sinusitis, or airborne irritants
- Gastroesophageal reflux disease (GERD)—especially if nocturnal cough (when lying flat, reflux worsens due to position and decreased lower esophageal sphincter [LES] tone)
- Asthma—cough may be the only symptom in 5% of cases
- ACE inhibitors—may cause a dry cough (due to bradykinin production)

B. Diagnosis

1. Usually no tests are indicated in a patient with acute cough.
2. CXR is indicated only if a pulmonary cause is suspected, if the patient has hemoptysis, or if the patient has a chronic cough. It also may be appropriate in a longterm smoker in whom COPD or lung cancer is a possibility.
3. CBC if infection is suspected
4. Pulmonary function testing if asthma is suspected or if cause is unclear in a patient with chronic cough
5. Bronchoscopy (if there is no diagnosis after above workup) to look for tumor, foreign body, or tracheal web

C. Treatment

1. Treat the underlying cause, if known.
2. Smoking cessation, if smoking is the cause
3. Postnasal drip—Treat this with a first-generation antihistamine/decongestant preparation. If sinusitis is also present, consider antibiotics. For allergic rhinitis, consider a nonsedating long-acting oral antihistamine (loratadine).
4. Nonspecific antitussive treatment
 - a. Unnecessary in most cases, because cough usually resolves with specific treatment of the cause
 - b. May be helpful in the following situations:
 - If cause is unknown (and thus specific therapy cannot be given)
 - If specific therapy is not effective
 - If cough serves no useful purpose, such as clearing excessive sputum production or secretions
 - c. Medications
 - Codeine
 - Dextromethorphan
 - Benzonatate (Tessalon Perles) capsules
 - d. Agents used to improve the effectiveness of antitussive medications include expectorants such as guaifenesin and water.