Evaluation and Management of Cough

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Objectives

- Recognize causes and complications of subacute and chronic cough.
- Examine treatments for post-infectious cough.
- Review a standard diagnostic approach and treatment strategy to apply to chronic cough.

Prevalence

- All types of cough
  - 3.6% of visits to primary care
  - 29.5 million visits per year
- Chronic Cough
  - One of the most common reasons for new patient visits to a pulmonologist.

Complications

- Embarrassment / self consciousness
- Urinary incontinence
- Disturbed sleep / fatigue
- Dizziness / syncope
### Definitions

- **Acute cough** - < 3 weeks
- **Subacute cough** – 3-8 weeks
- **Chronic cough** - > 8 weeks

### Acute Cough

- **Other**
  - Infectious
  - Exacerbation of pre-existing condition
    - Asthma
    - Bronchiectasis
    - Upper Airway Cough Syndrome (UACS)
    - COPD

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### Acute Cough

- **Severe or life threatening disease**
  - Pneumonia
  - PE
  - Heart Failure
  - Severe exacerbation of asthma or COPD

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### Subacute cough algorithm >= 15 years old

![Subacute cough algorithm](Irwin, R. S. et al. Chest 2006;129:15-23S)
**Subacute Cough**
- May be a postinfectious etiology
- Mechanisms include:
  - Postviral airway inflammation
  - Bronchial hyperresponsiveness
  - Mucus hypersecretion
  - Impaired mucociliary clearance
  - UACS (upper airway cough syndrome)
  - Asthma
  - GERD

**Bordetella pertussis “whooping cough”**
- Highly contagious
- Vaccination but increasing incidence (especially 10-19 yr old) due to waning of immunity

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**Treatment – Postinfectious**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No role for antibiotics (unless sinusitis or pertussis)</td>
</tr>
<tr>
<td>2</td>
<td>Inhaled ipratropium</td>
</tr>
<tr>
<td>3</td>
<td>Inhaled corticosteroids</td>
</tr>
<tr>
<td>4</td>
<td>Investigate concomitant UACS, Asthma, GERD</td>
</tr>
<tr>
<td>5</td>
<td>Brief trial of steroids (prednisone 30-40mg day) for severe paroxysms</td>
</tr>
<tr>
<td>6</td>
<td>Codeine or dextromethorphan</td>
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**Bordetella pertussis “whooping cough”**

- Paroxysms of coughing, posttussive vomiting, inspiratory whooping sound (often absent in adults)
- B. parapertussis – similar but shorter duration
- Diagnosis – nasopharyngeal swab or aspirate
- Treatment – macrolide
Approach to Chronic Cough

1) History, Exam, CXR, ? Spirometry
2) If cause apparent - treat
3) If no obvious cause:
   ✓ UACS (upper airway cough syndrome)
   ✓ Asthma
   ✓ NAEB (nonasthmatic eosinophilic bronchitis)
   ✓ GERD (gastroesophageal reflux disease)

Diagnosis and Management

• If history, exam, or CXR reveals a potential cause – investigate and treat
• If smoker – QUIT
• If on an ACE Inhibitor – stop it!

Chronic Cough

• History
  ✓ Smoking, ACE Inhibitor?
  ✓ Immunocompromised?
  ✓ Fever, sweats, weight loss?
  ✓ Dyspnea, wheezing?
  ✓ Cancer, TB, AIDS

• Examination
• CXR
• ? Spirometry

Normal History, PE, CXR

Most common causes of cough are:

1) UACS (upper airway cough syndrome)
2) Asthma
3) GERD (gastroesophageal reflux disease)
4) NAEB (nonasthmatic eosinophilic bronchitis)
   ✷ Not as common as GERD, but may be evaluated after asthma in the workup.
<table>
<thead>
<tr>
<th>Considerations:</th>
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<tbody>
<tr>
<td>• Optimize therapy for each diagnosis</td>
</tr>
<tr>
<td>• Check compliance</td>
</tr>
<tr>
<td>• Step wise approach</td>
</tr>
<tr>
<td>• Maintain all partially effective treatment</td>
</tr>
<tr>
<td>★ Can have more than one cause of chronic cough!</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Diagnosis (asthma)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reversible airflow obstruction on spirometry.</td>
</tr>
<tr>
<td>• If nondiagnostic– perform methacholine inhalation challenge testing (MIC) or peak flow (PEF) monitoring.</td>
</tr>
<tr>
<td>• If MIC (-) asthma is unlikely.</td>
</tr>
<tr>
<td>• If MIC (+) may be asthma, but can only be diagnosed by resolution of cough with asthma treatment.</td>
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<table>
<thead>
<tr>
<th>Asthma</th>
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<tbody>
<tr>
<td>• May be the cause of chronic cough in 25% of patients.</td>
</tr>
<tr>
<td>• Usually associated with other symptoms of asthma, but doesn’t have to be!</td>
</tr>
<tr>
<td>• Cough variant asthma – distinct subgroup.</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Treatment (asthma)</th>
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<tbody>
<tr>
<td>• Inhaled corticosteroid and inhaled bronchodilators.</td>
</tr>
<tr>
<td>• If still coughing – assess airway inflammation to look for eosinophils.</td>
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<tr>
<td>• Leukotriene receptor antagonist</td>
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<tr>
<td>• Short course (1-2 weeks) of systemic corticosteroids followed by inhaled steroids.</td>
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### Nonasthmatic Eosinophilic Bronchitis (NAEB)
- First described 1989
- Normal CXR
- Normal spirometry
- No airway hyperresponsiveness
- ++ airway eosinophilia (>3%)

### ACE Inhibitor-Induced Cough
- Cough can occur at any time after initiation of ACE Inhibitor (1st dose to months)
- After cessation of medication – cough usually resolves in 1-4 weeks, but can take up to 3 months.
- Can try switching to angiotensin-receptor blocker.

### Miscellaneous - ILD
- Cough can be a prominent symptom of interstitial lung disease
- Consider UACS, asthma, GERD may also contribute and attempt to treat.
- For cough 2º to IPF or sarcoidosis, oral steroids are often effective but have many systemic side effects.

**Nonasthmatic Eosinophilic Bronchitis (NAEB)**

- **Treatment:**
  - Inhaled corticosteroids
  - Rarely trial of oral corticosteroids
  - Avoidance if an allergen or occupational sensitizer is identified.
  - Bronchodilators don't work.
### Miscellaneous - Chronic Bronchitis

<table>
<thead>
<tr>
<th>Stable</th>
<th>Exacerbation</th>
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<tbody>
<tr>
<td>✓ No smoking</td>
<td>✓ Antibiotics</td>
</tr>
<tr>
<td>✓ B-agonists</td>
<td>✓ B-agonists</td>
</tr>
<tr>
<td>✓ Anticholinergics</td>
<td>✓ Anticholinergic</td>
</tr>
<tr>
<td>✓ Theophylline (?)</td>
<td>✓ Systemic steroids</td>
</tr>
<tr>
<td>✓ Long acting b-agonist and inhaled corticosteroids</td>
<td>✓ No role for expectorants</td>
</tr>
<tr>
<td></td>
<td>✓ Codeine and dextromethorphan</td>
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### Uncommon Causes

- If common causes evaluated and cough persists, consider uncommon causes.
- Most involve airways or interstitium and can be evaluated with:
  - CT scan of chest
  - Bronchoscopy

### Miscellaneous

- Peritoneal dialysis associated with increased cough – may be 2º to GERD or ACEI, B blocker, pulmonary edema, infection.
- Lung cancer – treat the cancer. Centrally acting opioid cough suppressants are often effective.

### Cough Suppressants

- Conflicting data on efficacy of most cough suppressants.
- Short term use
- Doesn’t treat the cause of the cough.
**Chronic cough algorithm >= 15 yrs old**

- A cause of cough is suspected
- History, examination, chest X-ray
- Eliminating ACE-I
- Discontinue

**Upper Airway Cough Syndrome**

- Formally known as post nasal drip syndrome
- “One airway”
- Causes:
  - Allergic rhinitis
  - Vasomotor rhinitis
  - Chronic sinusitis

**Sinusitis**

- 35 million Americans with at least one episode of acute sinusitis
- Number one chronic illness in all age groups in U.S.
- 14% of population
- Most common health care complaint
### Sinusitis: Diagnosis

- History
  - Semters triad
- Physical exam
- CT scan

### Paranasal Sinus CT

- Mucosal thickening

### Sinusitis: Diagnosis

- Blood work
  - Quantitative Immunoglobulins
  - IgE
- Allergy testing

### Diagnostic Nasal Endoscopy
### Microbiology

#### Acute Sinusitis
- H. influenza 38%
- Strep. Pneumoniae 37%
- Strep. Pyogenes 6%
- Moraxella catarrhalis 5%
- Gram neg. bacilli and anaerobes 5%

#### Chronic Sinusitis
- Anaerobes more common
  - 51% sole isolate
  - 31% mixed
- Pseudomonas
  - Polyps
  - HIV
  - CF

### Irritable Larynx Syndrome
- Laryngeal based cough
  - Non-productive cough
  - “Tickle”
- Laryngeal mucosal irritation
  - Laryngeal Sicca
  - Chronic laryngitis
  - Reflux
- Vocal cord dysfunction

### Laryngeal Sicca
- Sjogrens Syndrome
- Medication induced
- Aging
- Previous radiation therapy
### Chronic Laryngitis

- Vocal misuse
- Fungal laryngitis
  - Steroid inhaler use

### Pathophysiology

- Decreased LES tone
  - Smoking
  - ETOH
  - Hiatal hernia
  - Medication
    - Theophyline
    - Calcium channel blockers
    - Anti-cholinergics

### LaryngoPharyngeal Reflux (LPR)

- Atypical GERD
- First recognized in 1968
  - Delahanty Syndrome
- Most common inflammatory disorder of the larynx

### Pathophysiology

- Gastric acid
- Proteolytic enzymes
  - Pepsin
    - Primary injurious component in refluxate
  - Capsaicin
- Bile
- Duration of exposure
### Diagnosis

- **History**
- **Physical exam**
  - Indirect laryngoscopy
  - Transnasal fiberoptic
  - EGD
    - 72% are “normal”
- **Barium swallow** - 20% detected
- **Scintigraphy**

### pH Probe

- **Abnormal findings**
  - Esophageal probe
    - 8% upright
    - 3% supine
    - Pharyngeal probe - any event
- **LPR**
  - Upright daytime reflux 2.5 times more common than supine nocturnal

### pH Probe

- **Need double probe**
  - 4 cm above LES
  - Pharynx just above upper sphincter
- **Percent of time with pH below 4**

### LPR Symptoms

- **Throat clearing** (90%)
- **Hoarseness** (90%)
- **Increased mucous production** (90%)
- **Chronic cough** (55%)
- **Globus pharyngeus** (40%)
**LPR Symptoms**

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<th>Symptoms</th>
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<tbody>
<tr>
<td>• Cervical dysphagia (40%)</td>
</tr>
<tr>
<td>• Heartburn (33%)</td>
</tr>
<tr>
<td>• Laryngospasm</td>
</tr>
<tr>
<td>• Rhinitis/post nasal drip</td>
</tr>
<tr>
<td>• Halitosis</td>
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**LPR**

- Why larynx and pharynx without esophagus?
  - Upper sphincter problem
  - Mucosal sensitivity
    - Thin
    - Fragile
  - Devoid of acid clearing mechanism
  - Proton Pump receptors found in the larynx

**Physical Findings posterior larynx**

- Interarytenoid thickening/pachyderma
  - Mild - concave
  - Moderate - straight
  - Severe - convex
- Posterior erythema

**Physical Findings posterior larynx**

- Postcricoid edema / erythema
Physical Findings

true vocal cords

- Edema
  ✓ Most common finding
- Infraglottic erythema
- Mucosal thickening

Treatment

- 40% treatment failure with H2 blockers
- Need to use proton pump inhibitors
  ✓ Esomeprazole
  ✓ Omeprazole
  ✓ Pantoprazole
  ✓ Lansoprazole
  ✓ Rabeprazole

Physical Findings

true vocal cords

- Ulceration
- Granuloma vocal process

Treatment

- Often require twice a day PPI
  ✓ Frequently under treated
- Minimal treatment period of 6 months for uncomplicated LPR
- Wean medication when asymptomatic and exam normal
### Vocal Cord Dysfunction

- Paradoxical vocal cord mobility
- Respiratory abductor dyskinisia
- Hysterical asthma
- Munchausen’s stridor

### VCD Symptoms

- Acute onset respiratory difficulty
- Tends to be episodic
- Mimics asthma attack
- Minimal relief with inhalers
- Audible respiration

### Definition

- Inappropriate constriction of the glottis during respiration
- Laryngeal mistiming
- Must demonstrate normal abduction

### VCD Diagnosis

- Videolaryngeal stroboscopy
  - Stressed exam
    - Exercise
    - Chemical provocation
- Transglottal airflow
  - Abrupt spikes and stops of flow
### Physical Findings
- abrupt adduction
- diamond shape glottal opening
- expiratory or inspiratory
- periods of complete abduction
- normal oxygenation

### Silent Aspiration
- Decreased sensation in larynx
- Vocal cord paralysis

### Treatment
- Laryngeal control therapy
- Psychiatric
- Neurologic
- Medical therapy
  - ✓ Reflux
  - ✓ Heliox
  - ✓ Ativan

### Cough
- Vagal mediated
- Under cortical control
- Can be habitual
<table>
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<th>Cough</th>
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<tbody>
<tr>
<td>• Most cases of cough can be determined and treated successfully.</td>
</tr>
<tr>
<td>• Unexplained cough or idiopathic cough is rare and shouldn’t be used as the diagnosis unless thorough evaluation and treatment has been tried.</td>
</tr>
<tr>
<td>• Often requires close follow up and multiple visits.</td>
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