Cough

Chapter 40 | Part 2: Cardinal Manifestations and Presentation of Diseases

KEY CLINICAL POINTS

1. Cough is a protective reflex; impairment leads to retained secretions, infection, and atelectasis, while excessive cough causes physical strain (e.g., emesis, syncope, rib fractures).
2. Chronic cough is defined as lasting >8 weeks.
3. ACE inhibitor-induced cough occurs in 5–30% of patients, is not dose-dependent, and results from bradykinin and other tachykinins (e.g., substance P) accumulation.
4. Cough-variant asthma is common in children but rare in adults; it presents as a dry cough without wheezing or shortness of breath.
5. Postnasal drainage (Upper airway cough syndrome) is a common cause where quantification is impossible and many patients with drainage do not cough.
6. Gastroesophageal reflux can trigger cough via reflex pathways or direct chemical irritation from laryngopharyngeal reflux (the latter being uncommon).
7. Chronic Cough Hypersensitivity Syndrome (CHS) involves sensitized sensory nerve endings; it is more common in women and presents as a dry, tickle-inducing cough.
8. Eosinophilic bronchitis is characterized by sputum eosinophilia >3% without airflow obstruction or bronchial hyperresponsiveness; exhaled nitric oxide can predict response to steroids.
9. A 1-month trial off ACE inhibitors is required to confirm the drug as the cause of cough; if no improvement occurs, the drug is ruled out.
10. Sputum analysis (culture/cytology) is critical for productive cough to identify infection, malignancy, or distinguish eosinophilic from neutrophilic bronchitis.

1. DEFINITION & OVERVIEW

- **Function:** Essential protective reflex for human airways and lungs.
- **Impaired Cough:** Failure to clear secretions → risk of infection, atelectasis, and respiratory compromise.
- **Excessive Cough:** Can lead to emesis, syncope, muscular pain, rib fractures, and may aggravate low back pain, abdominal/inguinal hernias, or urinary incontinence.
- **Cough Mechanism:**
  - Stimuli: Chemical (e.g., capsaicin) or Mechanical (e.g., mucus, particulates).
  - Sensors: Cationic channels (e.g., TRP) and P2X3 receptors; signals travel via Aδ (mechanosensory) and C fibers (chemosensory).
  - Pathways: Vagus and superior laryngeal nerves → Nucleus tractus solitarius.
  - Efferent Response: Glottic closure → Expiratory muscle contraction (pressures up to 300 mmHg) → Rapid expiratory flow.
  - Dynamics: Kinetic energy for dislodging mucus is proportional to the square of the velocity of expiratory airflow.

→ Figure 40-1 illustrates these spikes in flow exceeding the normal respiratory envelope.

1.1 Impaired Cough

- **Causes:** Weakness/paralysis of expiratory muscles, chest wall pain, or structural abnormalities.
  - Table 40-1 identifies specific causes:
- Respiratory muscle weakness (includes: chest wall/abdominal pain, deformity like severe kyphoscoliosis, impaired glottic closure/tracheostomy, and central respiratory depression).
- Abnormal airway secretions (includes: ciliary dysfunction, tracheobronchomalacia, bronchiectasis, and tracheal/bronchial stenoses).
  - **Assessment:** Usually qualitative; peak expiratory flow or maximal expiratory pressure at the mouth serve as surrogate markers for cough strength.

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2. EPIDEMIOLOGY

- **Duration as Diagnostic Clue:**
  - Acute cough (<8 weeks): Often due to respiratory tract infection, aspiration, or inhalation of noxious chemicals/smoke.
  - Chronic cough (>8 weeks): May involve inflammatory, infectious, neoplastic, or cardiovascular etiologies.
  - Chronic Cough Hypersensitivity Syndrome: Recognized as a cause of chronic cough in the absence of identifiable etiology.

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3. ETIOLOGY & PATHOPHYSIOLOGY

- **Cough-variant Asthma:** Common in children; rare in adults. Characterized by cough without wheezing, shortness of breath, or chest tightness.
- **ACE Inhibitor-induced Cough:**
  - Prevalence: 5–30% of patients.
  - Mechanism: Not dose-dependent; caused by accumulation of bradykinin and other tachykinins (e.g., substance P) leading to sensitization of sensory nerve endings.
- **Postnasal Drainage (PND):**
  - Also termed 'Upper airway cough syndrome'.
  - Cause: Chronic inflammation in nose/sinuses → stimulation of hypopharynx receptors or aspiration into the trachea.
- **Gastroesophageal Reflux:**
  - Triggered via reflex pathways in esophageal mucosa.
  - Laryngopharyngeal reflux (to pharynx) causes chemical bronchitis but is an uncommon finding in chronic cough.
- **Chronic Cough Hypersensitivity Syndrome (CHS):**
  - Presentation: Dry or minimally productive cough; tickle/sensitivity in throat; worse with talking, laughing, or exertion.
  - Demographics: More common in women than men; can last for years.
- **Eosinophilic Bronchitis:**
  - Criteria: Sputum eosinophilia >3% without airflow obstruction or bronchial hyperresponsiveness.
  - Diagnostic Marker: Elevated exhaled nitric oxide may detect inflammation and predict favorable response to inhaled steroids.

4. CLINICAL FEATURES

- **General Characteristics:** Cough often worsens at night, with talking, or during exercise; frequently improves with sleep.
- **Physical Examination:**
  - Respiratory: Check for wheezing or crackles.
  - Ancillary: Examine ears (Arnold's nerve), nose (rhinitis/polyps), and nails (clubbing).
  - Systemic: Evaluate for sarcoidosis or vasculitis.
- **Chronic Cough with Normal Chest Radiograph:**
  - Must rule out serious conditions: Sarcoidosis, Hodgkin's disease (young adults), lung cancer (older patients), or pulmonary tuberculosis.
- **Sputum Analysis:**
  - Purulent sputum → Routine bacterial culture and, if indicated, mycobacterial culture.
  - Mucoid sputum → Cytology to assess for malignancy, aspiration, and distinguish neutrophilic from eosinophilic bronchitis.

5. DIFFERENTIAL DIAGNOSIS

- **Acute Cough (<3 weeks):** Infection, aspiration, or inhalation of noxious chemicals/smoke.
- **Chronic Cough (>8 weeks):**
  - Common: PND, ACE inhibitors, GERD, and asthma.
  - Emerging Concept: 'Cough hypersensitivity syndrome' (sensitized neural pathways).

6. INVESTIGATIONS & DIAGNOSIS

1. **Chest Radiograph:** Standard first step for all chronic cough; identifies sarcoidosis, cancer, or TB.
2. **Sputum Analysis:**
   - Purulent → Bacterial/Mycobacterial culture.
   - Mucoid → Cytology (malignancy, aspiration, eosinophilic vs. neutrophilic).
3. **Peak Flow Monitoring:** Home monitoring to support or discount a diagnosis of asthma.
4. **Pulmonary Function Testing:**
   - Spirometry: Identify airflow obstruction that varies over time or reverses with bronchodilators.
   - Methacholine Challenge: Used to confirm/exclude asthma if spirometry is inconclusive.
5. **Esophageal Assessment:**
   - pH Monitoring (24h catheter or radiotransmitter capsule) → quantify reflux events.
   - Manometry → measure esophageal pressures.

7. MANAGEMENT & TREATMENT

1. **ACE Inhibitor-induced Cough:**
   - Action: Discontinue ACE inhibitor.
   - Evaluation: If no improvement after 1 month → rule out ACEI as cause.
   - Alternative: Switch to Angiotensin Receptor Blockers (ARBs).

2. **Gastroesophageal Reflux:**
   - Pharmacotherapy: Antacids, H2 receptor antagonists, Proton Pump Inhibitors (PPIs).
   - Adjuncts: Alginates, dietary changes, elevation of head/torrso during sleep.
3. **Postnasal Drainage:**
   - Treatment depends on etiology (infection, allergy, or vasomotor rhinitis).
   - Options: Systemic antihistamines, decongestants, antibiotics, nasal saline irrigation, nasal pump sprays (glucocorticoids, antihistamines, or anticholinergics).
4. **Asthma and Eosinophilic Bronchitis:**
   - Cough-variant asthma → Inhaled glucocorticoids + intermittent inhaled β-agonist bronchodilators.
   - Eosinophilic bronchitis → Inhaled glucocorticoids.

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8. PROGNOSIS & COMPLICATIONS

- **Impaired Cough:** Risk of retained secretions → infection, atelectasis, and respiratory compromise.
- **Excessive Cough:**
  - Physical: Emesis, syncope, muscular pain, rib fractures.
  - Systemic: Aggravate low back pain, abdominal/inguinal hernias, and urinary incontinence.

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9. KEY PEARLS & CLINICAL TRAPS

- **CHS:** More common in women; dry cough worse with talking/laughing.
- **GERD:** Many patients with symptomatic reflux do not experience chronic cough.
- **ACEI Rule:** A 1-month trial off medication is the standard for confirming ACEI-induced etiology.
- **Eosinophilic Bronchitis:** Defined by >3% sputum eosinophilia without airflow obstruction.

REFERENCE TABLES

TABLE 40-1

Causes of Impaired Cough and Airway Clearance Respiratory muscle weakness Chest wall or abdominal pain Chest wall...

40	Cough Bruce D. Levy

TABLE 40-1

Causes of Impaired Cough and Airway Clearance

- Respiratory muscle weakness Chest wall or abdominal pain Chest wall deformity (e.g., severe kyphoscoliosis) Impaired glottic closure or tracheostomy Central respiratory depression (e.g., anesthesia, sedation, or neurologic disease) Abnormal airway secretions Ciliary dysfunction Tracheobronchomalacia Bronchiectasis Tracheal or bronchial stenoses