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COUGH(TUSSIS): FROM BASIC MECHANISM TO CLINICAL APPROACH

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Abstract

Cough is one of the most frequent clinical manifestations that are observed in every day medical practice and is an important protective reflex of the respiratory system. It is important in clearing the airway of mucus, airway irritants, and foreign particles, hence, normal respiratory functioning. Despite the fact that cough is often related to minor conditions like a viral infection, cough can also be a symptom of serious sicknesses such as asthma, pneumonia, tuberculosis and chronic obstructive pulmonary disease. A good explanation of the underlying mechanisms, types, causes, and clinical approach to cough is the key to making accurate diagnosis and effective management. This article presents a clear and simple overview of cough focusing on its correlation, physiology, classification, differential diagnosis, red flag signs, investigation and treatment principles in a simple and clinically relevant manner to medical students.

Keywords:

Cough, Respiratory reflex, Acute cough, Chronic cough, Asthma, Airways clearance, GERD, Pneumonia, TB, Clinical approach.

INTRODUCTION:

Cough is one of the most common symptoms encountered in medicine. Almost every person experience cough at some point in life. It is among the most frequent reasons for visiting clinics, hospitals and emergency departments.

Although, many people think cough itself is a disease, in reality cough is usually a symptom of an underlying condition. It can occur due to infections, allergies, asthma, smoking, acid reflux, heart diseases, and many other conditions.

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What exactly is cough?

Cough is a protective reflex that helps clear the respiratory tract of mucus, foreign particles, irritants, and secretions through forceful expulsion of air from the lungs.

Why Cough Happens?

The respiratory tract is continuously exposed to dust, smoke, microorganisms, allergens, mucus, and pollutants. If these substances remain inside the airway, they may block breathing or cause infection.

To prevent this, the body has developed a protective reflex called cough. Whenever receptors in the airway detect irritation, they send signals to the brain. The brain then activates respiratory muscles to produce a sudden explosive release of air.

This high-pressure airflow removes the irritating material. Thus, cough is usually protective rather than harmful.

What will happen if we do not cough?

If we do not cough, we will die from the mucus accumulated in airways.

PHYSIOLOGY OF COUGH

Cough occur in several stages:

1)Deep Inspiration
= The patient takes a deep breath.
2)Closure of Glottis
= The vocal cord closes.
3)Pressure Build-Up
=Respiratory muscles contract strongly. Intrathoracic pressure rises.
4)Sudden Opening of Glottis
=The glottis suddenly opens.
5)Explosive Expulsion
=Air is expelled forcefully at high speed (Up-to 500mph).

ANATOMY OF COUGH

Cough receptors are located in Larynx, Trachea, Bronchi, Pleura including external ear canal.

These are the mechanical and chemical receptors like dust, smoke, acid mucus, Inflammation.

Signal cause by the Vagus Nerve → Medulla (Cough Centre)

CLASSIFICATION OF COUGH

- Based on duration there are three types of coughs.

A) Acute Cough
Duration less than 3 weeks
Common causes are Viral upper respiratory infections, Acute bronchitis, Pneumonia, allergy.

B) Subacute cough:
Duration is 3-8 weeks.
Common causes are Post Viral Cough, Asthma, Pertussis

C) Chronic Cough
Duration is more than 8 weeks.

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Common Causes are Asthma. GERD, Post Nasal Drip, Tuberculosis, COPD, Smoking, AcE Inhibiting Drugs

- Based on nature there are two types of coughs.

A) DRY COUGH: In dry cough there is no production of sputum.

Causes of dry cough are Irritation, Viral Infection, Asthma, GERD, Allergy, ACE Inhibitor use.

B) Productive Cough: In productive cough there is production of Sputum.

Causes of productive cough are Pneumonia, COPD, Bronchitis, Tuberculosis, Bronchiectasis.

- Based on Sputum colour in Cough.

1}Clear/White Sputum

White colour of sputum is due to the Viral infections, Allergy, Asthma.

2}Yellow/Green Sputum

Green/yellow colour of sputum is due to the Inflammation, Bacterial infection

colour of sputum is yellow/green because neutrophils contain Myeloperoxidase {MOP}

Important: Green sputum alone does not confirm bacterial infection it may be viral infection

3}Brown Sputum

Brown colour of sputum is due to the Smoking, Old blood

4}Hemoptysis

It is due to the Blood in sputum

Serious causes -TB, Lung cancer, Bronchiectasis, Pulmonary embolism

5)Pink Frothy Sputum

It is seen in pulmonary edema.

Sputum tells us what kind of cell/material inside

- Based on timing there are 3 types of coughs

1} Night cough

If the patient is coughing in night that mean patient can be suffering from Asthma, GERD, Heat Failure

2)Morning cough

If the patient is coughing in morning time that mean patient is Smoker

3}After eating

If the patient is coughing after the meal that mean patient can be suffering from Aspiration, GERD

Causes systematic approach

- Upper Airways

Cough due to the upper airway disease are Common cold, Sinusitis, Post-nasal drip

- Lower Airways

Cough due to the lower airway disease are Asthma, bronchitis, pneumonia, COPD, TB

- Cardiac

Cough due to the Hemoptysis, disease is Left Heart failure

- GI

Cough due to the gastroesophageal reflex disease is GERD

Important Diseases Associated with Cough

1. Viral Upper Respiratory Infection

It is the most common cause of acute cough

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Few symptoms are like Fever, Runny nose, Sore throat, Dry cough

2. Asthma

Asthma causes airway inflammation and bronchoconstriction.

Few symptoms are like Dry cough, Night cough, Wheezing, Chest tightness.

Some patients present only with cough this is called cough variant asthma.

3. Pneumonia

It is an Infection of lung parenchyma.

Few symptoms of Pneumonia are Fever, Productive cough, Chest pain, Breathlessness

Bacterial pneumonia often causes neutrophilic leukocytosis

4. Tuberculosis

Chronic infectious disease caused by Mycobacterium tuberculosis.

Few symptoms are like Chronic cough, Fever, Weight loss, Night sweats, Hemoptysis

Any cough lasting more than 2-3 weeks should raise suspicion for TB in endemic areas.

5. COPD

Chronic obstructive pulmonary disease usually occurs in smokers.

Few symptoms are like Chronic productive cough, Morning cough, Breathlessness, Smoking history

6. GERD

Acid reflux irritates airway receptors.

Few symptoms are like Burning chest pain, Sour taste, Night cough, Chronic dry cough

CLINICAL APPROACH TO THE PATIENT WITH COUGH

HISTORY TAKING:

Taking a patient history is important because you'll honestly figure out half the diagnosis

Few important questions that we must ask to the patient.

1] Duration of the cough like Acute and Chronic.

2] Nature of the cough like Dry or Productive.

3] Associated Symptoms with cough like Fever, Breathlessness, Chest Pain, Wheezing, Weight Loss, Night Sweat.

4] Smoking History - It is very Important in Chronic Cough.

5] Drug History - Asking to the patient he/she is taking any medicine like ACE Inhibitors.

6] TB Contact History-Asking to the patient that have you had any known contact with someone suffering from TB or any recent travel history.

Physical Examination:

General Examination like measuring the patient temperature, respiratory Rate, oxygen Saturation, Pulse.

- Chest Examination:

Inspection of chest: It is the first part of physical examination of the respiratory system like symmetry of expansion, respiratory rate etc.

Palpation: It is the second part of physical examination technique where a doctor uses their hand and fingers to feel the chest wall and thoracic cavity

Percussion: It is the third part of physical examination, technique involving tapping on the chest wall using fingers to produce sound, vibrations that assess underlying lung density.

Auscultation: It is the fourth part of physical examination listening to internal chest sounds with using stethoscope.

Investigation:

Blood Test: CBC-

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On the CBC report of patient we can clearly observe these signs like High WBC and high Neutrophils leads to Bacterial Infection if there is low WBC with Low Platelets results out of Dengue/Viral

Imaging:

Chest X-Ray: It is helpful in detecting Pneumonia, TB, Pleural Effusion, Lung mass

Sputum Examination: It is helpful in detecting TB and Pneumonia

Spirometry: It is helpful in detecting Asthma and COPD

Red flag symptoms in cough:

These are the few sign that a person should not ignore if the person notice he should visit to a doctor as soon as possible. Sign are like Hemoptysis, Weight Loss, Severe Breathlessness, Chest Pain, Fever More than Two to Three Weeks, Low Oxygen Saturation, Persistent Vomiting.

TREATMENT OF COUGH

Treatment Depends on Underlying Causes:

- General Measure includes Hydration, Steam Inhalation. Further-more it also depends on rest and the person must Avoid Smoking
- Dry Cough: It May require cough suppressants Eg: Dextromethorphin
- Productive Cough: Patient must avoid Suppressing Productive Cough excessively

Treat Underlying Cause:

1) Asthma: To treat the asthma patient should use Bronchodilators, Inhale Corticosteroids.

2) Pneumonia: To treat the Pneumonia patient requires antibiotic if pneumonia is bacteria

3) GERD: To avoid GERD patient should change lifestyle, and they may use Proton Pump Inhibitors

4) TB: To cure from TB, patient requires Anti Tubercular therapy.

COMPLICATION OF SEVERE OR CHRONIC COUGHS:

These are the few complications related to chronic cough, which includes Rib Fracture in some cases, it generally leads to sleep Disturbance as well. Symptoms also include effect like fatigue and Urinary Incontinence which is a major health risk

PREVENTION:

Prevention is better than cure. To lower cough risk people must stay updated on Vaccinations, avoid smoking, and practice strict hand hygiene, Additionally, wearing masks in high-risk areas and seeking early treatment for respiratory issues are vital steps for health.

CONCLUSION

Cough is a most important clinical symptoms in internal medicine. Although often caused by simple viral infection it may also indicate serious diseases, such as pneumonia, tuberculosis, COPD, Asthma and the lung cancer

A systemic approach involving taking proper history, examination, and investigation helps identify the cause accurately. By understanding the physiology and mechanism behind cough allows the medical students and the doctors to think logically.

The key principle in management is-

Treat the underlying causes of cough rather than suppressing it unknowingly.

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