Evaluation of the Patient with Common and Not So Common Pulmonary Disorders

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1

Objectives

- Upon completion of this lecture, the participant will be able to:
  - Identify various causes of chronic cough and other pulmonary issues
  - Discuss the workup for patients with a chronic cough and other pulmonary disorders
  - Discuss treatment options for the patient with a chronic cough and other pulmonary disorders

2

Definition

- Chronic Cough
  - Typically defined as a cough that lasts 8 weeks or longer
  - Can cause significant distress for the individual affected by the cough
  - It is estimated to occur in 40% of the population, at some point in one's lifetime
  - One of the ost common presenting symptoms in adults seeking primary care

http://emedicine.medscape.com/article/1048560-overview accessed 06-04-2017

3

Traditional Approach…

- Chronic cough was divided into two possible causes:
  - Upper respiratory tract conditions
  - Lower respiratory tract conditions

http://emedicine.medscape.com/article/1048560-overview accessed 06-04-2017

4

Current Approach

- "One airway, one disease"
- Even individuals with upper airway conditions such as post-nasal drip have elevated levels of inflammatory mediators in the lower airway

http://emedicine.medscape.com/article/1048560-overview accessed 06-04-2017

5

Look for Obvious Causes Based On History and PE

- Infection (Acute bacterial rhinosinusitis)
- Smoking or recent smoking cessation (cough will often resolve 4 weeks after cessation)
- ACE inhibitor
  - Can occur at any time on an ACE inhibitor
- Cerumen

http://emedicine.medscape.com/article/1048560-overview accessed 06-04-2017

6

Look for Obvious Causes Based On History and PE

- Congestive heart failure
  - S3, edema, DOE, PND, weight gain
- Standard workup
  - Chest X-ray (every patient needs)
  - Consider spirometry
  - Mantoux (if risk factors)

http://emedicine.medscape.com/article/1048560-overview accessed 06-04-2017

7

Most Common Causes

- Medication induced
- Asthma
- GERD
- Postnasal drip syndrome

http://emedicine.medscape.com/article/1048560-overview accessed 06-04-2017

8

Less Common Causes

- Account for 5-10% of cough (in total)
  - Bronchiectasis
  - Bronchogenic carcinoma
  - Chronic aspiration
  - COPD
  - CHF
- Interstitial lung disease
- Neuromuscular disorders
- Pertussis
- Psychogenic cough
- Sarcoidosis
- Tuberculosis

http://emedicine.medscape.com/article/1048560-overview accessed 06-04-2017

9

Most Common Etiology

- Most common:
  - Post-nasal drip syndrome
  - Post-infectious cough
  - GERD
  - Cough variant asthma
  - Medication induced
- Estimated that in non-smokers, immunocompetent individuals with a normal chest X-ray
  - Post-nasal drip, asthma, and GERD account for 92 – 100% of chronic cough cases (post-nasal drip most common)

http://emedicine.medscape.com/article/1048560-overview accessed 06-04-2017

10

Post-nasal drip syndrome

11

Post-nasal drip syndrome

- Most common cause of chronic cough
- Mechanism to clear mucous which has drained into the posterior pharynx and airway
- Twenty percent (20%) of individuals with post-nasal drip are unaware of the presence of mucous in posterior pharynx
- Physical examination is non-specific but may suggest:
  - Cobblestoning
  - Presence of mucous in posterior pharynx

http://emedicine.medscape.com/article/1048560-overview accessed 06-04-2017

12

New Terminology: Upper Airway Cough Syndrome (UACS)

- Post-nasal drip syndrome
  - Acute rhinosinusitis (ARS and ABRS)
  - Nonallergic rhinitis
    - Perennial rhinitis
    - Rhinitis of pregnancy
    - Gustatory rhinitis
    - Rhinitis medicamentosa
    - Nonallergic rhinitis with eosinophilia
  - Allergic rhinitis

http://emedicine.medscape.com/article/1048560-overview accessed 06-04-2017

13

4

Impact of Allergic Rhinitis in the United States

- 17 million individuals in US have diagnosed allergic rhinitis
  - This accounts for 14% of the US population
  - Recent prevalence studies show that it may be present in 31.5% of all adults
- 10-20% of this number is children
  - Most common chronic medical condition of childhood
- 79.5 million Americans have undiagnosed allergic rhinitis
- Average age of onset: 10 years of age

14

5

Pathophysiology of Allergic Rhinitis

- Results from repeated exposure to allergens in the individual already equipped with the genetic predisposition
- Upon exposure to an allergen, there is a release of IgE antibodies
- IgE antibody binds with the antigen
- It then attaches itself to the mast cells on the nasal and bronchial mucosa
- Release of numerous chemical mediators; including leukotrienes and histamine

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15

6

Asthma and Allergic Rhinitis: Closely Related Diseases

- Similar risk factors, pathophysiology, patterns of inflammation and triggers
- Approximately 74%-80% of children and adults with asthma have associated rhinitis
- Approximately 5-15% of individuals with allergic rhinitis will develop asthma
- It is said that if you don't treat the nose in the patient with asthma, you will never get their asthma under control

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7

One Airway, One Disease

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8

Symptoms of Allergic Rhinitis

- Nasal congestion
- Sneezing
- Profuse watery discharge from nose and/or eyes
- Itching of nose, eyes, and palate
- Frequent clearing of the throat
- Nose picking
- Grimacing or twitching

- Cough
- Mouth breathing
- Fatigue
- Irritability
- Decreased appetite
- Decreased hearing
- Hoarse voice
- Decreased smell
- Sniffling
- Epistaxis

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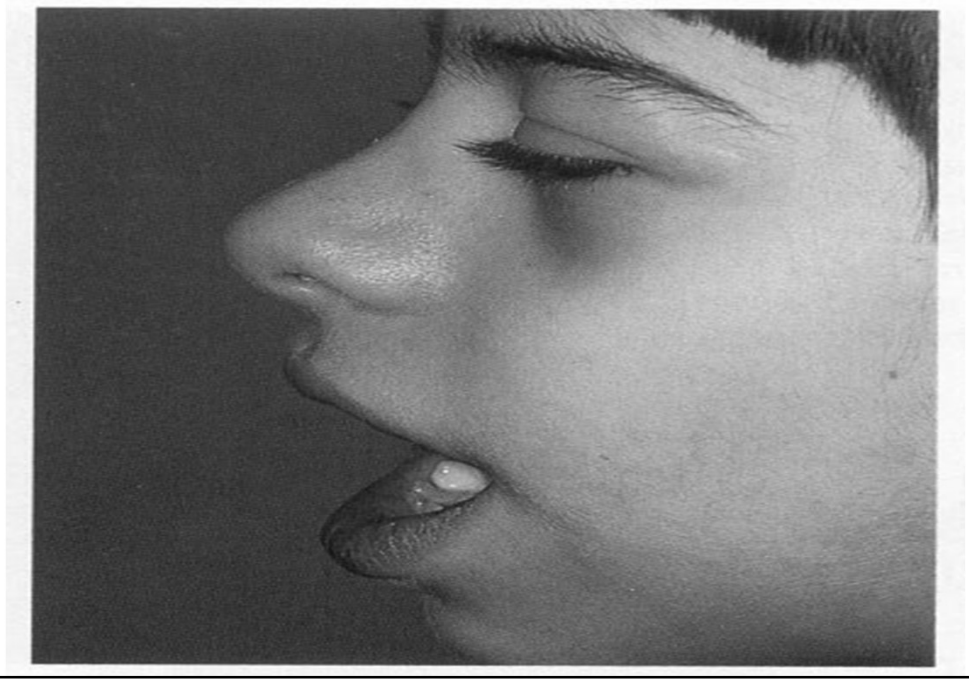

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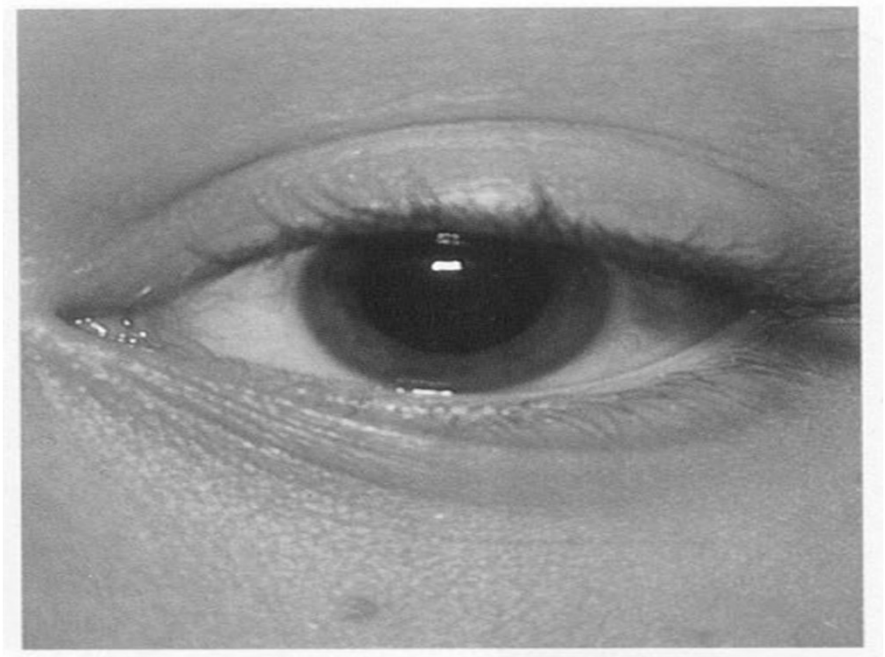

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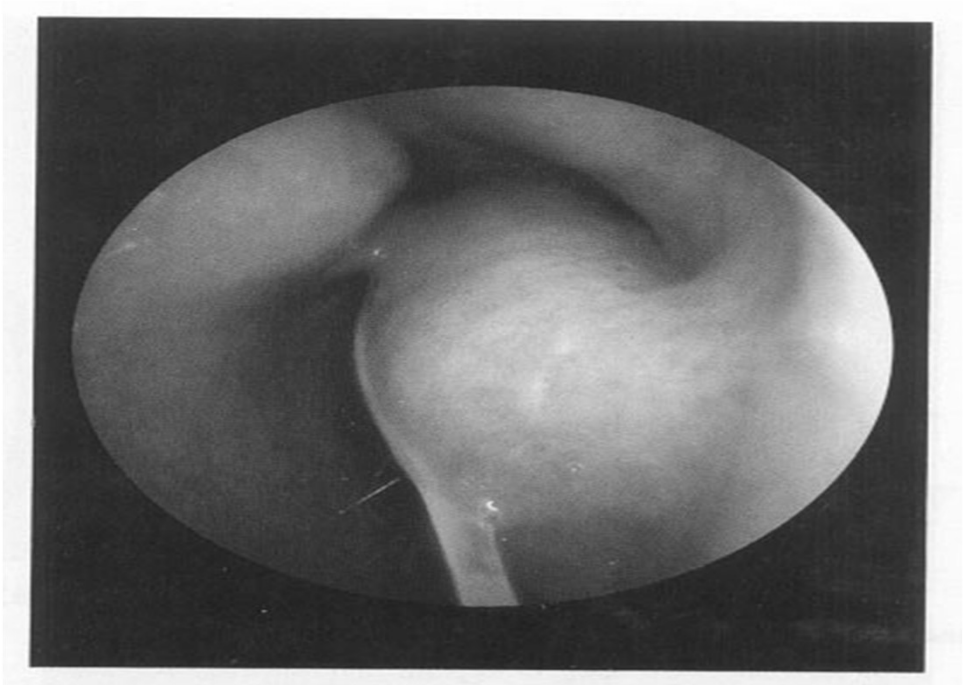

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Treatment Options

25

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Environmental Modification

- Environmental modification is recommended as first line therapy for the individual with allergic rhinitis

26

7

Reliever Medications

- Antihistamines
  - First Generation
  - Second Generation
- Decongestants

27

8

First Generation Antihistamines

- Number of Products Available
  - **Brompheniramine (Bromfed, Dimetapp)**
  - **Chlorpheniramine (Chlor-trimeton, Allerest)**
  - **Clemastine (Tavist)**
  - **Diphenhydramine (Benadryl)**
  - **Hydroxyzine (Atarax)**
  - **Promethazine (Phenergan)**
  - **Triprolidine hydrochloride (Actifed)**

28

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Second Generation Antihistamines

- These have emerged as first line rescue medications
  - Loratadine (Claritin)
    - 2 years and up: 5 - 10mg daily
  - Desloratadine (Clarinex)
    - 6 months of age and up
    - 1 mg – 5 mg daily depending upon age

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29

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Second Generation Antihistamines

- Fexofenadine (Allegra)
  - 60mg bid; 180 mg once daily: 12 years and up
  - 30 mg bid: age 2 years of age – 11 years of age
  - 15 mg bid: 6 months – 1 year (urticaria)
- Cetirizine (Zyrtec)
  - 2-5 years: 2.5-5 mg daily
  - 6 or greater: 5-10 mg daily6
- Levocetirizine (Xyzal)
  - 1.25 mg once daily: 2 – 5 years of age
  - 2.5 mg once daily: 6 – 11 years of age
  - 2.5 mg – 5 mg once daily: 12 years of age and older

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Decongestants may offer some benefit

- According to a survey of allergy patients who take medications more than 180 days per year
  - 9 out of 10 seasonal allergy patients experience nasal congestion
  - Nasal congestion is the single most frustrating symptom for seasonal allergy patients
  - Over 90% of seasonal allergy patients with nasal congestion want faster relief

Source: IAS 2004

31

Controller Medications

- Mast Cell Stabilizers
- Nasal Corticosteroids
  - Preferred controller therapy
- Nasal Antihistamines
  - (seasonal, perennial, and allergic rhinitis)
- Nasal Anticholinergics
- Leukotriene Antagonists
  - Recommends against using monotherapy
- Acupuncture (evidence exists to support)

32

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Inhaled Nasal Corticosteroids

- Numerous Products
  - Beclomethasone dipropionate (Qnasal, Beconase A!) * 4 years of age and older
  - Budesonide (Rhinocort Aqua) **6 and older
  - Flunisolide (Nasarel) **6 and older
  - Fluticasone (Flonase, Veramyst) **4 and older
  - Mometasone (Nasonex) **Age 2 and older
  - Triamcinolone acetonide (Nasacort AQ) **2 and older
  - Ciclesonide (Omnaris, Zetonna) **6 years of age and older

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According to the Guidelines

- Corticosteroids are first line for the person with moderate to severe allergic rhinitis
- Very potent and effective
  - Most corticosteroids are equally efficacious
- Many are now available OTC

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34

5

Inhaled Corticosteroids

- Most potent anti-inflammatory on the market
- Side effects
  - Nasal irritation, epistaxis
- Precautions
  - High dosages: Increased systemic absorption leading to HPA axis suppression

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35

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Leukotriene Receptor Antagonists

- Cysteinyl leukotriene production in the body has been associated with airway edema, smooth muscle constriction and the inflammatory process
- These medications block the leukotriene receptors which in turn is able to prevent inflammation and bronchoconstriction

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36

7

Montelukast (Singulair)

- (Montelukast) Singulair
  - 4 mg tablet for children 12 months – 5 years of age
  - 5mg at bedtime for ages 6-14
  - 10mg at bedtime for ages 15 and older
  - Caution: mood destabilization; now officially a boxed warning

37

Sublingual Allergen Extract

- Oralair (other products: ragwitek, grastek)
  - Treatment of allergic rhinitis with or without allergic conjunctivitis
  - For those allergic to certain grass pollens age 10 – 65 years
  - First dose administered in healthcare providers office with observation for minimum of 30 minutes
    - If tolerated, patient may then use at home
    - Once daily, initiated 4 months before allergy season
  - Box warning: anaphylaxis

38

9

Immunotherapy

- Reserved for the most severe cases; those unresponsive to treatment, unwilling or unable to tolerate pharmacologic treatments
- Successful therapy causes an initial rise in IgE levels and then a subsequent decline in levels and symptomatology
- Treatment for 6 months or longer is required before benefits will be seen
- Entire course of treatment: 3-5 years

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39

Other Options

- Azelastine (Astelin, Astepro)
- Azelastine/fluticasone (Dymista)
- Ipratropium bromide (Atrovent)
  - Perennial and gustatory rhinitis
- Rhinitis medicamentosa
  - D/c medication
  - Can be accomplished with prednisone and introduction of nasal corticosteroid

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40

Post-infectious and Infectious Cough

41

Reported Cases of Pertussis Are Highest in Adolescents and Adults …

- ~10,000-25,000 cases of pertussis are reported in the US every year[1]
- ~60% of reported cases occur among adolescents and adults[2]
- Reported cases are the tip of the iceberg
  - Estimated actual cases among adolescents and adults: 800,000-3.3 million per year[3]

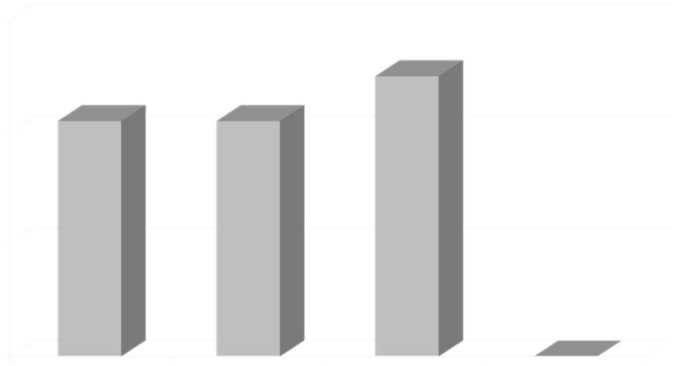
Courtesy of the Centers for Disease Control and Prevention (CDC).

"Despite increasing awareness and recognition of pertussis as a disease that affects adolescents and adults, pertussis is overlooked in the differential diagnosis of cough illness in this population."[4]

References: 1. CDC. (Published July 9, 2009 for 2007). *MMWR*. 2007;56(53):1-94. 2. CDC. Data on file (Pertussis Surveillance Reports), 2003-2008. MKT 17595 (2003-2006); MKT18596 (2007); MKT 18761 (2008). 3. Cherry JD. *Pediatrics*. 2005;115(5):1422-1427. 4. CDC. *MMWR*. 2005;55(RR-14):1-16.

42

Number of Medical Visits Needed in Adults with Pertussis



N=2472 Massachusetts adults.

Centers for Disease Control and Prevention. *MMWR*. 2006;55(RR-17):1-43.

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Diagnostic Tests for Pertussis

- NP culture on special media (Regan-Lowe, Bordet-Gengou)
- PCR
- Serologic tests
- Increased WBC with an absolute lymphocytosis
- DFA—variable sensitivity/specificity

44

5

Treatment of Cases and Chemoprophylaxis of Close Contacts

- Erythromycin estolate or erythromycin ethylsuccinate (EES) 40-50 mg/kg/day (max 2 g/day) in 2-4 divided doses for 7-14 days[1]*
- Azithromycin 10-12 mg/kg/day (max 500mg/day) 1 dose/day for 5 days†
- Clarithromycin 15-20 mg/kg/day (max 1g/day) in 2 divided doses for 7 days

Reference:
1. Halperin SA. Pertussis Control in Canada [letter]. *CMAJ*. 2003;168(11):1389-1390.

* Use caution when using macrolides, especially erythromycin, in infants less than 2 weeks old.
† Azithromycin may be given as 10-12 mg/kg/day (max 500 mg/day) on day 1 and 5 mg/kg/day (max 250 mg/day) on days 2-5.

45

6

Treatment of Cases and Chemoprophylaxis of Close Contacts (cont'd)

- For patients allergic to macrolides:
  - Trimethoprim-sulfamethoxazole 8mg TMP/40mg SMX/kg/day (max 320mg TMP/1600mg/day) in 2 divided doses for 14 days[1]
- All of these agents reduce transmission of *B pertussis* and ameliorate early symptoms[2]
- No antibiotic lessens the severity or shortens the duration of cough in patients who are already experiencing paroxysmal episodes[1]
- Penicillins/cephalosporins are not effective

References:
1. Edwards KM, et al. In: Plotkin SA, et al, eds. *Vaccines*. 1999:293-344.
2. CDC. The Pink Book, 7th ed. 2002:75-88. Available at: www.cdc.gov/nip/publications/pink/pert.pdf. Accessed March 15, 2005.

46

Bronchitis

47

Bronchitis

- 90% - 95% of cases are viral
- American College of Chest Physicians
  - Ipratropium bromide
  - Albuterol
  - Prednisone
  - Cough suppressants
- If bacterial, mycoplasma must be considered
- Consider *B. pertussis*

 http://www.aafp.org/afp/2010/1201/p1345.html accessed 08-01-2015

48

January 2016: CDC/ACP Guideline

- Management of Acute Respiratory Tract Infections (ARTIs)
  - Number one reason for antimicrobial use in adults
  - Antibiotics prescribed for more than 100 million adult visits per year with 41% for ARTIs
  - Thought to be large contributor to antimicrobial resistance
  - 1 in every 5 ER visits for drug reactions is result of antibiotic use

http://annals.org/article.aspx?articleid=2481815 accessed 05-10-2016

49

Bronchitis

- Bronchitis is characterized by inflammation of the bronchial tubes (bronchi), the air passages that extend from the trachea into the small airways and alveoli
- Lasts for up to 6 weeks
- Accompanied by constitutional symptoms

http://annals.org/article.aspx?articleid=2481815 accessed 05-10-2016

50

CDC/ACP

- Bronchitis
  - Use of antibiotics in this patient population is not warranted
  - If pneumonia is suspected, work-up and treat accordingly
  - Treatment now aimed at symptomatic management

http://annals.org/article.aspx?articleid=2481815 accessed 05-10-2016

51

Etiology

- Etiology:
  - Majority of cases are viral
    - Influenza, adenovirus, rhinovirus, coronavirus, parainfluenza virus and RSV
  - If infection is bacterial:
    - *Mycoplasma pneumoniae*
    - *Chlamydia pneumoniae*

http://annals.org/article.aspx?articleid=2481815 accessed 05-10-2016

52

Symptoms

- Cough
- Dyspnea
- Sputum production
- Fever/chills
- Malaise
- Chest pain
- Often accompanied by other URI symptoms

http://annals.org/article.aspx?articleid=2481815 accessed 05-10-2016

53

Recommendations for Treatment

- Cough expectorants
  - guaifenesin
- Cough suppressants
  - dextromethorphan, codeine
- First generation antihistamines
  - diphenhydramine
- Decongestants
  - phenylephrine
- Beta agonists
  - albuterol

http://annals.org/article.aspx?articleid=2481815 accessed 05-10-2016

54

Other Options: Post-infectious cough

- Ipratroprium bromide
- ICS
- Corticosteroids
  - 30 – 40 mg / day x 3 – 5 days
  - Single daily dose
  - No taper necessary

http://journal.publications.chestnet.org/pdfaccess.ashx?ResourceID=2118520
accessed 05-10-2016

55

Gastroesophageal Reflux Disease (GERD)

56

EE

- 52-year-old female presents with a 6 month – 1 year history of cough; denies chest pain, SOB, abdominal pain. Believes that it is aggravated by eating. No association with exercise. Has not been ill.
- Aggravating factors:
  - Foods
- Alleviating factors:
  - None
- Medications:
  - Escitalopram 5 mg one daily

57

EE (Continued)

- PMH
  - Anxiety disorder
  - Postmenopausal
  - Overweight
  - L5-S1 disc surgery
- No previous work-up for symptoms
- Physical Examination
  - HEENT: unremarkable
  - Lungs clear
  - Heart: S1, S2; RRR; no murmurs
  - Abdomen: unremarkable

58

What is GERD?

- Heartburn is one symptom of GERD
- This is characterized by:
  - Reflux of food and acid from stomach into esophagus
  - Often associated with esophageal inflammation
  - May be associated with mucosal injury or even cancer
    - Erosive esophagitis and/or Barrett's

59

EE (Continued)

- Most likely diagnosis is:
  - Cough x 1 year
  - Spirometry: normal
  - ECG: normal
  - Chest Xray: normal
  - Mantoux: normal

60

GERD

- Heartburn and regurgitation are the most common symptoms of GERD
- GERD is a complex of different abnormalities
  - To simplify, reflux of gastric contents into the esophagus resulting in symptoms and / or complications

61

Etiology of Heartburn and GERD

- Relaxation of the lower esophageal sphincter (LES) temporarily relaxes
  - Allows reflux of stomach acid into the esophagus
  - Normally, gravity and peristalsis clear material from the esophagus and the saliva that we swallow neutralizes the remaining esophageal acid
  - Heartburn occurs when any one of these mechanisms are impaired

62

Cause of Lower Esophageal Sphincter Relaxation

- Relaxation or weakening of the LES can be caused by:
  - Eating certain foods
    - Onions, garlic, black pepper
  - Pressure on the stomach because of an individual's weight
  - Frequent bending and lifting, particularly after eating
  - Vigorous exercise

63

Cause of Lower Esophageal Sphincter Relaxation

- Relaxation or weakening of the LES can be caused by:
  - Pregnancy
    - Progesterone relaxes LES; slows peristalsis and increases retention of partially digested food and acid
  - Medications also can decrease LES pressure
    - CCB's, hormone replacement therapy, muscle relaxants, beta blockers
    - Alpha-blockers
    - Nitrates
  - Pathophysiologic mechanisms
    - Hiatal hernia and gastric acid hypersecretion
    - Zenker's diverticulum

64

Etiology

- Several other defects thought to contribute to heartburn and GERD
  - Abnormal esophageal epithelial resistance
  - Abnormalities of gastric emptying
  - Gastric distention
  - Abnormal acid production

65

Diagnosis of Heartburn and GERD

- Diagnosis of heartburn is usually made with history and physical examination
  - Usually, this is all that is needed
- Many clinicians will try routine treatments first and assess for response prior to ordering a variety of tests
- EGD – is not needed to make diagnosis

66

Treatment Options

67

ACG Clinical Guideline for the Diagnosis and Management of Gastroesophageal Reflux Disease

Philip O. Katz, MD, MACG1 , Kerry B. Dunbar, MD, PhD, Felice H. Schnoll-Sussman, MD, FACG , Katarina B. Greer, MD, MS, FACG, Rena Yadlapati, MD, MSHS and Stuart Jon Spechler, MD, FACG

Am J Gastroenterol 2022;117:27–56. https://doi.org/10.14309/ajg.0000000000001538; published online November 22, 2021

68

Nonpharmacologic Treatment Options

- Dietary Modification
  - Avoidance of meals within 2-3 hours of bedtime
  - Avoidance of tobacco/cigarette related products
  - Avoidance of trigger foods
  - Elevate the head of the bed by 2-3 inches
  - Weight loss in overweight or obese individuals

69

ACG Guidelines

- PPI therapy is now first line
  - For those without alarm findings, PPI x 8 weeks is the recommended treatment
  - Discontinue after 8 weeks if patient has responded to the PPI
- No diagnostic testing needed
- No need for repeat endoscopy, unless patient does not respond adequately to PPI x 8 weeks

70

Alarm Findings

- Weight loss
- Dysphagia
- Iron deficiency anemia
- Black/bloody stools
- Chest pain
- Failure to respond to PPI therapy

71

Proton Pump Inhibitors

72

Mechanism of Action

- PPIs
  - Suppress gastric acid production by blocking parietal cell hydrogen/potassium ion adenosine triphosphatase
  - Known as the proton pump
  - This is the final pathway involved in acid secretion
  - Remember…PPI's affect only those pumps which are active
    - Not all pumps are active at the same time
  - 25% of new proton pumps are synthesized daily

73

Proton Pump Inhibitors

- Omeprazole (Prilosec)
- Lansoprazole (Prevacid)
- Esomeprazole (Nexium)
- Rabeprazole (AcipHex)
- Pantoprazole (Protonix)
- Dexlansoprazole (Dexilant)

74

PPIs

- Best efficacy when taken in the morning
  - PPIs only bind to proton pumps that are actively secreting acid
  - Ideally, 30–60 minutes before breakfast for once-daily dosing and 30–60 minutes before breakfast and dinner for twice-daily dosing
- If an endoscopy is needed, stopping PPIs 2-4 weeks before endoscopy is beneficial for optimal findings/results

75

Switching PPIs

- There is a wide variation in individual intragastric pH
- Sometimes, very helpful to try changing a PPI for an individual having suboptimal response
  - In one study, patients taking lansoprazole and having suboptimal response were changed to bid lansoprazole vs. once daily esomeprazole with equal efficacy

76

Refractory GERD

- Considered refractory when individual is on two times daily PPI for 8 weeks and is continuing to have symptoms

77

Proton Pump Inhibitors

- Recent studies have shown an increased risk of:
  - Osteoporosis
    - Should take calcium citrate NOT carbonate
    - Carbonate – i.e. Tums needs an acidic environment
  - Pneumonia
    - Diminished acid protection
  - B12 deficiency
  - C. difficile related infections
  - ? Link with dementia
  - Chronic kidney disease
  - Hypomagnesemia

78

What Does ACG Say?

- "PPIs are the most effective medical treatment for GERD. Some medical studies have identified an association between the long-term use of PPIs and the development of numerous adverse conditions including intestinal infections, pneumonia, stomach cancer, osteoporosis-related bone fractures, chronic kidney disease, deficiencies of certain vitamins and minerals, heart attacks, strokes, dementia, and early death. "
- "Those studies have flaws, are not considered definitive, and do not establish a cause-and-effect relationship between PPIs and the adverse conditions."
- "High-quality studies have found that PPIs do not significantly increase the risk of any of these conditions except intestinal infections."

79

Combination Therapy

- Omeprazole/sodium bicarbonate (Zegerid)
  - Indications
    - Gastric and duodenal ulcer
    - Erosive esophagitis
    - Symptomatic GERD

80

Interaction with Clopidogrel

- Interaction has been documented in a few studies but larger studies do not confirm true interaction
- Does not necessarily seem to be a class effect
- Most interaction to least interaction
  - Omeprazole (Prilosec), esomeprazole (Nexium), lansoprazole (Prevacid)
  - Lowest interaction: pantoprazole (Protonix) and dexlansoprazole (Dexilant)

81

Stopping PPIs

- Try tapering rather than abruptly stopping
- Try replacing PPI dose with H2RA; as needed antacids
- Lowest dose of PPIs possible to control symptoms, if unable to discontinue

82

EE

- Patient returns 1 month after initiating treatment with a PPI; significant improvement in cough; very rare in occurrence

83

Asthma

84

Asthma is...

- Derived from the Greek word for panting or breathlessness
- Recurrent airflow obstruction caused by chronic airway inflammation with a superimposed bronchospasm
- Leads to… wheezing, breathlessness and a cough

Guidelines for the Diagnosis and Management of Asthma—Update on Selected Topics 2002. NIH, NHLBI. June 2002. NIH publication no. 02-5075.

85

Pathophysiology of Asthma

- Genetic predisposition
  - Chromosome: 5Q31-Q33
- Results from repeated exposure to allergens in the individual already equipped with the genetic predisposition
- Upon exposure to an allergen, there is a release of IgE antibodies
- IgE antibody binds with the antigen

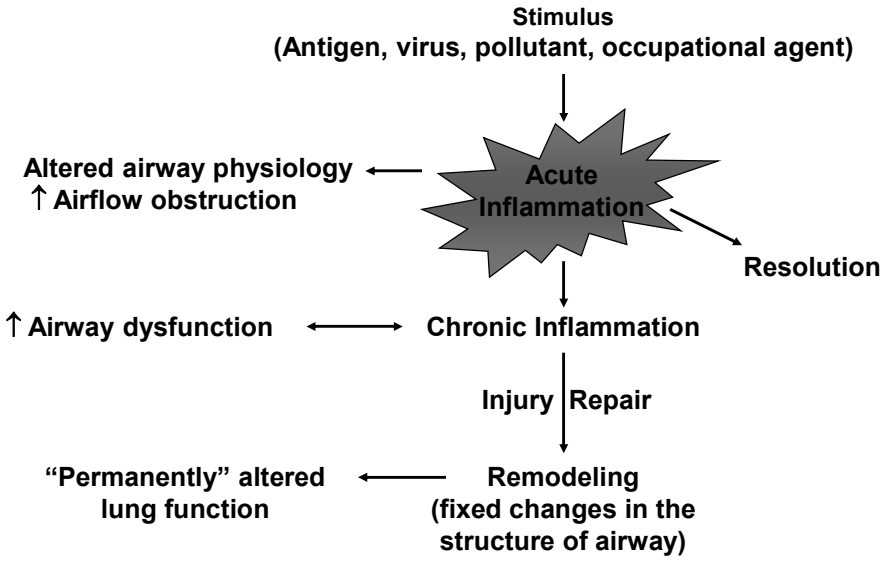
86

Pathophysiology of Asthma

- IgE/allergen complex - then attaches itself to the mast cells on the nasal and bronchial mucosa
- Release of numerous chemical mediators

87

Consequences of Inflammation in Asthma



88

Asthma is...

- A disease of:
  - Inflammation
    - Primary Process
  - Hyperresponsiveness
  - Airway bronchoconstriction
  - Excessive mucous production

89

Diagnosis of Asthma

90

Diagnosis of Asthma

- History and Physical Examination
- Spirometry is needed to make diagnosis
- Monitoring:
  - Peak Flow Meters

91

Symptoms and Signs of Asthma in Children and Adults

- Coughing, particularly at night or after exercise
- Wheezing
- Chest tightness
- SOB
- COUGH that lingers x months

92

Methods for Measuring Airway Caliber

Maximum PEFR airflow achieved	FVC, FEV_1 $FEF_{25\%-75\%}$	Airway Resistance
Home	Office/Clinic	Clinic/Laboratory

93

Classification of Asthma Severity (Youths≥12 Years of Age and Adults)

Initial Diagnosis: Determine Severity and Treatment Needed

Components of Severity		Intermittent	Mild	Persistent Moderate	Severe
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3-4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting $beta_2$-agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not >1x/day	Daily	Several times per day
Normal FEV_1/FVC: 8-19 y 85%, 20-39 y 80%, 40-59 y 75%, 60-80 y 70%	Interference with normal activity	None	Minor limitation	Some limitation	Extreme limitation
	Lung function	Normal FEV_1 between exacerbations; FEV_1 >80% predicted; FEV_1/FVC normal	FEV_1 >80% predicted; FEV_1/FVC normal	FEV_1 >60% but <80% predicted; FEV_1/FVC reduced 5%	FEV_1 <60% predicted; FEV_1/FVC reduced >5%
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year (see note)		≥2/year (see note)	
		Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time for patients in any severity category. Relative annual risk of exacerbations may be related to FEV_1			
Recommended Step for initiating Treatment		Step 1	Step 2	Step 3 and consider short course of oral systemic corticosteroids	Step 4
		In 2 to 6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.			

94

Asthma Findings

- Typically, reversibility of 12% or greater after administration of a bronchodilator aerosol is consistent with asthma.

Conboy-Ellis, Kathleen. Asthma: Pathogenesis and Management. *The Nurse Practitioner*: November 2006; Vol.31, No. 11. 24 – 39.

95

EPR 4

Figure I.d: Stepwise Approach for Management of Asthma in Individuals Ages 12 Years and Older

	Intermittent Asthma	Management of Persistent Asthma in Individuals Ages 12+ Years				
Treatment	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6■
Preferred	PRN SABA	Daily low-dose ICS and PRN SABA or PRN concomitant ICS and SABA▲	Daily and PRN combination low-dose ICS-formoterol▲	Daily and PRN combination medium-dose ICS-formoterol▲	Daily medium-high dose ICS-LABA + LAMA and PRN SABA▲	Daily high-dose ICS-LABA + oral systemic corticosteroids + PRN SABA
Alternative		Daily LTRA* and PRN SABA or Cromolyn,* or Nedocromil,* or Zileuton,* or Theophylline,* and PRN SABA	Daily medium-dose ICS and PRN SABA or Daily low-dose ICS-LABA, or daily low-dose ICS + LAMA,▲ or daily low-dose ICS + LTRA,* and PRN SABA or Daily low-dose ICS + Theophylline* or Zileuton,* and PRN SABA	Daily medium-dose ICS-LABA or daily medium-dose ICS + LAMA, and PRN SABA▲ or Daily medium-dose ICS + LTRA,* or daily medium-dose ICS + Theophylline,* or daily medium-dose ICS + Zileuton,* and PRN SABA	Daily medium-high dose ICS-LABA or daily high-dose ICS + LTRA,* and PRN SABA	
		Steps 2-4: Conditionally recommend the use of subcutaneous immunotherapy as an adjunct treatment to standard pharmacotherapy in individuals ≥ 5 years of age whose asthma is controlled at the initiation, build up, and maintenance phases of immunotherapy▲			Consider adding Asthma Biologics (e.g., anti-IgE, anti-IL5, anti-IL5R, anti-IL4/IL13)**	

Assess Control

- First check adherence, inhaler technique, environmental factors,▲ and comorbid conditions.
- **Step up** if needed; reassess in 2–6 weeks
- **Step down** if possible (if asthma is well controlled for at least 3 consecutive months)

Consult with asthma specialist if Step 4 or higher is required. Consider consultation at Step 3.

Control assessment is a key element of asthma care. This involves both impairment and risk. Use of objective measures, self-reported control, and health care utilization are complementary and should be employed on an ongoing basis, depending on the individual's clinical situation.

96

Less Common Causes

- Tuberculosis
  - Sputum culture, Mantoux, PCR testing, Chest X-ray
- Bronchogenic carcinoma
  - Chest X-ray, CT scan
- CHF
  - S3, edema, crackles, JVD, weight gain
- Interstitial lung disease
  - Pulmonary fibrosis, amyloidosis
- Psychogenic cough
  - Consider gabapentin

97

Refractory Cough

- No benefit to bronchoscopy in most individuals
- Gabapentin and speech therapy may offer benefit
- Pulmonology vs. otolaryngology referral
- Awaiting new medication:
  - Gefapixant: P2X3 receptor antagonist that has shown promise for the treatment of refractory and unexplained chronic cough
  - P2X3 receptors are found on sensory nerve fibers in the airway lining

98

Thank You For Your Time and Attention!!!

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99