

ASTHMA

BACKGROUND

Asthma is an inflammatory disorder of the small airways. The inflammatory cascade occurs in response to a wide range of stimuli, resulting in contraction of bronchiolar smooth muscle. Bronchoconstriction increases resistance to flow, thus impeding the volume of air that moves through the small airways.

Bronchoconstriction along with edema and mucus plugging further impede airway movement. Microscopic findings characteristic of small airways inflammation include - denuded epithelium, thickened basement membranes, and inflammatory cell infiltration. The episodes are reversible and airways may be normal between asthma attacks. Although asthma is known as a reversible airway disease, frequency and duration of bronchoconstriction can lead to irreversible damage in a process known as *airway remodeling*. Permanent changes typically have thickened airway walls and larger smooth muscle mass. Medications used to reduce bronchoconstriction are often ineffective in treating patients with airway remodeling.

DIAGNOSIS

The diagnosis of asthma should include a thorough medical history and review of symptoms including, attention to age of symptom onset, allergies and identifiable triggers (exercise, aspirin, mold exposure, etc.), smoking history, and family history. Review of symptoms should include fever, chills, weight loss, edema, which may be indicative of other problems.¹

Due to the episodic nature of asthma, patients may not present with wheezing upon examination and histories of symptoms may be vague. Classic presentations include a constellation of recurrent symptoms such as chest tightness, difficulty breathing, cough, shortness of breath, and reported expiratory wheezing. However, in severe bronchoconstriction, wheezing may be diminished or not heard at all. In these cases a reduction in wheezing could indicate a worsening of airway function. The components of asthma severity determine whether the patient's disease is classified as *Intermittent* or *Persistent*. Persistent disease can be mild, moderate or severe.

Imaging studies for asthma patients are usually normal, but may be indicated to assess other problems which display asthma-like symptoms, such as congestive heart failure, lung mass, pneumonia, bronchiectasis, and emphysema, among others. Hyperinflation of the lungs can be visualized on a chest X-ray (CXR) with flattening of the diaphragm.

Peak flow meters are often used at the point of care to monitor status of the patient. More sophisticated Pulmonary Function Tests may be required to further assess and guide management. Pulmonary function tests are especially helpful in diagnosis and to differentiate between asthma and COPD. FEV1 and forced vital capacity (FVC) are two common indicators taken as a ratio. FEV1 measures the total amount of air exhaled within the first second after maximal inhalation. FVC is the total amount of air exhaled after blowing out for as long as possible (at least 6 seconds). Of note, the FEV1/FVC ratio is often normal in patients with asthma due to the reversibility of airway obstruction. If the ratio FEV1/FVC is less than 75%, then the airway is likely obstructed.

TREATMENT & MANAGEMENT

The diagnosis of asthma is followed by assessment of severity of disease, initiation of medication and proper demonstration of inhalers, an action plan², and scheduling tests (if indicated), and scheduling a follow up appointment. Subsequent visits should include assessment of symptom control, review of adherence and technique, review and revision of the asthma plan. When prescribing the medication consider the goals of treatment and the patient's willingness and ability to use the medication.

Asthma is rarely cured. However, symptoms can be managed through a variety of environmental changes, and the use of medications. The targets of treatment include relieving the bronchoconstriction and the underlying inflammation, prevention of exacerbation, and appropriate use of short acting beta agonists. Other treatment goals should include minimizing emergency department visits and hospitalizations, and minimizing adverse effects of treatment.

Asthma symptoms vary over time and asthma should be monitored at each visit. Peak flow measurements should always be performed, and actual values should be entered into the medical records, rather than normal/abnormal. A high peak flow excludes severe disease, but it is important to remember that a low peak flow doesn't always indicate severity. The clinician should determine the frequency of visits based on the severity of the acute or chronic condition. For example, when trying to gain control of symptoms, visit frequency can be adjusted as clinically indicated.

Asthma management requires full patient participation and understanding of the disease and their ability to identify their triggers, and treatment and treatment goals. The treatment plan should be discussed and shared with patients.²

Maintain asthma control during pregnancy. Treating asthma with recommended medications is safer for the mother and fetus than having poorly controlled asthma. Maintaining lung function is important to ensure adequate oxygen supply to the fetus.

Identify and treat co-morbid conditions. Referral to a pulmonologist is warranted for uncontrolled symptoms and the best optimization of treatment. An allergist consultation will help in cases of environmental or food triggers. Referral to emergency department is necessary for severe symptoms.

RECOMMENDATIONS:

- Obtain formal Pulmonary Function tests, including spirometry, for diagnosis and then as clinically indicated¹
- Classify disease severity according to current standards
- Screen for tobacco use, provide smoking cessation counseling and interventions as indicated
- Administer Short acting beta agonist for intermittent asthma
- Order Inhaled corticosteroids for persistent asthma; inhaled corticosteroids should be stepped down after asthma is well-controlled.³
- Use caution when prescribing long acting beta agonists for those with a history of exacerbations.³
- Use referrals to pulmonary specialists for persistent asthma that does not respond to treatment by the primary care provider
- Administer Annual Influenza Vaccine
- Administer Pneumococcal Vaccines (PPSV23 and PV13) according to national guidelines
- Baseline Chest X-ray, if indicated, to exclude diseases that cause asthma-like symptoms

SOURCES

1. Guidelines from the National Asthma Education and Prevention Program: Expert Panel Report t. Revised 2012. http://www.nhlbi.nih.gov/guidelines/asthma/asthma_qrg.pdf
2. Sample of written Asthma Action Plan: www.nhlbi.nih.gov/health/public/lung/asthma/asthma_actplan.pdf
3. Global Strategy for Asthma Management and Prevention, Global Initiative for Asthma (GINA) 2016 (p.49). www.ginasthma.org
3. Global Initiative for Chronic Obstructive Lung Disease: <http://www.goldcopd.org/Guidelines/guidelines-resources.html>
5. Up to Date: An Overview of Management of Asthma www.uptodate.com/home

All of the above sources were accessed on 12/15/2016