An Osteopathic Approach To Asthma

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Disclosures:

- Dr. Chabra has provided no disclosures.

Objectives:

- Review the pathophysiology of asthma
- Discuss staging and management of asthma
- Summarize new guidelines in management and self-management of asthma
- Describe osteopathic principles as they apply to asthma
- Practice osteopathic techniques for asthma
Introduction

Asthma:
- Chronic disease of the lungs
- Affects adults and children of all ages
- Characterized by repeated episodes of wheezing, breathlessness, chest tightness, and nighttime or early morning coughing
- Affects 25.7 million people (including 7.0 million children under age 18)
- Significant health and economic burden to patients, their families, and society

Causes

- Caused by a combination of genetic and environmental factors that interact most often early in life
- Risk factors include:
  - Genetic factors such as inherited allergies or atopy
  - Parents who have asthma
  - Airborne allergens and viral respiratory infections
  - Other environmental exposures; tobacco smoke, air pollution, occupations and diet

Pathophysiology

- Inflammatory disorder of the airways
- Features of asthma include inflammatory cell immunohistopathologic infiltration
  - Neutrophils seen especially in patients that have sudden-onset, fatal asthma exacerbations and occupational asthma
  - Eosinophils
  - Lymphocytes
  - Mast cell activation
  - Epithelial cell injury
- Airway inflammation contributes to airway hyper-responsiveness, airflow limitation, respiratory symptoms, and disease chronicity
Histopathology

- Bronchoconstriction
  - airway narrowing and subsequent interference with airflow
- Airway edema
  - as disease becomes more persistent and inflammation more progressive, other factors function to narrow airway
- Airway hyperresponsiveness
  - as airway constriction occurs in response to a wide variety of stimuli
- Airway remodeling
  - airflow limitation may occur and permanent structural changes can occur in airways that is refractory to treatment

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Physiology

- Important to understand the innervation behind the mechanism for asthma
- Sympathetics are supplied by:
  - Upper thoracic sympathetic chain ganglia T1-T5/6
- The viscero-somatic reflexes for the lungs for the sympathetics are located in T1-T4

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Physiology

- The pulmonary parasympathetics are supplied by the vagus nerve, the fibers originate from midbrain-medulla oblongata
- Parasympathetic viscero-somatic reflexes for the lungs are located Occiput, C1 and C2

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Classification

- The disease can be categorized into intermittent, persistent-mild, persistent-moderate, and persistent-severe.

- Disease control and severity is determined by the current impairment and also risk of future risk of exacerbations.

Physical Exam Findings

- Airway obstruction can cause shortness of breath.
- Wheezing and chest tightness.
- Prolonged expiratory phase.
- In children - flaring of nostrils, increased heart rate and cyanosis.
- In severe cases - no wheezing auscultated if all the breath sounds are reduced (ominous sign).

Osteopathic Exam Findings

- Viscero-somatic reflexes in T1-T5/6 region bilaterally.
- Somatic dysfunction involving DA-C2.
- Hypertoncity of C4-C5.
- Chapman’s reflexes.
- Tissue texture changes to the thoracic area.
- Inhalation rib dysfunction.
- Restrictive movement of the scapula.
- Edema/Restriction of the thoracic inlet.
Treatment - Medications

- **Controller medications** are the foundation of care in asthmatic patients.

- **Inhaled corticosteroids** are the preferred controller medication - when used consistently they improve asthma control more than other long-term control medications.
  - Beclomethasone, Budesonide, Fluticasone, Mometasone
  - Improvement in asthma symptoms can be seen in 1-3 weeks; best results in 3 months.

- Combining long acting beta2 agonists and inhaled corticosteroids is effective and safe when added on therapy is needed.
  - Formoterol (usually in combo w/Budesonide), Salmeterol (Fluticasone), Vilanterol (Fluticasone)
  - have an action of more than 12-24 hours.

- **Leukotriene receptor antagonists** can be used as adjunctive w/inhaled corticosteroids but for persons >12 years of age addition of long acting beta2 agonist is preferred.
  - Zileuton (leukotriene synthesis inhibitor) has been shown to improve peak flows
  - Long acting Beta2 agonists and Leukotriene modifiers - Montelukast (Singulair), Zafirlukast (Accolate)

- **Short acting beta2 agonists** should be used for rapid reversal of airflow obstruction and prompt relief of symptoms.
  - Albuterol, levalbuterol and pirbuterol
  - onset of action of ≤5 minutes; peaking in 30-60 minutes; duration 4-6 hours.

- **Methylxanthines**
  - Theophylline is most common
  - acts as bronchodilator in asthma, is non preferred add on.

- **Cromolyn**
  - decreases bronchoconstriction through anti-inflammatory effects

- **Monoclonal antibodies**
  - Omalizumab (Xolair)
  - anti IgE antibody should only be used in children >12 and adults with confirmed IgE dependent allergic asthma that is uncontrolled with conventional medications.
Management-Acute exacerbation

- At home, assess peak flow; if <50-79% of their personal best, then give up to two treatments of 2-6 inhalations of short-acting beta2 agonist 20 minutes apart and then should recheck their peak flow.
- In ED or ambulatory care, goal is correction of severe hypoxemia, reversal of airflow obstruction and reduce of risk of relapse.
  - Multiple doses of inhaled anticholinergics with beta2 agonist improve lung function and decrease hospitalization in school-aged children.
  - Intravenous magnesium sulfate has been shown to significantly increase lung function and decrease hospitalization in children.
  - Administration of systemic steroids within one hour of presentation has also shown to decrease hospitalization.

Management-Long term

- Reduce impairment
- Reduce risk
- Assess asthma control to determine if therapy should be adjusted
  - Written asthma plans
  - Proper medication techniques
  - Patient adherence and concerns
  - Obtain spirometry every 1-2 years

- Schedule follow up care
- Select medications that meet patients needs such as those they would comply with.
- Develop written asthma action plan; new plan asthma APGAR tool (Activities, Persistent, Triggers, Asthma medications, Response to therapy)
- Teach patients how to manage their asthma - self-monitoring through symptoms or peak flow monitoring
- Taking medications correctly and educating between controller and fast acting medications
- Develop written action plan
- Recommend ways to control exposures to allergens, irritants, and pollutants
- Discussing occupational exposure
- Making sure if there are smokers at home that they smoke outside the house.
Management - Long term

- NIH study on a new pathway for asthma
- About half the asthmatics will have type 2 high asthma which is caused by an increase in eosinophils. In these patients, standard asthma medications don’t work but immunotherapy does work.
- Currently led by Dr. Stewart Levine. Apolipoprotein A-I is being studied and shows that they can regulate the severity of asthma.
- It was shown that inhalation of 5α-apo-1 mimetic peptide prevented allergic lung inflammation in asthmatic mice who lacked their own apolipoprotein A-I.
- The next step is to see if this will help in humans. Preliminary studies have shown higher levels of Apolipoprotein A-I in asthmatic patients were associated with better lung function.

Article adapted from www.nih.gov

Management - New horizons

- Next we will move on the hands-on treatment of asthma.
- Dr. Margaret Wilkins DO will be assisting me. She is Director of Faculty Development at PCOM MedNet OPTI and Clinical Associate Professor of Family Medicine.
- What is the evidence?
- Reviewed article from the JAOA on “Effects of Osteopathic Manipulative treatment on Pediatric Patients with Asthma: Randomized Controlled Trial.”
- OMT was shown to improve peak flow from 7L per minute to 9L per minute.
- OMM techniques have been shown to increase vital capacity and rib cage mobility, improve diaphragmatic function and enhance clearing of airway secretions.
Benefits of Osteopathic Manipulative Therapy in Asthmatic Patients

- Osteopathic manipulative (OMT) techniques have been shown:
  - To increase vital capacity and rib cage mobility
  - Improve diaphragmatic function
  - Enhance the clearing of airway secretions, and possibly enhance autoimmune function.

- In patients with asthma, osteopathic techniques that focus on thoracic structure and function can be employed to enhance the effectiveness of the respiratory cycle.

- Notable improvements (25% to 70%) in patients' peak expiratory flow rates (PEFs) have been reported following the use of OMT.

Management-Osteopathic Manipulation

- Soft tissue techniques:
  - Direct techniques which involve linear stretching, deep pressure, and traction
  - Myofascial tissues are moved to the restrictive barrier

- Myofascial release:
  - Performed in either a direct means where the restrictive barrier is engaged or an indirect means where the physiological barrier at the ease of direction of tension or release of asymmetry

- Lymphatic techniques:
  - Help improve lymphatic flow
  - Must first eliminate somatic dysfunction through above techniques as well as muscle energy and HVLA

- Use Osteopathic techniques to encourage proper tissue activity and metabolism
  - Soft Tissue and Myofascial Release of cervical and thoracic region
  - Rib Raising
  - Thoracic Inlet Release
  - Diaphragm release
“Osteopathic Approach to Asthma”
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Soft tissue techniques to cervical spine

Images adapted from Atlas of osteopathic techniques Nicholas and Nicholas

Soft tissue techniques to thoracic region

Images adapted from Atlas of osteopathic techniques Nicholas and Nicholas

Soft tissue techniques to thoracic region

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Soft tissue techniques to thoracic region (upper)

1. The patient lies on the bed in a supine position with the neck slightly flexed, the head turned to the side, the arms resting by the side, and the legs extended on the table.
2. The physician stands at the foot of the table, facing the patient.
3. The physician presses the thumb and index finger against the rib in the thoracic region to palpate the rib.
4. The physician places the thumb and index finger on the rib in the thoracic region and applies pressure to the rib.
5. The physician applies pressure to the rib in the thoracic region using a combination of manual pressure and oscillatory motion.

Soft tissue techniques to thoracic region (lower)

1. The patient lies on the bed in a supine position with the neck slightly flexed, the head turned to the side, the arms resting by the side, and the legs extended on the table.
2. The physician stands at the foot of the table, facing the patient.
3. The physician presses the thumb and index finger against the rib in the thoracic region to palpate the rib.
4. The physician places the thumb and index finger on the rib in the thoracic region and applies pressure to the rib.
5. The physician applies pressure to the rib in the thoracic region using a combination of manual pressure and oscillatory motion.

Rib Raising

1. The patient lies on the bed in a supine position with the neck slightly flexed, the head turned to the side, the arms resting by the side, and the legs extended on the table.
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Myofascial Release of Cervical and Thoracic regions

Myofascial Release of Thoracic region

Pectoral Traction - Lymphatic technique
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**Lymphatic Techniques - Continued**

Images adapted from Atlas of osteopathic techniques Nicholas and Nicholas

**Lymphatic Pump**

Images adapted from Atlas of osteopathic techniques Nicholas and Nicholas

**Lymphatic Pump-Thoracic**

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Diaphragm Doming

References


