My Breath is Barely There!

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for
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Objectives

• Define asthma
• Describe pathophysiology
• Identify asthma “triggers”
• Describe the assessment of the asthma patient
• Describe Signs and Symptoms
• Identify appropriate pre-hospital treatments
Case 1

- 32 year old female
- Chief complaint of shortness of breath
- Assessment: audible expiratory wheezes, HR: 114, RR: 28, BP: 144/92, SAO2: 88%
- How severe an asthma exacerbation is this?
- What would be your treatment?
Asthma

• A diffuse airway disease
• Result of partial or completely reversible bronchoconstriction
• Very prevalent medical condition worldwide
  – In US, 20 million reports of symptoms compatible with asthma
  – 4000 – 5000 deaths per year
  – Over 300 million people worldwide have asthma
It’s Not So New

• First written description found in the Ebers Papyrus (circa 1500 BC)
  – 110 page scroll of Egyptian medicines
  – Listed treatment as inhaling vapors of Henbane
It’s Not So New

• Maimondies wrote a treatise on asthma
• Some of his findings include
  – No magic cure for asthma
  – Asthma often starts with a common cold during the rainy season
  – Air pollution in Cairo may in part be responsible

• Written in the 12th Century!
It’s Not So New

• Asthma, as a descriptive word for shortness of breath first appeared in the Iliad of Homer

• Early 1800’s started to be understood as a medical disease explained through its pathology.
  – Thank you Paris Hospitals
Pathophysiology

- Reduction in airway diameter
- Three major components
  - Airway inflammation
  - Intermittent airflow obstruction
  - Bronchial hyper responsiveness
Inflammatory Response

• Inflammatory Cells
  – Mast Cells
  – Eosinophils
  – Macrophages
  – Activated T lymphocytes

  • Play an important role in regulation through the release of numerous cytokines
Intermittent Airflow Obstruction

• Bronchi and bronchioles very responsive to irritants
  – Leads to bronchoconstriction, edema, increased secretion of mucous.
    • Mucous plugs

• May totally or partially block the airway
How Does this Present?

- Pulmonary Function Changes
  - Increased work of breathing
  - Abnormal distribution of pulmonary blood flow
  - Bronchospasm/Bronchoconstriction cause wheezing
They must be doing better, I can’t hear anything?
Air Trapping

• Air passes into the areas distal to the obstruction

• Exhalation is a passive process
  – Less force is available to move air out
  – Forced expiration often collapses the bronchial wall
  – Residual volume increases
  – Becomes harder and harder to inhale or cough to remove mucous.
Proof This Stuff Makes Sense

• Over time, asthma can damage tissues
• Autopsy findings in asthma fatalities
  – Increased smooth muscle mass in the airways
  – Increased wall thickness
  – Increased inflammation
Types of Asthma

• Extrinsic
  – Immune response to inhaled irritants that the patient has an allergy to.
  – Onset of extrinsic asthma is usually in childhood or early adolescence.
Types of Asthma

• Intrinsic
  – Response to stimuli other than allergies that initiate the attack
    • Infections
    • Cold air
    • Exertion
    • Medications
    • Stress
    • Cigarette smoke
    • Occupational exposure
Occupational Asthma

• Asthma as a result of workplace stimuli
  – Patients will often worsen in the workplace

• One of the most common occupational lung diseases in developed countries
Asthma Triggers

- Viral URI’s
- Smoking
- Non-compliance
- Emotional stress
- Weather changes
- Heavy allergen exposure
- Air pollution
Air Pollution

• Remember Maimondies? Bet he was right!
Case 2

• 28 year old female
  – Chief complaint of tightness in chest and difficulty breathing.
  – Assessment: Loud expiratory wheezes audible without auscultation, speaking single words only, dyspnea, pale, oxygen saturation is 67% on room air, HR – 128, RR – 28, labored

• How severe an asthma exacerbation is this?
• What would be your treatment?
Case 2 Continued

• Patient administered 100% oxygen and provided albuterol/atrovent svn, x2 20 minutes apart.

• Follow up assessment reveals oxygen saturation is not improving, increased work of breathing, decreased lung sounds in all fields, alterations in mentation

• How severe an asthma exacerbation is this?

• What would be your treatment?
Assessment

• Pretty obvious
  – Do they have an airway that is maintainable?
  – Is their breathing productive?
  – What is the pulse like?
  – Vital signs, to include pulse oximetry and ETCO2.

• ASSESSMENT MUST BE CONTINUOUS
History

• You must know the history and medications of asthma patients.
• Most people with asthma are aware of their condition and can adequately self manage an attack.
• Usually on a regimen of medications to control various stages of an attack.
Home Asthma Medications

- Albuterol
- Atrovent
- Xopenex
- Glucocorticosteroids
- Advair
- Pulmacort
- Singular
- Theophylline
Home Remedies

- Steambaths
- Honey in a glass of water 3 times per day
- Garlic cloves boiled in milk once per day
- Ginger tea with garlic cloves
- Mustard oil and camphor rubbed on back
- Licorice root tea
- Dried grapes, soaked in milk overnight, then chew
- Chewing fennel
- Pomegranate
Don’t Forget These!

• Allergies
  – Prescription
  – OTC
  – Homeopathic
  – Illegal???

• Last oral intake

• Events leading up to the crisis
Assessment
Assessment Findings

• Generally dyspneic, scared, sweaty
  – If they are solemn, expect a crash!
• Tripoding
• May have a non-productive cough
  – What would we like to see?
• Tachycardic and tachypneic
• Wheezes
  – Not all that wheezes is asthma!
Wheezing

• Are they wheezing on expiration, inspiration, or both?
Lung Sound Assessment

• One of the most important and difficult skills you must master.
• You have to know:
  – Where to place the stethoscope
  – Identify various sounds
  – Know the potential problems the lung sounds indicate
  – How to properly address their presence in the field
Lung Sound Assessment

- Normal
- Wheezes
- Stridor
- Rales
Lung Sound Assessment

- Normal
- Wheezes
- Stridor
- Rales
Lung Sound Assessment

- Normal
- Wheezes
- Stridor
- Rales
Lung Sound Assessment

- Normal
- Wheezes
- Stridor
- Rales
Accessory Muscle Use
Accessory Muscle Use

- May be obvious
- May be not so obvious
  - Put a hand on their abdomen
Pulsus Paradoxus

• Refers to the loss or diminishing strength of the radial pulses on inhalation.
• Air trapping will cause an increase in the pressure inside the chest.
• Increased pressure on the vena cava reduces blood flow to the heart.
• May note this condition upon assessment of the patients blood pressure.
Capnography

• Excellent assessment tool!
  – Instantaneous assessment of the patient
Capnography in Asthma

- The expiratory plateau should be flat.
- Inflammation - will be squared
- Bronchospasm - will be curved
Capnography in Asthma

• Valuable triage tool
  – Can measure severity
  – Can be used for trending.

• A square waveform does not indicate bronchospasm.
  – Carefully assess the side effects of a bronchodilator.
Case 3

- 8 year old male
- Chief complaint is severe difficulty breathing
- EMS arrives and finds patient face down in the hallway of the residence
- Patient has a history of asthma and numerous allergies. Prescribed several MDI’s and Epi-Pen.
- Patient is pulseless, no respirations, peripheral and central cyanosis noted.
Case 3 continued

• Presenting rhythm is V-fib
  – 2 minutes of chest compressions performed
  – EMT-I crew is on call, performed shock with SAED.
    • After initial shock, patient converts to asystole
    • Requested Paramedic intercept

• What is the underlying cause?
• What would you do?
Status Asthmaticus

• Progressive respiratory distress due to asthma where conventional therapy has failed.

• Essentially, any patient who is not responding to initial appropriate doses of inhaled bronchodilator agents can be classified.

• Life threat = aggressive treatment
Acid – Base Changes

• Initial hyperventilation causes increased $\text{CO}_2$ elimination.
Extra Hospital Stuff

• ABG’s
  – Might help
  – Supplemental oxygen will generally correct hypoxia
  – CO$_2$ might be elevated or decreased
    • A steadily rising PaCO$_2$ can indicate impending respiratory collapse.
  – Changes in pH
Extra Hospital Stuff
Airway

• Hopefully they are able to maintain it
• These patient may cough up mucus
  – This is a good thing
• Advise medical control of airway problem ASAP!
Breathing

• These patients may already oxygen starved
• Don’t hold back?
• Don’t be afraid to assist them

• BUT WAIT!!!!
Alternative Therapy

• Continuous Positive Airway Pressure
•
Oxygen

• All oxygen should be humidified (if possible)

• Humidified oxygen will help to loosen mucous
INHALE 2 PUFFS BY MOUTH EVERY 4 HOURS RECTALLY

VENTOLIN HFA 90 MCG INHALER
Other Medications

• Albuterol
  – Bronchodilator
  – Adult dosage
    • 2.5 mg (0.5 ml of a 0.5% solution mixed with 2.5 ml of normal saline) via a SVN.
    • May give up to 5.0 mg
  – Pediatric dosage
    • 2.5 mg (0.5 ml of a 0.5% solution mixed with 2.5 ml of normal saline) via a SVN.
Other Medications

• Ipratropium (Atrovent®)
  – Anticholinergic
  – Indicated for bronchial asthma and reversible bronchospasm in COPD
  – Dosage
    • Administer in conjunction with beta agonist therapy
    • 0.25 – 0.5 mg
Corticosteroids

- Emerging trend in pre-hospital medicine
- Solumedrol or Prednisone added to the scope
- Not an immediate solution, but will help the patient later.
- 125mg IV solumedrol or 60 mg of Prednisone
Corticosteroids

- Inhibit inflammation of the airway
- Blocks leukotriene synthesis
- Inhibit cytokine production
- Blocks the late response to inhaled allergens
Prednisone

• Contraindications
  – Systemic fungal infections
  – Hypersensitivity

• Interactions
  – Additive hypokalemia with thiazides and loop diuretics.
  – May increase requirements for insulin or oral hypoglycemic agents in diabetics.
  – Phenytion, phenobarbital and rifampin may decrease effectiveness.
Corticosteroids

• Why give it?
  – Early use often aborts exacerbation
  – Reduces likelihood of hospital admission
  – Reduces chances of relapse
  – Improves recovery rate
Other Medications

• Epinephrine
  – Sympathomimetic
  – Indicated for severe bronchospasm, bronchospasms unresponsive to albuterol
  – Dosage
    • Adults: 0.3 mg 1:1,000 SQ or IM (if pre-filled device)
    • Adults: 0.3 mg 1:1,000 IV or 1 mg if severe or no response to SQ/IM
    • Pediatric: 0.01 mg/kg 1:1,000 SQ (max 0.3 mg/dose)
Magnesium

• Bronchodilator
• Does not replace other medications
• 1 to 2 grams IV over 30 minutes
Summary

• Assess
• Reassess
• Albuterol
• Ipratropium
• Corticosteroids
• Call Medical control for further options on long transport times
Thank You!

Life is not measured by the number of breaths we take, but by the moments that take our breath away.