

All That Wheezes Is Not Asthma

—Chevalier Jackson, MD (1865-1958)

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Poll: Which EMT med(s) could be useful for wheezing?

- Oxygen
- Oral glucose
- Metered dose inhaler bronchodilator
- Epinephrine auto-injector

• Nitroglycerin

Wheezing

- Sound: sign, not diagnosis
 - Musical vibration of approximated medium-sized airway walls
- Vague and broad by laypeople
 - 20% aware of wheezing, 6% dx asthma (Dodge and Burrows, 1980)

A&P of airways

- Levels
 - Diameter, collapsability varies
 - Wheezing needs sufficient flow
 - Flow relates to length and $1/r^4$

- Layers
 - Vulnerability varies
 - Secretions and exudate are luminal
 - Edema is interstitial and/or luminal

Breath Sounds

- Bronchial
- Vesicular
- Adventitious

Sound Suggests Position

LOCATION	ADVENTITIOUS SOUND
Upper airway	Stridor (inspiratory) Crowing (expiratory)
Medium airways	Wheezing (I &/ E) Rhonchi (E > I)
Alveolar	Grunting (expiratory) Rales (I &/ E)

Other Characteristics

- Pitch relates to degree of obstruction
 - Sibilant rhonchi
- Tone suggest level of involvement
 - Chord vs. note
 - Monotonal
 - Polyphonic

Phasic Correlation

- Inspiratory - extrabronchial obstruction
 - Paninspiratory, holinspiratory
 - End-inspiratory
 1. Expiratory - bronchopulmonary narrowing

Airway Caliber During Breathing

Phase	Patent	Upper Airway Obstruction
Inhalation	Dilation	Constriction
Exhalation	Constriction	Dilation

Airway Lumen Narrowing

- Bronchoconstriction
 - Inflammatory
 - Secretions

- Bronchospasm

Conditions That Wheeze COPD

- Blend of chronic and episodic obstructions
- Spasm, sputum, swelling
- Emphysema
- Chronic bronchitis
- Asthma
 - Reactive airway dz in infants
- Tx: position, low/high oxygen, bronchodilators (MDI, epi)
 - Nebulizer Tx and FiO₂

Pulmonary Edema

- Abnormal lung tissue fluid accumulation
- Wheezing precedes rales (“cardiac asthma”)
- Usually cardiogenic
 - Orthopnea, PND, other edema, # pillows?
 - Cardiac Rx, diuretics, ACE-inhibitors

- Tx: upright, no exertion, high FiO₂, NTG
- ### Inhalation Injury

- Super heated gas, smoke, cigarettes, chemical fumes
- Irritate, inflame, inability to clear secretions
- Carbon monoxide and other toxins

- Tx: airway, oxygen

Allergy

- Multiple airway layer effects, like COPD
 - Chronic: atopy
 - Episodic: e.g., post-nasal drip syndrome
 - Asthma risk

- Anaphylaxis

- Tx: airway, oxygen, epinephrine, MDI

Yeah, there are others...

- Aspiration
 - Carcinoma
 - Cystic fibrosis
 - Epiglottitis
 - Infection/pneumonia
 - Pulmonary embolism
 - Retropharyngeal abscess
 - Tracheomalacia
 - Vocal cord dysfunction
- ### Treatment Issues Oxygen Judiciously
- Oxygen is a drug

–How much? Just enough.

- Hypoxic drive and COPD
- Hyperoxia and oxidative stress injury
 - SpO₂ 94-99%

Clinical Monitoring

- “Their wheezing is getting better.”
 - Less is not always better
- Describe
 - Patient’s level of dyspnea, distress
 - Wheeze intensity, phase, tonicity, duration
- Respiratory distress vs. failure

External Monitoring

- Pulse oximetry
 - Limitations
 - Saturation vs. oxygen carrying capacity
 - Anemia vs. the “blue bloater”

- Co-Oximetry

- Capnography

Heliox

- 21% oxygen and 79% helium, other blends
- Used medically since 1930’s
- Eases WOB in COPD
 - Encourages laminar over turbulent flow
 - Turbulent flow in larger airways eased by lighter density
- Useful in severe asthma
- Expensive, displaced by bronchodilator Tx

Samter’s Syndrome

- Triad of
 - Aspirin sensitivity
 - Asthma
 - Nasal/ethmoidal polyposis

- Adult onset

- Progressive rhinitis → asthma → anaphylaxis

Let’s Review

- Wheezing is a sign indistinct to laypeople
- Flow, phasic and phonic characteristics
- Indicates luminal narrowing
- Treatment tailored to underlying cause
 - Prompt oxygen isn’t harmful, usually helpful
 - Hey, you have a nasal cannula, too!
 - Several medications can be offered