



پیاد اللہ الرحمن الرحیم

# Asthma Diagnosis and Differential Diagnosis

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# Introduction:

- ❑ Approximately 80 percent of children with asthma develop symptoms before five years of age.
- ❑ Coughing and wheezing are the most common symptoms of childhood asthma.

# Introduction:

- ❑ Establishing a diagnosis of asthma involves a careful process of history taking, physical examination, and diagnostic studies.
- ❑ The differential diagnosis of wheezing must be carefully considered, particularly in infants and very young children

# History:

- ❑ The history in a patient with suspected asthma should focus on:
  - Presence of symptoms
  - Typical symptom patterns
  - Precipitating factors or conditions (ie, atopy)
  - Known asthma risk factors

# Symptoms:

- Cough
- Wheezing
- Breathlessness
- Chest tightness

# Cough:

- The most common cause of chronic cough in children older than three years is asthma, even if it is not accompanied by wheezing.
- The cough is typically dry and hacking but may be productive; when the cough is productive, clear or whitish sputum may be expectorated (which often contains eosinophils).

# Cough:

- Nocturnal cough
- A cough that recurs seasonally
- A cough in response to specific exposures (eg, cold air, exercise, laughing, allergen exposure, or crying)
- A cough that lasts more than three weeks should raise the suspicion for asthma.
- Although wheezing is considered the hallmark of childhood asthma, cough is frequently the sole presenting complaint.





# Wheeze:

- On many occasions, the word "wheezing" is used as a general term to describe noisy breathing
- The most likely diagnosis in children with recurrent wheezing is asthma
- However, other diseases can present with wheezing in childhood
- patients with asthma may not wheeze

# Symptom patterns :

- Intermittent exacerbations superimposed upon an asymptomatic baseline
- Chronic symptoms punctuated by periods of worsening symptoms
- Morning "dipping" (worsening of symptoms and decreased peak flow in the early morning, with improvement as the day progresses)

# Precipitating factors:



cigarette smoke



pollen



dust



furry pets



changes in the weather



colds



exercise



cockroaches



food allergies



cold weather



strong smells

# Additional History:

- Personal history of asthma and atopy
- Family history of asthma and atopy
- Environmental history
- Past medical history
- Asthma co morbid
- Medication use
- School attendance
- Psychosocial factors



## Environmental history for the child with asthma

Passive tobacco smoke exposure (house, car, daycare)
Siblings and ages
Wood-burning stoves and ventilation system
Animals (dogs, cats, birds, furry pets); where animals reside and how often they are in the house or in the patient's bedroom
Leaky plumbing, recent flooding, obvious mold, mildew in any part of the house
Method of heating, cooling; is there an evaporative cooler? window air conditioner?
Patient's bedroom: type and age of mattress, bedding, window-coverings, flooring, dust-collecting items, stuffed animals and how often laundered

# Physical exam:



- ❑ Usually normal
- ❑ During exacerbation or in severe disease:
  - (Wheezing, Tachypnea, ...)
  - Rhonchi and rales can sometimes be heard, resulting from excess mucus production
  - Nasal exam- polyps
  - Level of wheezing (high, low)

# Features that favor the diagnosis of asthma:

- Intermittent episodes of wheezing that usually are the result of a common trigger
- Seasonal variation
- Family history of asthma and/or atopy
- Good response to asthma medications
- Positive asthma predictive index



# Features that suggest a diagnosis other than asthma:

- Poor response to asthma medications
- A history of wheezing since birth
- Wheezing associated with feeding or vomiting
- A history of choking
- Wheezing with little cough

# Features that suggest a diagnosis other than asthma:

- Symptoms that vary with changes in position
- Poor weight gain and recurrent ear or sinus infections
- History of progressive dyspnea, tachypnea, exercise intolerance, and failure to thrive suggest interstitial lung disease.

# Diagnosis:

- ❑ A history of intermittent or chronic symptoms typical of asthma plus the finding on physical examination strongly point to a diagnosis of asthma.
- ❑ Confirmation of the diagnosis of asthma is based on three key additional elements :
  - The demonstration of variable expiratory airflow limitation, preferably by spirometry, when possible.
  - Documentation of reversible obstruction
  - Exclusion of alternative diagnoses

# Laboratory and imaging studies: :

- Spirometry
- peak flow measures
- Allergy skin testing
- radioallergosorbent test (RAST)
- chest radiograph
- exhaled nitric oxide analysis
- sputum for eosinophilia

# Radiographic studies:



- ❑ A (PA) and lateral chest x ray radiograph are usually indicated
- ❑ In mild asthma, the chest radiograph is normal
- ❑ In more severe, signs of air trapping may be seen:
  - hyper lucency
  - flattening of the diaphragms
  - increased AP diameter
  - horizontal positioning of the ribs





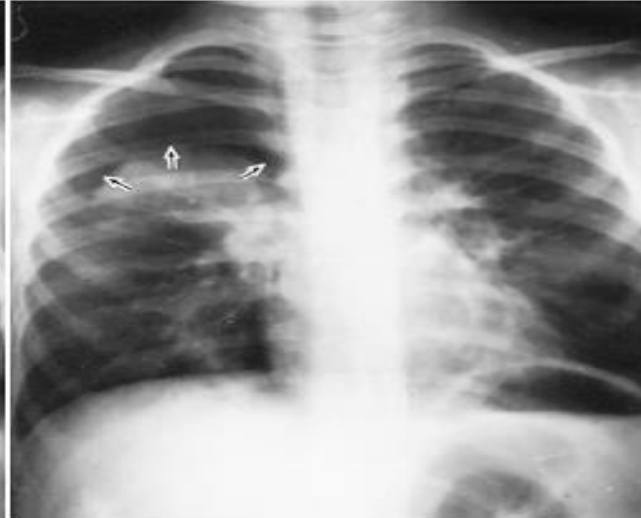
A



B



C



D

# Lung Function Abnormalities in Asthma:

- ❑ Spirometry (usually feasible in children >5yr of age)
- ❑ Many of whom can have near-normal or even supra-normal airflow despite having the other hallmarks of moderate to severe disease.

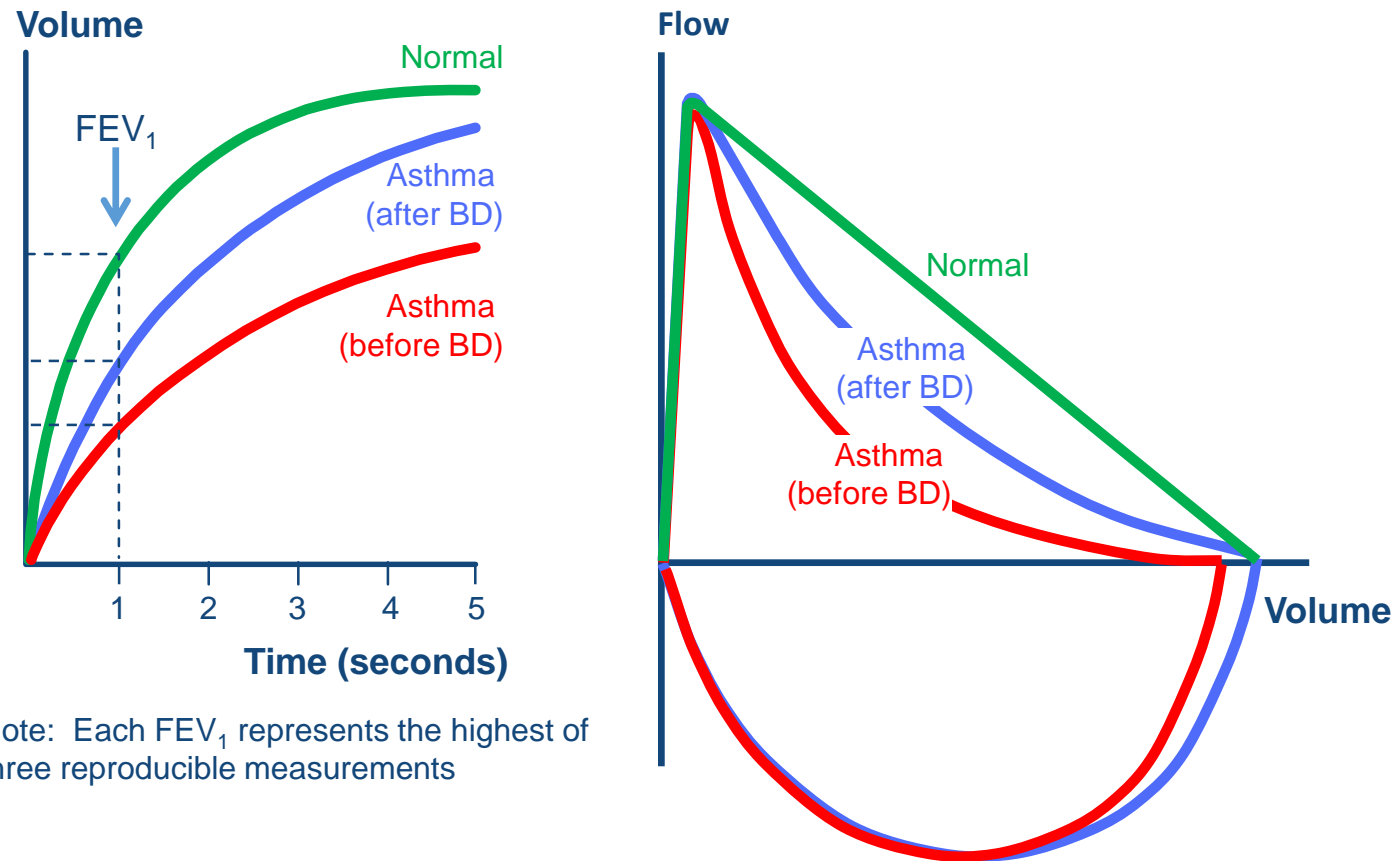




# Lung Function Abnormalities in Asthma:

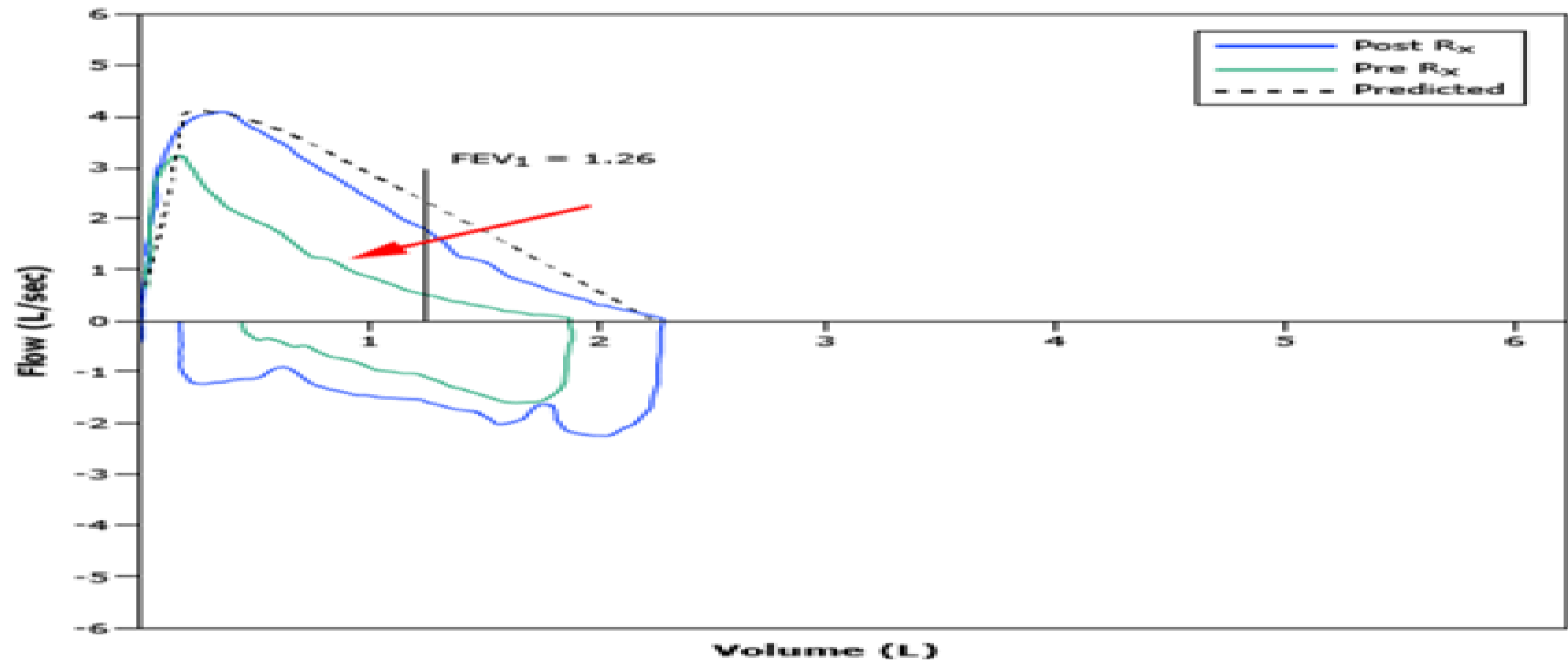
- Low FEV1 (relative to percentage of predicted norms)
- FEV1/FVC ratio  $<0.80$
- Bronchodilator response to inhaled  $\beta$ -agonist (Improvement in FEV1  $\geq 12\%$  or  $\geq 200$  mL)
- Exercise challenge Worsening in FEV1  $\geq 15\%$
- Daily peak flow or FEV 1 monitoring: day to day and/or AM-to-PM variation  $\geq 20\%$

## Typical spirometric tracings



Note: Each FEV<sub>1</sub> represents the highest of three reproducible measurements

# Obstructive defect on spirometry in a nine-year-old child



Spirometry		Predicted		Observed		Observed		Percent change
Parameter	Units	value		Pre*	% Pred	Post†	% Pred	
FVC	L	2.23		1.92	86	2.30	103	20
FEV <sub>1</sub>	L	1.95		1.26	65	1.81	93	44
FEV <sub>1</sub> /FVC	%	89		66	---	79	---	---

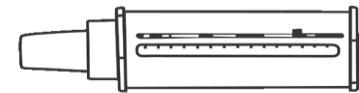
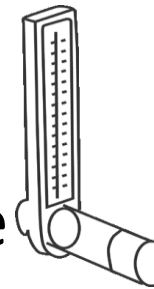
# Exhaled nitric oxide (feno):

- A value of >20 ppb supports the clinical diagnosis of asthma in children
- FeNO can be used to predict response to ICS therapy:
- <20 ppb: Unlikely to respond to ICS because eosinophilic inflammation unlikely
- 20-35 ppb: Intermediate, may respond to ICS
- >35 ppb: Likely to respond to ICS because eosinophilic inflammation is likely



# Peak Flow Meter:

- A device used to measure how air flows from your lungs in one “fast blast.”
- children with poor symptom perception
- peak flow measurements alone should not be used to diagnose asthma.
- Peak flow measurements may be more useful in monitoring a patient's symptoms and response to therapy over time moderate to severe asthma



# Allergy Testing:

- Indoor Allergen
- Outdoor Allergen
- Food Allergen



Table 78-1. Differential Diagnosis of Cough and Wheeze in Infants and Children

Upper Respiratory Tract	Middle Respiratory Tract	Lower Respiratory Tract
Allergic rhinitis	Bronchial stenosis	Asthma
Adenoid/tonsillar hypertrophy	Enlarged lymph nodes	Bronchiectasis
Foreign body	Epiglottitis	Bronchopulmonary dysplasia
Infectious rhinitis	Foreign body	<i>Chlamydia trachomatis</i>
Sinusitis	Laryngeal webs	Chronic aspiration
	Laryngomalacia	Cystic fibrosis
	Laryngotracheobronchitis	Foreign body
	Mediastinal lymphadenopathy	Gastroesophageal reflux
	Pertussis	Hyperventilation syndrome
	Toxic inhalation	Obliterative bronchiolitis
	Tracheoesophageal fistula	Pulmonary hemosiderosis
	Tracheal stenosis	Toxic inhalation, including smoke
	Tracheomalacia	Tumor
	Tumor	Viral bronchiolitis
	Vascular rings	
	Vocal cord dysfunction	

### Box 1: Differential diagnoses of asthma.

<b>Upper airway</b>
Vocal cord dysfunction Allergic rhinitis and sinusitis Tracheobronchomalacia Tracheal stenosis
<b>Lower airway</b>
Chronic obstructive pulmonary disease Allergic bronchopulmonary aspergillosis Endobronchial obstruction from mass or foreign body Churg–Strauss syndrome Obliterative bronchiolitis
<b>Cardiovascular</b>
Congestive heart failure Pulmonary embolism Pulmonary hypertension
<b>Gastrointestinal</b>
Gastro-oesophageal reflux disease
<b>Psychiatric</b>
Anxiety Panic attacks



## معرفی بیمار:

دختر ۱۰ ساله با شکایت از سرفه مکرر و خس خس سینه بدون تنگی نفس از ۱ سالگی به شما مراجعه کرده است علایم بدنبال سرماخوردگی حدود ۲ ماه طول میکشد و در تماس با بوهای تند تحریک میشود. در فواصل سرماخوردگی مشکلی ندارد. سابقه آسم و آلرژی در خانواده ندارد.

# سوال ۱:

کدامیک از موارد زیر در شرح حال بیمار به ضرر تشخیص آسم است؟

الف) سرفه مکرر و خس خس سینه بدون تنگی نفس

ب) شروع علایم از ۱ سالگی

ج) نداشتن سابقه آسم و آلرژی در خانواده

د) سرفه مکرر و طولانی بدنبال سرماخوردگی

## سوال ۲:

کدامیک از موارد زیر در شرح حال یا معاینه در صورت وجود به ضرر تشخیص آسم است؟

- الف) شروع علایم از ابتدای شیر خوارگی
- ب) سابقه عفونت مکرر سینوس و اختلال رشد
- ج) وجود سیانوز پایدار در معاینه بدون دیسترس تنفسی
- د) سرفه مکرر و طولانی بدنبال سرماخوردگی

## سوال ۳:

کدامیک از علایم زیر شایع ترین یافته مورد انتظار در معاینه بیمار است؟

- الف) سمع نرمال ریه
- ب) ویزینگ دو طرفه
- ج) کاهش صدای دو طرفه
- د) رتراکشن ساب کوستال

## سوال ۴:

کدامیک از موارد زیر شایع ترین یافته رادیولوژیک مورد انتظار در کلیشه قفسه سینه ی بیمار است؟

الف) پرهوایی دو طرفه

ب) نرمال

ج) آتلکتازی لوب میانی ریه راست

د) ارتشاح پری برونکیال دو طرفه

## سوال ۵:

کدامیک از موارد زیر در اسپرومتری به نفع تشخیص آسم است؟

الف) افزایش  $FEV1 \geq 15\%$  بدنبال ورزش

ب) افزایش  $FEV1 \geq 12\%$  بدنبال برونکودیلاتور

ج) نسبت  $FEV1/FVC \geq 0.80$

د) افزایش  $FEV1 \geq 20\%$  بدنبال متاکولین

