Pediatric Respiratory cases

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Respiratory Case 4

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Case 4

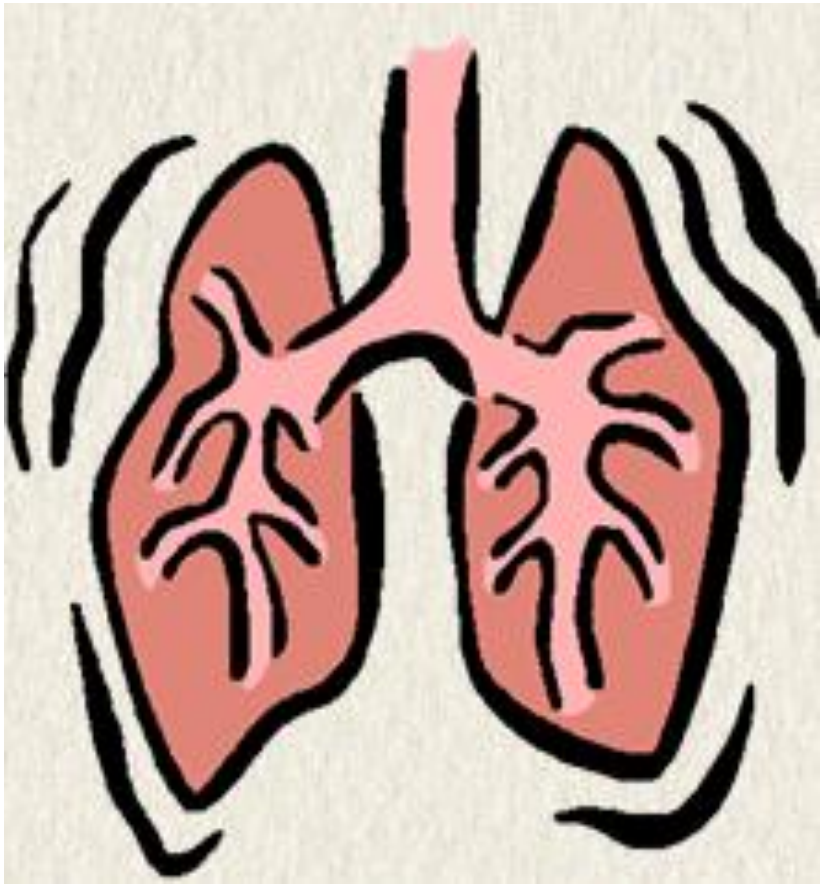
- A 10 year old child coming to the chest clinic with the following complaints :

Wet (productive cough) for 2 months duration

Question 1

1-What are important questions you should ask in history ?

Mention anything relevant in :HOI,ROS,Past medical ,Birth ,Social , Vaccination, drug hx



Discussion for Q 1:

Q1:History of Present illness

1.Analysis of cough :

Onset : gradual or sudden : in this child it was gradual

Duration : 2 months

Course : The cough progressed in frequency and intensity over past 5 days

Nature : wet ,productive with sputum

Sputum: large amount (small cup),yellowish in color sometimes greenish , foul – smelling ,worse when wakes up in the morning.

Heamoptysis : blood tinged sputum observed last 2 days

Severity of cough: The cough continuous day and night awakens child from sleep ,disturbs daily activity and appetite ,sometimes associated with post -tussive vomiting .

Diurnal Variation : mostly during the day but frequently awakens him from sleep over past 5 day

Aggravating factors : worse with exercise ,worsens with intercurrent URTI

Relieving factors : Relieved only temporarily for few days with a course of oral Antibiotics (Amoclan)

Q1:History of Present illness

2.Associated symptoms:

1-Dyspnea : noted sometimes following cough in the morning ,or after exercise .Increased over past 2 days

2-Wheeze , not present

3-Chest pain : experienced chest pain specially following cough or after exertion .

4-Cyanosis : No cyanosis

5-URT : frequent purulent nasal discharge ,with blocked nose occasionally ,no sneezing or itching from the nose

6-**FEVER** : Fever ,low grade noted 2 days ago then resolved ,no current fever

No sore throat , No ear pain or discharge at the moment

Q1:History of Present illness

- 3-Relevant Questions :
- 1-Previous similar episodes : child had similar episodes in the past ,frequent ,one episode every two or three months lasting for weeks
- 2-admission to hospital with respiaratory problems : admitted about 5 times over past 5 years with chest infections ,received AB at a local hospital
- 3-Sick contact : a sibling with flue 1 week ago

- 4-Family history : an older brother ,now 17 with multiple episodes of chest infections ,no family hx of asthma in parents or siblings .No hx of neonatal or early infancy deaths (PID)

- 5-Infections in other systems : recurrent GE, skin abscesse ,sepsis ,meningitis ….etc

- Past medical : admitted 5 times to a local hospital with chest infections for IV antibiotics and nebulizers ,no PICU admissions.No definite Dx given to family ,no follow up by respiratory physician yet.

as infant ;had multiple episodes of (bronchiolitis).

- Drug hx: frequent antibiotic oral and 5 times IV in a hospital for chest infections (fever , cough ,SOB)
- Family Hx :

  Parents are cousins (first degree) ,has older brother and younger two sisters .His older brother had frequent chest infections ,his parents are healthy .No family hx of cardiac disease ,DM

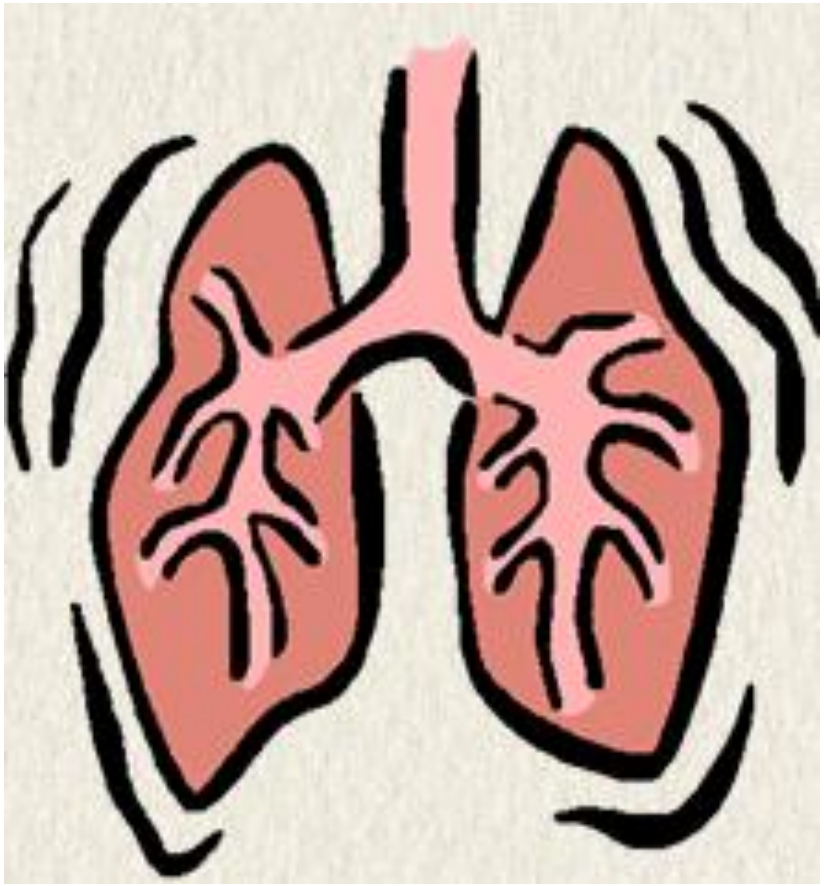
Q1:
Review of Systems

- 1-ENT : positive hx of purulant nasal discharge ,nose blockage ,recurrent otitis media sometimes with discharge. Podtive PND (post nasal drip)
- 2-GIT : frequent heart burn ,vomiting with bad cough , chronic Diarrhea with bulky foul -smelling loose stools .
- 3-Heart : no cyanosis ,no syncopy, no palpitations,no sweating post exercise ,No PND or orthopnea
- 4-Skin : No eczema, skin infections, abscesses
- Other systems : nothing remarkable

- Social : rented house ,average income of middle class , no pets at house ,father smoker ,insured ,father teacher ,mother house wife.
- Vaccination : received usual national vaccine according to age : other vaccine not given : (Influenza vaccine ,PCV :polyvalent conjugated pneumococcal vaccine
- Birth hx : term ,NVD ,no NICU admission. No meconium ilieus .Anti natal : free
- Nutrition : usually good appetite unless sick.No food allergy .not on supplementation.
- Growth : thin not gaining enough weight compared to his class mates . (See growth parameters on P/E)
- Development : Good school performance : 88 % end of term average.

Question 2

-What are important findings you should look for in Physical Examination ?



DISCUSSION FOR Q 2:

Physical Examination :

1- General look :

- The child is alert ,cooperative and well oriented .
- Not dysmorphic .
- No audible breathing sounds ,no cyanosis ,no jaundiced .
- mild pallor
- He looks thin .
- Well hydrtaed

Physical Examination :

- 2-Signs of Respiratory distress :

  He has mild tachypnea ,but no other signs of RD (no retractions no grunting no use of accessory muscle …etc) .
- 3-Vital signs : RR 35 /m (NL for age : 16-30),Pulse rate and blood pressure normal ,afebrile.
- 4-Growth parameters :

  His Wight is below 5th percentile .Height : on 50^{th} percentile . BMI : 13 (below 5^{th} percentile)

Physical Examination :

- 4-Fingers : clubbing found ,no cyanosis
- 5-ENT exam:

positive for PND

Positive for nasal polyposis

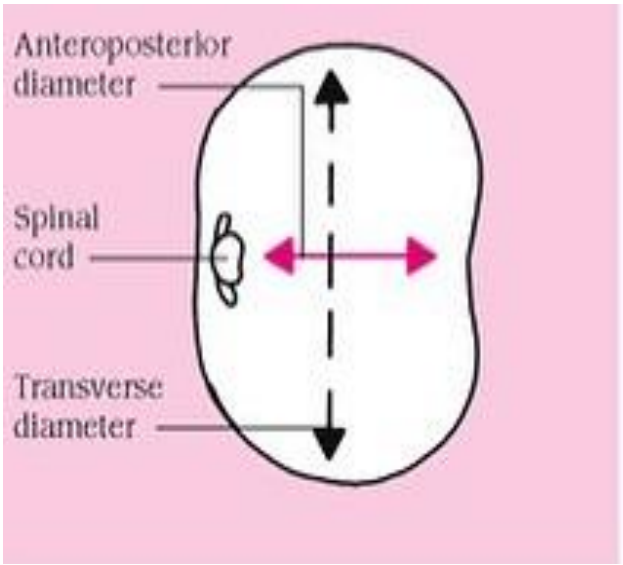
6-Skin : free

Physical Examination :

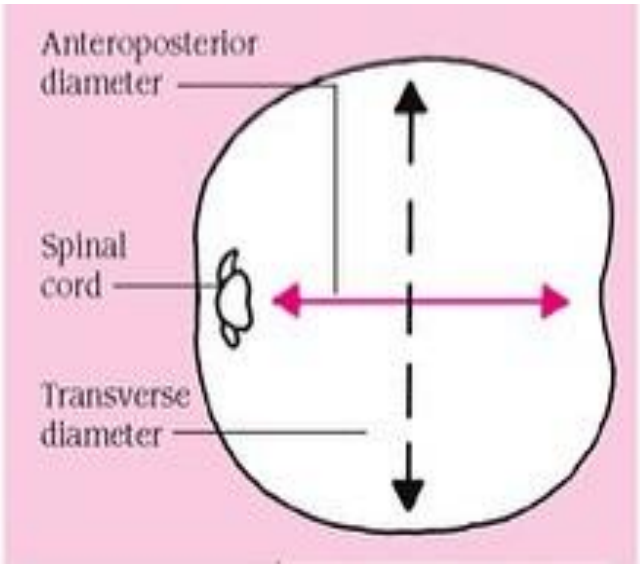
- Chest Examination : perform complete chest examination :
- -Inspection :

  comment if retractions present ,any scars or deformity : if child has increase AP diameter of chest .Any signs of rickets (rosary beads :malabsorbtion)

Barrel chest



Normal

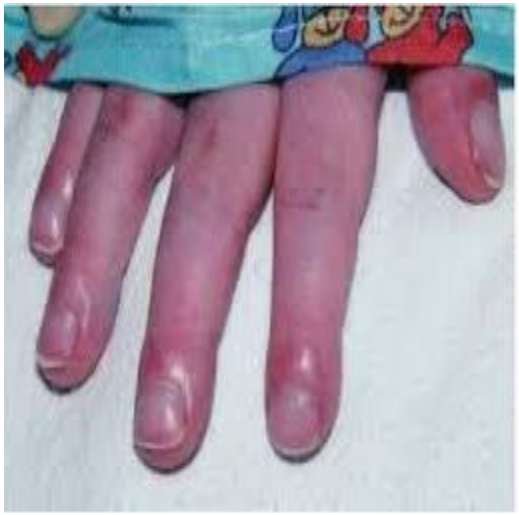


BARREL CHEST

Physical Examination :

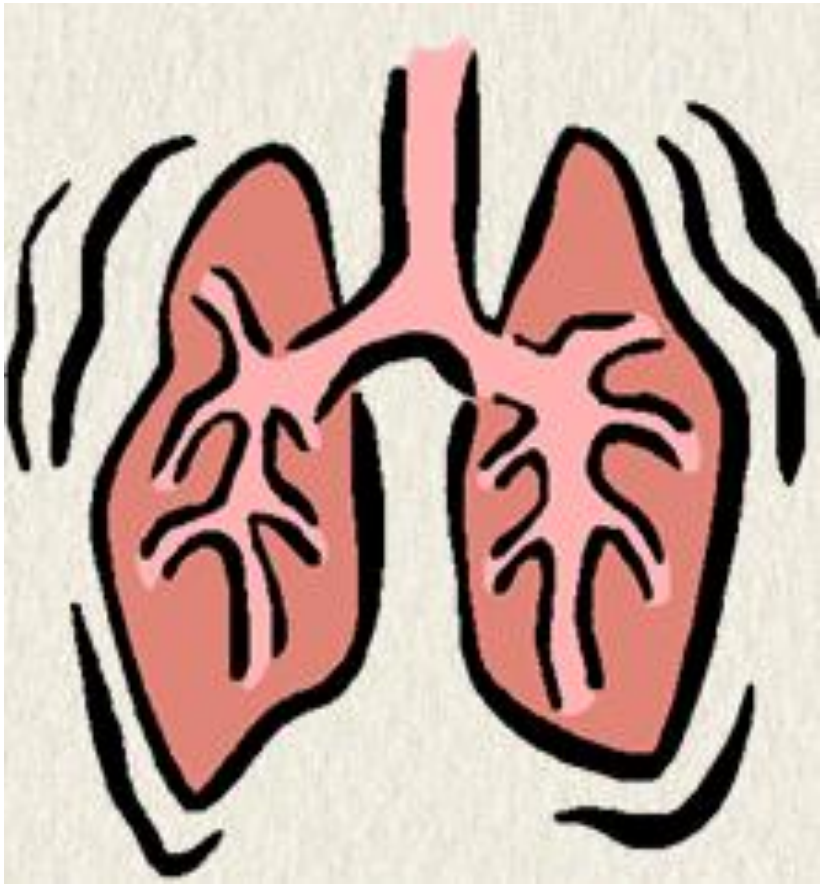
- Percussion : comment on note :resonant
- Palpation: palate for tenderness, tracheal deviation, apex beat and chest expansion.
- Auscultation : child has diffuse coarse inspiratory crepitations(crackles) ,adequate air enrty

Finger Clubbing



Question 3

What important investigation should be performed for this child ?



DISCUSSION Q 3

Work up

- 1-Chest Xray :

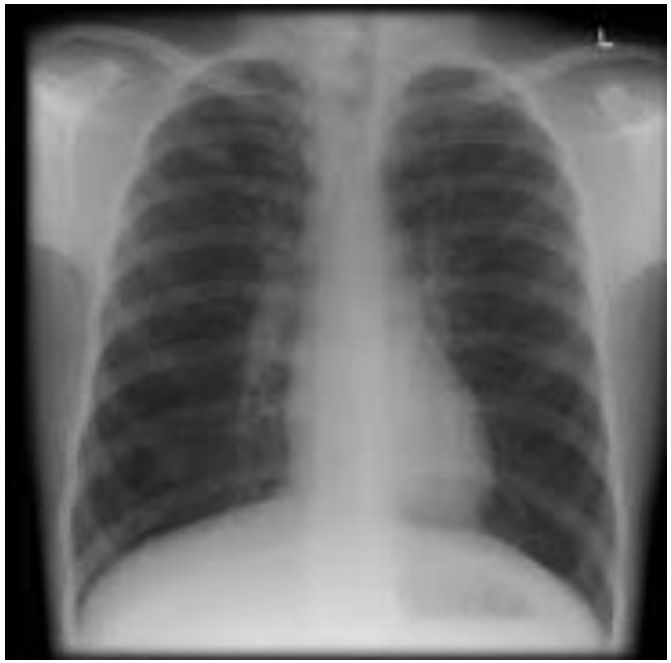
  any child with chronic (more than 4 weeks) productive cough deserves a chest xray :looking for :

-Hyperinflation (diffuse)

- Inflammatory changes : pneumonia,collapse/consolidation
- Dilatation of airways ; bronchiectasis
- Aspiration changes - cardiomagaly

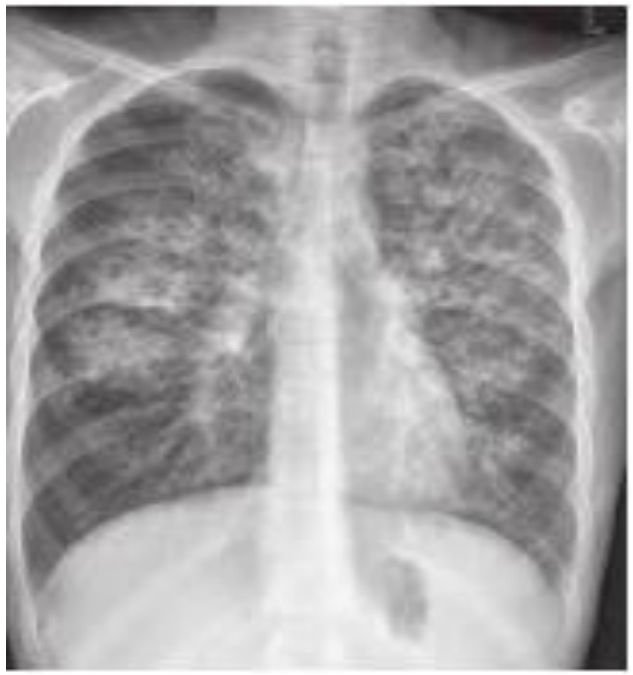
What is your interpretation ?

Early disease :



Diffuse marked hyper inflation with peribronchial thickening

Late disease for similar condition

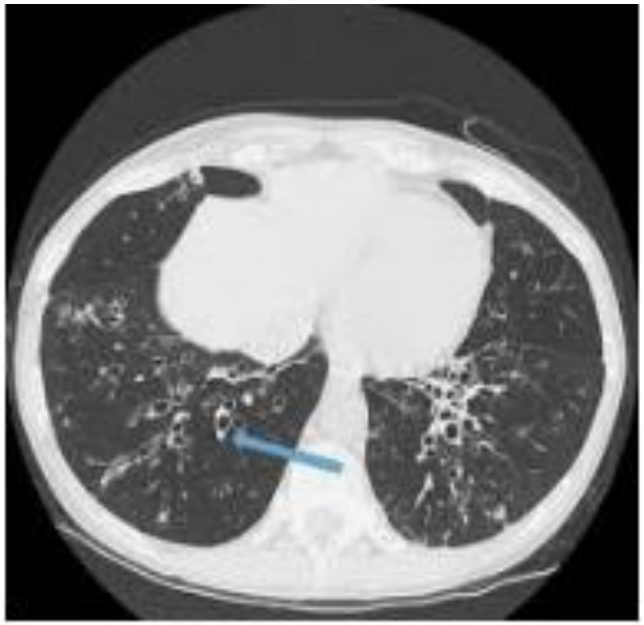


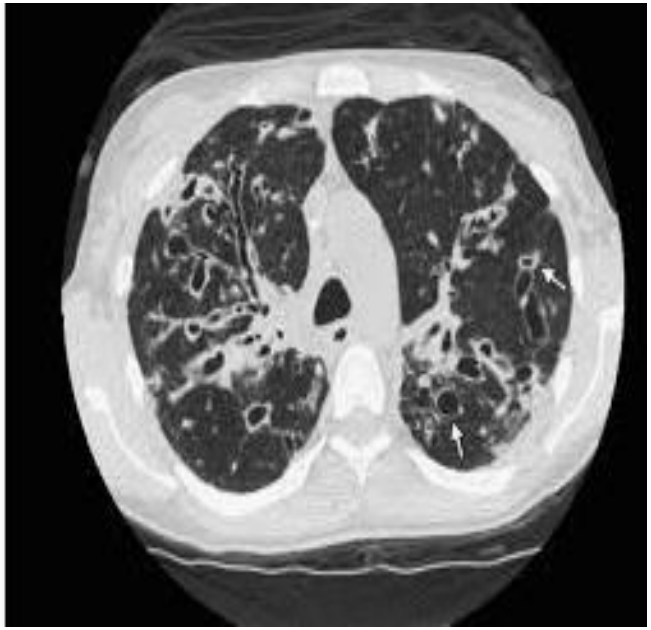
- Severe hyperinflation
- Diffuse Bronchiectasis
- Peri- bronchial inflammation and fibrosis

Work up

- 2 –Chest CT :
- HRCT recommended if child has clubbing ,even with normal or minimal change on CXR why :
- CT is most sensitive for Bronchiectasis not chest x rays .
- Looking for Bronchiectasis , mucus plugging ,consolidation ,fibrosis , lymphadenopathy ,abnormal lung cong anomalies , ….etc

Bronchiectasis on HRCT





Definition of Bronchiectasis on CT :
Bronchoarterial ratio of > 0.8 – 1.0 diagnostic

What is Bronchiectasis ?

- It is a permanent dilatation of the airways ,often due to chronic ,recurrent infection and inflammation of the lower respiratory tract .
- It is an obstructive disease
- It can be congenital or acquired(more common)
- Clinically it causes suppurative lung disease

Work up

- **3- Sputum culture :**
- important for children with productive cough to identify microorganism responsible for airway infection .
- In children spontaneous expectoration of sputum is difficult . Then what to do :
- 1-induced sputum ; give nebulizer wirh HTN 3% then chest physiotherapy
- 2.BAL : bronchoalveolar lavage with flixible bronchoscopy
- 3-Early morning gastric aspirate
- 4-cough swab ,naso- pharyngeal swab : less sensitive

Work up

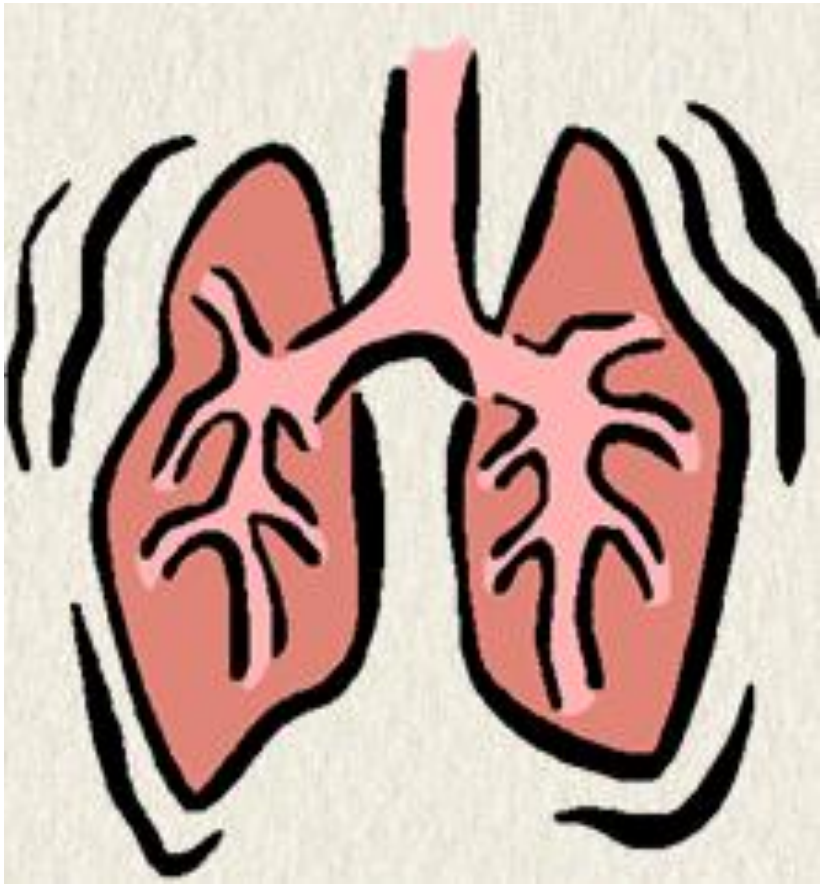
4- Investigations for Failure to Thrive:

CBC ,Film ,PT ,INR ,KFT ,LFT ,Ca PO4

iron studies ,vitamin studies (especially fat soluble :ADEK)

- Celiac screen
- Sweat chloride
- stool for fat , for elastase , stool analysis

What is your DDX so far ?



DDx : causes of Bronchiectasis (suppurative lung disease)

- 1-Cystic Fibrosis
- 2-Primary immune deficiency
- 3-Chronic Aspiration syndrome(neuromuscular disease causing aspirations)
- 4-Post LRTI infections ,and endemic infections : TB ,Adenovirus, Measles , Pertussis,bacterial pneumonua ….
- 5-Severe bronchomalacia

- Bronchial asthma is a DDx of any chronic cough : however unlikely : wet cough , bronchiectasis,clubbing ,FTT

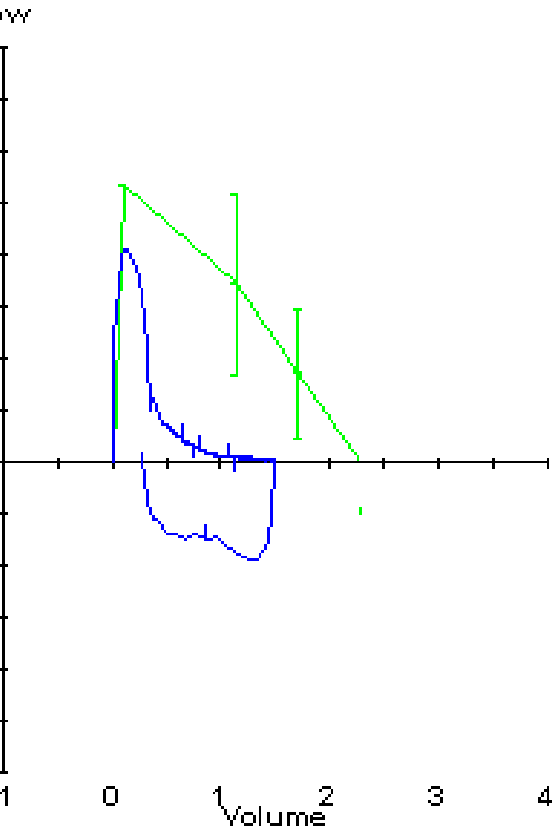
Work up for Bronchiectasis

- We should order investigations step wise.
- 1- Sweat chloride test ; to exclude Cystic fibrosis
- 2-Immune work up ,if sweat chloride negative, ; serum total and specific immune globulins and subclasses , other tests for phagocytic ,T cell or complement disorders may be asked for if necessary .
- 3-Ciliary studies ,brush Bx and E microscopy ,if Primary Ciliary Dyskinesia suspected (family hx, severe ENT infections with nasal polyposis and draining ears, situs inversus,dextrocardia)
- 4-Swallowing studies if aspiration suspected : BA swallow,modified BA swallow,milk scan …etc
- 5-Flixible Bronchoscopy with lavage ,to assess airways
- 6-Test for TB if suspected : PPD , sputum for Mycobacterium PCR

Work Up

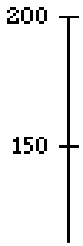
- **5-Lung function test : spiromerty and lung volumes**
- If child older than 7 years
- To demonstrate obstructive pattern : low FEV1,Low FEV1/FVC (< 80 % predicted)
- For follow up and monitor of progression of disease
- In Cystic Fibrosis can be mixed pattern .obstructive and restrictive : low FEV1,Low FEV1/FVC ,low FVC .but predominantly obstructive

CF child with mixed pattern on PFT



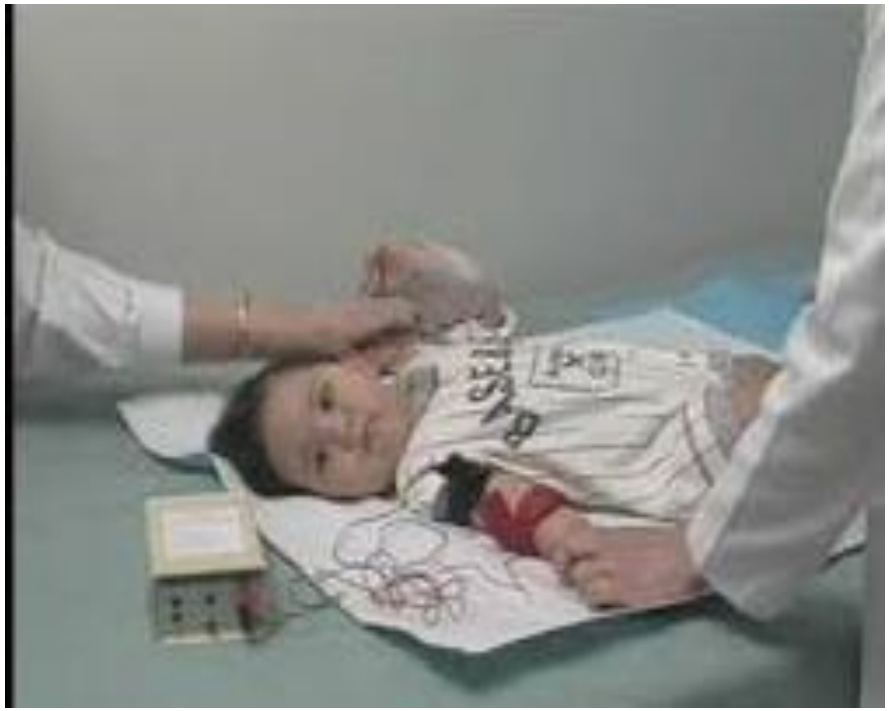
Spirometry

		Ref	Pre Meas	Pre % Ref	Post Meas	Post % Ref	Post % Chg
FVC	Liters	2.28	1.49	65			
FEV1	Liters	2.14	0.81	38			
FEV1/FVC	%	86	54				
FEF25-75%	L/sec	2.53	0.22	8			
FEF50%	L/sec	3.42	0.32	9			
PEF	L/sec	5.31	4.72	89			



- The child work up came back as :
- Sweat chloride: 110 meq/L (normal < 30)
- Elastase in stool low
- Sputum cx : pseudomonas aurginosa
- Blood work : malnutrition with low iron and vitamin levels
- PFT : moderate obstruction FEV1 60% predicted

Sweat chloride Test



What is your diagnosis

Cystic Fibrosis

Note : Genetic testing **PCR** for **CFTR- gene** mutations should be performed when available for CF

What are the main line of treatment

Please refer to relevant lecture and resources for more details

- Main lines of treatment :
- 1-Multidisciplinary care : respiratory ,ENT ,GI ,Dietitian ,Respiratory therapist ,social worker ,Endocrinology, Cardiology …etc.Regular follow up every 3 months

- 2-Education and counseling for child and family

- 3-Respiratory Therapy :
- Daily Chest physiotherapy techniques
- Daily mucolytic therapy ,nebulized NS and HTN ,(nebulized Dornase alfa if available …)
- Inhaled bronchodilators ,Inhaled GCS
- Frequent courses of oral or Nebulized Antibiotics as per sputum culture
- Long Courses of IV antibiotics routinely every 3 or 4 months and upon acute exacerbations .
- Follow up sputum cx and Spirometry every 3 months

- 4- GI care :
- Optimize nutrition
- Vitamin supplementation
- Pancreatic replacement enzymes
- High calorie-diet
- Sodium chloride added to food when necessary
- Anti-reflux medications when needed
- 5-ENT : nasal irrigation ,AB ,nasal steroids
- 6-Screan for possible complications like IDDM when appropriate .

Summary

- Child presents with chronic wet cough.
- **Clinical diagnosis** : suppurative lung disease(clubbing,crackles,FTT,hyperinflation)
- **Radiological Dx :** Bronchiectasis
- **Underlying Disease**:

Cystic Fibrosis

Thank you