Respiratory tract infection

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Respiratory tract infection in children

- To know how common this problem in pediatric medicine.
- How to differentiate between upper respiratory tract infection and lower respiratory tract infection.
- To know epiglottitis in details (History, physical examination, etiology, differential diagnosis, management).
- To know the pneumonia (bacterial vs viral)

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MANAGEMENT OF COMMUNITY ACQUIRED PNEUMONIA IN CHILDREN

- Clinical features (How do children with CAP present?)
- Etiology – Causes of CAP (virus, bacterial, atypical organism) does the etiology alter by age.
- Investigations.
- Severity assessment
- Managements
- Complications of CAP pneumonia (pneumatocele necrotizing pneumonia)

Community acquired pneumonia

Pulmonary TB

- Local Epidemiology vs. inherited epidemiology
- Diagnosis, Intervention, managements.
- How to approach children with PPD (children and family)

INTRODUCTION

- Children have about 6 respiratory infection per year Normal
- They are the the greatest of all causes of medical morbidity in pediatrics.
- Majority of acute respiratory infections are URTI but infection of lower respiratory tract are sufficiently frequent to pose almost daily problems for clinician caring for children
- Large number of different miroorganisms are capable of infecting the lower respiratory tract produces several respiratory syndromes and illnesses.

Etiology

- Viral: Infleunza, Parainfleunza,RSV,Rhinovirus,Entero, Corona, Measles, Varicella, Adeno, EBV,CMV, Herpes
- Mycoplasma: M. pneumoniae School age kids
- Rickettsia: Coxiella burnetii (Q fever)
- Chlymedia

Etiology (CONt.)

- Bacterial: staph, H flu Pneumococcus
- Fungi: Candida, Histoplasma, Aspergillus
- Parasites: Pneumocystis carinii, Toxoplasmosis

Staph. A is Very bad in children less than a year, it destroys all the lung
H. Flu not seen a lot after vaccines (atypical infection)
Pneumococcus is the most common cause of pneumonia in all age groups
Fungi & parasites are common in immunocomromised children

The doctor went through them

TABLE 13.2. Common causes of upper airway obstruction in children.

Anatomic
- Altered level of consciousness (airway muscle laxity) Secondary to anesthesia and ICU
- Postextubation airway obstruction
- Tonsillar hypertrophy
- Subglottic stenosis (acquired or congenital)
- Macroglossia Hypothyroidism & mucopolysaccharides
- Vocal cord paralysis Any lesions on the vocal cords & post aggressive intubation

External or internal compression
- Tumor
- Hemangioma
- Hematoma
- Cyst
- Papilloma
- Vascular rings and slings

Infectious
- Laryngotracheobronchitis (croup)
- Peritonsillar abscess
- Retropharyngeal abscess
- Bacterial tracheitis
- Supraglottitis (epiglottitis)
- Infectious mononucleosis

Miscellaneous
- Postextubation airway obstruction
- Angioedema
- Foreign body aspiration
- Airway trauma

Upper airway obstruction illneses

- **INFECTIOUS CAUSES**
  - ***Epiglottis***
  - Larynogotracheobronchitis(***Croup)***
  - Bacterial tracheitis
  - Diphtheria
  - Retropharyngeal abscess
  - Peritonsillar abscess

Upper airway obstruction illnesses

- **NONINFECTIOUS CAUSES:**
  - Foreign body
  - Trauma
  - Angioneurotic edema
  - Hypocalcemic tetany
  - Caustic burns

Upper airway obstruction illnesses

Acute Epiglottitis

- Life- threatening condition characterized by upper airway inflammation and obstruction.
- infection of epiglottis and supraglottic structures.
- High risk of death(7%)
- Most common in male (ration of 2.5 to 1).
- may occur at any age.
- Age incidence 2-7 Y
- Vulnerable population incluse Lower immunity
  - infants less than 12 months
  - elderly more than 85 years old

Acute Epiglottitis

- Caused by almost always H.Influenza type B(HIB) 90%

Croup: more in fall and winter

- No seasonal predilection in incidence of epiglottitis .
- Risk factors:
  - absence of immunization against HIB
  - immunocompromised state
  - smoking

Acute Epiglottitis

Life threatening

- Pathology:

Direct invasion by HIB

↓

Cellulitis with marked edema of the epiglottis, aryepiglottic folds, ventricular band and arytenoid.

↓

Edema increase the epiglottis curls posteriorly and inferiorly

↓

Airway obstruction

(Inspiration tend to draw the inflamed supraglottic ring into the laryngeal inlet)

Acute Epiglottitis

- **Clinical features**:
  - Sore throat, followed by Odynophagia accompanied by drooling, retching and difficulty breathing
  - Voice is not hoarse but speech is muffled
  - Cough is not croupy
  - Stidor
  - Marked Fever(38.8-40C)
  - Child assuming posture that maximize the increase in diameter of the obstructed airway(Sitting& leaning forward with hyperextension of the neck and protrusion of the chin)

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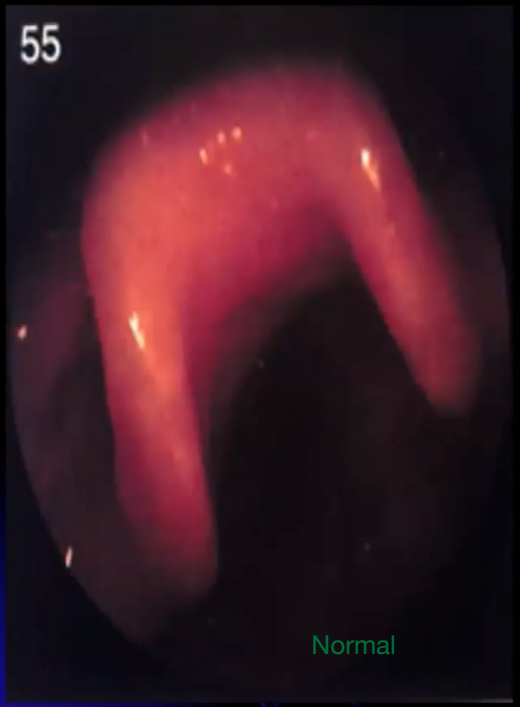
If you see a child like this in the ER it is Epiglottis until proven otherwise



Normal

Inflamed epiglottis, inlet is almost obstructed

Acute Epiglottitis

- Lateral Neck: Thumb sign
- Treatment

Avoid stimulation of the child. This includes radiographs, drawing bloods, starting IVF until secure airway established

Stabilization first then intubation

Emergency Intubation: Elective nasopharyngeal intubation (ETT 0.5mm smaller than that required is recommended)

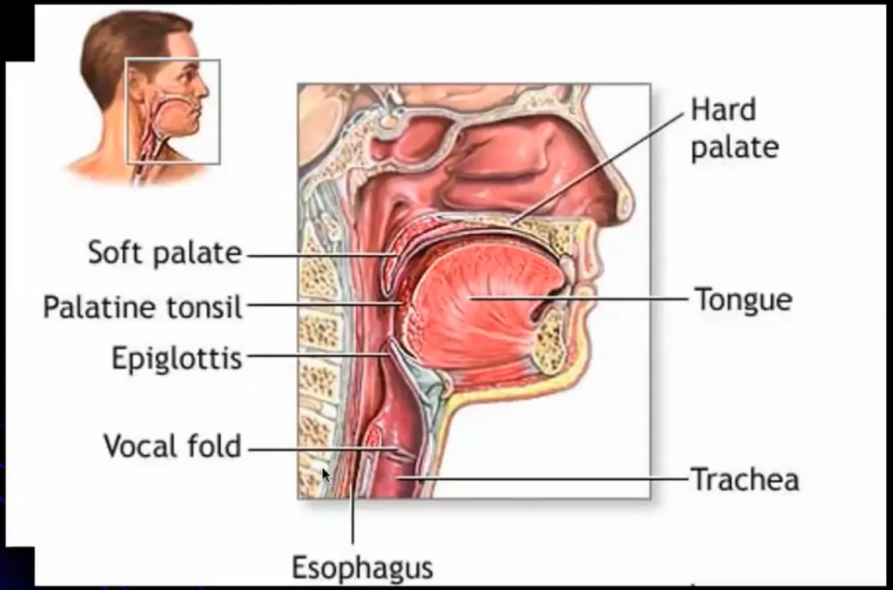
I.V Ceferuxime or cefotaxime for 7 days

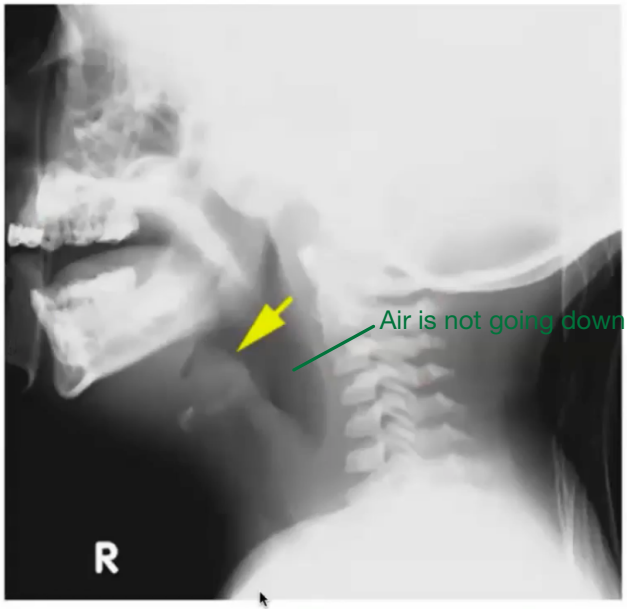
Second or third generation cephalosporins

NO steroid

Criteria for extubation: Aferbril

swallowing comfortable





Lateral radiograph of the neck in epiglottitis: there is enlargement of the epiglottis (arrow) giving the "thumb sign. (Courtesy of B Poss)

X-ray is not done routinely, only when the case is atypical

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CROUP

- Age: 6months - 3 years
- More in fall winter and spring
- URI (Rhinorrhea, Mild to moderate fever
- Progress to inspiratory stridor, hoarseness and croupy cough
- Rib cage and abdominal asynchrony occurs as the condition deteriorates

Am review Resp dis,1990;142,540-544

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CROUP

- Most children have mild disease
- Last 7-14 days
- Among children admitted with croup less than 1% require intubation
- Lateral neck X-ray: Narrowing of subglottic area

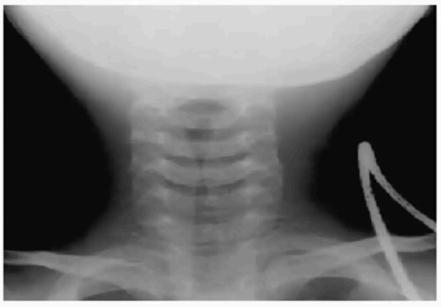


Fig 2. AP radiograph of the neck in patient with LTB showing narrowing in the subglottis ("steeple sign"). (Photo courtesy of the Department of Radiology, University of Texas Medical Branch at Galveston.)

Rat tail sign, X-ray is not usually done it's a clinical diagnosis but know it for the exam

CROUP

- **Treatment:**

Moist air

Oxygen

IV fluid

Steroid therapy: IM,PO, Inhalation (suppression of the local inflammatory reaction, shrinking of lymphoid swelling and reduction in capillary permeability)

Mainstay of treatment
IM: in the thigh

0.6mg/kg IM

Aerosols: Recemic epi. ; increase the airway diameter within 30 mints, however the effect is short lived lasting for 2 hours

Beware or rebound phenomenon (in two hours) observe for 2 hrs before discharge

Imp. For MCQs and OSCE

Know how to differentiate between them

Already took them in ENT, you're expected to know them

Table 13.3. Infectious causes of upper airway obstruction.

	Croup	Epiglottitis	Bacterial tracheitis	Retropharyngeal abscess
Onset	Gradual Viral prodrome 1–7 days	Rapid onset 6–12 hr	Viral prodrome followed by rapid deterioration	Viral prodrome followed by rapid deterioration
Typical age at onset	6 months to 4 years	2–8 years	6 months to 8 years	<5 years
Seasonal occurrence	Late fall to winter	Throughout the year	Fall to winter	Throughout the year
Causative agents	Parainfluenza, respiratory syncytial virus, influenza A	*Haemophilus influenzae* type b (classically), *Streptococcus pneumoniae*, GABHS	*Staphylococcus aureus* (classically), GABHS, *Streptococcus pneumoniae*	Anaerobic bacteria, GABHS, *Staphylococcus aureus*
Pathology	Subglottic edema	Inflammatory edema of supraglottis	Thick, mucopurulent, membranou stracheal secretions	Abscess formation in the deep cervical fascia
Fever	Low-grade	High fever	High fever	High fever
Cough	"Barking" or "seal-like"	None	Usually absent	Usually absent
Sore throat	None	Severe	None	Severe
Drooling	None	Frequent	None	Frequent
Posture	Any position	Sitting forward,mouth open, neck extended ("tripod position")	Any position	Sitting forward, mouth open, neck extended ("tripod position")
Voice	Normal or hoarse	Muffled	Normal or hoarse	Muffled
Appearance	Nontoxic	Toxic	Toxic	Toxic

Note: GABHS, group A β-hemolytic *Streptococcus*.

PNEUMONIA

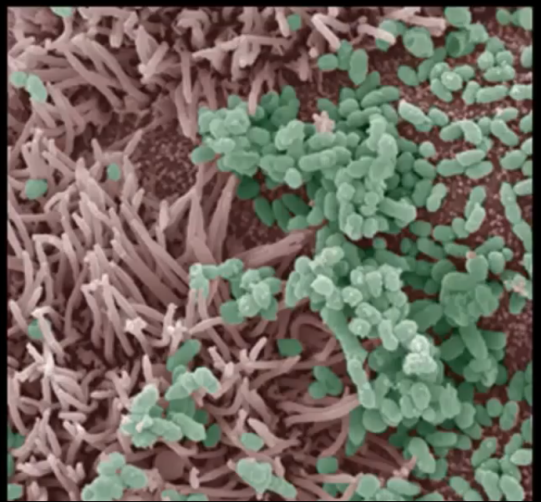
Factor relating to the etiology:

1) Host normal or compromised.
2) Age
3) Season
4) Environment: animate (human and animals) and inanimate.

For your information

- Innate immunity in the lung is truly amazing. The lung has ~100 square meters of surface area (roughly the size of a tennis court) and is directly exposed to the outside environment with every breath we take. Despite this, the lower airway is normally sterile. There are many levels of innate immunity that keep the lung free of pathogens, including
- filtering in the upper airways,
- mucociliary clearance,
- antimicrobial factors

Causes primary ciliary dyskinesia



PNEUMONIA

Etiology:

Bacterial: S. pneumonia, H flu, Staph, GAS, TB.

Viral: RSV, parainfl (1,2,3), Inf, adeno, rhino, entero. Especially type C

Immuno-compromised: Broader spectrum of etiological agents: fungi, gram negative bacili, pneumocystis carini. anaerobes, CMV.

Very strange organisms

Most Common Causes of Pneumonia in Immunocompetent & Immunocompromised Children over 1 month of Age

	IMMUNOCOMPETENT	IMMUNOCOMPROMISED
• Bacterial	*Streptococcus pneumonia* *Haemophilus influenzae* *Staphylococcus aureus* *Group A Streprococci* *Bordetella pertussis* *Moraxella catarrhalis* *Yersinia pestis* *Pasteurella multocida* *Brucella spp.* *Francisella tularensis* *Neisseria meningitidis* *Salmonella spp.*	*Pseudomonas spp.* *Enterobacteriaceae* *Legionella pneumophilia* *Nocardia spp.* *Rhodococcus equi* *Actinomyces spp.* *Anaerobic bacteria* *Enterococcus spp.*
• Bacteria – Like Agents	*Mycoplasma pneumonia* *Chlamydia pneumonia* *Chlamydia trachomatis* *Chlamydia psittaci* *Coxiella burnetii*	

VIRAL PNEUMONIA

Know RSV Bronchiolitis from A-Z it's very important

Most common cause of LRTI, RSV, parainfl (1,2,3), inf, adeno, rhino, entero.

Treatment:

Difficult to distinguish from bacterial pneumonia.

Oxygenation and ventilatory assistance in severe cases.

Clinical case

January.....ahmed 1 months.....

- An older brother with an upper respiratory tract infection
- 3 days of rhinorrhoea and cough accompanied by low grade fever.
- **Admitted to the Emergency Department for an episode of apnoea with mild respiratory distress with retractions and reduced oral intake of fluid (<50%)in the last 12 hrs**

Classical case of bronchiolitis

CLINICAL DEFINITION

The diagnosis of bronchiolitis is a clinical one based on typical history and findings on physical examination. Clinicians in different countries use different criteria to diagnose acute bronchiolitis.

A consensus guidelines panel reported a 90% consensus on the definition of bronchiolitis as a seasonal viral illness characterized by fever, nasal discharge and dry, wheezy cough.

On examination there are fine respiratory crackles and/ on high pitched expiratory wheeze.

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Bronchiolitis: *Definition*

Age <24 months

Signs of viral infection
+
Wheeze

American Academy of Pediatrics. 2006; 118(4):1774-1793

Age <12 months

Signs of viral infection
+
widespread crackles
+/-
wheeze

Everard, Ped Clin N Am 2009;56:119

BRONCHIOLITIS

Lower respiratory tract infection in children < 24 months of age.

It involves large and small airways tracheobronchitis, bronchiolitis and alveolar and interstitial lung involvement (pneumonia).

Etiology:

Viral: RSV; adenovirus (3,7,21), influenza; parainfluenza (3); rhinovirus; mumps.

Others: Mycoplasma pneumoniae.

Respiratory syncytial virus, the most common cause

If these strains infect the child (or adult) they will destroy the lung and he will need a transplant

RSV season?

- Ubiquitous throughout the world
- Seasonal outbreaks
  - Temperate Northern hemisphere: November to April, peak January or February
  - Temperate Southern hemisphere: May to September, peak May, June or July
  - Tropical Climates: rainy season
  - In Saudi Arabia RSV appears in November and the seasonal peak occurs during Jan. &Feb.

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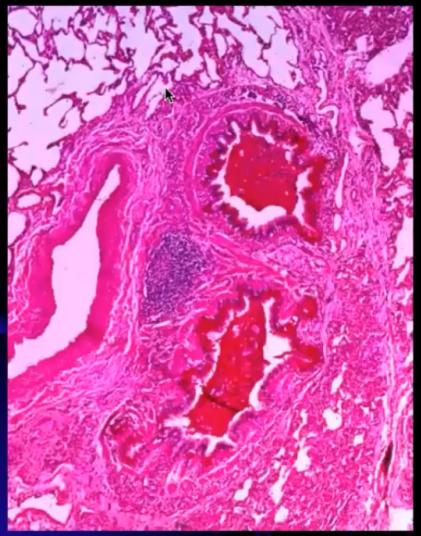
Bronchiolitis: *clinical manifestations*

- Exposure to children or adults with a respiratory viral infection.
- The initial symptoms are rhinorrhoea, cough and sometimes low grade fever. In 18% of cases the first clinical symptom could be episodes of apnoea.
- With the relief of fever the child manifests tachypnoea, retractions, nasal flaring, rales and hypoxemia
- Dehydration and metabolic acidosis.
- Syndrome of inappropriate secretion of antidiuretic hormone is common with severe respiratory distress.
- It is a dynamic disease and its clinical characteristics can quickly change

Pathophysiology



- Upper → lower airways
  - Peribronchiolar mononuclear infiltration
  - Epithelial necrosis
  - Airway plugging
  - Hyperinflation, atelectasis, V/Q mismatching
  - Hypoxemia, work of breathing

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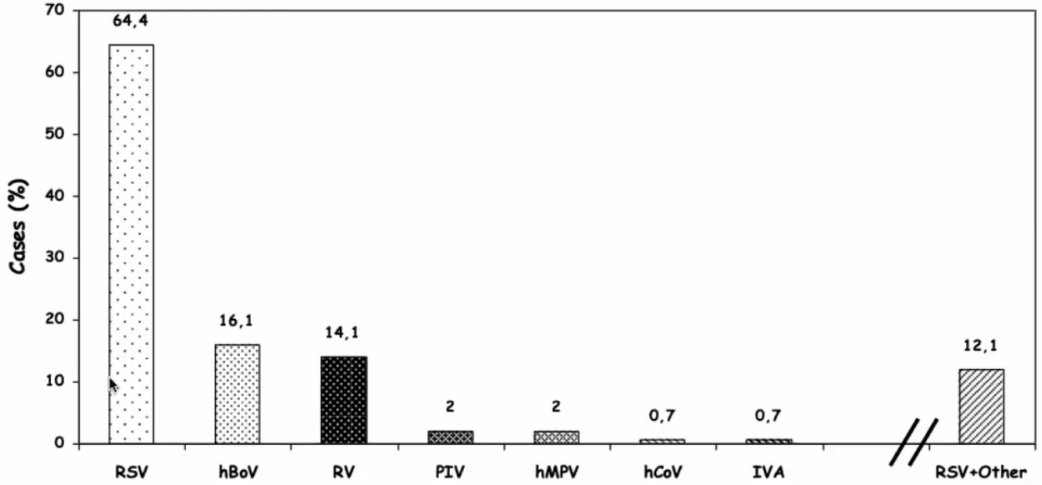
Distribution of identified virus in 182 infants with acute bronchiolitis



Midulla et al. Arch Dis Child 2010;95(1):35-41.

BRONCHIOLITIS (cont.)

Pathology: Inflammation of small bronchi and bronchioles, sloughing of resp. ciliated epi.

The bronchioles are plugged with fibrin and mucus – bronchiolar obst. – increase work of breathing + **V/Q mismatching – hypoxemia.**

CO_2 retention is uncommon, but if present it may lead to assisted ventilation. It may lead to death

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Pathogenesis

Know it for OSCE

- Mechanical occlusion of terminal and respiratory bronchiole with mucus, fibrin, epithelial cells and inflammatory cells.
- Effects of the immunological reaction and of inflammatory mediators.

Air bronchogram

BRONCHIOLITIS (cont.)

Complications:

Because they get tired, they have small muscles

Atelectasis, apnea and respiratory failure. Bronch obliterans (esp. with adeno) &.myocarditis

1, 2, 3, 7 , 21

Majority: Mild to moderate disease lasting 3-10 days. 2% require hospitalization; of those 3-7% develop respiratory failure and 1% die.

High risk:

Children with Cardiopulmonary disease (e.g. BPD, CF, VSD), immune deficiency and neonates.

RISK FACTORS OF SEVERITY

Memorize them

- Prematurity
- Low birth weight
- Age less than 6-12 weeks
- Chronic pulmonary disease
- Hemodynamically significant cardiac disease CHF
- Immunodeficiency
- Neurologic disease
- Anatomical defects of the airways

Laryngotracheomalacia,trachea esophageal fistula

ENVIRONMENTAL RISK FACTORS

- Older siblings
- Concurrent birth siblings
- Native American heritage
- Passive smoke exposure
- Household crowding
- Child care attendance
- High altitude

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Bronchiolitis: *"Indications for hospitalization"*

- Prematurity
- Age <3 months
- Apnoea
- Severe underlying conditions
- Poor feeding (less than 50%)
- Respiratory distress (RR >60/min, nasal flaring, retractions) and cyanosis
- Oxygen saturation <92%

Not feeding because of respiratory distress

Phase of illness should be considered in the decision for timing of review or admission to hospital

BRONCHIOLITIS (cont.)

Treatment:

Admit: if sig respiratory distress, dehydration, underlying disease.

O2 sat, CXR, NP aspirate.

X-ray (if needed): Look for atelectasis or secondary infection
Aspirate: to know if they have additional organisms (other than RSV)

Oxygen, IPPV (apnea, fatigue)

IV fluid

BD: 30% respond to salbutamol.

Steroids: not recommended.

The only antiviral for RSV

Ribvirin : for RSV, Inf A & B to high risk group, given nebulization 12-18 hr/day for 3-7 days

Recemic epi: .

Not used anymore

Pediatr Radiol (2002) 32: 644–647
DOI 10.1007/s00247-002-0755-y

ORIGINAL ARTICLE

Rib fractures after chest physiotherapy for bronchiolitis or pneumonia in infants

Martin Chalumeau
Laurence Foix-l'Helias
Pierre Scheinmann
Pierre Zuani
Dominique Gendrel
Hubert Ducou-le-Pointe

After vigorous chest physiotherapy

Table 1. Summary of medical histories and radiological signs

Patient	Age (months) at the time of chest physiotherapy	Chest physiotherapy indication	Age (months) at the time of rib-fracture diagnosis	Fractured ribs
1	1	Bronchiolitis	2	Lateral left 3rd to 7th
2	1	Pneumonia	2	Posterior right 6th, 7th Posterior left 7th, 8th
3	2	Bronchiolitis	3	Lateral left 7th
4	2	Bronchiolitis	3	Lateral right 3rd, 4th
5	6	Bronchiolitis	7	Lateral right 3rd, 6th

TABLE 1

Prophylaxis with Palivizumab or RSV-IG*— Categories of Risk

Prophylaxis for high risk patients, in the previous slides

Infants and children less than two years of age with known CLD who required medical therapy for CLD within six months of the anticipated start of the RSV season.

Preterm infants born at 28 weeks of estimated gestational age or earlier may benefit from prophylaxis during their first RSV season, whenever that occurs during the first year of life, even if CLD is not present.

Preterm infants born at 29 to 32 weeks of estimated gestational age or earlier may benefit from prophylaxis during their first RSV season, whenever that occurs during the first six months of life, even if CLD is not present.

Infants born at 32 to 35 weeks of estimated gestational age must have two of the following risk factors to be candidates for prophylaxis: attendance at a child-care center, school-aged siblings, exposure to environmental pollution, abnormalities of the airways, or severe neuromuscular problems.

RSV-IG = intravenous RSV immune globulin (RespiGam); CLD = chronic lung disease; RSV = respiratory syncytial virus.

*—RSV-IG is contraindicated in children with cyanotic congenital

Prevention?

- Prevention of spread
  - In hospital : Meticulous infection control
    - *Isaacs D. Arch Dis Child 66,p226;1991*
  - At home?
- Immunization?

No vaccines available
Only monoclonal antibodies

  - Formalin inactivated → worse disease
  - Heat inactivated?
- Passive immunity?
  - RSV-IG
  - Palivizimub

For high risk, before winter, expensive (each dose 3000SR)

Eur Respir Top 2004; 10: 000
Printed in the UK - all rights reserved

PREVALENCE OF BACTERIAL INFECTION IN CHILDREN WITH A DOCUMENTED RESPIRATORY SYNCYTIAL VIRUS LOWER RESPIRATORY TRACT INFECTION

METHODS

In this retrospective study* the authors reviewed the medical records of children aged <6.5 yrs discharged between July 1, 2000 and June 30, 2002 with a documented diagnosis of respiratory syncytial virus (RSV) infections. The presence and degree of fever at the time or before admission, complete and differential blood cell count and culture results (cerebrospinal fluid, blood culture, suprapubic aspiration urine, catheterised urine) obtained on the first day of hospitalisation were assessed.

RESULTS

A total of 912 patients with a median age of 135 days (range 6–2,398 days) were selected. Fever was present at or before admission in 628 (68.9%) of the 912 patients. None of the 63 (95.5%) patients aged <30 days, and none of the 135 (89.4%) patients aged 30–90 days had positive blood cultures. Urine cultures were positive in six of 45 patients aged <30 days, 14 of 94 patients aged 30–90 days and eight of 95 patients aged >90 days. Cerebrospinal fluid cultures obtained in 57.6% of febrile patients aged <30 days, 29.8% of

If you have a child who's not behaving well think about concurrent infections (both viral & bacterial)

CONCLUSIONS

Concurrent serious bacterial infections appear to be rare in children with a documented RSV lower respiratory tract infection. Blood and cerebrospinal fluid cultures may not be necessary in nontoxic-appearing infants and young children with fever and a documented RSV lower respiratory tract infection, even in those aged <3 months,

ERS

Bronchiolitis: discharge criteria

- Oxygen saturation stably remains >90-94%
- Absence of respiratory distress
- Adequately oral intake to prevent (>75% of usual intake) to prevent dehydration
- Adequate parental care and family education

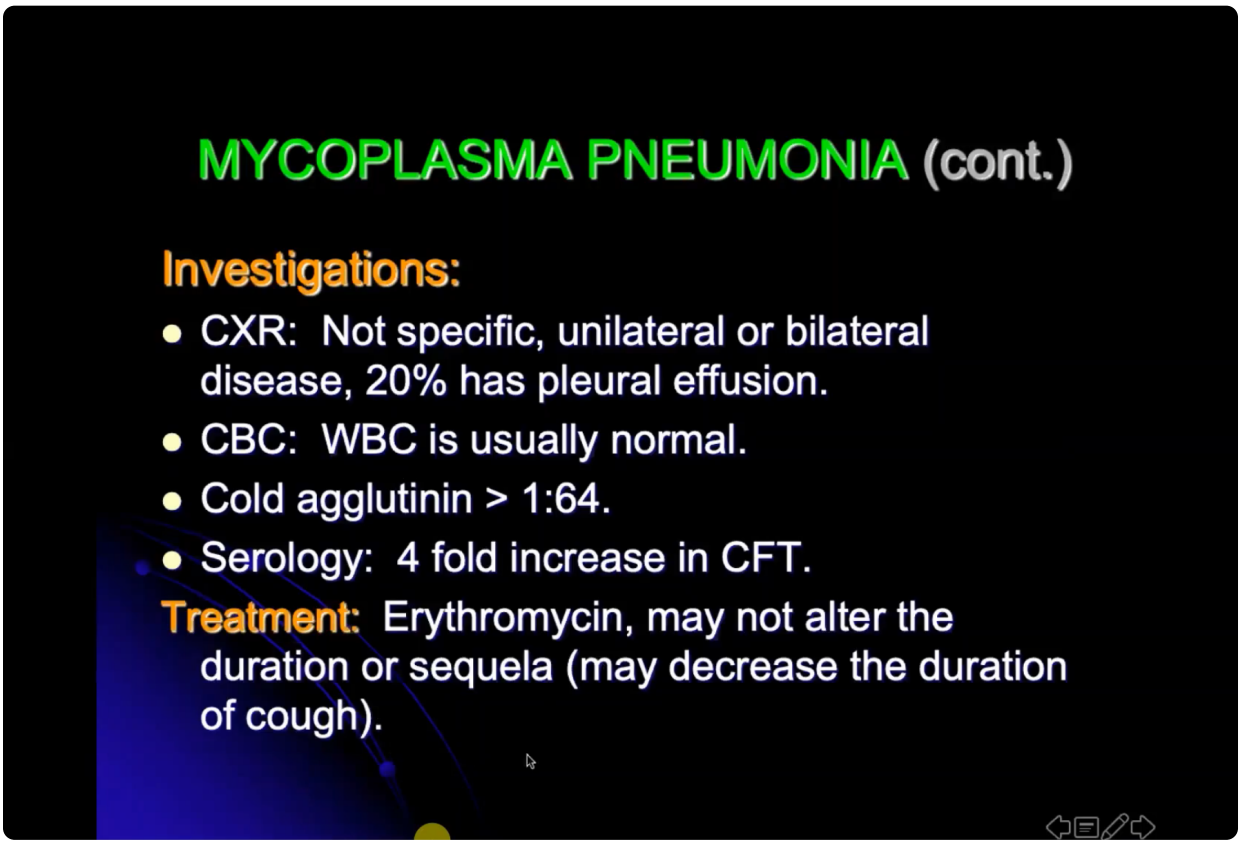
Very important

American Accademy of Pediatrics DOI:10.1542/peds.2014-2742

MYCOPLASMA PNEUMONIA

- Peak incidence 5-15 year (account for 75% of pneumonia in this age group)
- C/P: Insidous onset of fever, headache and sore throat followed by dry cough that can last for months.
- Other organs: Meningoencephalitis, carditis, migratory arthralgia and arthritis, hemolytic anemia, +ve coomb's and cold agglutinins.

All can be caused by mycoplasma infection



WBCs normal or slightly high
Treatment: macrolides for 10 days

BACTERIAL PNEUMONIA

Very imp. For antibiotics choice

Etiology:

Neonatal period: GBS, listeria monocytogenes and gram –ve bacilli.

After neonatal period: S pneumoniae, H. flu type B, staph. Aureus, GAS.

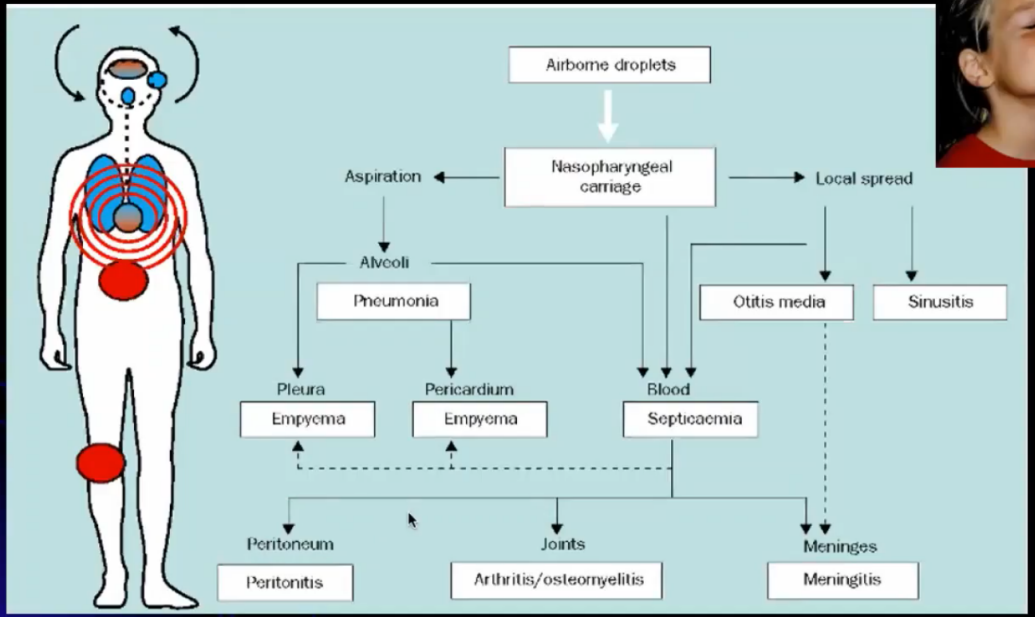
Mycoplasma is quite common >5y.

After age of 4 – 5 years: S. pneumoniae and mycoplasma responsible for the majority of cases.

Bacterial adhesion and invasion:

- *Streptococcus pneumoniae* -

The doctor went through it



Bogaert, Lancet Infect. Dis. 2004; 4:144-154

BACTERIAL PNEUMONIA (cont.)

Pathology:

Normally the resp. tract is **sterile** below the vocal cords. Pneumonia result from asp. Of pathogen to lower resp. tract. Concurrent viral infection aid this process (present in 30-50% of cases) esp. RSV, measles and influenza.

BACTERIAL PNEUMONIA (cont.)

C/P: Fever, chills, cough, chest and abdominal Pain.
Younger infants less specific symptom and signs

Diagnosis:

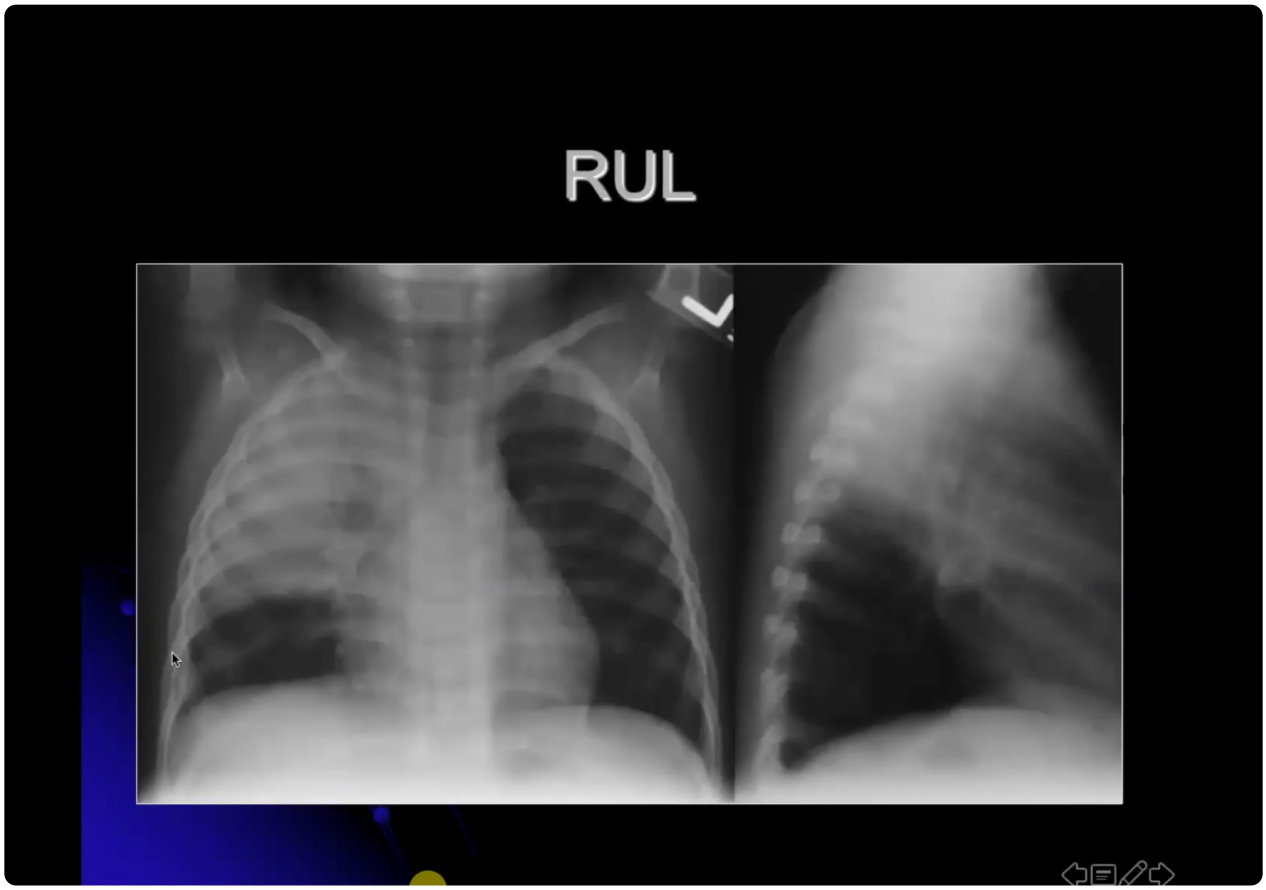
CBC – dif, cold agglutinin WBCs very high 30-40,000

CXR Lobar/bronchopneumonia

Blood culture, sputum in older children Blood culture 30% positive (septicemia)

Treatment:

1) Adequate oxygenation.
2) Depends on severity and age. Ampi or amoxacillin (10-30% of H flu are resistance) cefuroxime 75-100mg/kg/day Augmentin if resistant to amoxicillin
3) Older child: Pen or macrolides =>erythro (clarythromycine or zithromax)



Child with RUL pneumonia, he will need antibiotics for longer periods (14 days) because if he doesn't take them orally the infection will spread
Killing an infection in the lung is difficult because it's difficult to penetrate

Features of severe disease in an older child include:

- Oxygen saturation <92%, cyanosis
- Respiratory rate >50 breaths/min
- Significant tachycardia for level of fever (values to define Tachycardia vary with age and with temperature
- Prolonged central capillary refill time >2 s
- Difficulty in breathing; grunting
- Signs of dehydration
- chronic conditions (eg, congenital heart disease, chronic lung disease of prematurity, chronic respiratory conditions leading to infection such as cystic fibrosis, bronchiectasis, immune deficiency).

BACTERIAL PNEUMONIA (cont.)

Complications:

1) **Parapneumonic effusion:**

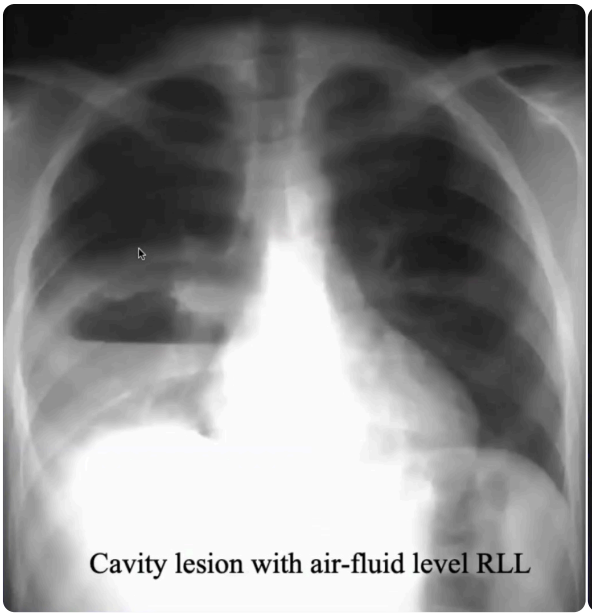
Esp. with S. aureus, H flu, S pneumoniae. Can be thin transudate or thick exudates (empyema)

Send pl fluid for cell count, glucose, protein, pH, LDH and culture.

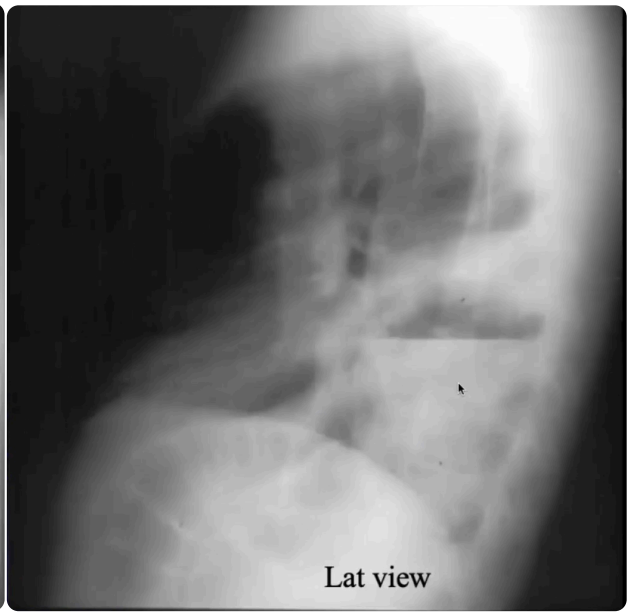
Empyema WBC > 15,000/mm3, protein >3 g/dl, pH <7.2

Management: ABX + drainage, recovery is slow, fever continue for 1 – 2 weeks.

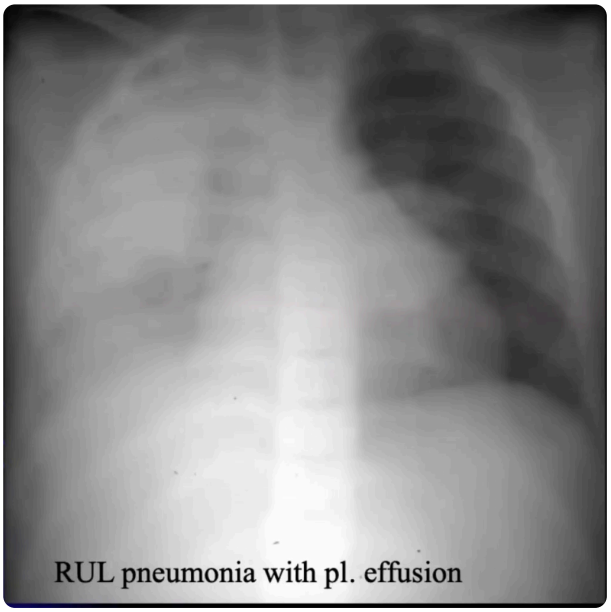
Pleural tap: Usually exudate
Empyema: treatment for 6-8 weeks IV antibiotics

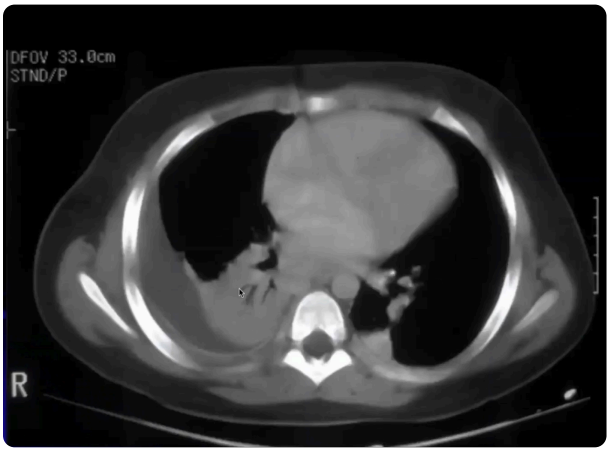


Cavity lesion with air-fluid level RLL



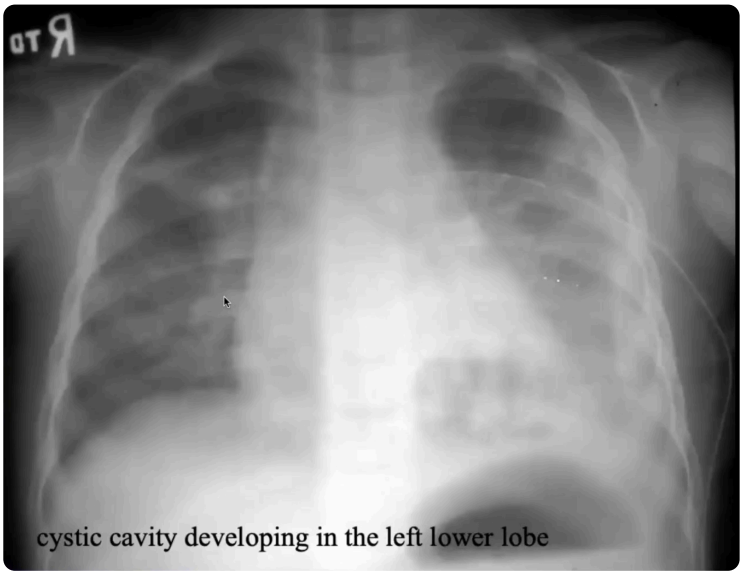
Lat view





Right Effusion, air bronchogram

Eaten lung, takes time to recover (3,4 months



2) Pneumatoceles: Thin wall cavity, complicate 40% of staph pneumonia, unusual with other types. Usually asymptomatic unless rupture – pneumothorax or pyothorax. Resolve spontaneously within 3 months

With sports

2) Lung abscess: Esp in aspiration pneumonia in mentally retarded children. Esp. in the dependent portion of the lung.

Growth: mixed anaerobic bacteria

Treatment: Pen G, clinda or flagyl.

Staph.pneumatocele

The predisposing factors to necrotizing pneumonia include

- **Congenital cysts**
- **Sequestrations**
- **bronchiectasis,**
- **neurological disorders**
- **Immunodeficiency**

certain serotypes of pneumococcal disease are more likely to lead to necrotizing pneumonia and abscess formation than others

- S aureus with Pantone Valentine leukocidin

toxin can lead to severe lung necrosis with a high risk of mortality

3. Septicaemia and metastatic infection

Children can present with symptoms and signs of pneumonia but also have features of systemic infection. Children with septicaemia and pneumonia are likely to require high dependency or intensive care management. Metastatic infection can rarely occur as a result of the septicaemia associated with pneumonia.
Osteomyelitis or septic arthritis should be considered, particularly with S aureus infections.

4. Haemolytic uraemic syndrome

S pneumoniae is a rare cause of haemolytic uraemic syndrome.
A recent case series found that, of 43 cases of pneumococcal haemolytic uraemic syndrome, 35 presented with pneumonia and 23 presented with empyema. Although a rare complication.
Renal shutdown
in cases with pallor, profound anaemia and anuria, this should be considered.

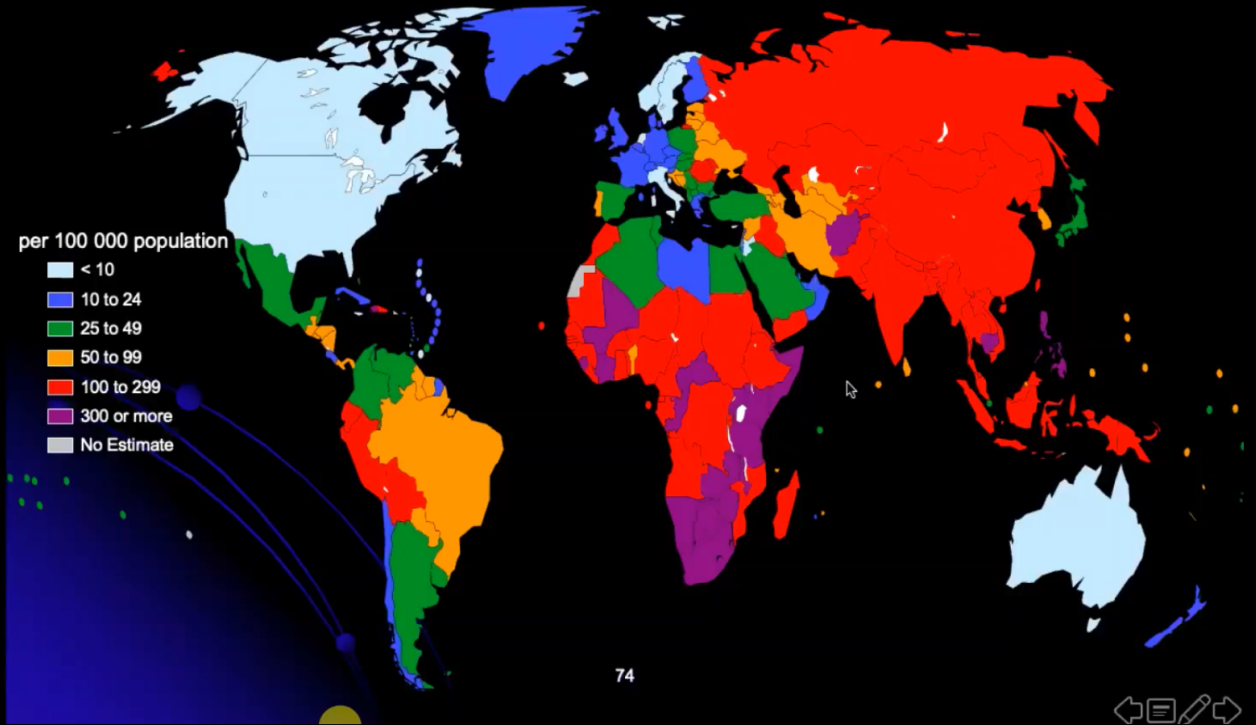
TUBERCULOSIS

TUBERCULOSIS

- ✓ The vast majority of childhood TB occur in children < 4 y usually after exposure to an infected adults.

  (i.e. children infected with TB always have an adult with active TB in their environment).
- ✓ Transmission is by droplet nuclei

Estimated TB incidence rate (2003)



TUBERCULOSIS (Cont.)

- ✓ Its distribution is worldwide
- ✓ Multi-drug resistance has emerged as an important clinical problem
- ✓ Infection in patients with HIV infection initially lead to increases in the number of cases

TUBERCULOSIS (Cont.)

- Adults with cavity harbor a great no. of bacilli for long time. They become non-infectious 2 weeks after therapy.

- Children with primary TB are rarely infectious, TB bacilli are sparse, but they are the long term reservoir of infection in the population.

TUBERCULOSIS (Cont.)

Etiology:

- Mycobacterium tuberculosis & M. bovis
  Culture takes 4-6 w, sensitivity another 4 w.
- Radiometric methods, detection & sensitivity 4-10 d.
- By DNA proves detection within 2 hrs.

Problems in the diagnosis of TB

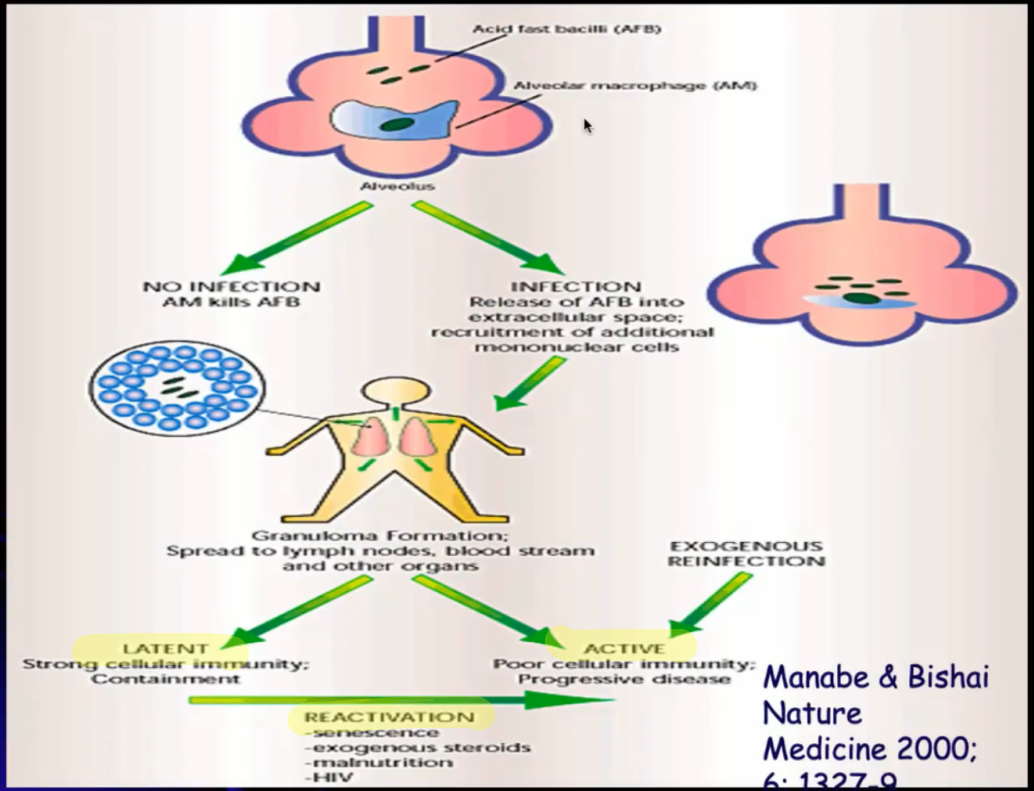
- **Active disease**
  - *M. tuberculosis* is difficult to isolate: even with good microbiological facilities, the bacillus is recovered in only 50-60% of cases
- **Latent infection**
  - *M. tuberculosis* cannot be cultured from latently infected individuals: no gold standard

Clinical features

- insidious onset
- weight loss
- anorexia
- fever
- hepatosplenomegaly
- Headache almost always = meningitis
- abdominal pain and tenderness usually = peritonitis.
- Skin and eye tubercles (Tuberculous Uveitis)

PPD: – ve in 30%

CXR: may be characteristic.



Manabe & Bishai Nature Medicine 2000; 6: 1327-9

Bacteriologic confirmation

Problematic in children

- Pauci-bacillary disease, often poor yield

NB! BUT still do culture if possible

- Which specimen to collect?

Gastric aspirate (fasting, early morning)

Induced sputum / Assisted sputum

Broncho-alveolar lavage

String test

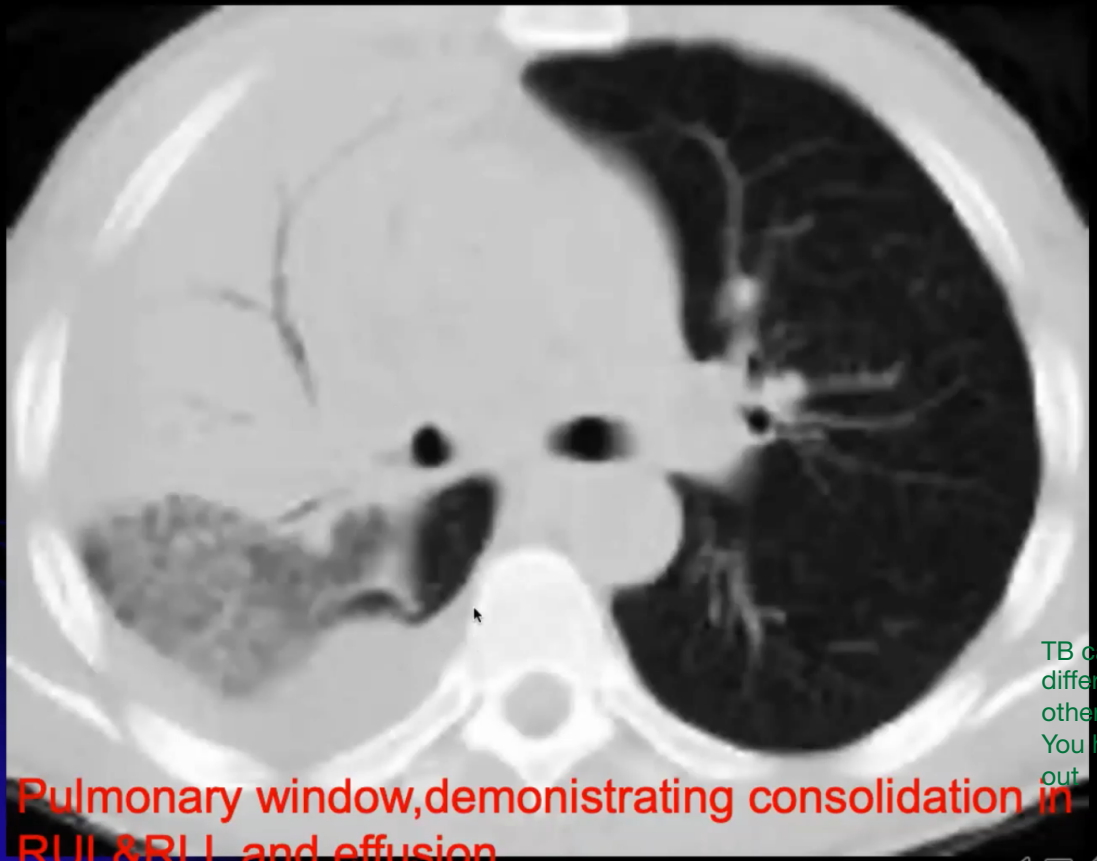
Fine needle aspiration or excision biopsy

Not incision biopsy

Timetable of disease after primary infection in children

- **3-8 weeks**:
  - TST response PPD is +
  - Hypersensitivity reactions
  - Erythema nodosum
- **1-3 months**:
  - Hematogenous spread (meningitis and miliary in infants)
- **3-7 months**:
  - Bronchial disease (< 5 years)
  - Pleural effusions (>5 years)
- **1-3 years**:
  - Osteo-articular disease
  - Calcifications
  - Adult-type disease
- **> 3 years**:
  - Reactivation

Primary tuberculosis
RUL&RLL Consolidation and samall pleural effusion on Right side



Pulmonary window,demonstrating consolidation in RUL&RLL and effusion

TB can't be differentiated from other pneumonia
You have to rule it out

Complications

Most occur in the 1st year.

1) Miliary TB & TB meningitis: not later than 3-6 mo. after initial infection.
2) Endobronchial TB: within 9 mo.
3) Bones or joints: within 1 y.
4) Renal: 5-25 y.
5) Secondary reactivation.

In the book

Suggested criteria for diagnosis of TB in children

Suspected/probable

Any three of the following:

1. History of contact with an adult with suspected or proven
2. Symptoms and signs of TB such as persistent fever, cough, ,weight loss, failure to thrive, anorexia, respiratory distress,
   decreased breath sounds, rales on chest examination, lymphadenopathy, etc.
3. Positive Mantoux or PPD more than10mm of indurations Not redness
4. Chest radiographic Findings such as an infiltrate or Lymphadenopathy

Confirmed

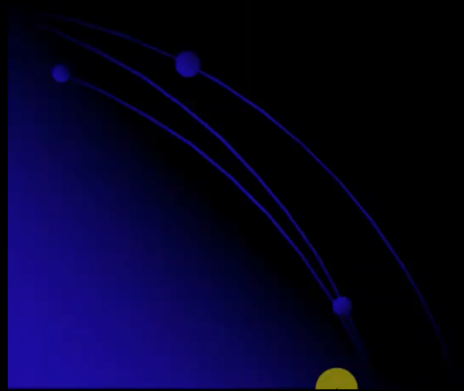
- A positive AFB smear or culture of gastric aspirate or other body Fluid or
- Histological Findings consistent with TB

Treatment

- **First line** : INH, rifampin, pyrazinamide ethambutol and streptomycin

  You have to know the side effects of these medications like hepatitis, change in urine color and vision

- **Second line** : para-aminosalicylic acid, ethionamide, caperomycin, kanamycin and cylcoserine.



Treatment

- INH + rifampin X 9 mos. will cure 98%.
- Shorter courses (6 mos.) using more drugs; INH, rifampin and pyrazinamide for 2 mos. followed by 4 mos. of INH and rifampin.
- ***The 9 mos. approach is the one recommended for children.***

The course is 9 months for children not 6 months

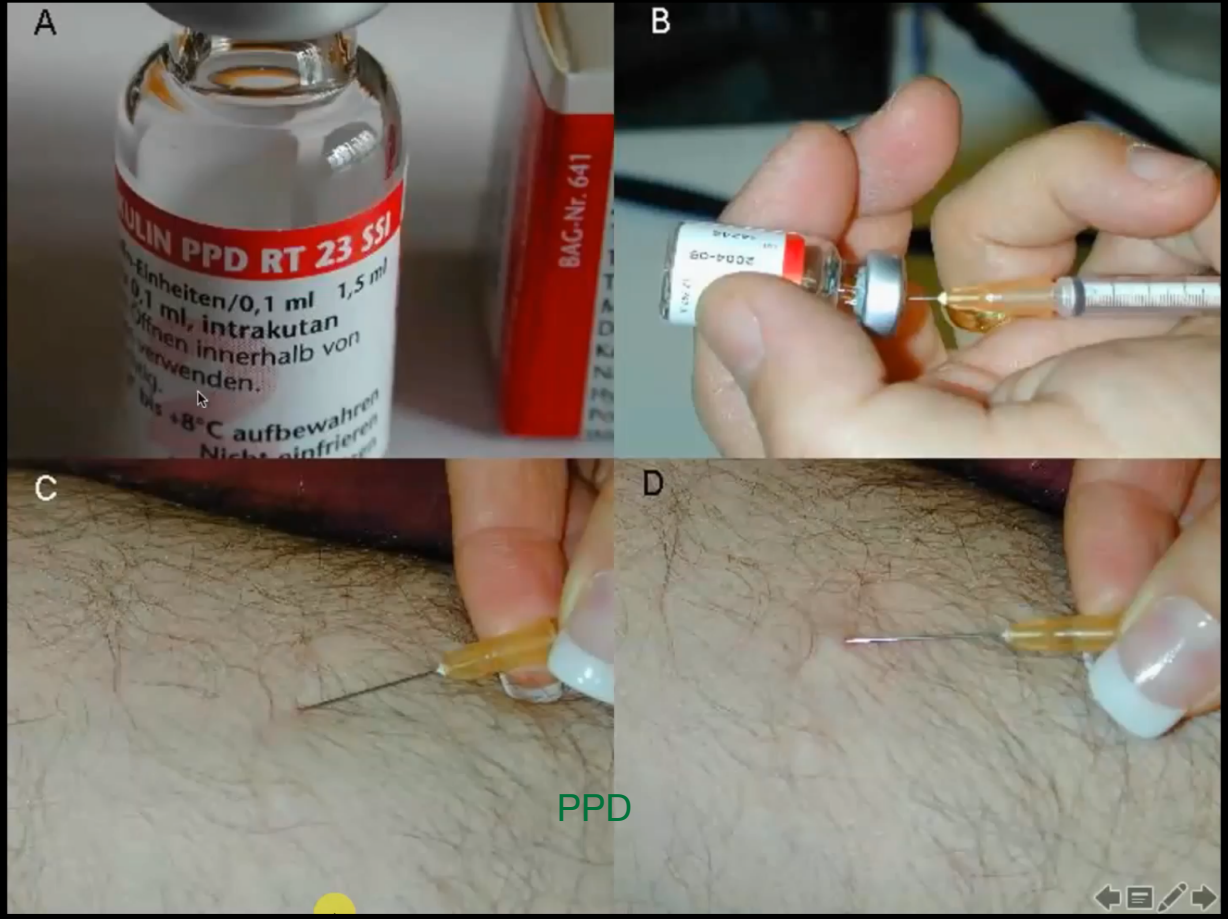
Treatment

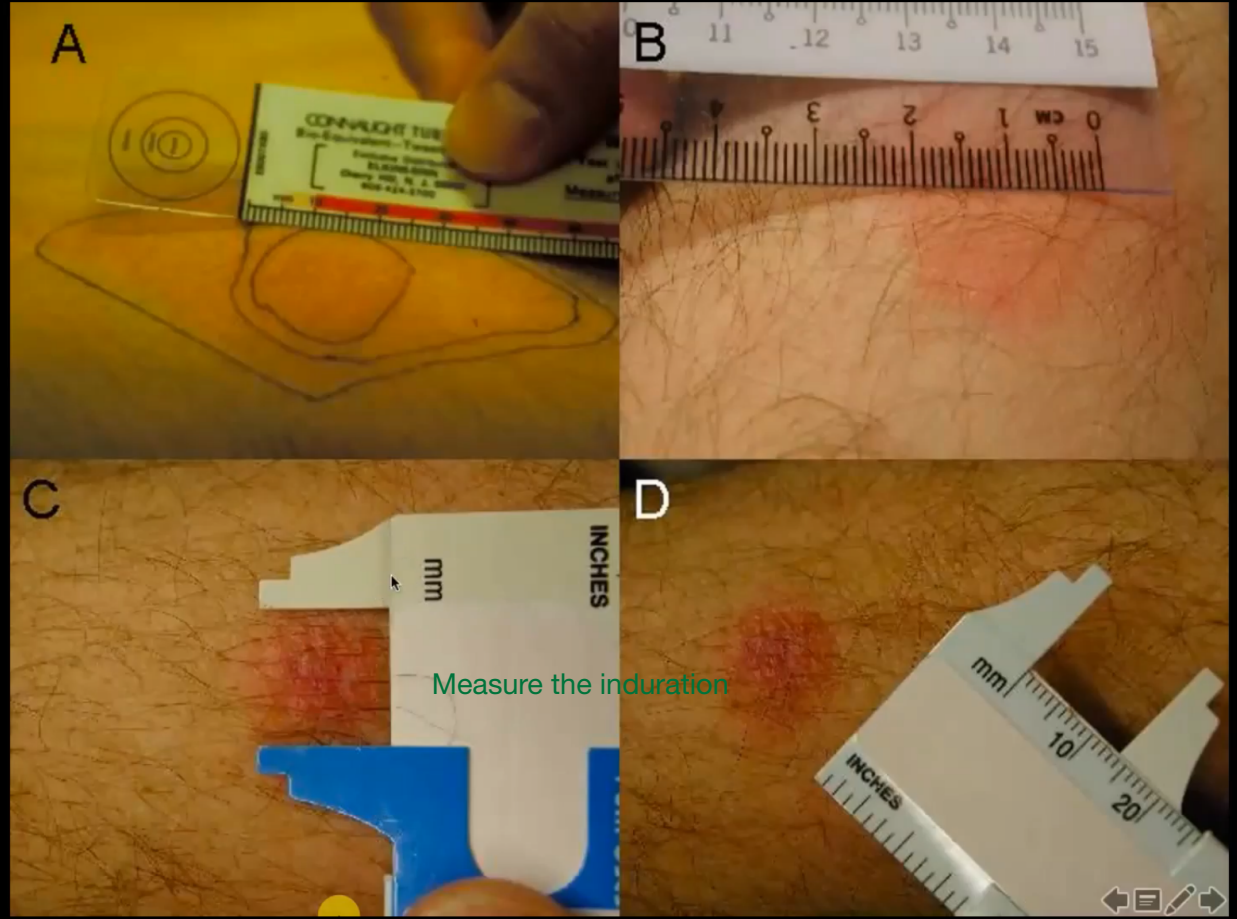
STEROIDS

Not alone

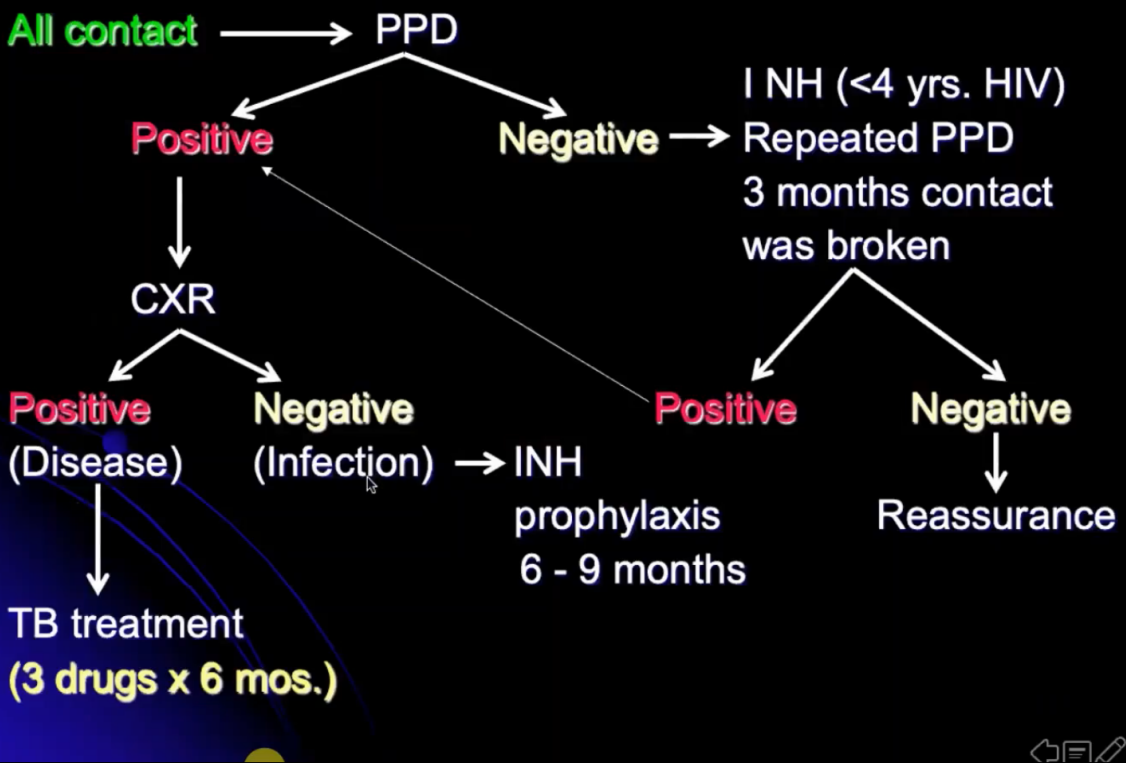
Use only with anti-TB med indicated in:

1) TB meningitis and increased ICP due to brainstem inflam and resultant HC.
2) Endobronchial TB → collapse or air trapping.
3) Miliary TB with pericarditis, pleural effusion or peritonitis.


A
B
C
D
ULIN PPD RT 23 SSI
BAC-Nr. 641
PPD


A
B
C
D
INCHES
mm
Measure the induration

Treatment of Contact



Conclusion

- TB remains a permanent threat
- Importance of contact tracing and treatment adherence
- Future perspectives
  - Improved efficacy of TB vaccination
  - Improved diagnosis of TB infection (ELISPOT)
  - Shorter treatment for latent TB infection (and TB): new drugs

THANK YOU ALL