

Lower respiratory tract infections



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In developing countries, acute lower respiratory infections remain the greatest cause of mortality in children under the age of 5 years.

A lower respiratory tract infection can be considered to be present when significant symptoms or signs arise from the intrathoracic airway

Pneumonia

Pneumonia is inflammation and consolidation of the lung.

There are many different causes of pneumonia, the most common being:

- viral infections*
- bacterial infections*
- atypical infections*
- Aspiration (foreign body, hydrocarbon or lipoid substances).*

Viral pneumonia

Viruses are common causes of pneumonia in children of all ages.

The most common causative viruses include:

- Parainfluenza virus.*
- Influenza.*
- RSV.*
- Adenovirus.*
- Metapneumovirus.*

Risk factors for viral pneumonia include:

- Age. Children under 5 years of age.*
- Season. Peak seasonal incidence is in winter.*
- Passive smoke exposure.*
- Poor socioeconomic status.*
- Pre-existing chronic problems, such as, cystic fibrosis, congenital heart disease and HIV infection.*

Clinical features

- Peak attack 2-3 years of age.
- Mostly preceded by URTI.
- With a history of contact.
- A mild fever with signs of respiratory distress.
- Difficulty to differentiate between viral and bacterial pneumonia.

Diagnosis

1. CXR
Patchy, widespread consolidation rather than lobar involvement.
2. CBC which maybe normal or <20.000 cells/ml with lymphocytic predominance.
3. A definite diagnosis is achieved by growing the virus in a tissue culture (7 days).
4. Detection of the viral antigen by use of labeled specific antibodies.

Treatment

- Supportive measures (IVF, humidified O₂)
- Antiviral agents may be used.
- Prognosis
- Good without sequels.

Pneumococcal pneumonia

- The most common cause of bacterial pneumonia in children at any age.
- Pneumococcal pneumonia may be preceded by symptoms suggestive of a mild upper respiratory infection and typical symptoms and signs of pneumonia may then appear.
- Risk factors include:
 - male gender.
 - preterm delivery.
- It is partially a vaccine-preventable illness

Clinical features

- ***Symptoms***
 - Fever.
 - Pleuritic chest pain.
 - Cough can be absent.
 - Tachypnoea.

➤ ***Signs***

➤ ***Chest examination***

- Reduced movement of the chest wall
- Dullness to percussion,
- Reduced breath sounds and bronchial breathing.
- Dullness to percussion (empyema).
- If the upper lobes are involved, neck stiffness.

➤ ***Diagnosis***

- Increased WBC (polymorph predominant).
- Increased acute phase reactants ESR CRP.
- Culture of pleural fluid.
- ***CXR*** which show:
 - Lobar involvement.
 - Abscess, empyema or pneumatocele.

➤ ***Treatment***

- Penicillin G
- 3rd generation cephalosporins

➤ ***Cpx***

- Pleural effusion
- empyema

Staphylococcal pneumonia

When *Staphylococcus aureus* causes pneumonia, it is usually a more severe form.

It is more common in younger children, especially those under 2 years of age

An important risk factor is a socially disadvantaged or indigenous background.

Clinical features:

The onset is usually acute and the course more rapid

1. High fever
2. Respiratory distress.
3. The child may appear toxic and lethargic.
4. Abdominal distension, vomiting.
5. Chest signs are nonspecific.

Diagnosis:

- Increased WBC (polymorph predominant).
- Increased acute phase reactants ESR CRP.
- Blood culture and Culture of pleural fluid.
- **CXR** which show

- **Early** are similar to other forms of bacterial pneumonia, including;
 - lobar consolidation,
 - patchy shadowing
 - a small pleural effusion.
- **However, within days**, more serious findings may be evident, including;
 - widespread opacifications,
 - large pleural effusions
 - abscesses,.
 - pneumatoceles

Pneumatoceles can be found in other bacterial pneumonias, including;

- *Escherichia coli*,
- *Klebsiella* sp.,
- *Pseudomonas* sp.,
- group A streptococci

For staphylococcal pneumonia, computed tomographic (CT) scans of the chest are often useful in defining the nature and extent of these complications.

Treatment:

- Infants in whom staphylococcal pneumonia is suspected should be hospitalized to allow adequate observation.
- Antibiotics (broad spectrum).

A combination of a beta-lactamase-resistant penicillin such as flucloxacillin and a third-generation cephalosporin.

- Surgical intervention.

The long term outcome is usually good.

Cpx:

- Meningitis
- Pericarditis
- Arthritis
- Osteomyelitis

Haemophilus influenzae

Pneumonia due to *H. influenzae* is now relatively uncommon because of immunization.

It usually occur in children aged under 2 years.

H. influenzae is found in the upper respiratory tract of the majority of normal, non-immunized children, and less commonly in those who have been immunized.

Risks factors for H. influenzae infection include:

- indigenous race.
- lower socioeconomic group.
- male gender.
- Immunodeficiency.

The signs and symptoms of *H. influenzae* pneumonia are not distinguishable from those found in other pneumonias.

Treatment:

- 3rd generation cephalosporins

Mycoplasma pneumonia

Most common in school aged children (5-15) with a peak between (9-15).

Caused by *Mycoplasma pneumoniae*.

It is a severe form of illness which occurs in patients with;

- Hypogamma globulinaemia
- Sickle cell anaemia.

It is the most common cause of acute chest syndrome.

The clinical course is characterized by the gradual development of

- fever, headache, sore throat.
- Malaise.
- cough, initially dry.
- In children with a tendency to asthma, wheeze is commonly present.

The chest X-ray often shows changes that are more striking than expected for the degree of clinical illness.

- High serum cold hemagglutinin.
- Positive IgM
- Culture of sputum.

Treatment:

- Macrolides:
 - Clarithromycin
 - Azithromycin

Cpx:

- Erythema multiform, steven Johnson syndrome.
- Autoimmune haemolytic anemia.
- Guillian Barrie syndrome.
- Meningioencephalitis.
- Transverse myelitis.

Other bacteria that can cause pneumonia include:

Group A beta-haemolytic streptococci (S. pyogenes).

- Uncommon in children under the age of 5 years
- Fever, chest pain and haemoptysis
- Large pleural effusions and empyema.
- Rapidly progressive course
- Treatment is with high-dose intravenous penicillin G

Group B beta-haemolytic streptococci.

- Neonatal pneumonia, which has a rapidly progressive course.
- Is similar to respiratory distress of prematurity
- It has a high mortality.

Klebsiella pneumoniae.

- This organism typically causes pneumonia in neonates and immunocompromised host.
- In children, it is a rare cause of pneumonia.
- Recommended treatment is an amino glycoside and/or a third-generation cephalosporin.

Other bacterial organisms

- Anthrax,
- *Bordetella pertussis*,
- *Brucella*,
- *E. coli*,
- *Mycobacterium* sp.,
- *Pseudomonas aeruginosa*,
- *Salmonella* sp.

Aspiration pneumonia

This is suspected in small infants with recurrent or persistent lower respiratory symptoms including; cough and wheeze.

Aspiration is due to:

1. GER
2. Incoordinated swallowing
3. Tracheo-esophageal fistula

Prophylaxis

- Immediate suction
- O₂ administration
- Endotracheal intubation
- Mechanical ventilation in severe cases

Prognosis

- Aspiration is cleared in 2 weeks

Hydrocarbon pneumonia

This includes; kerosine, lighter fluid, gasoline and furniture polish.

Hydrocarbons with low viscosity, low surface tension and ones which are highly volatile pose the greatest risk for aspiration pneumonia.

Gastric lavage is contraindicated.

Hydrocarbon interacts with pulmonary surfactant causing collapse.

Clinical features:

- Cough and vomiting initially.
- Within the first few hours signs of RD with tachypnoea develop.
- Later cyanosis.

CXR maybe unremarkable initially as 8-12 hours.

Cpx:

- Pulmonary and subcutaneous emphysema
- Pleural effusion
- Empyema
- 2ry bacterial infections

Treatment

- At least 6 hours observation is required before sending the patient home even if he is asymptomatic.
- For symptomatic patients admission with O₂, IVF and antibiotic consideration is required if there is a 2ry bacterial infection.

Differential diagnosis of recurrent pneumonia

- Cystic fibrosis
- Sickle cell anemia

Disorders of immunity

- HIV
- Selective IgG subclass deficiency
- Common variable immunodeficiency
- Severe combined immunodeficiency

Disorders of leukocytes

- Chronic granulomatous disease
- Job's syndrome.

Disorders of cilia

- Immobile cilia syndrome
- Kartagener's syndrome

Anatomical defects

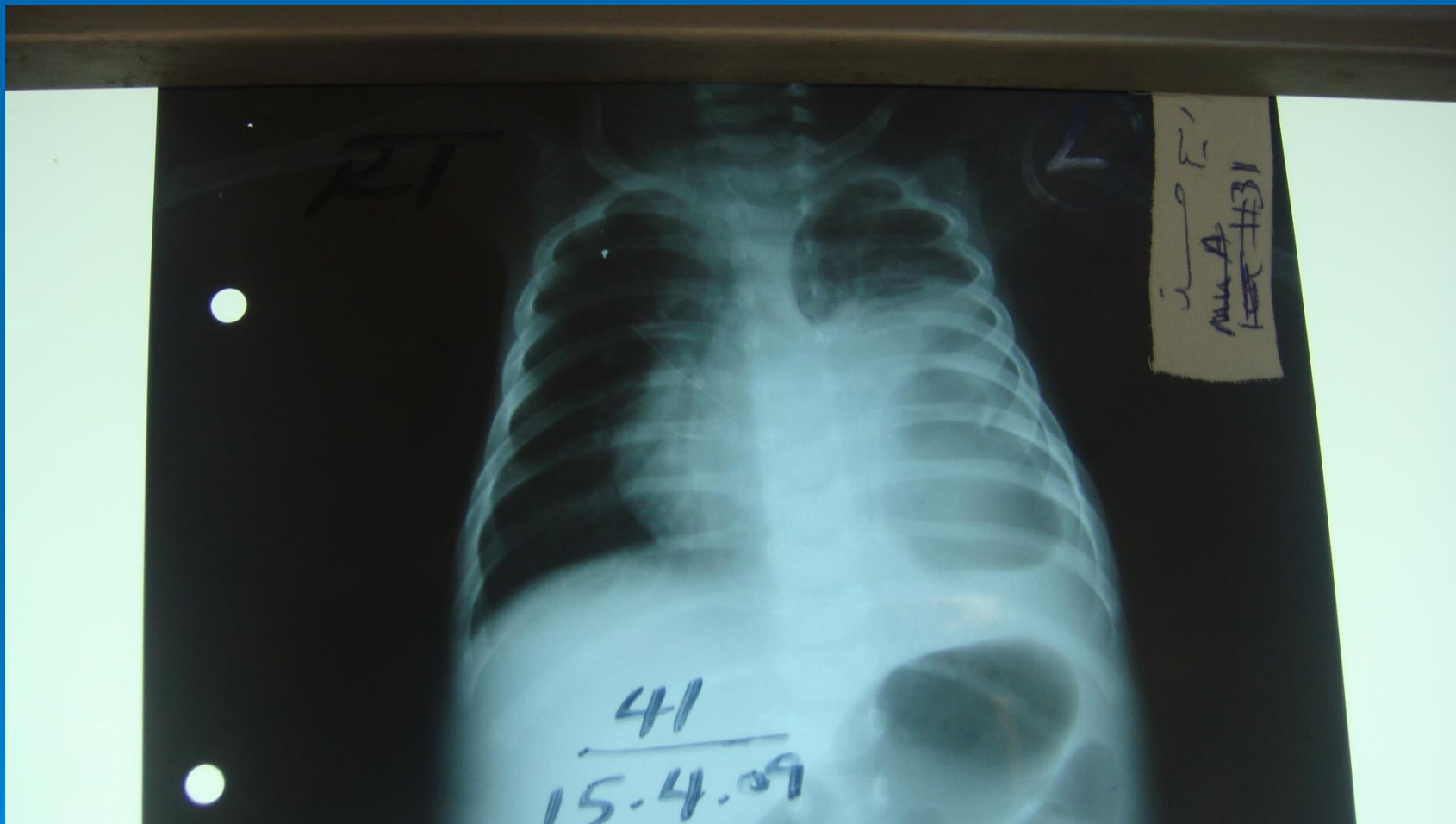
- Lobar empysema
- FB
- Tracheoesophageal fistula
- GER
- Bronchiectasis
- Aspiration

Factors suggesting a need for hospitalization

- Age < 6 months
- An immunocompromised state
- A toxic appearance
- Severe RD
- Dehydration
- Vomiting
- Requirement for supplemental O₂
- No response to appropriate antibiotics
- Non-compliant parents.







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