Paediatric Pulmonology

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Paediatrics 2024

Paediatrics Pulmonology

CONGENITAL ANOMALIES

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★ 4.5 37 Min video

INFECTIONS

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CONGENITAL ANOMALIES OF RESPIRATORY TRACT

Congenital anomalies of larynx

00:00:17

Laryngomalacia :

m/c anomaly of larynx (45-75% cases).

Structures affected :

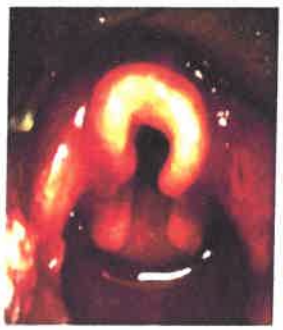
- Epiglottis.
- Arytenoids.
- Aryepiglottic folds.

Softness/weakness of supraglottic structures → Weak tone → Collapse during inspiration → Obstruction of upper respiratory tract.

Stridor :

- <2 weeks after birth.
- Increases in intensity in 1st 6 months, then reduces.
- Intermittent stridor.
- Exacerbated by exertion (Vigorous crying, feeding).
- Cry is good.
- Prominent in supine position.
- Relieves in prone position.

Benign condition : Normal growth.



Omega shaped epiglottis.

Diagnosis :

- Clinical based on symptoms.
- Flexible laryngoscopy : Floppy omega shaped epiglottis.

Conservative management :

- Reassurance : Usually disappears by 2 years of age.
- If associated with laryngopharyngeal reflux : Proton pump inhibitors.

Indications of surgical management (Supraglottoplasty) :

- Progressive respiratory distress.
- Cyanosis, failure to thrive.

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Congenital subglottic stenosis : 00:06:28

2nd m/c anomaly of larynx.

Subglottis :

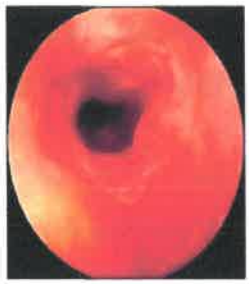
- Area between true vocal cord and lower margin of cricoid cartilage.
- Narrowest part of larynx in children.

Defect :

- Abnormally thick cricoid cartilage or
- Abnormal fibrous tissue in the subglottic area.

Stridor :

- Biphasic/primarily inspiratory stridor.
- Becomes prominent during respiratory tract infection.
- No postural variation.



Congenital subglottic stenosis.

Direct laryngoscopy :

- Diameter <4 mm in term babies or
- Diameter <3.5 mm in preterm babies.
- Narrowing >50% of expected : Severe symptoms.

Management :

Severity is based on Myer Cotton system (Grade I-IV) :

Grade I, II : Dilatation/endoscopic laser surgery.

Grade III, IV : Anterior cricoid split surgery.

Laryngotracheoplasty with cricoid graft.

Vocal cord paralysis : 00:11:43

Causes :

1. Idiopathic : Unilateral.
2. Associations (Bilateral) :
   - Meningomyelocele.
   - Arnold Chiari malformation.
   - Hydrocephalus.
3. Post surgical : Repair of tracheo-esophageal fistula/patent ductus arteriosus.

Clinical features :

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Unilateral vocal cord palsy.	Bilateral vocal cord palsy.
Aspiration, coughing, choking.	Respiratory distress soon after birth.
Stridor : Uncommon.	High pitched inspiratory stridor.
-	Weak cry.

Laryngoscopy : Inability to abduct the vocal cord.

Management :

Unilateral palsy : Observation, resolves within 6-12 months.

Bilateral palsy : Treat the primary cause/temporary tracheotomy.

Congenital anomalies of lungs

00:16:04

Congenital lobar emphysema (CLD) :

Emphysema : Overdistension of lung parenchyma.

D/t partial narrowing of bronchus :

1. Deficiency of cartilage.
2. Compression of bronchus by aberrant blood vessel.

Ball valve effect : Allows entry inside the bronchus, but does not let air out → Air trapping → Overdistension/hyperinflation of lungs.

Site affected :

- (m/c) Left upper lobe.
- Right middle lobe.
- Right upper lobe.

Consequences :

- Atelectasis of the ipsilateral normal lung.
- mediastinal shift.
- Atelectasis of the contralateral lung.

Presentation :

- Respiratory distress.
- Time of presentation depends on severity of emphysema.

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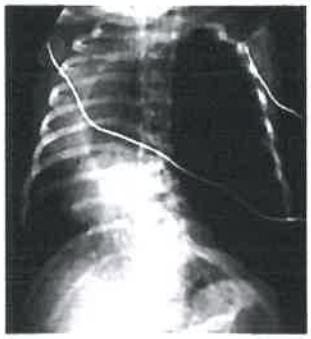
- Severe emphysema : Early presentation in neonatal period.
- Mild distension : Presents in later life.

Diagnosis :

Chest X ray :

- Characteristic distension of left upper lobe.
- Compression atelectasis of ipsilateral lung.
- Mediastinal shift.
- Compression atelectasis of contralateral lung.

IOC : CT chest.



Congenital lobar emphysema.

Management :

Based on :

1. Chest X ray.
2. CT chest.
3. V/Q scan.
4. Bronchocopy

Parameters.	Conservative management.	Surgical management.
Chest X ray (Hyperinflation)	Minimal.	Severe.
CT chest (Degree of herniation of lung fields).	Minimal.	Massive.
VQ scan (Perfusion defects).	Absent.	Present.
Bronchoscopy.	Normal.	Abnormal.

Congenital pulmonary airway malformation (CPAM) : 00:22:21

Previosuly K/a congenital cystic adenomatoid malformation (CCAM).

Hamartomatous/dysplastic lung tissue mixed with normal lung tissue.

Usually involves only 1 lobe of the lung.

Cysts communicate with tracheobronchial tree but do not contribute in gas exchange.

M/C cause of cystic lung disease in a newborn.

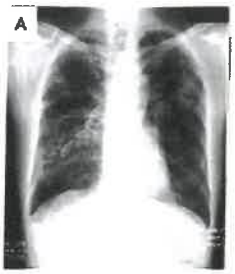
Types of CPAM :

Type 0 : Both lung fields involving all parts of lungs are affected.
Worst prognosis, not compatible with life.

Type 1 : M/C type (60%).
Macrocystic changes (Large cysts >2 cm in size).
Favourable prognosis.

Type 2 : Microcystic (<2 cm in size) changes.
Associated with risk of other anomalies.
Bad prognosis.

Type 3 : Mixed variety (Cyst + solid tissue).
Bad prognosis.
Type 4 : Macrocystic.
↑ Risk of malignancy (Pleuropulmonary blastoma).



X ray : CPAM.

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Features :

- Respiratory distress : Onset depends on number of cysts.
- Recurrent respiratory infections.
- Pneumothorax : D/t rupture of the cysts.

Diagnosis :
Chest x ray : Cystic changes in the lung fields.
IOC : CT chest.

Differential diagnosis :
Staphylococcal pneumonia : Pneumatoceles present, resolve with antibiotics.

Management :
All patients require surgery :

- High risk of infections.
- Risk of malignancy.

Timing of surgery :
Symptomatic : Immediate surgery.
Asymptomatic : By 1 year of age.

Bronchogenic cysts : 00:29:44
Defect : Abnormal budding of tracheal diverticulum.
Site :

- Right sided.
- Majority are attached to midline strctures (Esophagus/carina/trachea) through a fibrous tissue.
- Extrapulmonary >> intrapulmonary.

Clinical features :

- Majority cases are asymptomatic.
- Infected cyst : Fever, chest pain & productive cough.

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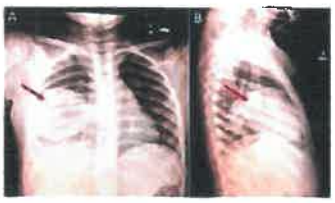
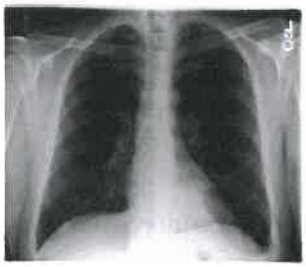
Diagnosis :
Chest x ray : AP, lateral views.
IOC : CT chest.


Bronchogenic cyst.

Management : Surgical excision of the cyst.

Pulmonary sequestration : 00:32:38

Non functioning mass of lung tissue.
Does not communicate with tracheobronchial tree.
Derives blood supply from systemic arteries : Lower thoracic/upper abdominal aorta.
Intrapulmonary > extrapulmonary.
m/c : Present on the left side of the lung.


Pulmonary sequestration.

Diagnosis :
Chest x ray : Separate area of lung tissue.
IOC : CT chest + angiography.

Features.	Intrapulmonary sequestration.	Extrapulmonary sequestration.
Age at diagnosis.	Older child.	Neonate.
Location.	Right = Left.	Always left sided.
Visceral pleura.	No separate visceral pleura.	Separate visceral pleura present.
Venous drainage.	Pulmonary veins.	Inferior vena cava.
Surgery.	Lobectomy.	Sequestrectomy.

Management :

- Lobectomy/sequestrectomy.
- Coiling embolisation procedure : Cutting off systemic arterial supply to sequestered tissue.

UPPER AIRWAY DISORDERS IN CHILDREN

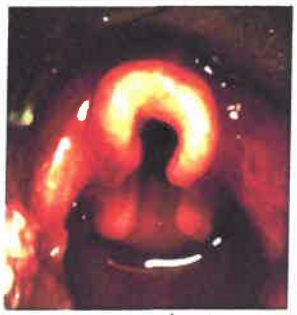
Upper airway obstruction 00:00:20

Narrowest part of the pediatric airway in children : Sub glottic area (at the level of cricoid cartilage).
Common feature of upper airway obstruction : Stridor (inspiratory sound).
Upper airway refers to larynx.

Conditions leading to stridor :

- Anomalies of the larynx.
- Infection in larynx.
- Foreign body in larynx.

Congenital anomalies of larynx :
Laryngomalacia :
m/c anomaly of larynx.
Softness/laxity of larynx.
Structures affected : Epiglottis, arytenoids & aryepiglottic folds.


Laryngomalacia on laryngoscopy

Laryngoscopy :
Abnormality in the shape of structures in larynx → Omega (Ω) shaped epiglottis.

Increased compliance during inspiration (in supine posture) → folding (epiglottis pushed downward into airway) → obstruction of upper airway → intermittent stridor (when child is in supine position, crying/agitated, feeding).
Stridor disappears in prone posture.

Stridor : Long standing, starts soon after birth or within two weeks after birth.

Laryngomalacia is diagnosed clinically. No investigations are needed.

Treatment :

Reassurance : Improves with age & will resolve spontaneously in 2 years.

Severe stridor : Supraglottoplasty (rare).

Croup 00:07:16

Acute Laryngo Tracheo Bronchitis (ALTB).

Age : 6 months to 5 years (peak : 2 years).

Etiology : Para influenza virus.

Presentation : Stridor (associated with low grade fever) in an otherwise well child.

Cough : Barking/seal like/brassy cough.

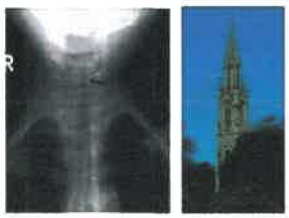
Graded based on clinical presentation :

1. Mild croup :
   - Stridor only upon coughing/exerting.
   - SpO_a : Normal.
2. Moderate :
   - Stridor at rest.
   - Respiratory distress (tachypnea/fast breathing + chest retractions).
   - SpO_a : Normal.
3. Severe :
   - Stridor at rest.
   - Respiratory distress (tachypnea/fast breathing + chest retractions).
   - Hypoxia (SpO_a < 92 % in room air).

X ray :

Narrowing of airway (maximum narrowing in sub glottic area) :

Steeple sign.



Steeple sign

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Management :

Mainly supportive treatment.

1. Mild croup : Oral Dexamethasone (0.15 – 0.6 mg/kg) as single dose.
2. Moderate or severe croup :

   If hypoxia is present : O_2 inhalation & nebulization with racemic epinephrine (racemic : D & L isomers of epinephrine) or L epinephrine alone (whichever is available).

Acute epiglottitis 00:14:11

It is a medical emergency.

Age group : 1 to 3 years (toddler age group).

Etiology : H. influenza type B (most common).

Presentation :

Sudden onset high grade fever.
Sick (toxic) looking.
Stridor.
Drooling of saliva.
Respiratory distress.

Characteristic posture : Tripod posture/sniffing dog posture.

Tripod position : Epiglottitis

Investigations :

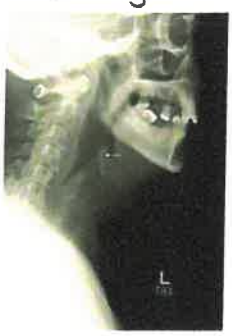
1. Lateral X ray of neck :

   Thumb sign (swollen epiglottis causes narrowing of airway → gives impression of thumb).

2. Laryngoscopy : Cherry red epiglottis (severely inflamed epiglottis).

   Laryngoscopy is not done in acute epiglottitis because of risk of acute laryngeal spasm while maneuvering.

Thumb sign



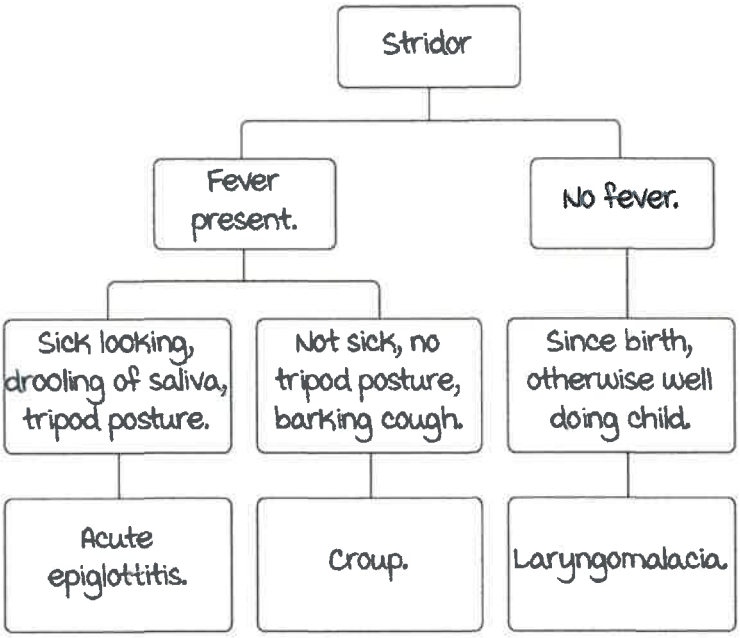
Management :

1. Priority : Secure airway (endotracheal intubation or tracheotomy).

Active space

2. Antibiotics : 3rd generation cephalosporin (Ceftriaxone or Cefotaxime).
3. No role for sedatives.

Differentials for stridor 00:20:50



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LUNG ABSCESS

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Basics :

- Lung abscess is a thick walled cavity with pus.
- Abscess is a localized area of necrosis and suppuration.
- Initially : Lung infection (Complication of pneumonia) → cavity → abscess.
- Seen in children with recurrent aspiration.

Types & etiology

00:02:15

Types :

a. Primary :

- Previously healthy patients
- Solitary lung abscess.
- Right-sided.

b. Secondary :

- Underlying disorders.
- Multiple.
- Left-sided.

Site of abscess :

- Recumbent : R/L upper lobes, apical segment of the lower lobe.
- Supine : Posterior segment of the upper lobes.

Etiology :

- Usually polymicrobial.
- Aerobic : Streptococcus pneumoniae, H. influenza, Staphylococcus, Ecoli.
- Anaerobic : Fusobacterium, Bacteroides, Peptostreptococci.

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Features & treatment

00:05:30

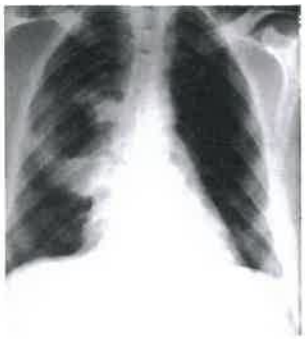
Clinical features :

- Sub acute presentation.
- Low grade fever.
- Wet cough with sputum, hemoptysis, weight loss
- Examination : Tachypnea, ↓ breath sounds, dull percussion note.

Investigations :

X-ray :

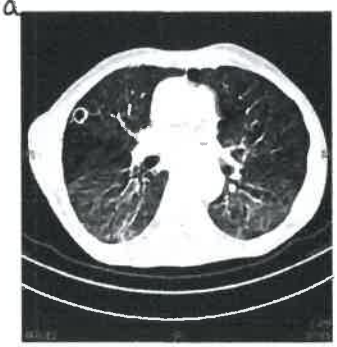
- Can miss the diagnosis in 20% cases.
- Thick walled cavity with air fluid levels is seen.



Thick walled cavity with air fluid levels is seen.

CECT :

- IOC.
- Lung abscess forms an acute angle with the chest wall = Egg on a carpet appearance.
- Helps to differentitate loculated empyema from a lung abscess.
- Helps to guide percutaneous aspiration.



Lung abscess CECT.

USG :

- Helps to differentitate empyema from a lung abscess.
- Monitors the response to the treatment.

Treatment :

- Antibiotics.
- Duration : 2-3 weeks parenteral and switch over to oral for another 2-3 week. total of 4-6 weeks.
- Aerobic : Ticarcillin-clavulanate or Amoxicillin-calvulanate.
- Anaerobic : Clindamycin.

Surgical intervention :

- Severe ill patients.
- Not responding to antibiotics even after >7-10 days.
- Minimal invasive CT guided percutaneous drainage.
- Rare cases require thoracotomy or thoracoscopic drainage.

PNEUMONIA

----- Active space -----

Introduction 00:00:21

Infection of lung parenchyma of alveoli.
Usually due to infection.
M/C/C of under 5 mortality.

Classification 00:01:12

Anatomical basis :

1. Lobar pneumonia :
   - Limited to only one lobe.
   - Caused by bacteria.
2. Bronchopneumonia :
   - Infection centred around bronchioles.
   - Pus formation spilling into lobules of lungs.
   - Patchy consolidation.
   - Caused by bacteria.
3. Interstitial pneumonitis :
   - Caused by virus.
   - Walls of alveolar sac/duct/bronchioles.

Based on origin of infection :

1. Community acquired pneumonia :
   - Not hospitalised 14 days prior to onset.

2. Hospital acquired pneumonia :
   - Early : Onset within 4 days of hospitalization.
   - Late :
     Onset after 5 days of hospitalization.
     MDR pathogen involved.
     ↑ risk of morbidity.
     Most severe type.

----- Active space -----

Etiology & risk factors

00:05:43

Etiology :

Bacteria > Virus.

Bacteria based on age :

< 2 months.	3 months to 5 years.	> 5 years.
• Gram -ve : Klebsiella. E. coli • GBS.	• Strep. pneumoniae. • H. influenzae type B.	• Strep. pneumoniae. • Atypicaln bacteria : mycoplasma. Chlamydia.

Overall m/c/c : Strep. pneumoniae.

Viral : RSV (<2yrs).

Immunocompromised child :

- Pneumocystis jiroveci.
- Fungal infections.

Risk factors :

- Severe malnutrition.
- LBW.
- Lack of breastfeeding.
- Indoor air pollution/overcrowding.

Clinical features

00:10:16

Symptoms :

Young infants (0 to 3m) :

- Fever.
- Hypoxia.
- Apnea.

Older infants :

- High grade fever.
- Malaise & lethargy.
- Pleuritic chest pain.
- Expectorating cough.

----- Active space -----

Examination :

Lobar pneumonia :

- Decreased chest movements on the affected side.
- Bronchial breath sounds.
- Dull note on percussion.

Other findings particular to etiology :

- Wheezing and concomitant features of URI : Viral cause (RSV).
- Mycoplasma :
  - Seen in >5yrs.
  - Hemolytic anemia.
  - Arthritis.
  - CNS features (Encephalitis, ataxia).
- Concomitant conjunctivitis : Chlamydia.
- Staph. aureus :
  - Most severe form.
  - Necrotizing pneumonia → Pneumatocele → Pneumothorax.
  - Empyema.
  - Skin involvement (Pyoderma).

BRONCHIECTASIS

----- Active space -----

Introduction

00:00:16

Definition :

Suppurative lung disease.

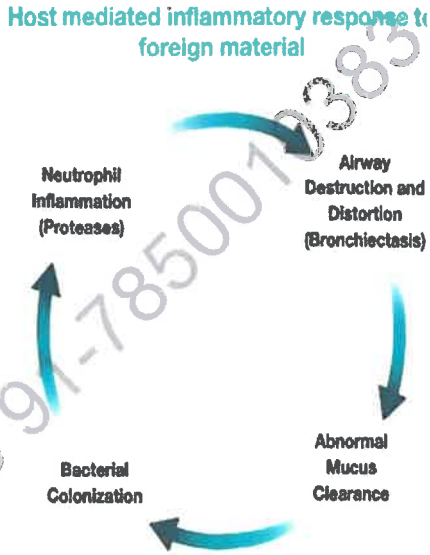
Ectasis means dilatation.

Bronchiectasis is a permanent, irreversible dilatation of bronchi and bronchioles.

Long term sequelae of chronic necrotizing lung infections.

Pathogenesis :

Vicious cycle : Infection triggers bronchiectasis, bronchiectasis triggers further infection.

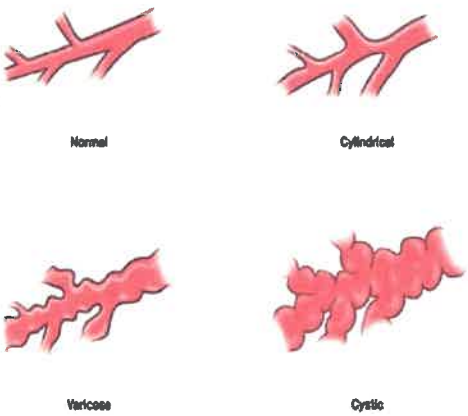


Cole's cycle of bronchiectasis.

1. Bacterial colonisation.
2. Neutrophilic infiltration.
3. Destruction by proteases : Smooth muscles, elastic tissue in bronchial walls.
4. Abnormal mucus clearance : Predisposes to bacterial colonisation

Types of bronchiectasis :

1. Cylindrical type (m/c) :
   Tram track appearance on chest X ray.
   Signet ring appearance on C/S.
2. Cystic/saccular type :
   Honey combing appearance on imaging.
3. Varicose type :
   Beaded appearance (Alternate dilatation and constriction).



Morphological types of bronchiectasis.