

Bronchiolitis

1. **Definition**
 - a. **Bronchiolitis is an acute, infectious, inflammatory disease of the upper and lower respiratory tract resulting in obstruction of the small airways. Although it may occur in all age groups, the larger airways of older children and adults better accommodate mucosal edema and severe symptoms are usually only evident in young infants**
2. **Etiology**
 - a. **Major (33%): Respiratory Syncytial Virus (RSV)-most common isolated agent in 75% of children less than 2 years hospitalized for bronchiolitis**
 - b. **Minor: Adenovirus, Influenza, Mycoplasma pneumoniae, Parainfluenza**
3. **Epidemiology**
 - a. **Incidence: 10-15/1000 (most common LRI syndrome in young kids)**
 - b. **Age of onset: Less than 2 yrs with peak between 6-10 weeks of age**
 - c. **Risk factors: Winter - > Early spring (RSV); Fall (M. pneumoniae), M > F, High risk patients: Cardiopulmonary disease (CHF, CF, BPD), Immunocompromised, Trisomy 21**
4. **Pathogenesis**
 - a. **The infecting virus spreads from the upper respiratory tract (prodrome) and invades the medium and small bronchi and bronchioles resulting in an inflammatory response consisting of edema and exudate (mucous and cellular debris) and epithelial necrosis. Since resistance to the airflow is inversely related to the 4th power of the radius (Poiseuille's Law), even minor thickening of the bronchiolar wall produces a profound effect on airflow. Airway resistance in the smaller air passages increases during both inspiration and expiration but since the radius of the airway is smaller during expiration, the resulting ball-valve respiratory obstruction leads to early air trapping and overinflation. Atelectasis occurs when the obstruction becomes complete and trapped air is absorbed**
 - b. **RSV is shed from the respiratory tract for an average of 9 days in children under 1 year of age and for up to months in infants with immunodeficiency syndromes**
5. **Diagnosis**
 - a. **Clinical: Age- Less than 2 yrs with peak between 6-10 weeks of age**
 - b. **Clinical: Season- Winter - > Early spring (RSV)**
 - c. **Clinical Features: Mild URTI for several (1-4) days, Rhinitis (serous nasal discharge), Sneezing, Cough, Fever (38.5-39 C), Poor feeding**
 - d. **Laboratory: Viral (RSV) identification**
6. **Respiratory Manifestations**
 - a. **Widespread fine end inspiratory, early expiratory crackles, Prolonged expiratory phase, Audible wheezing, Decreased breath**

sounds, Tachypnea, Tachycardia, Hypoxia +/- cyanosis, Lethargy and Apnea

7. Complications

- a. **Acute: Dehydration, Febrile seizures, Respiratory distress with prolonged apneic spells, Respiratory failure, Death (mortality rate <1%)**
- b. **Chronic: RSV Bronchiolitis, Asthma (Strong association between proven RSV bronchiolitis and subsequent development of asthma - about 30- 50%), Adenovirus Bronchiolitis, Bronchiolitis obliterans (chronic bronchiolitis), Unilateral hyperlucent lung syndrome**

8. Complications

- a. **Acute Course: 80% of cases will be clinically improved within 3-4 days of initial presentation (recovery usually dramatic), Blood gases normalize over the next 2 weeks, Radiologic changes normalize over 9 weeks**
- b. **Prolonged Course: 20% of cases will have a protracted course lasting from weeks to months, Persistent wheezing and hyperinflation, Abnormal gas exchange and lung function, Some develop lobar collapse**

9. Serum Investigations

- a. **CBC: WBC (5-24), may have increased PMN and bands**
- b. **Blood gas: Hypoxia due to V/Q mismatch, Metabolic acidosis (if dehydrated)**
- c. **Lytes, BUN, creatinine (dehydration)**

10. Virology

- a. **Nasopharyngeal aspirate for RSV or other viruses**
- b. **Culture and rapid antigen detection techniques**

11. Imaging Studies- Chest X-Ray

- a. **Scattered areas of consolidation, segmental collapse and/or patchy atelectasis**
- b. **Hyperinflation - flattened diaphragms with increased AP diameter**
- c. **Peribronchial thickening**
- d. **Rule Out: CHF, Foreign bodies, BPD, Bacterial pneumonia**

12. Management

- a. **Humidified oxygen- Relieves hypoxia, dyspnea, and cyanosis; Decreases the insensible water loss from tachypnea**
- b. **Saturation monitor for hypoxia**
- c. **Apnea and blood gas monitoring**
- d. **Careful temperature control**
- e. **Oral/IV rehydration**
- f. **Suction! (Gently) Especially obligate nasal breathers**
- g. **Racemic Epinephrine (2.25%)- Alpha-adrenergic effect, Mucosal vasoconstriction decreases subglottic edema.**
 - i. **< 6 months: 0.25ml/2cc NS Nebulized**
 - ii. **Child: 0.5ml/2cc NS SVN Nebulized**
 - iii. **Adolescent 0.75ml/2cc NS Nebulized**

- iv. **Avoid too frequent use due to tachyphylaxis**
 - h. **Bronchodilators- Use in bronchiolitis is controversial unless underlying Reactive Airway Disease**
 - i. **Albuterol (5mg/ml): 0.3cc/kg (up to 1cc)/2cc NS Nebulized**
 - i. **Corticosteroids- Use in bronchiolitis not proven beneficial despite the dominant role inflammation plays in the pathogenesis of airway obstruction**
- 13. Severe Respiratory Distress or Failure**
- a. **Admit to PICU**
 - b. **Heliox- Helium and Oxygen (Decreases airway resistance)**
 - c. **Intubate and ventilate for mean of 5 days**
 - d. **Ribavirin (Virazole)- Controversial; Use in high-risk patients. Synthetic antiviral agent directed against viral DNA, Prevents viral replication**