

McCance: Pathophysiology, 6th Edition

Chapter 34: Alterations of Pulmonary Function in Children

Key Points – Print

SUMMARY REVIEW

Structure and Function

1. The airways of infants and children are narrower than those of adults, thus making them more prone to obstruction.
2. Infants and young children continue to form new alveoli for several years after birth.
3. Surfactant production is an important marker of developmental maturity of the fetal lung.
4. The immature chest wall is soft and compliant, contributing to inefficient mechanisms of breathing.
5. Children have greater oxygen consumption than adults.
6. Immune mechanisms are not fully developed at birth, making young infants more susceptible to infection.
7. Physiologic control of breathing may be impaired during the first few weeks of life.

Pulmonary Disorders

1. Physical examination can provide important clues in assessing the location and nature of UAO.
2. Upper airway infections can pose serious threats, including bacterial tracheitis, retropharyngeal abscess, and peritonsillar infections. Recognition and rapid evaluation are crucial.
3. Viral croup (laryngotracheobronchitis) is the most common cause of acute upper airway obstruction in children and usually affects children ages 6 months to 5 years. Subglottic edema may be mild to severe. Parainfluenza is the most common cause.
4. Acute epiglottitis is a life-threatening emergency that is now rarely seen because of vaccination against *H. influenzae*, which had been the primary causative microorganism. Current cases usually represent vaccine failure or are caused by other bacteria, such as group A streptococci.
5. Aspiration of a foreign body should be considered whenever there is a sudden onset of stridor, coughing, wheezing, or hoarseness. This usually occurs in 1- to 3-year-olds. Occasionally diagnosis is delayed and symptoms may be attributed to asthma, bronchitis, or pneumonia without recognition of the underlying cause.
6. Chronic UAO may be manifested by stridor, abnormal cry, wheezing, or dyspnea. The most common cause of stridor in infants is laryngomalacia. Other causes include subglottic stenosis, vocal cord paralysis, and vascular rings.

7. Obstructive sleep apnea usually occurs in older children rather than infants and is underdiagnosed. Typical symptoms are snoring, gasping, and restless sleep. The most common cause in children is adenotonsillar hypertrophy.
8. RDS of the newborn usually occurs in premature infants who are born before surfactant production and alveolocapillary development are complete. Atelectasis and hypoventilation cause shunting, hypoxemia, and hypercapnia.
9. BPD is a chronic lung disease of infancy that is usually the consequence of acute respiratory disease in the newborn period. Almost always this occurs in infants who were premature and required ventilatory support. Contributing factors include structural immaturity, inflammation, and disordered lung repair processes.
10. Bronchiolitis occurs in infants and toddlers, usually in the winter and early spring. It is caused by viruses, most commonly RSV. There is extensive edema, inflammation, and damage to the bronchiolar epithelium. Injections of monoclonal antibody against RSV are recommended as a preventive measure for high-risk infants.
11. Childhood pneumonia can be caused by viruses, bacteria, or *Mycoplasma*. Lobar pneumonia is usually bacterial. Certain bacteria, such as *S. aureus* and group A streptococci, can cause particularly fulminant disease, as well as abscesses and empyema.
12. Aspiration pneumonitis can occur because of lung inflammation from entry of any foreign substance, including food, drink, or chemicals. Aspiration of oropharyngeal bacteria can occur because of loss of protective reflexes in neurologically impaired children, or during anesthesia.
13. ARDS is an acute life-threatening condition characterized by severe hypoxemia, poor lung compliance, and diffuse densities on chest radiograph. It can be triggered by acute pulmonary insults or major systemic illness (e.g., sepsis) or trauma. High-level ventilatory support is required, and mortality is significant.
14. Asthma is an obstructive airway disease with episodes of acute respiratory symptoms (cough, wheeze, dyspnea) and intermittent or chronic subacute symptoms. It is the most common chronic condition in children. It is a disease of local airway inflammation, with exacerbation in response to triggers, such as infections or allergens. Inflammatory cell infiltration, mucosal edema, mucous plugging of airways, and epithelial damage are seen, and there is evidence of long-term remodeling of airways.
15. CF is an autosomal recessive disease characterized by thick, tenacious mucus, plugging of airways, chronic pulmonary infection, and bronchiectasis. The other major manifestations are digestive and nutritional, related to pancreatic insufficiency. Median survival is currently 36.5 years, with mortality primarily related to lung disease.

Sudden Infant Death Syndrome

1. SIDS is a diagnosis of exclusion after thorough investigation and autopsy following sudden death of an infant less than 6 months of age. Usually the event occurs during nighttime sleep.

2. The cause is unknown. However, some known risk factors are avoidable, such as maternal smoking, prone sleeping, soft bedding surfaces, and overheating. The incidence of SIDS has decreased significantly since public health campaigns have encouraged the supine sleeping position for babies.