



Season 1, Episode #18

Bronchiolitis

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Learning objectives:

- What exactly is bronchiolitis and why is this topic so important?
- How do you make the diagnosis and what other diagnoses should you consider?
- What treatments work, and more importantly, which treatments do not?
- What patients can go home and who needs to be admitted?

Background and pathophysiology:

Bronchiolitis is a seasonal viral lower respiratory infection that typically begins in the fall and peaks in the winter each year. As the leading cause of hospital admission in children less than 1 year old, it is one of the greatest burdens in pediatric health worldwide. It is caused by respiratory viruses that infect the lower airways. This causes inflammation, edema and increased mucous production that ultimately can lead to worsening respiratory distress. Children that are most severely affected are unable to breathe or maintain normal feeding and may become dehydrated. Infants who are born prematurely or who have chronic lung disease, congenital heart disease, or an immunodeficiency are likely to have more severe symptoms. The peak incidence is between 3 and 6 months. The most common etiology is respiratory syncytial virus followed by rhinovirus, human metapneumovirus, influenza, adenovirus, and parainfluenza virus.

Diagnosis:

Bronchiolitis is a clinical diagnosis. The typical clinical picture is an infant who develops upper respiratory symptoms, like runny nose and cough, followed by progressive lower respiratory symptoms over the next few days. Frequently, viral respiratory symptoms will be going through the home or daycare. The same viruses that cause the common cold in adults and older children can cause bronchiolitis in young infants. Routine labs and imaging are not necessary for diagnosis and may lead to overtreatment with antibiotics without any clinical benefit. Prolonged high-grade fever, focal respiratory findings, or abnormal cardiac findings are not consistent with bronchiolitis. These findings should prompt further workup for undiagnosed congenital airway abnormalities, foreign bodies, pertussis and congenital heart disease which may present similarly to bronchiolitis early on.

Treatment and hospital admission:

The cornerstone of treatment is excellent supportive care. This includes maintaining appropriate hydration and respiratory support as needed. Corticosteroids, albuterol, nebulized epinephrine and nebulized hypertonic saline have all been studied and have not been shown to benefit meaningful clinical outcomes. The American Academy of Pediatrics recommends against routine use of these interventions.



Mild Disease:

In mild disease, symptoms will likely peak on day 3-5, but it may take 2-3 weeks for the illness to totally resolve. These infants can be cared for at home with frequent nasal saline and suctioning. Young infants are obligate nasal breathers, so nasal congestion may interfere with feeding. Nasal suctioning before feeds and before a nap can be used to ease the work of breathing.

Moderate Disease:

Dehydration and respiratory support are the most common reasons to admit these infants to the hospital. As the respiratory rate increases up to 60-70 breaths per minute it interferes with effective breast or bottle feeding leading to dehydration. These infants can be admitted for fluids or supplemental oxygen via nasal canula. Traditionally in pediatrics, an oxygen saturation below 92% is indication for admission. However, in bronchiolitis, intermittent hypoxemia with lower airway mucous plugging that spontaneously improves is fairly common. One recent study on children with bronchiolitis falsely elevated pulse-ox reading by 4 percentage points. For example, if the infant's oxygen saturation was 90% then the monitor actually read 94%. The treatment group with the falsely elevated pulse-oximeters were admitted much less often and did not suffer increased adverse outcomes. So, in cases of bronchiolitis, more emphasis should be placed on clinical picture than the pulse-oximetry reading when deciding whether to admit. Finally, patient's with limited access to care should be considered for observation especially if the infant is early in their disease course.

Severe Disease:

In general, when infants are requiring more than 1-2 L by nasal canula to maintain saturations or if there is severely increased work of breathing then other modes of support should be considered, like high-flow nasal canula (HFNC). HFNC is a way to deliver humidified and heated oxygen by a specialized nasal canula at up to 2 L/kg/min which is much more than standard oxygen therapy that cannot be tolerated at higher flow rates. In 2018, a large multicenter, randomized study was done to answer the question--Does the use of HFNC to hypoxic infants with bronchiolitis reduces the need to escalate care in comparison to standard oxygen therapy? They concluded that the infants that had HFNC outside the ICU had a lower rate of escalation of care than those who received the standard oxygen therapy. Although, there was no significant difference on duration of hospital stay, duration of oxygen therapy or days in the ICU. A systematic review and meta-analysis completed in 2019 showed that HFNC is safe as an initial respiratory management, but the evidence is still lacking to show benefits in bronchiolitis compared to standard oxygen therapy. In conclusion, HFNC may prevent ICU admission or more invasive modes of ventilation but has not been proven to shorten disease duration or length of stay.

Prophylaxis:

Palivizumab, a monoclonal antibody to RSV, can be used for prophylaxis in high-risk infants. Currently it is indicated during RSV season during the first year of life for infants born before 29 weeks' or those born before 32 weeks' who have chronic lung disease. Infants with hemodynamically significant heart disease, or those who are immunocompromised, have pulmonary abnormalities or neuromuscular diseases that impair airway clearance should also be considered for prophylaxis.



References and additional reading:

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