

Croup – Laryngotracheitis

Background: Croup is an infection in the upper airway that leads to swelling and a barking cough. Infections of the upper airway are predominantly caused by viruses. Parainfluenza viruses cause about 75% of croup, but other causative pathogens include influenza A and B, adenovirus, RSV and measles.

Epidemiology: Most cases occur between age 3 months and 5 years, with a peak incidence in 2nd year of life. It occurs more commonly in boys. About 15% of patients will have a family history of croup. Interestingly,

Differential includes other causes of upper airway infection such as diphtheria, epiglottitis, bacterial tracheitis. *Hemophilus influenzae* used to be a common cause of epiglottitis, however since the *H. flu* vaccine became widespread in the late 1980s this incidence has been reduced dramatically. Laryngitis is similar to croup in the sense that both are viral infections of the larynx that cause swelling and hoarseness, but croup has the added symptom of stridor and/or barking cough. Diphtheria is super rare especially in countries with widespread vaccination but is nonetheless on the differential. Symptoms include sore throat, anorexia, low grade fever, and then progresses to airway obstruction, often accompanied by pseudomembrane formation in the airway.

Clinical Course:

- Days 1-3: patient develops typical cold symptoms – runny nose, mild cough and/or low-grade fever
- Then, they develop characteristic barking cough, hoarseness and inspiratory stridor
- Symptoms are worse at night and with agitation
- Each night will be a little better, and the entire course resolves within a week
- Severe cases may include progressive airway obstruction with tachypnea, nasal flaring, retractions, continuous stridor

Work-up:

- This is a **clinical diagnosis!**
- Don't need neck films, but if you do get them, the AP view classically shows the steeple sign, which represents narrowing of the subglottic airway. The reason we don't routinely obtain these is because the steeple sign isn't sensitive or specific for croup, so it doesn't really change our management.
- Blood gas is typically normal (lungs are fine, it's the upper airway that's the problem)

Management: Most kids can be managed at home, but for those who can't, airway management is the main focus of therapy.

- **Racemic epinephrine:**

- o Nebulized racemic epinephrine causes constriction of the arterioles in the swollen tissue, which leads to fluid resorption from the interstitial space. This leads to less airway edema and easier work of breathing. "Racemic" refers to the fact that we administer equal amounts of L- and D-isomers, which helps decrease side effects of tachycardia and hypertension.
 - Given to children with stridor at rest, respiratory distress or hypoxia
 - Dosing: 0.25 – 0.5mL mixed into 3ml normal saline.
 - Use as frequently as every 20 minutes
 - Effects wear off in 2 hours – so, in ED setting, these patients will be observed for 2-3 hours after administration to ensure that they don't need another dose.

- **Oral corticosteroids:**

- o Corticosteroids reduce inflammation and edema in the airway, and their use is associated with lower rates of hospitalization and intubation.
 - Typically, dexamethasone at 0.15mg/kg, but sometimes prednisolone is given
 - A study published in September 2019 compared two doses of dexamethasone (0.6mg/kg and 0.15mg/kg) with prednisolone. They tracked rates of unscheduled medical care sought in the 7 days following administration and found that there was little difference between the three therapies. Reattendance rates were 18-21% in all groups.
- o However, steroids aren't perfect. Their effect is not immediate - can take up to 6 hours to see results.

- **Admission:**

- o Admission criteria for croup varies from institution to institution, but in general, admission occurs in cases where children have persistent respiratory distress, hypoxia or require multiple racemic epinephrine treatments.
- o However, several studies have been published looking at hospital course in pediatric patients admitted with croup. In one 2019 study, 75% of patients admitted with croup received no significant interventions after admission. Another study from 2014 found that over 50% of croup admissions did not require additional racemic epinephrine after admission. Predictors for prolonged hospitalization included hypoxia, tachypnea on initial vital signs, and history of intubation.

Sources: Nelson's Textbook of Pediatrics, 21st edition.

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