Epiglottitis and Croup

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Objectives:

• Differentiate between Croup and Epiglottitis
• Describe the clinical manifestations of Croup and Epiglottitis
• Explain clinical care for each respiratory infection

Viral Croup
Laryngotracheal bronchitis

Incidence

• Classic viral croup affects children between the ages of 6 months and 6 years
• Peak incidence is 6 months to 36 months of age.
• Croup is a self-limiting illness; morbidity is low, and mortality is rare.
• Known as laryngotracheitis or laryngotracheobronchitis
• Most common etiology is viral - Parainfluenza virus, adenovirus, RSV
Viral Croup Pathogenesis

- Croup usually results from viral infection.
- The most common infecting organisms are the parainfluenza virus types 1 and 2.
- The pathogenesis involves inflammatory edema.
- Edema and obstruction is greatest beneath the cricoid cartilage.
- Obstruction at this point produces the classic inspiratory stridor and barking cough associated with the disease.

Viral Croup Diagnosis

- Diagnosis made primarily on clinical grounds.
- A white blood cell count should be obtained to rule out secondary infection. A normal or mildly elevated WBC (10,000/mm$^3$) usual.
- Anteroposterior and lateral neck X-rays confirm subglottic tracheal narrowing indicated by a sharply sloped appearance (steeple sign).
- Classic radiographic signs of croup are present in only about 50% of cases.

Classic radiographic signs of Croup

[Image of X-ray showing subglottic tracheal narrowing]
Viral Croup
Classic Clinical Manifestations

- Begins with respiratory symptoms
- Within 2 days progresses to:
  1. Hoarseness
  2. Barking seal like cough
  3. Stridor
  4. Symptoms worse at night
  5. Fever

Viral Croup
Mild disease: occasional barking cough, no stridor at rest, mild to no suprasternal retractions

Moderate: frequent cough, audible stridor at rest, retractions,

Severe: frequent cough, inspiratory/expiratory stridor, retractions, decreased air entry, distress, and agitation.
Laryngotracheal bronchitis
Croup- Diagnosis

• A/P neck x-ray: subglottic narrowing
• CBC might show lymphocytosis

Croup Differentials

• Diphtheria
• Epiglottitis
• Inhalation injuries

Viral Croup- Management

• Cool air mist, exposure to outdoor cool air
• Adequate hydration
• Glucocorticoids
• Racemic epinephrine
• Dexamethasone for severe cases
Viral Croup - Management

Hospitalization indications
• Dehydration
• Significant respiratory compromise
• Signs of respiratory failure

Complications
• Associated complications that may occur include pulmonary edema, pneumothorax, subglottic stenosis and secondary bacterial infection.

Prognosis
• The prognosis for children with croup is excellent, and most cases resolve spontaneously in about a week. Only rare cases of croup require the placement of an artificial airway.

Spasmodic Croup
• No prodrome of upper respiratory syndrome.
• Subglottic edema
• Affects individual at night.
• Affects children between 1-3 years
• Managed at home
Croup Review Questions

Respond with true or false.

1. Patients receiving nebulized racemic epinephrine should be monitored for at least four hours after administration for signs of worsening stridor (rebound).
   - True

2. Neck X-rays usually show the classic thumb sign, confirming the diagnosis of croup.
   - False

3. Most cases of croup will respond to the appropriate antibiotic.
   - False

Croup Answers

• 1. False
• 2. True
• 3. False
• 4. False
Epiglottitis

- The epiglottis is a cartilaginous structure covered with mucous membrane.
- Epiglottitis is an acute inflammation of the epiglottis and pharyngeal structures.
- Can be a severe life threatening disease.

Epiglottitis

- Epiglottitis is a bacterial infection usually caused by invasive Haemophilus influenzae type b (Hib).
- Vaccination has decreased the number of cases.
- It can be caused by Streptococcus pneumoniae, group A and C streptococci and nontypeable Haemophilus influenzae.
- Children with viral infections can also present with epiglottitis secondary to a superinfection.

Epiglottitis

- Sudden marked swelling of the epiglottis and surrounding tissues can rapidly result in full airway obstruction.
- Noninfectious causes of epiglottitis include:
  - burns
  - caustic agents
  - trauma, or
  - foreign body ingestion

Epiglottitis can be fatal if not handled quickly and appropriately.
Epiglottitis Incidence

- Prior to Hib vaccination in 1988, epiglottitis was most prevalent in children ages 2 to 7
- Today the average age of the affected patient was 45 years old.
- Significant increase in cases was in children under age 1 year. Children under the age of 2 months who have not yet been immunized
- Unlike croup and RSV, epiglottitis is unpredictable and can occur at any time of the year.

Diagnosis

The changes in age distribution of epiglottitis have affected the classic clinical presentation. The classic triad of dysphagia, drooling and distress can still be seen in younger patients. Patients may report a severe sore throat as their primary symptom. Dx of epiglottitis is usually based on history and the characteristic clinical presentation. Confirmed by a lateral neck X-ray that demonstrates a swollen epiglottis.

Epiglottitis Diagnosis

- Lateral neck - enlarged edematous epiglottis.
- Laryngoscopy: Direct inspection of epiglottis under controlled conditions
- Leukocytosis
- Blood cultures positive
Epiglottitis
Differentials

• Anaphylaxis
• Croup
• Retropharyngeal Abscess
• Foreign body obstruction

Physical examination

• Physical examination of the airway should be performed only by a physician who is able to establish an artificial airway, including performing a cricothyrotomy or tracheostomy.
• When directly visualized, the supraglottic area is cherry red and swollen

Physical examination

• Laboratory studies should never be drawn until the artificial airway is in place. Agitating interventions may result in full airway obstruction.
• Once blood can be safely drawn, an elevated leukocyte count is likely, over 15,000 cells/mL.
When directly visualized, the supraglottic area is cherry red and swollen

Clinical Course

• Abrupt onset; Almost all deaths from epiglottitis can be attributed to acute airway obstruction.
• May present with shock, cyanotic, and unconscious upon admission.
• Delaying medical treatment by even two hours can prove fatal.
• Drooling, a preference to sit upright with chin forward and neck extended in a tripod position and marked tachypnea are classic signs of epiglottitis.
• Do not force child to lay down, can precipitate respiratory failure.

Clinical Course

• Triad of drooling, dysphagia, and distress.
• High fever
• Positioning- tripod position
• Dyspnea / Inspiratory stridor / Accessory muscle use / Muffled voice
• Brassy cough
Treatment and Supportive Care

• The priority in acute epiglottitis management is to establish a mechanical airway until the inflammation resolves.
• All necessary interventions must be carried out in a nonthreatening atmosphere
• If possible the child should be left in the parent’s arms, allowing a position of comfort.

• If oxygen is necessary, use the least invasive manner of delivery
• Although steroids are used routinely, their effectiveness remains controversial
• ED physicians may need to rapidly intubate the child, if possible an ENT or general surgeon should be consulted on whether to intubate the child.

• Nasotracheal intubation is well accepted
• Once the airway is in place, IV line placement and blood draws may begin.
• Antibiotics should begin as soon as IV access is established.
Treatment and Supportive Care

- Until the results of susceptibility tests are known, treatment should be targeted at addressing the most likely pathogens—*Staphylococcus aureus* or *group A streptococci*. In general, antibiotic treatment should continue for 7 to 10 days. Sedation is needed for comfort.
- Air leaks around the endotracheal tube also indicate that the edema is resolving. The average period for intubation varies, but the patient should be observed for 24 to 36 hours postextubation.

Outcome

- Acute epiglottitis rarely recurs.
- With prompt recognition of the clinical symptoms and proper management, the condition is resolved within a week or two.
- With appropriate therapy, most children with epiglottitis have no long-term adverse effects from their illness.

Review

- Infectious causes of airway obstruction can be distinguished by anatomic location and causative agent. Epiglottitis, the most common supraglottic obstruction, is bacterial in origin. An artificial airway and antibiotic therapy are mandatory. Spasmodic croup is a mild, transitory subglottic swelling which responds to mist and sometimes antihistamine therapy. Laryngotracheitis, or viral croup, affects the subglottic airway with fluctuating severity and is treated with mist, racemic epinephrine, oxygen, and sometimes steroids. Obstruction may be so severe that intubation or tracheostomy is needed.
Epiglottitis Review Questions

Respond with true or false.

1. The onset of epiglottitis is gradual, often preceded by a few days of cold-like symptoms.
   - False

2. Most patients with acute epiglottitis are between the ages of 9 and 14.
   - False

3. Children who have been vaccinated can be diagnosed with croup but not epiglottitis.
   - False

4. Classic signs of epiglottitis include drooling and marked tachypnea.
   - True

Epiglottitis Review Answers

- 1. False
- 2. False
- 3. False
- 4. True
Pertussis (Whooping Cough)

Incidence
- In the United States, widespread use of vaccine (diphtheria-tetanus-pertussis) has controlled pertussis for decades.
- DTaP recommended for routine use in infants.
- However, despite the use of vaccines, this endemic disease persists with periodic, epidemic cycles.
- Most of the cases occur between early summer and early fall.
- In 2012, the Centers for Disease Control and Prevention report 48,000 cases, the highest number since 1955.

Pertussis Vaccination in Adults
- Children and adolescents 11 to 18 should receive a booster to protect against pertussis.
- Tdap recommended for Adults age 19 and older
- Women should be vaccinated before pregnancy
- Recommendation to administer a dose of Tdap to all pregnant women, ideally between 27 and 36 weeks gestation
- When Tdap is not administered during pregnancy, women should receive the vaccine immediately postpartum.
Diagnosis

- Suspicion of the infection depends on history of exposure and clinical features
- Clinical signs of pertussis can be recognized readily only during the paroxysmal stage of the disease
- An elevated blood lymphocyte count, ranging from 15,000 to 50,000/mm.

Diagnosis

- The gold standard and preferred laboratory test is isolation of *B. pertussis* by culture.
- Polymerase chain reaction (PCR) testing of nasopharyngeal swabs is increasingly used for detection in addition to culture, rapid
- Chest X-ray during the paroxysmal phase of the disease may reveal perihilar infiltrates or atelectasis.

Clinical Course (3 Stages)

1. Catarhal phase
   - Duration: one to two weeks (most infectious stage)
   - Symptoms: rhinorrhea, lacrimation, mild cough, low-grade fever
2. Paroxysmal phase
   - Duration: one to six weeks or longer
   - Symptoms: Increased severity of cough, repetitive series of coughs, massive inspiration with a whoop. Cyanosis, tongue protrusion, neck vein distention. Children younger than 6 months may not make the classic whoop sound but can become exhausted from coughing. Infants may experience apnea, life-threatening pauses in breathing.
Clinical Course (3 Stages)

3. **Convalescent phase**
- Duration: two to three weeks
- Symptoms: Episodes of coughing, whooping, vomiting that decrease in frequency and severity. Cough may persist for several weeks to months

Treatment and Supportive Care

- Pertussis is treated with antibiotics, and early treatment is very important.
- Albuterol (bronchodilator) has been used, but it is not consistently effective
- The CDC states that for children a month or older and adults, erythromycin, clarithromycin and azithromycin are preferred drugs for treating pertussis.

Treatment and Supportive Care

- For those who have been exposed to whooping cough, recommendations suggest early prophylactic treatment with erythromycin or clarithromycin for 14 days
- Supportive treatment to treat symptoms may include:
  - Secretion management
  - Oxygen
  - Bronchodilators and even mechanical ventilation..
Pertussis Complications

Complications in infants younger than 1 year:
• Pneumonia (23%)
• Convulsions (1.6%)
• Apnea (67%)
• Encephalopathy (0.4%)
• Death (1.6%)

Complications in teens:
• Weight loss (33%)
• Loss of bladder control (28%)
• Fainting (6%)
• Rib fractures from severe coughing (4%)
• Pneumonia (2%)

Outcome
• The prognosis for pertussis varies directly with age.
• Older patients seem to have more favorable outcomes.
• In the past, the mortality rate had been greater than 50%.
• Before vaccination was available, pertussis caused more than 200,000 cases and nearly 9,000 deaths annually.
• Now, the mortality rate for hospitalized patients in the U.S. is between 1% and 2%.
Pertussis Questions

1. The predominant symptom of whooping cough is a paroxysmal cough that lasts for several weeks.
   - True

2. Erythromycin reduces communicability of pertussis and may abbreviate the illness.
   - True

Pertussis Questions

3. Pertussis occurs in seasonal epidemic cycles.
   - True

4. Pertussis is the most prevalent vaccine-preventable disease among young children.
   - True

Conclusion

- Croup, Epiglottitis, and Pertussis are still clinical concerns today posing a real threat
- By keeping up-to-date with advances RTs can add significant value in the care of patients with these infections.
Any Questions?

Pertussis Answer

1. True
2. True
3. True
4. True

References