Project: Ghana Emergency Medicine Collaborative

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#### Plan for the hour

- Split into 4 groups
- You will be given 2-3 diagnoses and you have to create the cases.
- Then answer a few questions
- In 15 minute we'll meet again as a big group to discuss our findings.

#### Questions

- Create a case for each diagnosis
- What is the differential diagnosis for each case?
- How do you distinguish between them? Is it a clinical diagnosis? Are ancillary tests needed?
- What is the treatment and how does it differ?
- What is the disposition and how does it differ?

# Croup

- Most commonly occurs in children 3 months to 3 years, rare > 6 yrs
- Most frequent presentation 10pm 4 am (although if seen between 12pm - 6pm more likely to be admitted)
- Yesterday nasal irritation and congestion
- This morning fever
- Tonight woke up with barking cough and stridor when crying.
- Symptoms improved when brought outside to the car

# Croup

- Laryngotracheitis
- Narrowing of the subglottic trachea
- Most commonly Parainfluenza virus type 1 (fall and winter epidemics)
- Other possible culprits
  - RSV and Adenovirus is relatively common
  - Measles, Influenza, Rhinovirus, Enterovirus, HSV

#### **Bacterial Tracheitis**

- Peak incidence 3-4 yrs, but has been regularly reported in adolescents and young adults
- Features of croup and epiglottits overlap: fever, toxic appearing, purulent secretions, stidor, and increasing respiratory distress
- Commonly misdiagnosed as croup or epiglottitis
- Poor response to usual croup treatment
- Signs/Symptoms of lower airway disease may be present
- Primary infection
  - Sudden onset of symptoms
- Secondary infection
  - Worsening of the clinical course of viral URI

#### **Bacterial Tracheitis**

- Bacterial infection of subglottic trachea and usually bronchi and lungs as well.
- Traditionally Staph areus, but also HIB Moraxella catarrhalis and anaerobes
- May occur as a complication of viral URI or as primary bacterial infection.
- Accumulation of thick pus within the lumen of the subglottic trachea
- Of 35 pts admitted to PICU in one hospital (1997-2006) with upper airway infections:
  - 3 (15%) had viral croup
  - 15 (75%) had bacterial tracheitis
  - 2 (10%) had epiglottits

# Epiglottitis

- 2-7 yrs
- Rapid onset
- High fever, sore throat, stridor, no cough
- Dysphagia, Difficulty handling oral secretions
- Pale, toxic appearing
- Anxiety
- Muffled "hot potato" voice, no hoarseness
- Sitting in the "sniffing position"

# Epiglottitis

- Supraglottitis
- H. influenza, though GPC also possible
  - Staph and Strep pneumo, Strep A
- 50-85% of pts with H. flu epiglottitis have bacteremia
- Rapidly progressive inflammation of and around epiglottis
- Hib vaccine in 1991. Since that time:
  - Overall incidence decreased from 10.9 to 1.8 per 10,000 admissions (95% reduction in Hib related disease)
  - Older children on average
    - Prior to 90s mean = 3 yrs
    - Early 90s mean = 6 yrs
    - Late 90s to 2002 mean = 14.6 yrs
  - HIB now only 25%, Group A strep predominates

Rosen's Emergency Medicine: 5th edition Mosby, Inc. 2002

Shah et al Laryngoscope 114: March 2004

#### **Differential Diagnosis**

- Foreign Body
- Retropharyngeal abscess
- Trauma
- Anaphylaxis
- Angioedema

### **Evaluation of Stridor**

- In general: Keep the kid calm
- Rapid initial assessment/management
  - Signs of respiratory failure
    - Listlessness, fatigue
    - Decreased level of consciousness
    - Marked retractions
    - Decreased or absent breath sounds
    - Tachycardia out of proportion to fever
    - Cyanosis or pallor
  - Start treatment (More on this later)
  - Intubation
    - Required in < 1% of ED croup presentations
    - Use ETT 0.5 1.0 mm smaller than

#### **Evaluation of Stridor**

#### • History

- Sudden onset with no fever, chocking and gagging.....
   Foreign body, anaphylaxis
- Sudden onset with fever .... Likely a bacterial process.
- Hoarseness and barking cough.... Typically absent in acute epiglottitis or foreign body.
- Difficulty swallowing or Drooling.... Foreign body, epiglottitis, retropharyngeal abscess
- Exposures
- Underlying disease (congenital anomilies, previous airway surgery, children with neuromusclular disease) increased risk for more severe disease.

# **Ancillary Studies**

- Lab studies:
  - Croup: rarely indicated
  - Bacterial tracheitis: wbc count, left shift.
- Imaging: PA and Lateral Chest, Soft Tissue Neck
  - Should never interfere with stabilization
  - Rarely indicated for croup unless:
    - Diagnosis is in question or course atypical
    - Looking for a foreign body (though most are not radioopaque
  - Portable lateral neck used to dx epiglottitis

#### Lateral Neck Xrays

- Neck extended
- During inspiration
- 4 things to look at:
  - The epiglottis
  - The retropharyngeal (prevertebral space)
    - Normally widens during expiration leading to false dx
  - Tracheal air column
  - The hypopharynx

### What's Normal

- Epiglottis
- Retropharyngeal Space
- Tracheal air column
- Hypopharynx



#### Imaging



#### Croup



"Steeple sign," subglottic narrowing

## Imaging



#### **Bacterial Tracheitis**



# Nonspecific edema or intraluminal irregularities of the tracheal wall

#### Imaging



**PD-INEL** Source Undetermined

#### Epiglottitis



"Thumb sign," swelling of the epiglottis

#### Treatment

- Croup
  - Cold night air
  - Humidified air or O2 for more severe cases
  - Oral Dexamethasone
    - 0.6 mg/kg max dose 10mg
    - Can be given IV or IM if not tolerating PO
    - Improvement usually within 3-6 hrs but no longer significant at 24 hrs
  - Racemic epinephrine
    - 0.05 mL/kg per dose max of 0.5 mL nebulized over 15 min
    - Can be repeated Q15-20 min
    - >3 doses in 3 hrs, put them on a monitor
  - Other things to try:
    - Nebulized Budesonide 2mg
      - As effective as oral dexamethasone but more expensive
      - Can be mixed with racemic epi in the nebulizer
    - Prednisone 4mg/kg = .6mg/kg dexamethasone, volume limited
    - Prednisolone 1mg/kg not as effective as dexamethasone
    - Heliox

#### How good is Dex?

- 5x reduction in # intubations in severe croup
- If intubated, remain so for 1/3 the time
- 10% reduction in need for epi
- Mild croup: 50% less likely to return for medical care

#### Repeat Dosing for Dex?

- Effects of Dex last 24 hrs
- No evidence for or against
- Risk progression of infection though most cases of this are anectodal and in
  - Repeat dosing over several days
  - Neutropenic patients

## Why Racemic?

- 1:1 mix of D and L isomers of epinephrine
- Supposed to reduce side effects like HTN and tachycardia
- PRCT in children with croup: no difference between racemic and L-epi (0.5 ml/kg max dose 5 ml of 1:1000)

#### When to pull out the R. Epi?

- Moderate retractions and/or Stridor at rest
- Single dose of epi? Safe to d/c after 2-4 hours of observation.
- 3 or more doses in 2-3 hrs, admit for cardiac monitoring

#### Heliox?

- Decreases airflow turbulence through airway obstruction
- RCT in 29 children with mod-severe croup heliox vs epi found no difference
- RCT in 15 children with mild croup heliox vs O2 showed trend but not significant

### Treatment: Bacterial Tracheitis

- Secure the airway

   6/8 studies intubation rates > 70%
- Bronchoscopy diagnostic and therapeutic
- Broad spectrum antibiotics
  - Vancomycin (mrsa, mssa, strep)
  - Clindamycin (mrsa, anaerobes)
  - Cefotaxime (moraxella, anaerobes)

### Treatment: Epiglottitis

- Secure the airway
  - As soon as dx is made, prior to deterioration
  - ETT (nasal vs oral) vs Tracheostomy
- Supportive care
  - IV hydration
  - Humidified air with O2 if needed
  - Cefuroxime or Unasyn
  - Oral abx after extubation for total 7-10 days
  - +/- Steroids

# Epiglottitis: Should I look in there?

- Traditional Dogma: Don't touch 'em
- Some now advocate a quick look with a tongue blade: No evidence
- My advice: If you are going to look....
  - Controlled environment
  - Prepared with to do something (DAC)
  - With help (ENT, Anesthesia)

#### **Epiglottitis Management**



Fig. 4. Suggested management algorithm for patients with epiglottitis. IV = intravenous.

PD-INEL Source Undetermined

## Disposition

- Croup
  - Mild: D/C criteria:
    - No stridor at rest
    - Normal oxygenation and air exchange
    - Normal color
    - Normal LOC
    - Can tolerate PO
    - Specific instructions to caregivers as to what to watch for
  - Moderate/Severe Croup
    - Dexamethasone alone? Observe 3-4 hrs for improvement
    - Dex and 1-2 doses epi? Observe 3-4 hrs then decide
    - 3 or more does epi? With improvement admit with cardiac monitoring. Without improvement admit to PICU.
- Bacterial Tracheitis Admit PICU
- Epiglottitis Admit PICU

#### General Indications for Admission

- Needs supplemental O2
- Still symptomatic (ie retracting, increased work of breathing)
- Toxic appearing
- Young age (< 6 mo)</li>
- Can't return for follow up
- Recurrent visit to ED within 24 hrs.

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