Croup and Other Causes of Stridor

Introduction: "Croup" is a generic term for the clinical syndrome of harsh barking cough, hoarse voice, and inspiratory stridor. Usually refers to viral laryngotracheobronchitis, but also can refer to spasmodic croup, laryngotracheitis, and laryngotracheobronchopneumonitis.

Epidemiology

- Common - 3% of pre-school children each year
- Genetics: 15% have strong family history
- Age: Usually between of 6mo to 6yrs. Greatest incidence in 2nd year of life (5%)
- Gender: M>F by 1.5-2x
- Seasonal: All year but Autumn-Winter peak

Aetiology

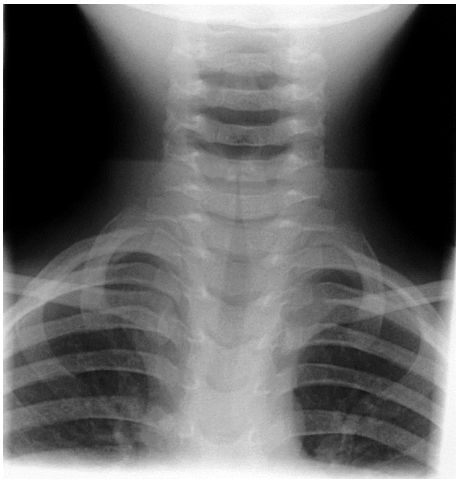
- Laryngeal, tracheal & bronchial inflammation
  - Cricoid ring (immediately subglottic) is narrowest part of a child's airway.
  - Infection → inflammation & swelling → airway narrowing
- Viral causes
  - Parainfluenza – types 1, 2 & 3 – 75% of cases
  - Also: Influenza A (assoc with severe disease), Influenza B, RSV, Adenovirus, Measles, & rarely Enteroviruses, Echovirus, Coxsackie, Rhinoviruses, Reovirus
- Mycoplasma - Rare

Clinical Features

- 12-72hr URTI prodrome (coryzal, cough, low-mod fever)
- Symptoms worsen at night/when upset/on exertion
- Brassy, barking, seal-like cough, hoarseness, harsh inspiratory stridor, respiratory distress. May have palpable pulsus paradoxus & wheeze too if extends intrathoracically

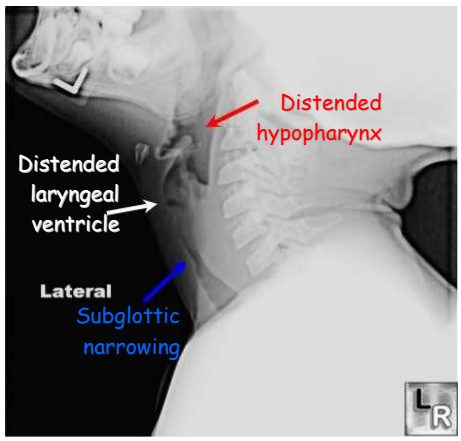
Red Flags

- Severity of croup:
  - Age <6months
  - Decreased saturations/cyanosis
  - Decreased LOC, hypotonia, exhaustion
- Alternative diagnosis:
  - Biphasic stridor
  - Toxic appearance
  - High fever, no cough
  - Drooling



Investigations

- Vital signs
- Radiology: Not routine as risk deterioration in XR Dept, ~50% normal, rarely helpful.
  - AP CXR: may show steeple sign,
  - Lateral airways may show: Distended hypopharynx & laryngeal ventricle, narrowing of subglottic space.
  - CT may be helpful if anatomic differential suspected



Management

Resuscitation: O_2 if SaO2<94% & if impending airway loss: **adrenaline** neb, gas induction & intubation in OT, transfer to PICU (via NETS if req transfer)

Confirm diagnosis clinically/ rule out alternatives

Assess croup severity: Stridor, recession, air entry, oxygenation, alertness

Therapy:

- Nebulised 1:1000 **adrenaline** 0.5ml/kg (max 5ml) if significant resp distress
  - Works rapidly - <30mins. Duration only ~2hrs
  - SE: Tachycardia, hypertension. Care if Congenital Heart Disease or arrhythmias
  - If **CI** use **budesonide**
  - Mandates obs for 4-6hrs (to ensure no rebound) before ?D/C
- Steroids (Advocated for >30 yrs)
  - EBM: Improve symptoms, ↓hospital stay, ↓admission, ↓use of adrenaline
  - **Dexamethasone** 0.15, **0.3** or 0.6mg/kg PO/IM od
    - Onset ~1hr. Lasts ~24hr
    - Better than prednisolone at reducing re-presentation
  - **Prednisolone** 1-2mg/kg PO od/bd
    - Similar to Dex
  - **Budesonide** 2mg Neb q12h
    - Onset ~30mins
    - Shorter duration than dexamethasone or prednisolone
- Steam inhalation/Mist: Although used for >100yrs no evidence of efficacy. Anecdotally shower steam or conversely cool evening air is purported to help some
- **Heliox**: Insufficient evidence currently to recommend

Disposition

- If mild/moderate croup and improved with Rx→D/C. Advice re recurrence.
- If severe, not improving, <6mo, poor social situation, or sig. PMHx → admit
- If very severe, ↓SaO_2, ≥3 doses of adrenaline → PICU.

Complications

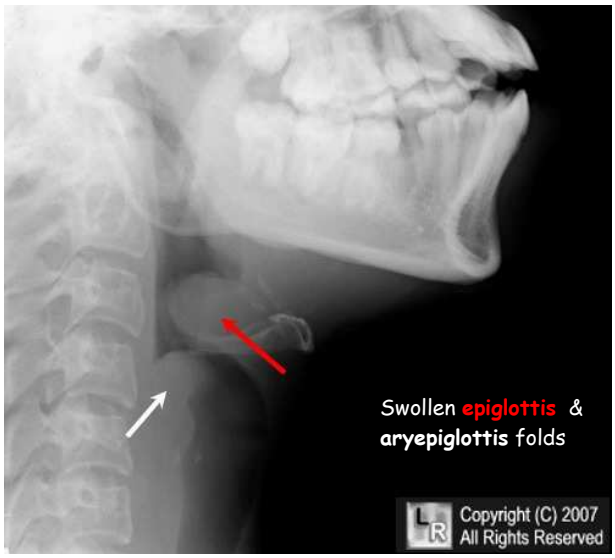
- Occur in <15%
- Extension of respiratory tract infection: OM, bronchiolitis, pneumonia
- Secondary bacterial infection: Tracheitis
- Intubation (<2% admissions) & Cx of intubation (death<1:10,000)
- Recurrence ~5%

Differential Diagnosis

Spasmodic croup

- Rapid onset, no prodrome. ?allergic reaction to virus. Often atopic Hx. Same Mx.

Epiglottitis



- Hx:
  - Rare in children if immunised against Hib, pneumococcus
  - More common in adults
  - Strep, Staph or viral infection
  - Age usually >3. Acute onset, not coughing
- O/E:
  - Toxic looking, high fever, soft stridor w/o much cough
  - Dysphagia, dysphonia, drooling, distress
  - Sitting forward with neck extended, reluctant to lie down
- Initial MX:
  - Call most senior doctor. Transfer calmly to resuscitation room. Oxygen.
  - Absolutely minimal interaction. Do not send for Xray (despite above image!)
  - 80-100% require intubation with gas induction
  - Antibiotics – **ceftriaxone** 1g (child 50mg/kg) IV od 5-7d after intubation

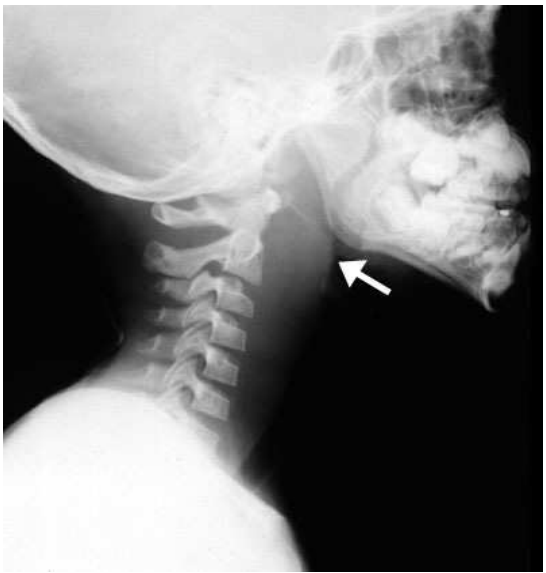
Bacterial tracheitis

- Organisms: Most commonly Staphylococcus Aureus, also H. influenzae, Moraxella catarrhalis, anaerobes, Corynebacterium diphtheriae
- May be relatively sudden onset or after several days of viral URTI
- "Toxic croup": High fever, croupy cough, respiratory distress ± drooling
- Purulent secretions & pseudomembranes ± pneumonia
- Mx: ABx incl anti-staphylococcal agent. (eg flucloxacillin ± cefotaxime). >50% intubated.

Foreign Body

- Hx: Sudden onset, during unsupervised play or choking on food
- O/E: Wheeze/stridor - depending on location of FB, cough, cyanosis if severe
- Initial Mx:
  - If well: CXR – may need inspiratory & expiratory films
  - If conscious & still choking: Back slaps
  - If unconscious: chest thrusts, laryngoscopy, intubation or surgical airway, oxygen

Retropharyngeal abscess: Rare but serious



- Torticollis, fever, odynophagia, dysphonia, drooling
- Lateral XR – loss of cervical lordosis, pre-vertebral swelling. CT may help quantify.
- Secure airway. Abx. Surgery – I & D
- High mortality if not treated promptly

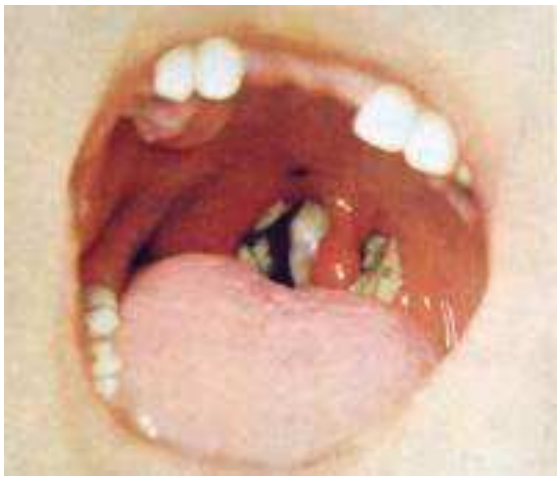
Tonsillar enlargement or peritonsillar abscess

Thermal/caustic/traumatic injury

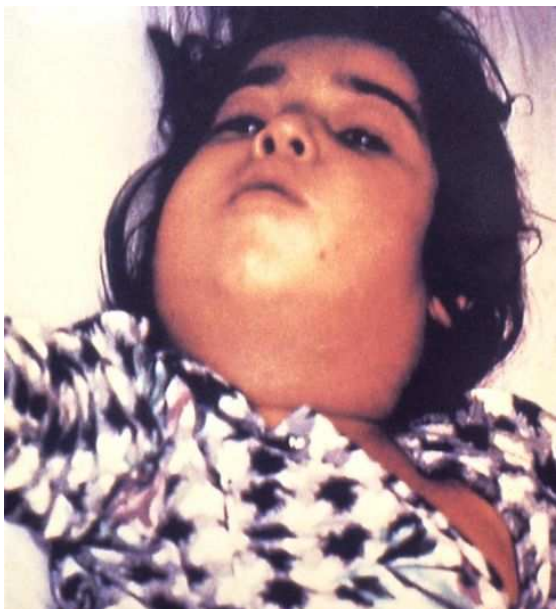
Angio-oedema

Rare causes: Diphtheria, extrinsic compression by vascular ring, laryngo- or tracheomalacia + URTI, neoplasm/haemangioma

Diphtheria



- Gram + bacillus Corynebacterium Diphtheriae that inhabits humans exclusively
- Mainly affects children<15. Prevalent in some parts of Africa, Asia & Indonesia
- Infection now a rarity in developed countries where majority vaccinated
- Mortality has remained at 10%
- Only bacteria affected by a Corynebacteriophage can → toxin that causes the disease
- Transmission is by droplet, milk, food handlers or fomites
- Incubation 2–5 days
- Usually affects tonsils, throat, or nose. Sometimes coryza, sore throat, stridor.
- Adherent off-white pseudomembrane (necrosis) can extend along URT
- Bull neck lymphadenopathy
- Toxin also causes palatal paralysis (nasal voice, dysphagia), renal tubular necrosis, cardiomyopathy (myocarditis & arhythmias), and cranial/peripheral neuropathies.



Mx:

- Equine diphtheria antitoxin
- Antibiotics
  - **Erythromycin**
  - **Penicillin**
- Intubation if required
- Notifiable disease

Prevention

- Treat contacts & carriers
- Vaccination
  - Formaldehyde-treated toxin adsorbed onto Al salts.
  - 3 doses as infant, 1 preschool booster, and 1 at 15yrs