Description

Croup is a clinical syndrome. The clinical picture includes:

- A "barking" cough – often described as “seal-like"
- Stridor
- Hoarse voice
- Other signs of respiratory distress
- Relatively mild systemic illness

Other causes of acute upper airway obstruction include epiglottitis (see below), retropharyngeal abscess, bacterial tracheitis and foreign bodies. These are particularly important to consider in children who are outside the typical age range (six months to three years) or have an unusual clinical picture.

Causes

Two main causes

1. Viral laryngotracheobronchitis, (parainfluenza viruses, RSV, influenza, or adenoviruses).
   a. Most common,
   b. Younger age group
   c. The signs of upper airway obstruction may be associated with or preceded by 1-2 days of mild cough, coryza and fever.

2. Recurrent or spasmodic.
   a. Less common,
   b. usually without signs of acute infection,
   c. older child.

There is no clear distinction between these two causes and the management is uniform (see below).

Assessment

Anxiety is an important exacerbating feature in croup.

- Any procedure which could produce more distress should be avoided (such as blood tests, O₂ masks, and nebulisers which are rarely indicated).
- The child should be allowed to settle quietly on a parent’s lap, preferably away from direct observation of other potentially upsetting activities occurring in the department.
- Under these circumstances initially distressed children may show almost complete resolution of their symptoms.
CROUP

- Stridor may vary considerably from one hour to the next and the clinical signs noted on arrival in hospital will not necessarily reflect the severity of the problem at home.
- Typically the symptoms are worse at night and peak on about the 2nd or 3rd night.
- Signs of severe obstruction include:
  - Respiratory: marked intercostal and sternal indrawing,
  - CVS: progressive tachycardia and pallor,
  - CNS: lethargy and restlessness.
- **Cyanosis is a late sign and always indicates very severe obstruction.**
- The loudness of the stridor is not a good guide to the severity of illness.
- Auscultation of the chest usually reveals only transmitted upper airways noise. If breath sounds are reduced in volume this also indicates severe illness.
- Certain children are at increased risk of severe disease. Children with pre-existing upper-airways narrowing such as sub-glottic stenosis (usually following prolonged neonatal ventilation) are one example. Children with Down's Syndrome also have greater problems with croup due to narrow upper airways. These children should be managed with caution.

**Management**

**Mild**

*A child with no or minimal symptoms at rest.*

Undistressed child, no sternal retraction, minimal stridor at rest, no signs of hypoxia, history does not suggest risk of severe deterioration.

- A large proportion of the children presenting to the Emergency Department with croup, fall into this category.
- These children should be managed as an outpatient unless there are complicating factors.
- A single oral dose of dexamethasone (0.15mg/kg max 12mgs) is probably indicated in mild croup on the first day of illness (e.g. barking cough only) as it may help prevent deterioration on day 2 or 3.
- Short courses of steroids are safe.
- There is no evidence that inhaled mist or steam is helpful. Some children do improve with a change in air temperature.
- Parents should be asked to return if there are signs of increased obstruction such as sternal retraction, or if the child is becoming restless or lethargic (as per the croup information sheet which should be given to all care-givers).
CROUP

Moderate
Child with symptoms at rest, but no signs of hypoxia.
Often distressed child, stridor and sternal retraction at rest, but normal volume of breath sounds, minimal tachycardia when settled and no signs of hypoxia.

- Reduce anxiety. Interventions should be minimal and the child disturbed as little as possible.
- It is important for the parent to stay with the child if possible, since the distress of separation can precipitate more severe obstruction.
- A single dose of oral dexamethasone (0.15 to 0.6 mg/kg, max. 12 mg) should be given to these children. An alternative is 2 days of oral prednisolone (1mg/kg, max. 40mg, once daily).
- These children rarely require nebulised adrenaline (see “Severe” section below). Adrenaline may be given to particularly distressed children assessed to have moderate croup (rest symptoms but no signs of hypoxia). It often improves their symptoms rapidly but mandates they be observed for a minimum of 3 hours (at Starship this is a Short Stay admission in Children’s ED).
- These children do not require facemask O₂, nor should intravenous lines, blood tests and lateral neck X rays be performed.
- These children should be observed until they have mild croup. Moderate croup generally improves over 2 to 6 hours following oral steroid.

Severe
Child with severe symptoms at rest and evidence of hypoxia.
Marked sternal retractions, marked tachycardia, pallor, with restlessness, lethargy, or cyanosis. Breath sounds often reduced.

- If notified of a child in this condition outside the hospital advise urgent transport via ambulance with medical/paramedical escort.
- Attend to ABCs. Give oxygen.
- A dose of steroids should be given as soon as practical.
  (Dexamethasone 0.6 mg/kg po, IM or IV stat, max. dose 12mg).
- Nebulised adrenaline should be given to the severely obstructed child.
  - Use the 1:1000 ampoules at a dose of 0.5ml/kg/dose, max. dose 5ml (make up to at least 4ml with 0.9% saline).
  - If nebulised adrenaline is given prior to transport, a medical escort must accompany the child to hospital since deterioration may occur en-route.
- Monitor the child closely during and after nebuliser treatment. If the child’s symptoms are relieved and they remain well 3 hours after the nebuliser and steroids, they may be able to go home.
- If they have persistent signs of moderate obstruction (stridor or indrawing at rest) they should be admitted or observed overnight in Children’s ED.
- Generally, if 2 or more doses of adrenaline are required, the child should be admitted.
- If there is recurrent severe stridor after nebulised adrenaline and steroids, consider admission to PICU.
Severe Croup vs. Epiglottitis

- From time to time difficulty arises in distinguishing severe croup from epiglottitis. The following table may be of assistance. While “typical croup” and “typical epiglottitis” are easy to distinguish, there is a spectrum of disease with overlap between atypical presentations of these two diagnoses.
- If in doubt, assume epiglottitis and arrange for an experienced person to examine child urgently while monitoring the child in the receiving room (preferably leave the child sitting on a parent's lap).
- Epiglottitis is now very rare.

<table>
<thead>
<tr>
<th></th>
<th>Croup</th>
<th>Epiglottitis</th>
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<tbody>
<tr>
<td>Onset</td>
<td>Days</td>
<td>Hours</td>
</tr>
<tr>
<td>Fever</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Cough</td>
<td>+++</td>
<td>-</td>
</tr>
<tr>
<td>Drooling</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Activity</td>
<td>Upset</td>
<td>Lethargic</td>
</tr>
<tr>
<td>Signs of obstruction</td>
<td>+++</td>
<td>+</td>
</tr>
<tr>
<td>Stridor</td>
<td>Inspiratory, high pitched</td>
<td>Soft expiratory snore</td>
</tr>
</tbody>
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- Lateral neck X-rays can be misleading, since any slight rotation can cause the profile of the epiglottis to appear rounded or "swollen". If epiglottitis is suspected, the epiglottis should be directly visualised by an experienced paediatric anaesthetist/intensivist. An X-ray is not indicated, interferes with close observation/monitoring of the child, and may precipitate airway obstruction.
- Lateral neck X-rays may be of help in diagnosing retropharyngeal abscess, but a child with significant upper airway obstruction must not be sent to radiology without an experienced escort.

References


Geelhoed GC, Macdonald WB. Oral dexamethasone in the treatment of croup: 0.15 mg/kg versus 0.3 mg/kg versus 0.6 mg/kg. Pediatric Pulmonology 1995;20:362-8.

Chub-Uppakarn, S. and P. Sangsupawanich, A randomized comparison of dexamethasone 0.15 mg/kg versus 0.6 mg/kg for the treatment of moderate to severe croup.[see comment]. International Journal of Pediatric Otorhinolaryngology, 2007. 71(3): p. 473-7.