Clinical Guidelines

Upper airway obstruction (UAO)

Document Control Information

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CATS Document Number

Applicable to All CATS employees

Children’s Acute Transport Service provides paediatric intensive care retrieval for Great Ormond Street, The Royal Brompton and St Mary’s NHS Trusts. Funded and accountable to the North Thames Paediatric Intensive Care Commissioning Group through Great Ormond Street NHS Trust.
Assessment

The most pertinent clinical sign is stridor, which is usually an inspiratory noise, but sometimes can be both inspiratory and expiratory.

Not to be confused with:
- Wheeze: a sign of lower airway obstruction and narrowing.
- Stertor: signifies upper airway collapse in children with decreased conscious state, pharyngeal hypotonia or swallowing problems.

Causes of stridor in the UK population:

<table>
<thead>
<tr>
<th>Common</th>
<th>Uncommon</th>
<th>Rare</th>
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<tbody>
<tr>
<td>Viral laryngotracheobronchitis (croup)</td>
<td>Epiglottitis</td>
<td>Angioneurotic oedema</td>
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<tr>
<td>Superimposed infection on subglottic stenosis or laryngomalacia</td>
<td>Bacterial tracheitis</td>
<td>Diphtheria</td>
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<td></td>
<td>Laryngeal foreign body</td>
<td>Retropharyngeal abscess</td>
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<tr>
<td></td>
<td>Inhalational injury (burns)</td>
<td></td>
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<td></td>
<td>Anaphylaxis</td>
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<td></td>
<td>Severe bilateral tonsillar enlargement</td>
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Key message

Identify and treat serious upper airway obstruction. Once the airway is secure, time can be spent on identifying the specific cause for UAO.

Specific points in history:
- Is this a first presentation?
- Is there history of previous intubations or previous difficulty with intubation?
- Is the airway stable?

Danger signs and useful pointers to the cause of UAO:
- Sudden or rapid onset – foreign body, epiglottitis, tracheitis, anaphylaxis
- Soft or low pitched stridor – epiglottitis, tracheitis
- Toxic appearance and high fever - epiglottitis, tracheitis, retropharyngeal abscess
- Drooling, open mouth, sitting forward - epiglottitis, retropharyngeal abscess, severe tonsillar obstruction
Initial management

Irrespective of the cause for UAO, some general management guidelines apply:

2.1 General management: AVOID UPSETTING THE CHILD

2.1.1 Leave child with parent in a comfortable position

2.1.2 DO NOT insert tongue depressor

2.1.3 DO NOT attempt IV access or blood tests

2.1.4 DO NOT ask for a Chest or lateral neck X-ray

2.1.5 DO NOT force an oxygen mask over face.

2.1.6 Adrenaline nebulisers may temporarily relieve severe airway obstruction, usually in a dose of 0.5 ml/kg of 1:1000 solution, up to a maximum of 5 ml. The effect of adrenaline is temporary.

2.1.7 Pulse oximetry is a poor guide to severity when oxygen is delivered

2.1.8 Consider Heliox

2.2 Specific management of selected conditions:

2.2.1 Viral croup: summarized in flow chart.

Mild Croup
Score = 0-1
Normal RR
No recession
Normal pulse rate
Normal O₂ sats
Normal conscious level

Moderate Croup
Score = 2-7
Normal or raised RR
Mild recession
AE decreased but easily audible
Increased pulse rate
O₂ sats > 93%
Normal conscious level

Severe Croup
Score =/> 8
Increased RR
Moderate/marked recession
Decreased AE and not easily audible
Increased pulse rate
O₂ sats > 93%
Altered conscious level

CALL FOR SENIOR HELP
Senior Paediatrician
Senior Anaesthetist
Senior ENT

If no improvement or worsening, re-score and act accordingly

Westley Croup Score

Stridor
0 = none
1 = at rest, audible with stethoscope
2 = at rest, audible without stethoscope
Recession
0 = none
1 = mild recession
2 = moderate recession
3 = severe recession

Cyanosis (O₂ sats < 92% in air)
0 = none
1 = with agitation
2 = at rest

Level of consciousness
0 = normal
1 = altered mental state

Croup score 0-1: Mild croup
Croup score 2-7: Moderate croup
Croup score =/> 8: Severe croup

CALL CATS

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2.2.2 Epiglottitis:

<table>
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<th>DO</th>
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<tr>
<td>Call for senior help</td>
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<tr>
<td>- Paediatric SpR/Consultant</td>
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<td>- Anaesthetic SpR/Consultant</td>
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<tr>
<td>- ENT SpR/Consultant</td>
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<td>Attempt oropharyngeal examination, since this may precipitate complete obstruction</td>
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<td>Allow the child to remain in its favoured position</td>
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<td>Attempt insertion of an iv cannula or take blood</td>
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<td>The child should be constantly supervised by someone skilled in intubation</td>
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<td>Send the child for neck x-ray or other x-ray</td>
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<td>Give humidified oxygen as tolerated</td>
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<td>Upset the child e.g. removing parents</td>
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<tr>
<td>Rely only on pulse oximetry</td>
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<td>Leave the child unsupervised</td>
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2.2.3 Foreign body obstruction: The management depends on the site and severity of airway obstruction. Intubation may result in further impaction of the foreign body, and should be considered ONLY when there is impending/actual cardio-respiratory arrest. The anaesthetist will then try to visualize/clear the object under direct laryngoscopy. Otherwise, examination under anaesthetic with rigid bronchoscopy by ENT team is the best option.

2.2.4 Bacterial tracheitis: Stridor may be soft or absent even in severe airway obstruction. Consider early intubation by anaesthetist. After intubation the ET may become blocked with secretions.

2.2.5 Inhalational injury: Along with the history, other pointers may include soot in sputum, singed nasal hair, soot around mouth and face, and facial burns involving mouth and nose. The airway must be secured at the earliest opportunity. Delay can lead to progressive airway obstruction due to oedema and a situation where intubation becomes impossible. Call anaesthetic team and intubate electively.

Indications for intubation
- Suspected epiglottitis
- Inhalational injury
- Fall in conscious level
- Increasing respiratory failure
  - Rising pCO₂
  - Exhaustion
  - Hypoxia (SpO₂ <92% despite high-flow O₂ by mask >5 L/min)
Management at Intubation
The most experienced anaesthetist must be present at the intubation. Most anaesthetists would favour a gas induction. The resuscitation team should have a back up oxygenation strategy prepared.

Anticipate a difficult airway. [Refer to the difficult airway guidance from APA/DAS]

It may be necessary to use croup tubes rather than standard ETT. These are longer than standard ETT, but come in similar sizes, and may be necessary in situations where severe airway narrowing mandates a much smaller ETT than indicated by age.[e.g. a 4.0 mm ETT for a 6 year old].

Management following intubation

- Once the airway obstruction is bypassed, most children are easy to ventilate. Exceptions might be in case of bacterial tracheitis (pulmonary involvement), inhalational injury (ARDS), or anaphylaxis (bronchoconstriction).
- Ensure that the ETT is securely taped.
- **Use sedation and paralysis to ensure safety of ETT.**
- Following a difficult intubation, an ETT should only be changed if there is a clear clinical reason which justifies this risk.
- Start adjunctive treatments such as iv dexamethasone (0.15 mg/kg QDS) in case of croup; or ceftriaxone (80 mg/kg) in case of epiglottitis or tracheitis.
- Blood cultures must be taken in suspected cases of infection.
- In case of inhalation injury and burns, start fluid replacement as per burns guidance.
- Patients with bacterial tracheitis may become septic, requiring fluid resuscitation and inotropic support.

Transport considerations

- Children with an unstable airway should not be transported without detailed discussion with the CATS consultant.
- ETCO2 monitoring is mandatory during transfer to maintain continuous correct ETT placement.
- Use continuous muscle relaxation during retrieval to ensure safety of ETT.
- If transporting an un-intubated child with suspected foreign body obstruction, avoid unnecessary delay and transfer immediately to ENT centre (directly to theatres if necessary). The team must have a strategy to manage unexpected obstruction or hypoxia.