

Acute Upper Airway Obstruction

Secure the airway first—nothing else matters if the child cannot breathe.

THE ONE-LINE TRUTH

Something blocks the passage that brings air from the nose and mouth down into the windpipe, so air cannot reach the lungs.

The chain — how it unfolds

1. Airway narrowing occurs at the pharynx (throat), larynx (voice box), or proximal trachea (upper windpipe) due to foreign body, anaphylactic swelling (edema) (allergic swelling), infectious swelling (epiglottitis, abscess, croup), trauma, or tumor. — why: The effective diameter of the airway lumen (inside space) shrinks. According to Poiseuille's law, resistance to airflow increases to the fourth power as radius decreases—halving the diameter increases resistance sixteen-fold. Air must now move much faster through the narrow segment to deliver the same volume per breath.
2. A high-pitched noise on breathing in (Stridor) (high-pitched, harsh inspiratory or biphasic sound) becomes audible without a stethoscope. — why: Turbulent, high-velocity airflow through the narrowed segment vibrates the airway walls, producing the characteristic whistle or squeak. Inspiratory a high-pitched noise on breathing in (stridor) suggests supraglottic or glottic obstruction (above or at the vocal cords). Biphasic a high-pitched noise on breathing in (heard on both inspiration and expiration) suggests subglottic or tracheal narrowing. Expiratory a high-pitched noise on breathing in alone suggests lower airway obstruction (bronchi). The pitch and timing of a high-pitched noise on breathing in localize the obstruction anatomically.
3. Suprasternal, intercostal, and subcostal retractions (skin pulling inward above the collarbone, between the ribs, and below the rib cage with each breath) appear. — why: The child generates large negative intrathoracic pressure (suction force inside the chest) to overcome the increased resistance and pull air through the obstruction. This pressure sucks the soft tissues of the chest wall and neck inward during inspiration. The degree of retractions reflects the severity of obstruction—deeper, more widespread retractions mean tighter obstruction and higher work of breathing.

4. Drooling, refusal to swallow, and tripod positioning (sitting upright, leaning forward with hands braced on knees or table, neck extended) develop. — why: Swallowing is painful when the pharynx or epiglottis is inflamed or obstructed, and the child fears that swallowing might close the airway completely, so saliva pools and drips out. Tripod positioning is an instinctive maneuver that straightens the pharynx and larynx, reduces gravitational collapse of soft tissues, and maximizes airway diameter. Any attempt to force the child to lie flat can precipitate complete obstruction.
5. Muffled voice (hot potato voice), hoarseness, or complete inability to speak (aphonia) occurs. — why: Swelling or mass at the epiglottis, vocal cords, or surrounding structures changes the resonance of the voice and prevents normal vocal-cord vibration. Muffled voice suggests supraglottic swelling (epiglottitis, abscess). Hoarseness suggests vocal-cord involvement (croup, laryngeal trauma). Aphonia (no voice at all) suggests severe vocal-cord swelling (edema) or complete laryngeal obstruction and is an ominous sign of imminent airway closure.
6. A fast heart rate (Tachycardia) (heart rate too fast) and fast breathing (tachypnea) (breathing rate too fast) increase. — why: The body tries to compensate for increased work of breathing and early tissue low oxygen (hypoxia) (low oxygen reaching cells) by raising heart rate and respiratory rate. This increases minute ventilation (total air moved per minute) and cardiac output (blood pumped per minute) to deliver more oxygen per minute. These compensatory vital-sign changes can temporarily maintain oxygen saturation in the normal range, masking the severity of the underlying obstruction.
7. Agitation, anxiety, restlessness, or altered mental status (confusion, lethargy) emerge. — why: Low oxygen (Hypoxia) (low blood oxygen) and hypercarbia (rising blood carbon dioxide from inadequate ventilation) stimulate the brain's respiratory centers in the brainstem, causing a sensation of suffocation, fear, and panic. The child senses they cannot get enough air. Agitation increases oxygen demand, worsening the low oxygen. As low oxygen deepens, the brain becomes less responsive, and agitation gives way to lethargy and confusion—a sign of impending respiratory arrest.

8. Low oxygen in the blood (Hypoxemia) (low blood oxygen saturation, typically below ninety percent), a slow heart rate (bradycardia) (heart rate too slow, a pre-arrest sign in children), and bluish skin (cyanosis) (blue or dusky discoloration of lips, tongue, and nail beds) appear late. — why: Exhausted respiratory muscles and worsening obstruction cause ventilation to fail—carbon dioxide rises, oxygen falls. Low oxygen in the blood (Hypoxemia) triggers reflex a slow heart rate (bradycardia) in children (unlike adults, who become with a racing heart (tachycardic)). A slow heart rate in a child with respiratory distress is a pre-arrest rhythm and signals imminent cardiac arrest unless the airway is opened immediately. Bluish skin (Cyanosis) appears when deoxygenated hemoglobin (hemoglobin without oxygen attached) exceeds five grams per deciliter in capillary blood, reflecting severe, prolonged low oxygen (hypoxia). These are late signs—by the time you see bluish skin and a slow heart rate, the child is seconds to minutes from respiratory arrest and requires emergent definitive airway control (intubation, surgical airway, or foreign-body removal).

Spot it — what you see, and why

- A high-pitched noise on breathing in (Stridor): When the airway narrows (like pinching a straw), air rushes through the smaller opening at high speed, spinning and bumping into the walls. This turbulent, fast flow makes the tissue vibrate and creates a high-pitched, harsh sound that you hear when the child breathes in, out, or both.
- Retractions (skin pulling in at the neck notch, between the ribs, below the ribs): To suck air through a blocked airway, the chest muscles work extra hard and create strong suction inside. That suction is so powerful it pulls the soft skin inward with every breath—you see the dips above the collarbone, between ribs, and under the ribs.
- Drooling and refusing to swallow: Swallowing hurts or feels scary when the throat is swollen, irritated, or blocked (maybe by a stuck object). So the child stops swallowing, saliva pools in the mouth, and it drips out.
- Tripod positioning (sitting upright, leaning forward, hands on knees): Leaning forward and propping up with the hands straightens the windpipe from throat to lungs (like unfolding a bent hose). Gravity also pulls the tongue and floppy throat tissue forward and away from the back wall, opening the airway as wide as possible.
- Muffled, hoarse, or no voice at all: The voice comes from air vibrating the vocal cords (two small bands inside the voice box). When swelling or a blockage sits on or near those cords—or on the epiglottis (the lid that covers the voice box)—the sound gets muffled, raspy, or completely silent.
- Fast breathing and fast heart rate: Breathing through a narrowed airway is hard work and oxygen levels start to drop. The body tries to fix this by breathing faster (to pull in more air) and pumping the heart faster (to deliver more oxygen to every cell).

Red flags — act now

- Blue lips, tongue, or fingernails (cyanosis)—shows severe oxygen starvation and the child is minutes from collapse
- Heart rate suddenly slowing or dropping (bradycardia)—the oxygen-starved heart is failing and arrest is imminent
- Decreased consciousness, extreme sleepiness, or no response—the brain is shutting down from lack of oxygen
- Silent chest with little or no air moving despite hard breathing effort—the airway is almost completely blocked
- Cannot speak, cry, make sound, or cough—the airway is totally or nearly totally closed off

Treat it — in this order

1. Position child upright in caregiver's lap, provide humidified oxygen by blow-by or mask (never force), and keep environment calm—do not agitate, do not force child to lie flat, do not attempt IV placement or throat examination unless airway is secure → Upright positioning uses gravity to pull the tongue and epiglottis forward, widening the airway opening (like straightening a bent tube). Humidified oxygen raises blood oxygen levels while the airway remains narrowed. Calm environment prevents crying and agitation, which increase oxygen demand and create stronger negative pressure on inspiration (both worsen obstruction and can trigger complete closure).
2. Administer dexamethasone 0.6 mg/kg by mouth, IV, or IM (maximum single dose 16 mg) for croup, angioedema (allergic swelling), or any inflammatory upper airway obstruction → Dexamethasone (a corticosteroid) blocks inflammatory signals (cytokines) that cause blood vessels in the airway lining (mucosa) to leak fluid and swell. This reduces tissue thickness and widens the airway opening within 1 to 4 hours. Cochrane reviews and AAP guidelines show single-dose dexamethasone improves outcomes in croup at all severity levels, reduces hospital admissions, and lowers need for intubation. Effect lasts 48 to 72 hours.
3. Give racemic epinephrine 0.5 mL of 2.25% solution via nebulizer (or L-epinephrine 5 mL of 1:1000 if racemic unavailable) with supplemental oxygen for severe croup, acute epiglottitis as bridge to intubation, or laryngeal swelling (edema) → Nebulized epinephrine (adrenaline mist breathed into lungs) causes rapid constriction of blood vessels in the airway lining (vasoconstriction), squeezing fluid out of swollen tissue and shrinking the mucosa. This increases airway diameter within 10 to 30 minutes, like wringing water out of a sponge. Cochrane reviews and AAP croup guidelines support this intervention for moderate to severe obstruction.

4. If foreign body is suspected and child is conscious with partial obstruction and able to cough or speak, encourage coughing and do not interfere; if complete obstruction (cannot cough, speak, or breathe), immediately perform back blows and chest thrusts (infants under 1 year) or abdominal thrusts—Heimlich maneuver (children over 1 year) per AHA pediatric basic life support guidelines → Coughing generates high pressure inside the chest (intrathoracic pressure) that can blast a foreign object out of the airway, like a cork from a bottle. Back blows, chest thrusts, and abdominal thrusts create sudden external pressure surges that compress the lungs and propel the object upward. Successful removal immediately restores airflow and reverses low oxygen (hypoxemia).
5. Administer broad-spectrum IV antibiotics—ceftriaxone 50 mg/kg once daily or cefotaxime 50 mg/kg every 6 to 8 hours PLUS vancomycin 15 mg/kg every 6 hours if MRSA (methicillin-resistant *Staphylococcus aureus*) is suspected—for epiglottitis, bacterial tracheitis, retropharyngeal abscess, or peritonsillar abscess; prepare for emergency intubation in operating room with ENT and anesthesia, or surgical drainage of abscess → Broad-spectrum IV antibiotics kill bacterial pathogens causing infection and swelling—*Haemophilus influenzae* type b, *Streptococcus pyogenes*, *Staphylococcus aureus* (including MRSA), or oral anaerobes (bacteria from mouth). This stops further inflammation and allows swelling to resolve over 24 to 72 hours. Surgical drainage of abscess removes pus and relieves mass effect (pressure from fluid collection pushing on airway). IDSA guidelines recommend antibiotics covering typical pathogens until culture results guide narrower therapy.

Your top priorities at the bedside

1. Keep the child upright in the position of comfort, usually sitting in the caregiver's lap, and do not force the child to lie flat or leave the caregiver. — why: An upright position uses gravity to keep the tongue and swollen tissues forward and away from the back of the throat, maximizing the open airway space; lying flat lets those tissues fall backward and can completely close the airway; agitation from separation increases oxygen demand and worsens obstruction.
2. Provide humidified oxygen by blow-by (tube or mask held near the face) at 4 to 6 liters per minute, never forcing the mask if the child resists. — why: Humidified oxygen raises the oxygen level in the blood (oxygenation) even when the airway is partly blocked; forcing a mask causes crying and struggling, which increases airflow resistance, worsens negative pressure in the airway, and can turn a partial obstruction into a complete one.

3. Maintain a calm, quiet environment—dim lights, speak softly, limit the number of people in the room, and delay all non-essential procedures like IV starts or blood draws until the airway is secured. — why: Crying and agitation increase the child's metabolic rate and oxygen consumption, create turbulent (rough, swirling) airflow that worsens a high-pitched noise on breathing in (stridor), and generate negative intrathoracic pressure (suction force inside the chest) that pulls swollen airway tissues inward and narrows the opening further.