The authors review acute epiglottitis and present accepted methods of anesthetic management for pediatric patients with this condition.

Upper airway obstruction is not infrequently associated with dire consequences in the pediatric population. Determining the etiology and severity of airway compromise mandates a prompt, careful history and physical assessment of the child. Immediate diagnosis and airway management to combat progressive hypoxemia and administration of appropriate parenteral therapy are essential to decrease morbidity and mortality.

Three clinical manifestations with the most potential for acute airway deterioration that would necessitate life-saving intervention are: (1) foreign body aspiration, (2) laryngotracheobronchitis, and (3) epiglottitis. Intense interest and some controversy accompany the proper modalities of treatment for patients with these conditions. The following is a review of the current methods for the management of children who have acute epiglottitis, with special emphasis placed on anesthetic management.

Signs and symptoms

Acute epiglottitis is an inflammatory swelling of the supraglottic structures of the larynx without involvement of the subglottic tissues. A variant of this has been reported with only edema of the aryepiglottic folds and ventricular bands and not the epiglottis. Another report notes inflammation extending to the vocal cords and subglottic region.

Characteristically, acute epiglottitis is seen more in preschoolers, but its occurrence in infants as young as 8 days and adults as old as 66 years has been reported. It appears to have no seasonal predilection. The most common etiologic agent is H influenza type B, but Pyogenic staphylococcus aureus and hemolytic streptococcus also have been cultured.

Clinically, the patient presents with a deceptively brief history of mild sore throat, fever, and cough. A “croupy” cough, hoarseness, muffled voice, flaring of the nostrils, and varying degrees of suprasternal, suprACLavicular and sternal retractions have been described. The classical signs of impending airway obstruction can be seen in the fatigued, restless patient who sits in a rigid position with chin thrust forward, neck hyper-extended, tongue protruding and drooling saliva.

Drooling, dysphagia, and distress are definitive for a diagnosis of acute epiglottitis. Occasionally, the swollen, reddened epiglottis can be visualized by having the patient open his mouth. However, to examine the pharynx with a tongue blade invites disaster.

Allowing the patient to maintain a position of “comfort,” administering supplemental oxygen and placing a large-bore functioning intravenous line are mandatory upon admission. Only if the patient’s condition permits, and then only with qualified anesthesia personnel in attendance, should transport to the radiology department be considered. Lateral neck films for localization of the area of obstruction as well as a chest film to rule out tracheal stenosis, pneumothorax, pneumonia, and radiopaque foreign bodies may be deemed necessary.

However, Steward feels x-ray results may be misleading. Podgore and Bass have reported their “thumb-little finger sign” utilizing the lateral neck view. An epiglottic shadow in a thumb shape is considered a positive indicator for a diagnosis of
Acute epiglottitis, whereas a little finger shape is negative.

Airway management

Once diagnosis has been established, an orderly, planned sequence of airway management is paramount. Oxygen, high humidity, ampicillin and/or chloramphenicol administered intravenously, and IV fluids are generally accepted methods of treatment for epiglottitis. The controversial areas of therapy include elective tracheostomy, nasotracheal intubation, corticosteroids, and intermittent positive pressure breathing by mask.

What is the most satisfactory method of securing airway control with the least morbidity and mortality? The intubation of severe supraglottic obstruction secondary to infection is difficult at best, even for the skilled endoscopist. The decision to use endotracheal tracheostomy or mask ventilation is probably best made on the experience and expertise of the personnel involved.

However, the preponderance of recent evidence suggests that nasotracheal intubation is safe as the sole means of airway care, and can significantly shorten the total hospital stay. These reports do not support earlier data suggesting a high incidence of tracheal complications following intubation for epiglottitis.

Feron and Steward favor the bronchoscopic approach to secure the obstructed airway, citing the ease of doing the tracheostomy over a rigid body. Bronchoscopy may reveal the obstruction to be due to a foreign body, cyst, tumor, subglottic stenosis, or vascular anomalies. However, broad clinical experience has not supported the need for this approach when the diagnosis of acute epiglottitis is clear.

Blanc, et al., Adair and Ring, and Glicklick have demonstrated that children with acute epiglottitis can successfully have their ventilation assisted. These authors prefer the spontaneous ventilation method of Oh and Motoyama, using oxygen and halothane as the anesthetic of choice.

Hannallab and Rosales emphasize that there is no place for intravenous induction agents or the use of muscle relaxants in these patients. If the child is totally exhausted or has suffered cardiorespiratory arrest, then endotracheal intubation may be accomplished without the use of anesthesia.

The standard anesthesia setup of suction, electrocardiograph, blood pressure cuff, and precordial stethoscope should be utilized. A series of endotracheal tubes ranging in size from the smallest to one size smaller than one would normally use for the child should be available.

The anesthesia sequence is begun with the intravenous administration of atropine (0.02 mm/kg). The child is permitted to remain in a sitting position, breathing high flows of oxygen spontaneously, with halothane slowly introduced and the concentration gradually increased. As the child becomes anesthetized, the respiratory effort will lessen as turbulent gas flow through the obstructed area becomes more laminar in nature, and total gas flow through the airway increases.

Intubation should not be attempted in light planes of anesthesia nor should any delay in the intubation sequence occur. Avoidance of laryngospasm is crucial. If the glottis is difficult to visualize initially, continue with mask and spontaneous respirations until the child is (again) deeply anesthetized. The edematous, reddened pharynx with its distorted anatomy requires that one look for the movement of the glottis with respiration and pass the endotracheal tube on inspiration.

If an oral tube cannot be passed through the glottis, then a tracheostomy will be needed immediately. Once the oral tube has been secured, the presence of equal bilateral breath sounds has been established and a nasogastral tube has been placed for stomach decompression, a nasotracheal or tracheostomy tube can then be safely substituted.

A chest x-ray should be taken as soon as possible to determine the position of the endotracheal or tracheostomy tube and to rule out pneumonia. Molten has reported a 25% incidence of pneumonia associated with acute epiglottitis. Soliman and Richer have shown that pulmonary edema is also a relatively frequent complication of epiglottitis.

With appropriate antibiotic therapy (ampicillin and/or chloramphenicol) guided by sensitivity studies, extubation can usually take place within 24 to 48 hours postintubation. Adair and Ring found they could extubate their patient in approximately 12 hours following the start of antibiotic therapy.

Ampicillin (200 to 400 mg/kg/24 hours) given in four divided doses intravenously is the antibiotic of choice. Chloramphenicol should also be started when known ampicillin resistant H-influenza is suspected.

Extrubation is best accomplished in the operating room under anesthesia where the epiglottis can be inspected. Battaglia and Lockhart give dexamethasone 0.5 mg/kg prior to extrubation.

Following extrubation, the child should be
placed in a humidified atmosphere and observed for signs of postintubation obstruction for 24 hours. Lewis, et al.26 give racemic epinephrine via nebulizer as indicated. Usually, the child is discharged to home soon thereafter.

Summary
Upper airway obstruction demands immediate diagnosis and management to combat progressive hypoxemia. Morbidity and mortality associated with epiglottitis has decreased but is still significant. H-influenza infections appear to be on the rise. A protocol for management of the patient with a suspected or confirmed diagnosis of acute epiglottitis is mandatory.

A preponderance of evidence suggests naso-tracheal intubation is safe and that children can be successfully ventilated with a mask until the airway is intubated. Extubation should be performed in the operating room with the same precautions and attention to detail as for the initial intubation. The child should be observed for 24 hours postextubation for any recurrence of obstruction; and if there is a benign recovery course, the child is then discharged to home.

REFERENCES


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