

Abstract:

Epiglottitis should be considered in the differential diagnosis of any child with acute upper airway obstruction, although the incidence has decreased dramatically since the introduction of the conjugate *Haemophilus influenzae* type b vaccine. Despite this decline, there are still more than 3000 admissions per year for this disease. Recent attention toward the potential for noncompliance with vaccination guidelines suggests that this incidence may increase. Airway management takes precedence over all other interventions and requires multidisciplinary coordination between emergency medicine, anesthesiology, and otolaryngology providers. An immediate diagnosis, treatment, and prophylaxis for close contacts greatly improve recovery time, increase survival rate, and, in turn, reduce overall cost of disease management and patient care. The potential lethality of this disease mandates that all health care providers remain acutely aware of how to immediately and effectively triage and intervene with a patient with epiglottitis.

Keywords:

bacteremia; bacterial infection; children; epiglottitis; *H influenzae* type b; inflammation; laryngeal/airway obstruction; pediatric; supraglottitis; swelling; vaccine

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Epiglottitis

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Epiglottitis is an infection of the supraglottic larynx (portion of the larynx superior to the vocal folds). It is a potentially lethal condition if not recognized and treated promptly. Prior to the introduction of the conjugated *Haemophilus influenzae* type b (Hib) vaccine, epiglottitis primarily affected children from 2 to 6 years of age. Since the introduction of the vaccine, there has been a decline in pediatric cases and an increase in adult supraglottitis, particularly those between 45-64 years and older than 85 years.¹ Although there has been a relative decrease in the incidence of disease, epiglottitis should still be considered in the differential diagnosis of any child who presents with acute upper airway obstruction. This article will review the current microbiology, presentation, evaluation, management, and prevention techniques of pediatric epiglottitis.

MICROBIOLOGY

H influenzae type b was a significant source of pediatric morbidity and mortality prior to the 1990s. This gram-negative aerobic coccobacillus was the causative organism for most cases of epiglottitis, meningitis, and other serious bacterial infections in children. The Hib vaccine was introduced in the United States in 1985 as a polysaccharide vaccine. Polysaccharides result in T cell-independent B-cell activation, which results in poor or absent immune response in infants who have an immature immune system.² The polysaccharide component was later attached to a protein carrier to improve the efficacy of the vaccine by recruiting T cells to the immune response. The conjugate vaccine is now recommended by the Centers for Disease Control and Prevention for all US children younger than 5 years. It is typically administered initially at 2 months of age and is available in combination with other vaccines such as diphtheria, tetanus, and pertussis to limit the number of injections.

Despite widespread use of the Hib vaccine, vaccine failure is possible and cases of Hib epiglottitis are still reported.³⁻⁷ *Streptococcus*

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1522-8401

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pneumoniae and beta-hemolytic streptococcus, particularly group A, have also been implicated in many recent cases. Other less common infectious causes include *Staphylococcus aureus*, nontypeable *H influenzae*, *Moraxella catarrhalis*, *Pseudomonas*, *Haemophilus parainfluenzae*, *Candida albicans*, and *Neisseria* species. Infection of the epiglottitis can occur in isolation or as a result of bacterial superinfection of an upper respiratory tract viral infection. Noninfectious causes such as trauma, burns, caustic injury, and lymphoproliferative disorder have also been described.⁸

EPIDEMIOLOGY

Since the introduction of the conjugate Hib vaccine, there has been a dramatic decline in the incidence of pediatric epiglottitis, particularly cases where Hib was the causative organism. One study noted an 84% decrease in incidence with 10.9 cases per 10 000 admissions prior to 1990 and 1.8 cases per 10 000 admissions from 1990 to 1992.⁵ From a national perspective, there continues to be a decline in admission for epiglottitis, with more than 4500 cases in 1998 to approximately 3800 in 2006.¹ There has also been a shift in the age of patients, with less patients younger than 18 years and more middle-aged (45-64 years old) and elderly patients.

PRESENTATION

A child with epiglottitis typically has a toxic appearance. Classically, caregivers will report rapid onset of noisy breathing and inability to tolerate secretions. On examination, the patient may have inspiratory stridor and a muffled voice quality. Drooling or spitting up secretions is common. Suprasternal and/or subcostal retractions may also be noted. Patients may assume the classic “tripod” position in which they are leaning forward with their arms extended to support them, or “sniffing” position with their neck forward, head upward, and their mouth open in order to maintain an airway. Altered mental status, mottled skin, and cyanosis are signs that airway obstruction and circulatory collapse are imminent.

EVALUATION

Often the patient arrives via ambulance to the emergency department. If possible, prior to arrival, the attending emergency medicine, anesthesiology, and otolaryngology staff should be made aware of the patient. If airway obstruction is imminent, arrangements should be made to transport the patient directly to the operating room or for

advanced airway equipment to be available in the emergency department (Figure 1).

The evaluation of a pediatric patient with suspected epiglottitis should proceed rapidly. The patient should remain in a position of comfort, typically sitting upright in the lap of a parent, and should never be forced to assume a different position. Caregivers should be questioned about when the illness began, sick contacts, immunization status, medical comorbidities, medications, and their last meal (to be ready to secure the airway as necessary). The extent of the physical examination is determined on a case-by-case basis, but should not agitate the patient, which could precipitate airway obstruction. In addition, practitioners capable of resuscitation and securing the airway in the event of acute obstruction should perform the evaluation. Indeed our mentor, Dr Gerald B. Healy, a father of pediatric otolaryngology, strongly advocates that the patient should not be perturbed and the diagnosis should be made based on the above constellation of symptoms. This includes minimal manipulation of the throat (avoiding use of a tongue depressor, lowering the lights in the room to keep the patient calm, etc).

Noninvasive hemodynamic monitors can usually be applied without significant discomfort. Patients will often exhibit tachycardia and tachypnea. The presence of hypoxia is concerning for significant airway obstruction. Auscultation will usually reveal inspiratory stridor. Crackles may occur late in the presentation as a result of negative pressure pulmonary edema from inspiring against an obstructed glottis. A basic oral cavity/oropharyngeal examination without a tongue blade in a cooperative child can help rule out peritonsillar or retropharyngeal swelling. Neck swelling and decreased range of motion of the neck are atypical and may be indicative of a deep neck space infection (Table 1).

In a stable and tolerant patient, a portable lateral neck radiograph can be considered to support the diagnosis. The edematous epiglottitis will have a

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