# Epiglottitis: A Review of 13 Cases and a Suggested Protocol for Management

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Thirteen cases of epiglottitis are reviewed in this paper. Fever and respiratory distress were the most common presenting symptoms. A lateral neck roentgenogram was a helpful laboratory test. Epiglottitis must be distinguished from viral croup and other causes of upper airway obstruction so that prompt treatment can be instituted. A suggested protocol for management of epiglottitis emphasizes the importance of establishing an artificial airway and administering intravenous antibiotics effective against Hemophilus influenzae type B.

Since Sinclair[1] and Alexander et al[2] first described epiglottitis as a clinical entity in the early 1940s, the disease has remained an important consideration in the differential diagnosis of upper airway obstruction. Epiglottitis is a true medical emergency that can progress rapidly to total obstruction of the airway and death within a few hours. Although effective therapy is now generally available for epiglottitis, occasional deaths still result from this disease because of pitfalls in management. Most of these deaths should be preventable if physicians rapidly recognize the disease and begin appropriate therapy without delay.

Thirteen consecutive cases of epiglottitis (defined by the visualization of a red, swollen epiglottis on direct examination of the oropharynx) at Columbia-Presbyterian Medical Center occurring between July 1977 and March 1981 are reviewed here. A suggested protocol for management of patients with epiglottitis is presented.

## Case Review

### *Patients and Clinical Findings*

The age of the patients ranged from 8 months to 43 years. The majority were in the preschool age group, and three were aged over 20 years. This disease occurred during all seasons of the year without a peak. There was wide variety of symptoms and signs in this group of patients (Table 1). Fever and respiratory distress were the most common symptoms in this series. The only two patients who were afebrile also had no respiratory distress; both were adults. All three adults in this series presented initially with dysphagia (and sore throat).

In five patients no attempt was made to visualize the epiglottis in the emergency department. In four patients the epiglottis was seen initially and was perceived to be large and inflamed. In four other patients the epiglottis was not seen well or was erroneously thought to be normal.

### *Laboratory*

The results of laboratory tests obtained from these patients were quite variable. The white blood cell count frequently showed a leukocytosis, as one would expect in a bacterial infection, but three patients had normal white cell counts. Moreover, a lateral neck roentgenogram was obtained in seven cases, and it consistently demonstrated epiglottitis. Also, roentgenograms of the chest showed pulmonary infiltrates in 4 of 13 patients. Finally, blood cultures were positive for Hemophilus influenzae in 7 of 12 patients, but Streptococcus pneumoniae was isolated in one 43-year-old patient who had been receiving

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**Table 1. Clinical Signs and Symptoms of Epiglottitis (n = 13)**

| Signs and Symptoms | No. of Patients |
|---|---|
| Prodromal illness | 11 |
| Fever (temperature 102° F) | 11 |
| Respiratory distress | 11 |
| Stridor | 9 |
| Dysphagia | 7 |
| Intercostal retractions | 6 |
| Hoarseness | 5 |
| Cough | 4 |
| Drooling | 3 |
| Cyanosis | 3 |
| Wheezing | 2 |

chemotherapy for multiple myeloma. Two of the four patients with negative blood cultures had been previously treated with antibiotics before the culture was obtained, and a third patient, aged 23 years, had been afebrile and had no respiratory distress during his illness. H influenzae was isolated from 2 of 7 cultures of the epiglottis, but staphylococcus or streptococcus or both were isolated from 5 of 7 of these cultures. One of the patients who grew H influenzae type B from a swab of his epiglottis had a negative blood culture; he had received intramuscular ampicillin one hour before his arrival at this medical center.

### *Management*

Eight patients were intubated orally, and five of these were subsequently intubated nasally. Three patients required tracheostomy because intubation could not be carried out. One adult patient (afebrile, without respiratory distress) did not have an airway placed, and neither had one child. Although that child presented with fever and respiratory distress, her lateral neck x-ray film was initially read as normal, and the child was sent home with presumed pharyngitis. The roentgenogram was later reviewed and considered to be consistent with epiglottitis. When this x-ray film was reviewed, her blood culture was positive for H influenzae, and she was recalled for admission. She was in only mild distress then and was not intubated. Of the 11 who were intubated or who had tracheostomies, 8 needed a respirator for up to 72 hours. One patient required reintubation because of stridor after extubation.

Eight patients were treated with ampicillin and chloramphenicol when the diagnosis was made, three patients received ampicillin alone, and one was treated with chloramphenicol and erythromycin because of a possible penicillin allergy. One adult patient who had been receiving chemotherapy was treated with ampicillin and gentamicin initially. Two adult and two pediatric patients received steroids.

### *Outcome*

One patient in this series died. This 1-year-old child had been transferred to Babies Hospital after cardiac arrest and resuscitation at another hospital. A tracheostomy was performed at the other hospital eight hours after admission, and ampicillin and chloramphenicol were not started until nine hours after admission. The blood culture grew H influenzae. A chest roentgenogram on arrival at Babies Hospital showed bilateral "white outs." The child had a second cardiac arrest on arrival at Babies Hospital and could not be resuscitated.

All other patients in this series recovered. Seven were discharged in three to five days to complete a course of medication orally; five remained hospitalized for more than one week.

## Discussion

This small series demonstrates many salient points about epiglottitis. First, the disease is not very common. Only 13 cases could be identified at Babies Hospital in five years; during this time the Pediatric Emergency Department had 40,000 to 50,000 visits per year. Second, the disease does occur in adults,[3,4] although children aged 0 to 3 years represented the peak age group. Moreover, the disease can occur at any time of the year;[3] almost one half of the cases occurred in the nonwinter months.

The diagnosis of epiglottitis is made on the basis of history and abbreviated physical examination. Fever and respiratory distress are the most common symptoms.[3,5] Stridor and drooling do occur, but are inconsistent findings.[3,5] In the three adult patients in this series, dysphagia and sore throat were more prominent symptoms than fever and respiratory distress. These symptoms have been found to be more prominent in other adults with epiglottitis, but acute airway obstruction is certainly not uncommon in these patients.[2] History

**Table 2. Clinical Features of Epiglottitis and Croup**

| Epiglottitis | Viral Croup |
|---|---|
| Older childen (over 2 years) | Younger children (less than 2 years) |
| No seasonal predominance | More in winter |
| Uncommon infection | Common |
| Recurrence is rare | Recurrence not uncommon |
| Bacterial (H influenzae type B) | Viral (parainfluenza, respiratory syncytial virus) |
| Above the true vocal cords | Below the true vocal cords |
| Rapid onset of symptoms | Gradual onset of symptoms |
| Toxic, high fever | Sick, but not toxic |
| Stridor less consistent | Stridor common |
| Muffled, guttural voice | Hoarse voice |
| No cough | Croupy cough |
| Hypoxia, no cyanosis | Hypoxia and cyanosis frequent |
| Prefers to sit up, quiet | Position not important, may be restless |
| Drooling occasionally | Not drooling |
| Sternal recession | Sternal recession |

and initial presentation are more informative than the casual examination of the epiglottis in the office or emergency department. This series demonstrated the difficulty of examining the epiglottis accurately in the emergency department. Such an examination may be dangerous because of the possibility that it may produce laryngospasm.

The family physician must recognize this disease quickly. Epiglottitis may infrequently be confused with foreign body aspiration. A foreign body lodged in the larynx can produce stridor and respiratory distress, but unlike epiglottitis, the patient is usually unable to vocalize effectively.[6] Also, such a patient is generally not toxic appearing. A child with a retropharyngeal abscess or laryngeal diphtheria may present with fever and respiratory distress, and these diseases must be considered in the differential diagnosis of upper airway infections.[7] A neck roentgenogram will help with the former diagnosis, and an immunization history and the appearance of a membrane on the tonsils may identify the latter. It is crucial to distinguish epiglottitis from viral croup, a more common upper airway infection. Table 2 lists the distinguishing signs and symptoms of each. If there is still doubt about the cause of the upper airway obstruction after the history and physical examination, a radiogram of the lateral neck is helpful in establishing the diagnosis of epiglottitis.[8] Radiographic examination was misleading in only one case in this study because an inexperienced radiologist initially read the film as normal. Again, the roentgenogram is needed only when the diagnosis is truly in doubt, and a person capable of establishing an artificial airway with appropriate equipment for airway management should accompany the child to the radiology department. Figure 1 compares the roentgenographic appearance of an inflamed epiglottis with that of a normal epiglottis.

Molteni[9] reported that 25 percent of patients with epiglottitis had associated pneumonia. The series in this study correlates well with that observation.

H influenzae is the most common causative organism of epiglottitis. Culture of the epiglottis gave more variable results than did the blood cultures but proved helpful in at least one case when the blood culture was negative. The significance of organisms other than H influenzae that are cultured from the epiglottis remains questionable. In other series, group A $\beta$-hemolytic streptococci, Staphylococcus aureus, and Streptococcus pneumoniae have all been implicated in this disease.[3,10,11,12] Battaglia and Lockhart[10] isolated H influenzae from throat or blood cultures in 54 percent of their 68 cases of epiglottitis. Baxter and Pashley[13] found H influenzae type B in 91 percent of blood cultures, whereas epiglottis cultures yielded this organism in only 15 percent. Normal flora and no growth were reported more common-

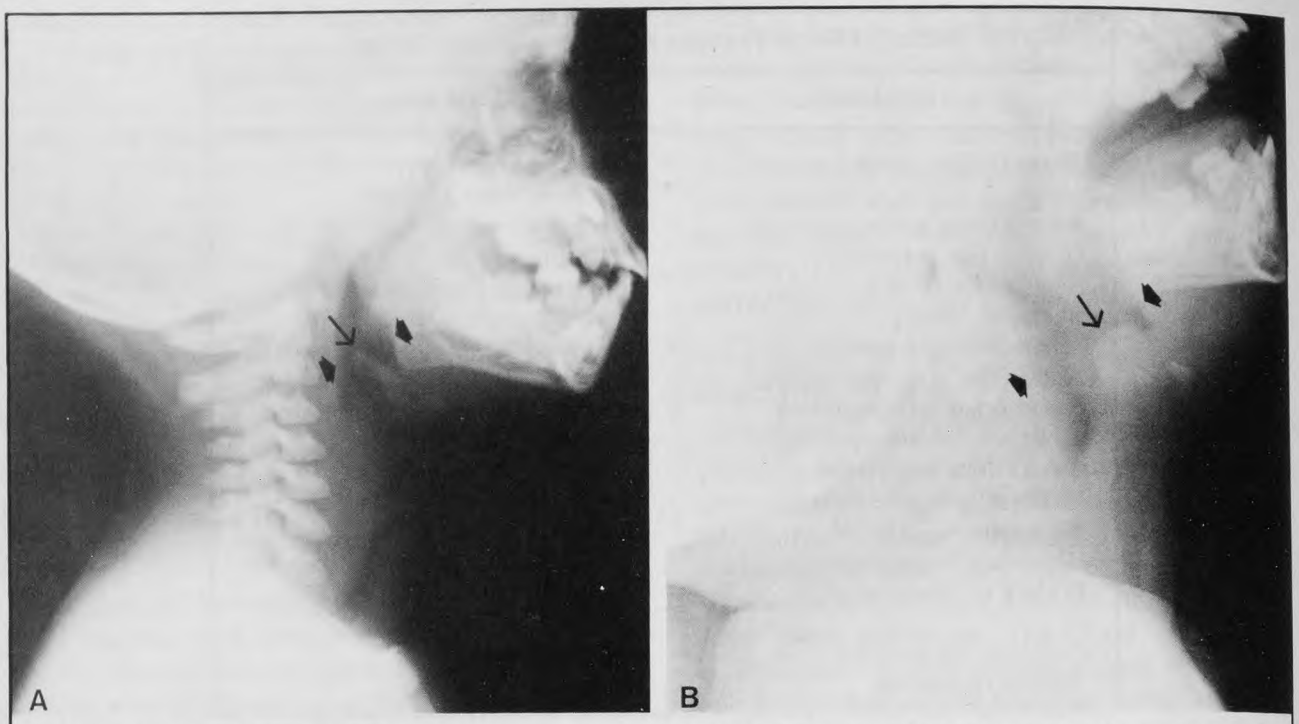


Figure 1. (A) The normal epiglottis (long arrow) is thin (on lateral projection) like an adult's small finger. The hypopharynx is normal in width (short arrows). (B) The inflamed epiglottis is wide and round (long arrow) like an adult's thumb. The hypopharynx is widened (short arrows) in patients with epiglottitis

ly than any single organism from cultures of the epiglottis.[13] Margolis et al[14] reported that 13 of 14 epiglottis cultures and 13 of 15 blood cultures grew H influenzae in their series. Culturing technique and previous antibiotic treatment will certainly influence culture results. Finally, the unusual isolation of S pneumoniae from one adult in this series may have been related to the fact that he was an immunocompromised host. He was receiving chemotherapy for multiple myeloma when he developed epiglottitis.

There are two important principles in the treatment of epiglottitis. First, the expedient placement of an artificial airway is crucial. As was demonstrated in this series, intubation is usually performed without difficulty, and tracheotomy is rarely necessary.[15,16] Most authors now agree that placement of an airway should not be delayed once the diagnosis of epiglottitis is made.[3,6] However, in an office setting it is best to arrange the transfer of the patient to an acute-care facility without attempting to establish an airway unless the patient is completely obstructed. In those cases, the child may be supported with bag and mask ventilation while arrangements are made to place a better airway.[17] Second, antibiotics are essential.[3,6] Ampicillin and chloramphenicol should be used initially because H influenzae is the usual cause of this illness. H influenzae may be resistant to either drug, but once sensitivities have been established, one of these drugs should be discontinued. There may be no need to treat each patient intravenously for the entire course of the illness. In this series and in others good results were achieved with only a few days of intravenous therapy followed by oral antibiotics.[12]

Finally, no comment can be made on the basis of these data about the value of steroids in the treatment of epiglottitis. Some advocate the use of steroids in treating patients with epiglottitis. For instance, Gross[18] recommends intravenous administration of 5 mg of dexamethasone (Decadron) for the first 5 kg of body weight and 1 mg for each additional kilogram. This dose is repeated every 15 minutes until a response is noted, and it is discontinued if no response is noted after two hours. Strome and Jaffe[19] recommend similar steroid therapy. Johnson et al,[5] however, reported no substantial difference in the duration of hospitalization when patients with epiglottitis who received steroids were compared with those who did not. There are still no controlled clinical trials that

adequately assess the value of steroids in treating epiglottitis.

The above principles of treatment have been incorporated into a recommended management protocol for epiglottitis included in the Appendix.

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## Appendix
## Epiglottitis Protocol

1. Upon the patient's arrival in the office or emergency department, or with notification of the impending arrival, equipment for intubation and tracheostomy is placed at the bedside. If seen in the physician's office, immediate transfer to a nearby emergency department should be arranged.
2. The operating room, the senior pediatric admitting resident or chief resident, and personnel from the departments of otolaryngology, anesthesiology, and emergency medicine are notified.
3. If the patient is cooperative and can easily open his mouth, a physician may attempt to visualize the epiglottis without inserting any instruments into the mouth.
4. If the diagnosis of epiglottitis is obvious or if the patient is in severe distress, he is escorted directly to the operating room by the most skilled available physician.
5. If the diagnosis is uncertain, the patient is escorted to the x-ray department for a lateral neck film. If the x-ray film depicts a large epiglottis, the patient is brought immediately to the operating room. He is kept as calm as possible. If the x-ray film shows a normal epiglottis, the patient returns to the emergency department or office for further examination as indicated.
6. In the operating room, the child is anesthetized by halothane and is given a muscle relaxant. The epiglottis is visualized directly through a laryngoscope.
7. The child is then intubated, first orally and then nasally, with tubes that are smaller than one would normally use in a child of that size. A tracheotomy is done only if the intubation is impossible.
8. A bacterial culture is obtained from the epiglottis in the operating room after the airway has been placed. An intravenous line is inserted, and the child is transferred to the intensive-care unit (ICU).
9. Blood cultures, routine white blood cell count, and arterial blood gas measurements are obtained on arrival in the ICU. Intravenous ampicillin, 200 mg/kg/d, and chloramphenicol, 100/mg/kg/d, are begun; one half of the day's dose is given initially. A chest roentgenogram is obtained.
10. The patient is sedated with morphine, 0.1 mg/kg/dose, and is restrained initially. A mechanical respirator is used as needed, and this may be volume- or pressure-cycled depending on the size of the patient. Parents are encouraged to stay with the child.
11. During the follow-up period, the epiglottis is visualized daily. The child is sedated with intravenous sodium thiopental, 2 mg/kg, in the ICU. When the epiglottis is no longer swollen and red, the child is extubated. Corticosteroids (intravenous dexamethasone, 0.5 mg/kg) are given six hours prior to extubation only if the intubation has been difficult or if the endotracheal tube remained in place for more than three days.
12. The child remains in the ICU one day after extubation and remains in the hospital until he is clinically improved and has completed at least five days of intravenous antibiotics. Generally the child will complete a seven- to ten-day course of antibiotics at home. As soon as sensitivities of the organism to the antibiotics have been ascertained, the antibiotics are adjusted accordingly.