

# Epiglottitis in the adult patient

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## ABSTRACT

Epiglottitis is an acute disease, which was predominantly caused by *Haemophilus influenzae* type b in the pre-vaccination era. In the vaccination era, with waning vigilance, adults remain at risk for acute epiglottitis according to recent Dutch incidence rates. There is more diversity in the cause of epiglottitis in adults. We describe three patients who presented to the emergency ward of a regional teaching hospital with severe epiglottitis. All three patients had stridor at presentation indicating a compromised airway. Emergency intubation was attempted, but two patients required a tracheotomy and one patient died. Patients received fiberoptic nasal intubation, systemic dexamethasone and antibiotics.

Stridor is an important acute sign of upper airway obstruction, which requires vigilance for epiglottitis, regardless of the patient's age. Fiberoptic nasal intubation should preferentially be attempted with the possibility of immediate surgical airway on hand. Timely diagnosis and treatment usually results in a complete recovery. In adults, severe acute epiglottitis and stridor can justify early intubation.

## KEYWORDS

Acute epiglottitis, adult, *Haemophilus influenzae*, stridor, upper airway obstruction.

## INTRODUCTION

Epiglottitis is an acute life-threatening disorder. Among children, the incidence of epiglottitis has been reduced due to vaccination against *Haemophilus influenzae* type b (Hib). This reduction in the incidence of epiglottitis is not apparent in adults.<sup>1,2</sup> In the Netherlands, Hib immunisation has been part of the National Immunisation

Programme since 1993. Most children have been vaccinated. The reduced incidence among children leads to the general impression that epiglottitis is becoming less frequent, resulting in waning vigilance. Despite the general immunisation, adults remain at risk. Epiglottitis in adults has many causes, and vigilance and familiarity with the clinical presentation is required for swift recognition and treatment. We describe three adult patients with stridor based upon acute epiglottitis to illustrate the possible severity of the clinical presentation, current treatment and outcome.

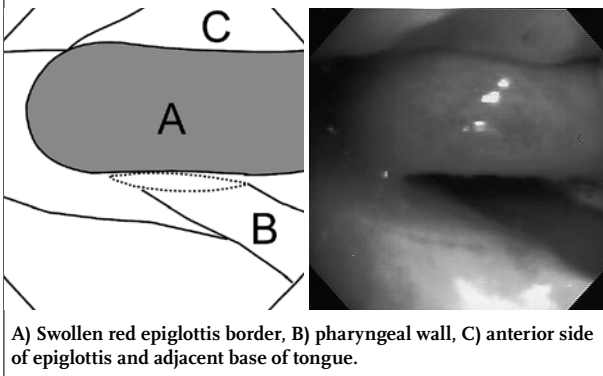
## CASE REPORTS

### Case 1

Patient A, a 54-year-old man, presented to his general practitioner with fever, a sore throat and dysphagia. Antibiotic treatment was initiated in the primary care setting and the patient was referred to the emergency ward two days later.

On examination in the emergency ward, the patient was short of breath with an oxygen saturation of 97% in blood gas analysis without oxygen supplementation. There was an audible inspiratory stridor and orthopnoea. His body temperature was 36.8°C with a heart rate of 72 beats/min and a blood pressure of 120/65 mmHg. There were no pathologically enlarged lymph nodes present in the neck. Serious epiglottitis was diagnosed by flexible nasopharyngeal laryngoscopy, showing a mucosal film in the cricoid region and imminent obstruction of the upper airway (*figure 1*). Auscultation of the lungs was normal. Blood chemistry analysis revealed a C-reactive protein (CRP) level of 309 mg/l (reference <6 mg/l), leucocytosis of  $14.0 \times 10^9/l$  (4.0 to 10.0), and neutrophil count of  $12.5 \times 10^9/l$  (1.5 to 7.5). Chest X-ray showed no abnormalities. The patient was transported to the operating room for

**Figure 1.** Flexible nasopharyngeal laryngoscopy shows a 'cherry red' acute epiglottitis with inflammation of surrounding tissue



controlled intubation with a surgeon immediately available to create a surgical airway. The patient was conscious and cooperative. Surface anaesthesia of the nasopharynx, oropharynx, larynx and trachea was ensured with 10% lidocaine spray. The patient was intubated by nasotracheal intubation under fiberoptic control. Antibiotic therapy with intravenous amoxicillin/clavulanic acid was continued (4 x 1200 mg daily) after admission to the hospital and supplemented with dexamethasone 1 x 20 mg daily. Blood and sputum culture remained negative, showing no pathogens. The patient showed clinical recovery with antibiotic and dexamethasone therapy. A computerised tomography (CT) scan of the neck showed no extraluminal structures compressing the trachea. On the second day, the patient was extubated after flexible laryngoscopy and a cuff leak test with a deflated cuff ensured the absence of significant obstruction. Repeated flexible laryngoscopy showed a normal hypopharynx and larynx and after four days he fully recovered.

#### Case 2

Patient B, a 45-year-old man, presented to the emergency ward with a sore throat and increasing stridor within hours. On examination, the patient had an audible stridor during respiration and a body temperature of 39.1°C. Blood chemistry analysis revealed a CRP level of 112 mg/l and leucocytosis of  $17.7 \times 10^9/l$ . During flexible laryngoscopy, a swollen epiglottitis with partial airway occlusion was observed and an elective nasotracheal intubation was performed. After successful intubation the tube dislocated resulting in immediate hypoxia. Repeated intubation failed, and an immediate surgical airway was required (tracheostomy and tracheal cannula placement). The patient was transported to the ICU and treated with corticosteroids and intravenous amoxicillin/clavulanic acid 4 x 1200 mg daily. Blood cultures remained negative. CT scan showed a swollen epiglottis. The patient was moved to the surgical ward on the second day. The tracheal cannula

was removed on the fourth day after flexible laryngoscopy had ensured the absence of significant obstruction.

#### Case 3

Patient C, a 46-year-old man, presented to the emergency ward with acute respiratory insufficiency and severe stridor. He had collapsed earlier that day while consulting his general practitioner because of a sore throat and increasing stridor. On examination, the patient was in distress and had a severe inspiratory stridor. The clinical presentation evolved into an acute complete airway obstruction. Thus, manual mask ventilation was unsuccessful. Subsequent urgent endotracheal intubation failed, so that an immediate surgical airway was necessary. During this procedure, the patient went into cardiac arrest despite the successful placement of a tracheal cannula. Adequate circulation was attained after 20 minutes of reanimation. Unfortunately, severe post-anoxic encephalopathy was present after resuscitation. Treatment was withdrawn and the patient died four days after admission.

## DISCUSSION

The incidence of acute epiglottitis in adults ranges from 0.97 to 3.1 per 100,000 with a mortality of approximately 7.1%.<sup>1,3</sup> In all presented cases a typical swelling of the epiglottis was present with obstruction of the upper airway, caused by inflammation. In all cases, antibiotic therapy was already initiated in the primary care setting, without preceding bacterial culture, which probably resulted in negative cultures at admission. Differentiation between acute epiglottitis and less urgent causes of a sore throat, shortness of breath and dysphagia is difficult, possibly leading to late referral to the emergency ward and selection of severe cases of acute epiglottitis. It is also important not to forget to examine the larynx in cases with severe dysphagia and no obvious findings in the mesopharynx.

There are various causes of acute epiglottitis in adults. Several microbiological agents can cause acute epiglottitis. Epiglottitis in children was mostly due to Hib, while in adults only 11% of sputum cultures and 31% of blood cultures revealed Hib and a more diverse microbiological aetiology was found.<sup>3,5</sup> In the Netherlands, the most important procreator of epiglottitis in children was *Haemophilus influenzae* type b (Hib) before the vaccination programme came into effect (61 to 65% of epiglottitis sputum cultures) with a drastic decrease after vaccination in a population with a large percentage of vaccinated patients (95.5%) and low incidence of vaccination failure (1.2%).<sup>6-8</sup> This corresponds well with reported developments in other developed industrial countries.<sup>6</sup> In the United States, Hib remained the main cause of epiglottitis among children

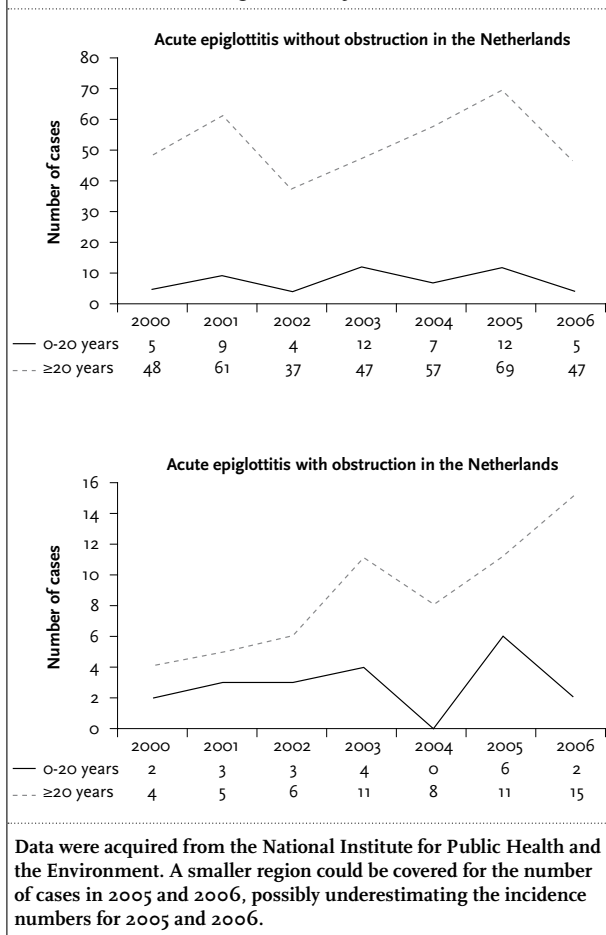
despite reduction after immunisation. The absolute number of cases of Hib-induced epiglottitis among adults did not decrease, but an increase occurred in the incidence of clinically less severe noninfectious epiglottitis in adults (85% negative sputum cultures).<sup>3,4</sup> In the Netherlands the number of nonobstructive acute epiglottitis cases has been constant in recent years, while a rise in the obstructive variant can be observed, especially in adults (*figure 2*). Together Hib and *Streptococcus* spp comprise the majority of microbiological causes of epiglottitis. Other microbiological causes are less frequent, but have a higher frequency in the adult patient.<sup>3,5</sup> Furthermore, some cases of epiglottitis have been attributed to *Candida* spp.<sup>3,5</sup> Bacterial blood culture and susceptibility testing is therefore useful in the diagnosis and treatment of epiglottitis. Bacterial blood culture should be done before treatment with antibiotics in all suspected cases. Sputum and throat cultures are less useful due to contamination.

Noninfectious causes of epiglottitis also occur in the adult population. Some of these causes are trauma by foreign objects, inhalation burns, inhalation of drugs, and chemical

burns.<sup>9-12</sup> Other noninfectious causes are associated with systemic disease or reactions to chemotherapy.<sup>13,14</sup> In children there is an association with asthma and allergies.<sup>15</sup> Special attention for throat burns affecting the epiglottis in bottle-fed infants seems advisable. Possible causes of reactive pharyngeal swelling should therefore be part of an adequate case history.

In general, a history of globus sensation, fast progression of the disease, and immunisation status are important to assess the risk for epiglottitis. Typical clinical deterioration such as dysphagia, fever, malaise, inability to swallow saliva, difficulties in breathing while lying down, shortness of breath, which may be more severe than the rise in inflammatory parameters, and stridor, without obvious oropharyngeal anomalies at global inspection, should result in an inclusion of epiglottitis in the differential diagnosis and are of primary importance for referral to an emergency ward. Patients with signs of an advancing upper airway obstruction, consistent with an acute epiglottitis, should be treated as a medical emergency. We advise against ingestion of fluids in case of dysphagia in epiglottitis when urgent intubation is anticipated.

**Figure 2.** Number of cases of acute epiglottitis with and without obstruction in the Netherlands according to the National Medical Registration for 2000 until 2006



It is possible to keep patients with mild signs of epiglottitis (dysphagia, sore throat, without evident oropharyngeal anomalies) under observation and to proceed to immediate intubation in case of clinical deterioration.<sup>1</sup> Another option, which has lost some support, is to choose an immediate elective intubation in controlled circumstances.<sup>1,3,4</sup> Clinical deterioration occurs within hours with stridor, hoarseness, drooling, dyspnoea, and fever. We preferred elective intubation in case of epiglottitis, mainly because of the accompanying stridor. Difficulty in breathing and stridor are common physical signs of epiglottitis in children, but less frequent in adults.<sup>4</sup> Stridor in adults is a typical indication for upper airway obstruction and is regarded as a warning sign for advancing occlusion of the upper airway. Audible reduction of stridor in the early clinical presentation indicates occlusion rather than recovery. Clinical observation in case of stridor and relying on the timely diagnosis of clinical deterioration was regarded as very hazardous, because this could imply suffocation. Similarly, a reduction in audible stridor at presentation was addressed with caution and endorsed management of epiglottitis with fiberoptic controlled elective intubation rather than clinical observation. Only 79% of the cases of epiglottitis are diagnosed on soft tissue X-rays of the neck.<sup>3</sup> It is recommended to first perform flexible fiberoptic laryngoscopy for a reliable, timely diagnosis.<sup>1,16</sup>

In case of epiglottitis and stridor, the clinician is presented with a difficult intubation and the risk of complete occlusion of the larynx and pharynx. Intubation of a patient with

epiglottitis must be regarded as a potentially difficult procedure. We prefer intubation in monitored conditions, with an anaesthetist on standby to administer a general anaesthetic if necessary. Furthermore, all the equipment for the intubation of a compromised airway and a prepared team capable of performing an immediate coniotomy or tracheotomy should be present. The preferred technique is intubating a conscious patient, using surface anaesthesia. If the patient is non-cooperative, necessitating general anaesthesia, conditions for a spontaneous respiration are preferred.

In case of epiglottitis a fiberoptic nasal intubation using a tube with substantially reduced diameter is preferred.<sup>17</sup> If ventilation with a reduced diameter tube is not adequate, a timely tracheotomy has to be performed. All patients were referred to the emergency ward with severe acute epiglottitis and stridor, which justified an early intubation attempt.

Extubation was preceded by a cuff leak test with a deflated cuff. If the cuff leak test was >24% of the tidal volume, the tube was removed.<sup>18</sup> Antibiotics and corticosteroids administered in the primary care setting may impede early referral, presentation and diagnosis in the emergency ward and adequate care. In the ICU, we choose a broad-spectrum antibiotic treatment with Augmentin® (amoxicillin/clavulanic acid) as a practical approach, in the absence of a clear aetiology of epiglottitis and the possibility of aspiration. Dexamethasone could possibly reduce the chance for a postextubation stridor in the ICU. Research in children revealed that dexamethasone treatment or budesonide aerosols could be used in an attempt to limit pharyngeal oedema and thereby reduce the obstruction.<sup>1,16,19,20</sup>

Prevention of epiglottitis mainly consists of the prevention of Hib infection. In the Netherlands, children have been immunised against Hib in the National Immunisation Programme since 1993, but many adults have not yet been vaccinated. Immunity against Hib has been adequate with an increasing level of immunisation among children in the last ten years (95 to 97.8%), but with a decreasing immunisation level with age.<sup>21,22</sup> The capsular polysaccharide of Hib, polyribosylribitol phosphate, is used in a conjugated form for immunisation. In the Netherlands, this is done at 2, 3, 4, and 11 months after birth. For patients after splenectomy, an additional recommendation for immunisation has been adopted.<sup>23,24</sup> Since there is a high degree of voluntary vaccination in the Netherlands with low vaccination failure rates and since humans are the only known reservoir for Hib, herd immunity may eventually protect the nonvaccinated population. Herd immunity not only requires young infants to be vaccinated but also older children.<sup>25</sup> We speculate that after several years into the vaccination programme, this point may not yet have been reached for some communities with low vaccination status.

## CONCLUSION

Acute epiglottitis in adults is a rare but life-threatening disorder, which can be treated well with timely diagnosis and adequate treatment by intubation, antibiotics and corticosteroids.

Despite the immunisation programme against Hib, vigilance for the occurrence of a possible epiglottitis in the adult patient is still important. Dysphagia and shortness of breath or the severity of stridor, which may not correspond with the level of inflammation parameters, must raise the suspicion of epiglottitis irrespective of the age of the patient. In adults, severe acute epiglottitis and stridor can justify early intubation.

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