

REVIEW

Early recognition and critical management of adult epiglottitis in the emergency department: a case report and review of the literature

Pavarit Piyachon¹, Korsin Laohavisudhi¹, Wachira Wongtanarasarin¹, Krongkarn Sutham^{1,*}

¹Department of Emergency Medicine, Faculty of Medicine, Chiang Mai University, 50200 Chiang Mai, Thailand

*Correspondence
krongkarn.s@cmu.ac.th
(Krongkarn Sutham)

Abstract

Background: Acute epiglottitis was considered a disease of the pediatric population. However, it has constantly been a report of a certain number of adult cases. Death by airway obstruction is caused by delayed diagnosis and untimely invasive airway management contributing to the higher mortality rate in adults.

Case presentation: We presented a case of a 24-year-old male patient without significant underlying condition, who presented at our emergency department with a progressive sore throat and high-graded fever for one day. After a set of investigations, the patient was diagnosed with acute epiglottitis, and airway management was managed accordingly. His conditions improved after a course of antibiotic treatment during hospital admission.

Conclusion: Acute epiglottitis in adults is not frequently encountered in the emergency department. This case underlines the importance of clinical suspicions in cases with consistent symptoms as well as the excellent utility of lateral neck radiography for the diagnosis of this life-threatening entity.

Keywords

Epiglottitis; Airway management; Emergency department

1. Introduction

Acute epiglottitis is defined as the inflammation of the epiglottis and associated supraglottic airway mucosa capable of causing dramatic deterioration in airway patency and lethal respiratory obstruction. Generally, acute epiglottitis was considered a virtually pediatric disease. Many studies nowadays have described the epidemiology of adult acute epiglottitis (or supraglottitis) to be more prominent. This is due to the decreased proportion of the pediatric cases according to widespread Hib vaccination. On the contrary, for the adult group, there is a speculation regarding the causative organism to be *Streptococcus pneumoniae* along with other serotypes of *H. influenzae*, rather than *H. influenzae* serotype B [1–5]. In Thailand, there is scarce evidence about the incidence of adult epiglottitis. Despite worldwide increasing vaccination against Hib, this vaccine has only been included in the mandatory national vaccination program for Thai children since 2019, while the adult vaccination remains costly and not widely available. Therefore, many adult populations in Thailand have not been immunized and could be at risk for Hib acute epiglottitis. This condition is not only unfamiliarized among the adult population, but also entails a relatively higher mortality rate compared to children, with a figure up to 7% [6].

A study of adult epiglottitis in the emergency department

for mortality predictors discloses that untimely recognition and delayed invasive airway intervention contribute to a higher mortality rate [1]. Typically, acute epiglottitis presents with progressive severe sore throat, difficult phonation, drooling, and high-grade fever with a toxic appearance, especially in children [4, 7]. Although the gold standard of diagnosis is direct visualization of inflamed or edematous epiglottitis with or without an abscess and aryepiglottic fold inflammation, lateral neck radiography has been proven for its high accuracy in both especially with novel radiographic parameters [8, 9]. Here, the authors presented a case of acute epiglottitis at the emergency department with the discussion of rapid initial recognition utilizing quantitative and qualitative radiographic study and subsequent treatments.

2. Case presentation

A 24-year-old male patient with no previously recorded medical condition presented to the emergency department with the 1-day onset of severe progressive sore throat, odynophagia, and high-grade fever with chill despite taking over-the-counter antipyretics. He also mentioned progressive difficulty breathing and change in phonation. He denied any history of traveling, smoking, chemical, or foreign body ingestion and had not got contact with ill patients. He has been previously

healthy except for a previous history of occasional asthmatic attack and he has been completely vaccinated according to the previous Thai national program. On arrival, he was febrile, with body temperature up to 39.7 °C, tachycardia (138 bpm), tachypnea (RR 22/min), and normal blood pressure value. On the first evaluation, he was awake but was noted to be rather agitated from breathlessness; hence, a primary assessment was carried out and stridor or other signs of upper airway obstruction were absent. However, his voice was hoarse and muffled with a certain amount of saliva in the oral cavity. Detailed otolaryngologic examinations disclosed severe tenderness at the left submandibular area and limited cervical range of motion due to severe pain. The salivary glands, palatine tonsils, oral cavity, oropharynx, lymph nodes, and dental examination were unremarkable. At the emergency department (ED), his differential diagnoses included deep neck infection (such as retropharyngeal or parapharyngeal space abscess), acute epiglottitis, infective sialadenitis, lymphadenitis, and acute asthmatic attack. Consequently, anteroposterior and lateral neck soft tissue radiography was requested. The radiologic studies revealed marked swelling of the epiglottis and aryepiglottic folds Fig. 1. The prevertebral soft tissue was not thickened, and no foreign body nor gas collection was seen. This is consistent with the “thumb sign” in acute epiglottitis. Regarding other laboratory investigations at ED, complete blood count showed marked leukocytosis and neutrophil predominance (white blood cells 24,800 cells/mm³, neutrophil 86%, lymphocyte 6.1%) with a platelet count of 285,000 cells/mm³. Blood urea nitrogen, creatinine level, serum electrolytes, and liver function test disclosed no end-organ damage evidence. The serum lactate was 2.63 mmol/L and the hemoculture showed no organisms. Emergency otolaryngologic consultation was done as prompt as the intravenous empirical antibiotics (Ceftriaxone 1 g, intravenously) were administered. His pulse oximetry and clinical signs of upper airway obstruction were on heedful observation with intubation equipment readied at the ED bedside. Fiberoptic laryngoscopy done by an otolaryngologist was reported as excessive swelling and redness of the epiglottis with necrotic debris and an ulcerative lesion, in association with bilateral arytenoid swelling.

Apart from a history of occasional asthmatic attack in this patient, all findings established the diagnosis of acute epiglottitis. Since no clinical signs and symptoms were suspecting acute asthmatic attacks, such as wheezing, chest tightness, or coughing, the patient was admitted to the otolaryngology ward and intubated with a flexible nasotracheal tube afterward. His clinical status, leukocytosis, and epiglottic inflammation gradually improved on the third day of admission. The patient was extubated without any complications on the fourth day of admission. The antibiotic course is to be given for 7 days before his anticipated disposition.

3. Discussion

Despite the higher prevalence in pediatric practice, acute epiglottitis (or supraglottitis) is not uncommon in an adult population. Many recent studies describe an increasing trend in adult epiglottitis in the post-vaccination world [1, 6, 10].

Significantly, the mortality rate is as high as 7% in spite of treatment [10, 11]. Emergency room aggressive intervention can reduce the mortality rate during admission [1].

Notably, epiglottitis in adults results from a different etiology compared to the pediatric age group. *Hemophilus influenzae* is the most common infectious agent in children, especially if not immunized. On the contrary, the bacterial etiologies in adults are on the wider spectrum and are rather difficult to identify [12, 13]. The other non-infectious causes included the foreign body, heated liquid or chemical ingestion, and Behçet’s disease with the risk being immunosuppressive status, alcoholism, chronic smoking, and post-splenectomy [6, 12–14]. This case proves another example where no inciting risk was present, and the causative bacteria has not yet been successfully identified.

Clinical presentations of this patient were classically in harmony with other reports [4, 5, 10, 13] and, thus, emphasized the main clinical symptoms being the acute onset of severe sore throat with odynophagia, high-grade fever, and hoarseness of voice or the so-called “hot-potato voice”. In contrast to the pediatric airway, that of the adults has got more rigid epiglottis and broader diameter, making the upper airway obstruction milder and respiratory symptoms less pronounced. However, all clinicians, especially in the ED, should be cautious for impending airway obstruction, as it was the most common cause of death in acute epiglottitis. Attending physicians should be concerned and prepared for difficult airways not eligible for standard intubation. This could be effectively achieved by close monitoring, preparation of difficult airway devices and alternative surgical airways, as well as activating the otolaryngologist team or other airway experts. Reflecting on this case, the patient presented with no stridor nor hypoxia at first. Nonetheless, nasotracheal intubation using fiberoptic laryngoscopy by a specialist’s team to prevent imminent airway obstruction was proved to be fruitful in this case.

“One only sees what one looks for. One only looks for what one knows”. In the same manners, one will only recognize epiglottitis if one suspects it and requests for lateral neck soft tissue radiography, a film not so routinely submitted simply for sore throat, hoarseness, or other acute febrile illness, but the only basic imaging study is sensitive enough to preliminarily diagnose acute epiglottitis. The “thumb sign” seen as enlarged epiglottitis and thickened aryepiglottic fold are classical signs of epiglottitis. Fujiwara and colleagues conducted a systematic review and meta-analysis regarding diagnostic accuracy for detecting acute epiglottitis [15]. The sensitivity of the thumb sign for diagnosing acute epiglottitis ranged from 66.7% to 100.0% and specificity of 89.3%.

However, these signs are arguable by several studies elucidating the subjective nature of such interpretation [8, 11, 16]. Hence, convenient qualitative measurements of the epiglottitis, aryepiglottic fold, and hypopharynx have been proposed [8, 9, 15]. Schumaker *et al.* [17] had proposed and confirmed the utility of the epiglottic width (EW; width of the epiglottis in the lateral neck film at the widest point) with the cut-off of more than 8 mm and aryepiglottic fold width (AFW) at the widest point with the cut-off value of 7 mm to be significantly related with the diagnosis of acute epiglottitis in adults made by direct visualization. However, the diagnostic values had not

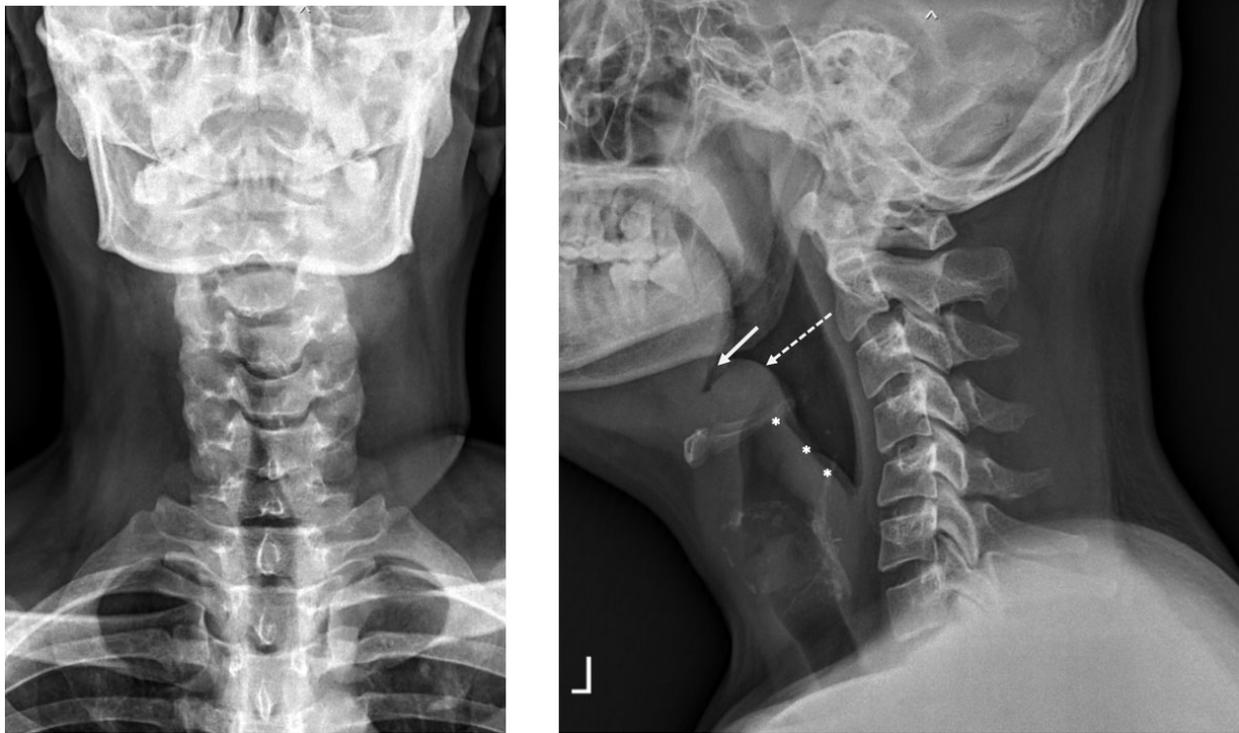


FIGURE 1. Antero-posterior and lateral views of the neck soft tissue show a marked enlargement of the epiglottis called “thumb” or “thumbprint” sign (dotted arrow) along with thickened aryepiglottic fold (asterisks). Note the narrowing of the vallecula (white arrow). These films are also helpful for excluding retropharyngeal abscess and radio-opaque foreign body ingestion, which may present with similar clinical pictures.

yet been studied. Regarding the age of the patients, Rothrock and colleagues have investigated lateral neck radiographs in patients aged 7 months to 61 years old [18]. They have concluded that the objective measurements converted to a ratio (such as EW/C3W) could be useful for patients of all ages without difference [18]. Besides, there has been a study on the association of sex, body weight, race, and epiglottic size, despite using sonographic measurement in healthy individuals [19]. This led to a conclusion that male gender and higher body mass index (BMI) are associated with a larger epiglottis.

More detailed measurements in Hong Kong populations [9] have reduced the cut-off EW to 5.5 while retaining the high diagnostic accuracy (sensitivity 96.2% and specificity of 100.0%) for acute epiglottitis. The ratio of EW/C3W of 0.3 or more also showed almost identical diagnostic values. Additionally, this study also implicated the measurement of hypopharyngeal width at the mid-C2 level (HW), HW/C3W ratio, and AFW which indicated inferior diagnostic values compared to the derivations of EW. A larger study in South Korea [8] was conducted to analyze similar lateral neck radiographic parameters, including EW, HW, and AFW. With the remarkably high diagnostic accuracy, the authors encouraged the use of such parameters for a screening of acute epiglottitis. The cut-off of EW was 5 mm—being even lower than most of the previous studies [8, 9, 15]—for the sensitivity and specificity of 96.2% and 98.2% respectively. Similarly, the AFW and HW followed sequentially for inferior accuracy with the cut-off of 6.6 mm (sensitivity 86.5%, specificity 78.8%) and 21.6 mm (sensitivity 40.8%, specificity 88.1%) respectively. Table 1 summarizes the sensitivity of specificity

of common parameters used for diagnosing acute epiglottitis from the literatures.

In a conformable manner, the presented case exhibited all positive findings of both subjective and objective domains of the lateral neck radiograph of epiglottitis Fig. 2 [8, 9, 15, 16]. The EW was 19 mm, being drastically higher than any cut-offs presented by other studies. Furthermore, the HW of 30.8 and AFW of 18.2 mm advocated the diagnosis. As a result, the diagnosis of acute epiglottitis surpassed all other differential conditions, and the otolaryngologist consultation was emergently done.

Regarding initial airway management at the ED, a definite guideline for the need for invasive intervention has not yet to be established; nevertheless, certain risk factors are associated with higher mortality from airway deterioration [1, 11, 12]. These constitute the following: male gender, diabetes mellitus, obesity, dyspnea or stridor at presentation, associated aryepiglottic edema, epiglottic abscess, and the level of PaCO₂ > 45 mmHg [1, 10–12]. Even though prophylactic invasive airway procedures are not necessary, intensive monitoring is recommended. All clinicians and associated health personnel ought to have a low threshold for invasive treatment, for the clinical course could be declining dramatically. In this case, close observation at the ED was done as the patient possessed the aforementioned risks: male, obesity, dyspnea at presentation, and aryepiglottic edema. Eventually, these risks contributed to worsened respiratory functions and he was intubated by an otolaryngologist.

Another cornerstone of emergency treatment is intravenous (IV) antibiotic administration. The preferred empirical agent

TABLE 1. Comparing the sensitivity and specificity across studies of the different common parameters used for diagnosing acute epiglottitis.

Parameter	Cut-off value (mm)	Sensitivity (%)	Specificity (%)	Reference
AFW	> 7	Had not been studied		[18]
	> 6.6	86.5	78.8	[8]
	> 5.9	92.3	80.8	[9]
EW	> 8	Had not been studied		[18]
	> 5.5	96.2	100.0	[9]
	> 5	96.2	98.2	[8]
HW	> 21.6	40.8	88.1	[8]
	> 16.3	80.8	69.2	[9]
EW/C3W ratio	> 0.3	96.2	100.0	[9]
HW/C3W ratio	> 1.04	73.1	84.6	[9]

Abbreviations: AFW, Aryepiglottic fold width; C3W, Retropharyngeal soft tissue thickness at the C3 level; EW, Epiglottic width; HW, Hypopharyngeal width.

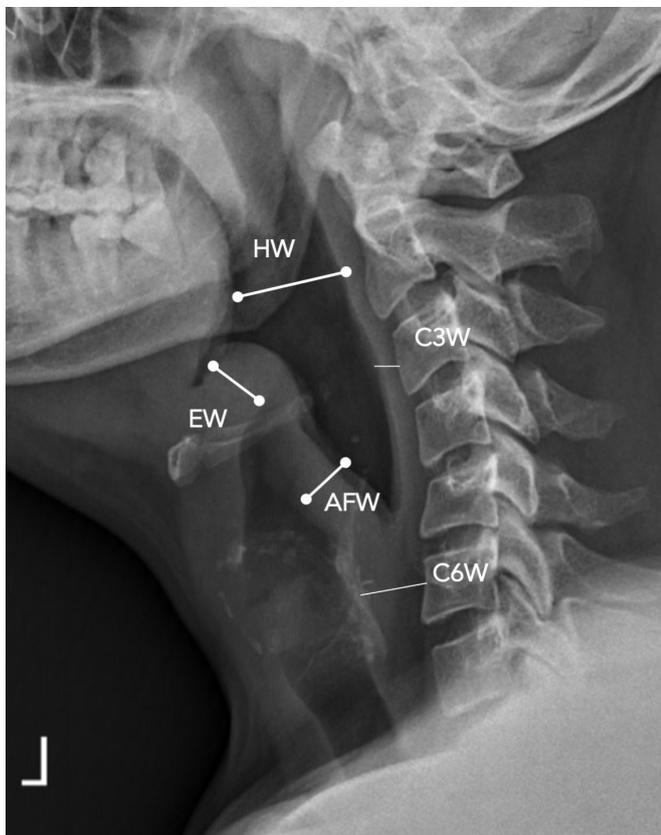


FIGURE 2. The qualitative measurements in suspected epiglottitis in this patient yielded the following. HW, Hypopharyngeal width 30.8 mm; EW, Epiglottic width 19.0 mm; AFW, Aryepiglottic fold width 18.2 mm; C3W, Retropharyngeal soft tissue thickness at the C3 level 6.7 mm; C6W, Retropharyngeal soft tissue thickness at the C6 level 21.4 mm. HW/C3W ratio 4.59. EW/C3W ratio 2.83.

is ampicillin or the third-generation cephalosporins [10, 14] with sometimes metronidazole added [13]. Rapid IV antibiotic administration improves clinical outcomes and reduces the rate of bacteremia and sepsis, despite not being common in

adults compared to children. The use of IV corticosteroids or inhaled racemic epinephrine is still in dispute [10, 14] and both were, thus, not used in this patient. During his hospitalization with the use of IV ceftriaxone, his clinical profile improved. Repeated fiberoptic laryngoscopy on the fourth day of admission showed significantly reduced epiglottic swelling and the patient could speak normally and tolerate a soft diet thereafter.

Late, in terms of chronic, complications in acute epiglottitis are scarcely reported, compared to the more serious life-threatening acute complications. Subsequent local complications include the formation of an epiglottic abscess, extension to deep neck infection, or meningitis [20]. While the remote ones are rather sequelae of the acute complications instead. For example, pneumonia or septicaemia develops following haematogenous spread and leads to further morbidity [20]. These complications could be efficiently prevented by early detection and timely emergency management.

4. Conclusions

Acute epiglottitis in adults is not to be neglected for its high mortality rate. This case emphasizes the awareness of epiglottitis in a patient presented with acute onset of high-grade fever, severe sore throat, odynophagia, and hoarseness of voice. Lateral neck soft tissue radiography is of indisputable importance for the diagnosis. The use of qualitative parameters is convenient and possesses high diagnostic yields. Timely diagnosis of this patient along with lowered threshold for airway management and intravenous antibiotics grants more favorable outcomes and reduces mortality.

AUTHOR CONTRIBUTIONS

PP: Emergency management of the patient, writing the first draft, editing and approval of the manuscript. KL: Emergency management of the patient, and approval of the manuscript. WW: editing and approval of the manuscript. KS: Emergency medicine management supervision, editing and approval of the manuscript. All authors contributed to the interpretation and

writing of the paper and approved the final version.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Our work does not infringe on any rights of others, including privacy rights, and intellectual property rights. There is no human rights violation in our manuscript. The patient provided written informed consent for publication of this case. Our institution provided an exemption for consideration since it was a case report article with permission from the patient.

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CONFLICT OF INTEREST

WW is a special guest editor for *Signa Vitae*. The remaining authors declare that there is no conflict of interest regarding the publication of this article.

DATA AVAILABILITY

The data used to support the findings of this study are available from the corresponding author upon request.

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