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Acute epiglottitis in the tropics: is it an adult disease?

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Abstract

Acute epiglottitis has traditionally been described as a paediatric disease in reports from temperate countries. There have been very few reports from tropical countries. This is a retrospective review of 32 cases of acute epiglottitis from Singapore over an eight-year period from 1992 to 1999. There were 31 adults and only one child. In Singapore, *Haemophilus influenzae* Type b (Hib) immunization in not routine, and thus the increased prevalence in adults cannot be attributed to Hib immunization.

Eleven patients required airway intervention, of whom nine had endotracheal intubation and two had a surgical airway. Significant predictors for airway intervention included the sex of the patient, stridor, presence of airway compromise on examination and a 'thumb sign' on the lateral neck radiograph. In adults, selective airway intervention is recommended as those without airway compromise at presentation recover very well with medical treatment alone.

Key words: Epiglottitis, Adult, Tropics

Introduction

Acute epiglottitis (AE) is an uncommon but potentially life-threatening inflammation of the supraglottis. In temperate countries, it has been predominantly a paediatric disease.[1] In recent years the incidence in children has shown a marked decline, while the incidence in adults has been relatively unchanged.[2] Most reports of AE have come from temperate countries and its epidemiology has been well studied. However, there have been very few reports of AE from the tropics and the epidemiology of AE in the tropics is still largely unknown. In children, AE can rapidly progress to airway obstruction, hypoxia and death. Therefore securing the airway early is often required in children. In adults, there is a potential for airway obstruction, but many patients can be managed conservatively without the need for airway intervention.[3] We reviewed AE in our hospital over an eight-year period from 1992 to 1999, looking at clinical, diagnostic and therapeutic parameters and outcomes, and also identified factors associated with airway intervention.

Methods

Thirty-two patients diagnosed with AE over a seven-year period were included in this study. The ICD-9 code was used to identify all patients discharged from the National University Hospital of Singapore, a tertiary institution with 950 beds and a full complement of departments including Accident and Emergency (A & E), Paediatrics and Otolaryngology. A diagnosis of AE was made when the epiglottis or supraglottis was inflamed on either indirect larygoscopy, direct laryngoscopy or flexible nasopharyngolaryngoscopy. There was airway compromise when it was clinically assessed that the laryngeal airway was narrowed by 50 per cent or more. Fever was defined as an oral temperature of 37.5°C or more.

Data collected included clinical, diagnostic, therapeutic, and outcome parameters. Patients requiring airway intervention were compared to those that did not require airway intervention.

Univariate analysis using Fisher's exact test was used to identify categorical factors associated with airway intervention. Student's *t*-test was used to analyse continuous variables.

Results

Age and sex distribution

Thirty-one (97 per cent) patients were adults and there was only one child. Their ages ranged from three to 93 (Figure 1). The peak age incidence was in the third decade and the mean age was 45 years old. There were 24 males and eight females.

Clinical presentation

Sixteen (50 per cent) patients presented with stridor. Thirty-one (93.7 per cent) patients, all adults,

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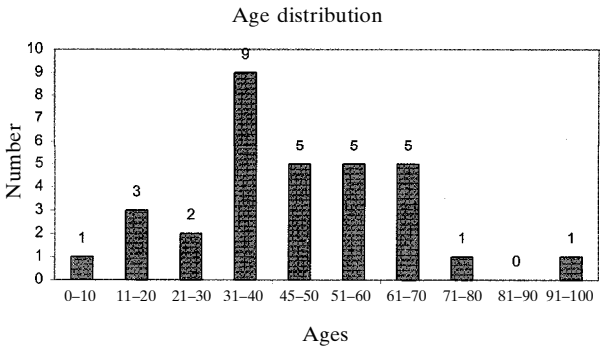

FIG. 1

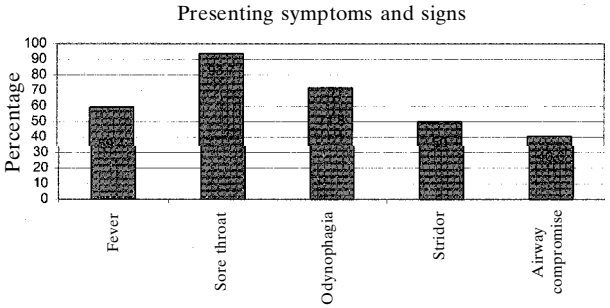

FIG. 2

presented with sore throat. The only patient who did not present with a sore throat was the child, who presented with stridor and fever. Nineteen (59.4 per cent) patients had fever at presentation. The highest temperature recorded was 40°C. Twenty-three (78.1 per cent) patients had odynophagia (Figure 2).

Rapid onset of symptoms was characteristic. The mean duration of symptoms before presentation was less than 48 hours. Only five patients had received medical treatment from general practitioners prior to presentation.

There were four patients with non-insulin dependent diabetes. These patients stayed longer than the average (six days compared with four days) but they did not have more complications.

Clinically, an oedematous and erythematous epiglottis was seen in all patients. In some patients there was also involvement of the ary-epiglottic fold and the arytenoids. Airway compromise was noted in 13 (40.6 per cent) of patients.

Patients who received airway intervention were not significantly different from those who did not receive airway intervention in terms of age, fever, sore throat or odynophagia (Table I). Patients requiring airway intervention are more likely to be male ($p = 0.03$). Patients who had stridor (100 per cent compared with 23.8 per cent, $p<0.001$) and airway compromise on clinical examination (100 per cent compared with 9.5 per cent, $p<0.001$) were also more likely to require airway intervention (Table I).

Investigations

A lateral neck radiograph was performed in 62.5 per cent of the patients. Of these, 65 per cent had the 'thumb sign', representing the swollen epiglottis (Figure 3). There was a significant relationship between a positive 'thumb sign' on the lateral neck radiograph and the necessity for airway intervention (100 per cent compared with 53.8 per cent, $p = 0.05$) (Figure 1). Twenty-four (75 per cent) cases had leucocytosis ($>11.00 \times 10^9$/L). The average value was 15.61×10^9/L. There was no significant difference in the mean leucocyte count between patients with airway intervention and those without.

Swabs from the epiglottis were taken from nine patients for aerobic and anaerobic culture and sensitivity tests. Two grew *Bacteroides fragilis* and one a coagulase-negative staphylococcus. Eleven patients had a blood culture done. There was only one positive culture for *haemophilus influenzae*, which was from the child in this study. Ten patients had throat swabs taken, but no significant bacteria were cultured.

Treatment

All patients received intravenous antibiotics. Fifty per cent of patients recieved ceftriaxone and the rest were given various other broad-spectrum antibiotics such as cefuroxime and amoxycillin-clavulanate. Four patients also received intravenous metronidazole. Seventy-five per cent of patients were also treated with steroids, either dexamethasone or prednisolone. However, this had no significant effect on the duration of stay or the development of complications.

Thirteen (40.6 per cent) of patients were admitted to the ICU. Nine of them had endotracheal intubation. One had an emergency cricothyrotomy when

TABLE I
COMPARISON OF PATIENT CHARACTERISTICS BASED ON AIRWAY INTERVENTION

	Patients with airway intervention (n = 11)	Patients without airway intervention (n = 21)	p
Mean age	47	45	$p = 0.8$
Male:Female	11:0	13:8	$p = 0.03$
Fever	72.7%	52.4%	$p = 0.4$
Sore throat	90.9%	95.2%	$p = 1.0$
Odynophagia	90.9%	61.9%	$p = 0.1$
Stridor	100%	23.8%	$p<0.001$
Airway compromised	100%	9.5%	$p<0.001$
Thumb sign on lateral neck radiograph	100%	53.8%	$p<0.05$
Mean leucocyte count	18.1×10^9/L	14.3×10^9/L	$p<0.1$
Mean number of days hospitalized	5.7	3.7	$p<0.05$

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FIG. 3
Lateral neck radiograph show epiglottic swelling – the classical 'thumb sign'.

he arrived at the A and E department in cardio-pulmonary arrest. This was later converted to a formal tracheostomy. One patient had an emergency tracheostomy in the A and E for failed intubation. Two other patients with airway compromise were also admitted to the ICU for close monitoring and medical treatment. They did not require any subsequent airway intervention.

The other 19 (59.4 per cent) of patients were admitted to the high-dependency ward for close monitoring of airway obstruction and arterial oxygen saturation. None of these patients subsequently deteriorated nor required airway intervention.

Complications and outcome

Thirty-one patients recovered completely. There was one mortality. This was a 20-year-old Chinese man who suffered cardio-respiratory arrest from upper airway obstruction while at home and was already asystolic when he arrived at the A and E department. A cricothyrotomy was done and he was resuscitated. Post-resuscitation, the patient suffered anoxic brain damage. He died two days later. Two other cases were complicated by pneumonia but they recovered fully.

On follow-up, two patients were found to have benign lesions in the epiglottis. One had a vallecular cyst and the other had an epiglottic polyp.

The mean length of hospital stay for all patients was 4.4 days. Those that required airway intervention stayed for a mean of 4.4 days in the ICU and their mean hospitalization was 5.7 days. The patients that required airway intervention were also hospitalized significantly longer than those who did not require airway intervention (5.7 days compared with 3.7 days $p<0.05$).

Discussion

Historically, AE has been predominantly a paediatric disease. Wurtele estimated that the incidence of AE in Quebec, Canada was approximately 60/million for children and 10/million for adults.[1] He reviewed 12 other reports of AE from North America and Europe from 1946 to 1983, and estimated the paediatric to adult ratio was 3:1. Frantz *et al*. from North California reported a steady decline of paediatric AE from 1980 to 1990.[4] The incidence of adult AE, however, remained stable. The paediatric to adult ratio dropped from 2.6 in 1980 to 0.4 in 1990. This was attributed to the introduction of the Hib vaccine in 1985. Carenfeld and Sobin also noted a similar decline of AE in children in Sweden, while the audit incidence remained stable.[5] However, Mayo-Smith *et al*. noted a significant increase in adult AE over an 18 year period in Rhode Island.[6]

The epidemiology of AE in temperate countries has been well studied. However, there have been very few reports of AE from tropical countries. Singapore is a tropical island in Southeast Asia with a population of three million. The temperature all year is about 30°C and the humidity is around 95 per cent. The first series of AE from Singapore was by Stanley *et al*.[7] He reported 42 cases of adult AE from the Singapore General Hospital over a four-year period. There were no paediatric cases in that series. In our study over a seven-year period, there was only one paediatric case. In Singapore, Hib vaccination is not part of the childhood immunization programme. Lee *et al*. estimated that less than 0.1 per cent of the population had been given the Hib vaccination.[8] Therefore, the low occurrence of AE in Singaporean children cannot be due to the Hib vaccine. In

TABLE II
ACUTE EPIGLOTTITIS: THE FRIEDMAN CLASSIFICATION

Stage I	Stage II	Stage III	Stage IV
No respiratory complaints Respirate rate <20	Subjective respiratory complaint Respiratory rate >20	Moderate respiratory distress Stridor, retractions, perioral cyanosis Respiratory rate >30	Severe respiratory distress Stridor, retractions, cyanosis, delirium, decreased consciousness Respiratory arrest

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Singapore, AE is commoner in adults. But how much is due to greater awareness and recognition of the disease in adults and how much is due to an actual high number of adult cases is uncertain.

In children, breathing difficulties are often the predominant symptom and securing the airway early is crucial. The prevalence of stridor in adults in this study was 50 per cent. Others have reported a range of seven to 45 per cent.[3,4,6,7,9,10,11] This corresponded significantly with the finding of airway obstruction on examination. Factors predicting the need for endotracheal intubation were stridor, clinical findings of airway obstruction and a 'thumb sign' on the lateral neck radiograph. The appropriate management of the airway in adult epiglottitis is controversial. Some have advocated an artificial airway in all cases, whereas others are more conservative, recommending intubation or tracheostomy only in those with respiratory distress. Friedman classified respiratory distress into four stages (Table II).[12] Crosby recommended creating an artificial airway in Friedman class II to IV patients.[3] In this study, a policy of selective intubation was adopted. Only 11 out of 32 patients required airway intervention and all but one recovered completely. The only death was a man who was already in cardio-respiratory arrest when he arrived at the hospital. Significantly, none of the other patients who were managed conservatively, subsequently deteriorated and required intubation. This was also true in the studies by Crosby[3] and Hebert.[11]

The role of steroids in the management of AE is still empirical. The usage in this study was 75 per cent and is consistent with the range in other studies of 24 per cent to 95 per cent.[3,4,6,10,11] The use of steroids did not shorten the duration of hospitalization in this or the other studies.

The rate of positive cultures from the epiglottis was 33 per cent, compared with 66 per cent reported by Frantz[4] and 75 per cent by Hebert.[11] Interestingly, in two of the cultures the anaerobe, *B fragilis*, was grown. This suggests that antibiotics with good anaerobic coverage should be used. Positive blood cultures are usually quite low, only one (nine per cent) in this study, and 11 per cent and 15 per cent described by Hebert[11] and Frantz[4] respectively. On follow-up, a vallecular cyst and an epiglottic polyp were noted in two patients. It is possible that AE resulted from an infected cyst or polyp in these patients.

Mayo-Smith suggested that there are two forms of AE, the classical paediatric disease caused by *Haemophilus influenzae* which presents with acute airway obstruction; and the adult form, which is associated with oropharyngeal inflammation and less likely to cause acute airway obstruction.[6] The adult form is also not related to *Haemophilus influenzae* infection. Our series of patients concur with this observation.

Conclusion

AE in tropical Singapore is commoner in adults. This is not due to Hib immunization. Stridor and airway compromise on examination, together with a 'thumb sign' on the lateral neck radiograph, should alert the surgeon that there is significant upper airway obstruction and airway intervention is likely to be needed. However, selective intubation is recommended as the results of conservative management with close monitoring, appropriate intravenous antibiotics with or without steroids are very good for those without airway compromise. By adopting such an approach, morbidity and mortality from AE can be kept to a minimum.

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