

Acute Stridor-Diagnostic Challenges in Different Age Groups Presented to the Emergency Department

Nasir Mohamad*, Afifah Sjam'un, Fauziah Ismail, Lavanya Devi Solayar, Saiful Azlan Mohamed, Siti Nurbaya Zainal Abidin, Benjy Tan, Kai Jie Yow, Norasmah Hasan and Shazana Hamizol

Department of Emergency Medicine, School of Medical Sciences, USM Health Campus, 16150, Kubang Kerian, Kelantan, Malaysia

Abstract

Stridor can be a frightening presentation in the Emergency Department (ED), necessitating prompt diagnostic and therapeutic maneuvers. The differential diagnosis of stridor in different age groups must be familiar to those practicing in emergency care. Early detection and management of the acute problem will pave a path towards a better recovery. In this case study, we report 6 cases of stridor from different age groups presented to the ED. By distinguishing the different presentations of acute stridor in children and adult, this will facilitate the diagnosis and management given by primary care physicians in the emergency department.

Keywords: Acute stridor; Diagnosis; Management; Emergency department

Introduction

Stridor is one of the life threatening symptoms presenting to the Emergency Department (ED) [1]. Its presence indicates an obstruction of the upper airway. Stridor is a manifestation of foreign body obstruction, severe anaphylaxis and infections such as viral croup, acute epiglottitis and acute tracheitis [1,2].

The presenting features of stridor caused by infection are very challenging. Text book teachings tell us there are characteristic features to differentiate between epiglottitis and croup [3]. Acute epiglottitis presents more commonly in children compared to adults [3,4]. In practice, the presentations are inhomogeneous and vague. This creates a problem in making a conclusive diagnosis and affects further management.

In this case series we present 6 cases of stridor from different age groups ranging from 1 to 55 years followed by their subsequent management and findings which vary from the conventional teachings.

Case report 1

An 11-month-old baby boy, who was born full term with no underlying congenital abnormalities, presented to the ED with a history of fever for one day associated with runny nose, noisy breathing, barking cough, dyspnoea, hoarseness of voice and irritability.

On examination he was restless with a respiratory rate of 60 breaths per minute and oxygen saturation of 99% under room air. His blood pressure, pulse rate and temperature were not documented. There was also presence of inspiratory stridor, subcostal recession and nasal flaring. There were generalized transmitted sounds on auscultation of the lungs. Examinations of other systems were unremarkable.

He was treated with nebulised adrenaline 0.5 mg, iv hydrocortisone 50 mg and oxygen via nasal prong with flow rate of 1.5 L/minute. Patient was then referred to the pediatrician who requested him to be admitted to the pediatric ward.

In the ward, patient's condition remained the same. He was afebrile (37°C), blood pressure was 98/58 mmHg, pulse rate was 136 bpm and oxygen saturation was 98% in room air. He was diagnosed to have viral croup with a differential diagnosis of influenza like illness (ILI). He was started on syrup tamiflu 30 mg BID, syrup prednisolone 15 mg daily and was put on continued observation.

His condition improved the next day. Serology result of paranasal

secretion showed parainfluenza type 3. Final diagnosis is moderate viral croup and he was discharged with syrup loratidine 0.5 mg daily, syrup prednisolone 15 mg daily and syrup paracetamol 180 mg QID.

Case report 2

A 15-month-old baby girl with no previous medical illness was brought to ED with history of fever for two weeks associated with cough and runny nose. She was noted to have a sudden onset of noisy and rapid breathing.

On examination, she was pink and alert but lethargic. She looked well-hydrated and was not septic looking. She was tachypneic with respiratory rate of 53 per minute. There were presence of intercostal recession, inspiratory stridor and barking cough. She was febrile (39°C), pulse rate of 140 bpm and oxygen saturation under room air was 98%. Her tonsils were enlarged and injected. There were generalized transmitted sounds on auscultation of the lungs. Examinations of other systems were unremarkable. Chest X-ray was done and revealed no pneumonic changes or hyperinflated lungs.

She was started on nebulised adrenaline stat and was referred to pediatrician. She was then admitted to the pediatric ward. She was treated as moderate croup with secondary bacterial pneumonia. She was given iv dexamethasone 3 mg stat and started on iv augmentin 200 mg TID and oral tamiflu 30 mg BID. Her condition improved and was discharged the next day.

Case report 3

A 7-year-old girl presented to ED with low grade fever for 2 days duration and it was associated with stridor on the day of presentation. She also had non productive cough as well as significantly reduced oral intake. On examination she was active. Her blood pressure was 96/73 mmHg and the heart rate was 200 bpm. Her respiratory rate was 40

***Corresponding author:** Nasir Mohamad, Departments of Emergency Medicine, School of Medical Sciences, Health Campus, Universiti Sains Malaysia, 16150, Kubang Kerian, Kelantan, Malaysia, Tel: +6097673219; Fax: +6097489951; E-mail: drnasirmohamadkb@yahoo.com

Received March 07, 2012; Accepted June 06, 2012 Published June 08, 2012

Citation: Mohamad N, Sjam'un A, Ismail F, Solayar LD, Mohamed SA, et al. (2012) Acute Stridor-Diagnostic Challenges in Different Age Groups Presented to the Emergency Department. *Emergency Med* 2:125. doi:10.4172/2165-7548.1000125

Copyright: © 2012 Mohamad N, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

per minute. She was febrile (37.8°C) and her SpO₂ under room air was 85%. Her weight was 6.8 kilograms. She looked dyspneic with barking cough and inspiratory stridor. There were generalized transmitted sound on auscultation of the lungs. Examinations of other systems were unremarkable. She was diagnosed to have viral croup. She was treated with oxygen, iv dexamethasone 4 mg bolus, iv ampicillin 250 mg QID and nebulised adrenaline single dose. She was then admitted to the pediatric ward. Her condition improved the next day and she was subsequently discharged with oral ampicillin 250 mg QID for a week course.

Case report 4

An 11-year-old boy with no prior medical illness presented to ED complaining of fever and cough for 2 days which was associated with shortness of breath and stridor for a day. There was no family history of bronchial asthma, atopy or dermatitis.

On examination he was alert, pink, tachypneic and had stridor. His blood pressure was 103/63 mmHg, heart rate was 164 bpm, temperature 39°C and oxygen saturation of 99% on salbutamol nebuliser. Rhonchi was heard on auscultation of the lungs. He was diagnosed to have croup or viral tracheitis. He was treated with nebulised salbutamol, iv hydrocortisone 150 mg and subcutaneous bricanyl 0.25 mg. He was referred to the pediatrician and ENT surgeon. On examination, his posterior pharyngeal wall was inflamed and mildly injected with a mildly enlarged but not inflamed tonsil. There was no drooling of saliva. Laryngoscopy revealed normal and mobile vocal cord, epiglottis, arythenoid and pyriform fossa. Neck X-ray showed steeple sign. (Figure 2, 3)

He was admitted to the high dependency unit for 2 days before transferred to the pediatric ward for 4 days. During admission in the ward he was treated with high flow mask oxygen, nebulised salbutamol 4-hourly, nebulised adrenaline 1 in 1000 concentration 6 mls hourly, tablet paracetamol 5000 mg QID, iv C-penicillin 1.6 mega unit QID, iv dexamethasone 12 mg stat followed by tablet prednisolone 30 mg OD.

He was discharged with tablet penicillin-V 500 mg QID for a week and syrup prednisolone 3 mg OD for two days.

Case report 5

A 17-month-old baby boy was brought to the ED with a history of fever for one day associated with cough, dyspnoea and stridor. He was born full term with no underlying congenital abnormalities.

On examination he was active with a respiratory rate of 30 breaths per minute. His blood pressure was 115/55 mmHg and had a pulse

of 102 beats per minute. He was febrile with a temperature of 38.7°C and his oxygen saturation is 100% under room air. His tonsils were enlarged and injected. There were generalized transmitted sounds on auscultation of the lungs. Examinations of other systems were unremarkable. He was treated as acute tonsillitis and discharged home with syrup paracetamol and syrup augmentin.

He was brought back to the ED 5 hours later for worsening of dyspnea with chesty cough and drooling of saliva. On examination he was tachypneic with a respiratory rate of 44 breaths per minute. He was febrile with a temperature of 38°C and had a barking cough. However, he was not toxic looking. His oxygen saturation dropped to 94% under room air and improved to 100% under high flow mask.

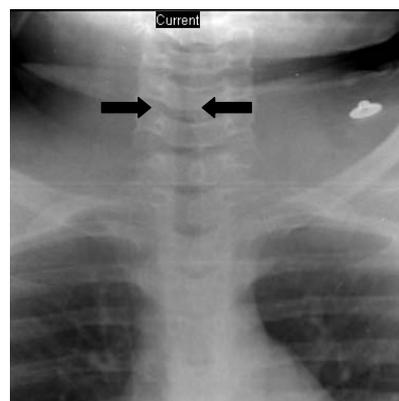


Figure 2: AP radiograph of the neck in patient with croup showing narrowing in the subglottis ("steeple sign") – case report 4.



Figure 3: Lateral radiograph of the neck in patient with croup showing subglottis haziness and normal supraglottis structure – case report 4.



Figure 1: Lateral radiograph of neck in patient with supraglottitis showing hypopharyngeal distension with thickening of the epiglottis and aryepiglottic folds ("thumb sign") – case report 5.

Children	Adult
Croup or laryngotracheobronchitis	Airway trauma
Inhaled foreign body	Anaphylaxis
Trachitis	Laryngeal tumour
Epiglottitis	Post-extubation
Retropharyngeal / peritonsillar abscess	Acute laryngitis

Table 1: Common causes of stridor in children and adults.

He was treated with nebulised salbutamol, adrenaline and dexamethasone 6 mg and continued on HFM. His condition was worsening and he was referred to the pediatrician, ENT surgeon and the anaesthetist for urgent intubation in the operation theatre. He was sedated and direct laryngoscopy was done which revealed tubular, edematous and inflamed epiglottitis. The vocal cords were normal and no pooling of saliva was noted. Lateral neck X-ray revealed presence of 'thumb sign' (Figure 1). Patient was then incubated. He was treated as acute epiglottitis and iv cefuroxime 400 mg BID was started. He was admitted to ICU for 6 days and it was uneventful. He was discharged on day 10 of admission.

Case report 6

A 55-year-old lady with no known medical illness presented to the ED with complaints of foreign body sensation in the throat and retching and stridor after taking tablet paracetamol. On examination, the blood pressure was 137/82 mmHg with a pulse rate of 120 beats per min. She was afebrile and her throat was normal. Air entry was equal and clear for both lungs. X-ray of neck revealed thumb sign and Steeple's sign. She was then referred to ENT surgeon. Examination of the ORL was unremarkable. She was diagnosed to have acute epiglottitis and treated with iv dexamethasone 8 mg bolus, iv augmentin 1.2 g BID and oxygen with nasal prong. She was then admitted to the ICU for 2 days which was uneventful. She was discharged on the 7th day of admission.

Discussion

Stridor is a high-pitched noise resulting from turbulent airflow through a partially obstructed upper airway. Any obstruction at the extrathoracic airway (glottis or subglottis) causes inspiratory stridor. Obstruction of the intrathoracic trachea, on the other hand, usually causes expiratory stridor [5].

Stridor is much more common in children than in adults. Stridor is recognized as one of the most ominous signs in childhood [6]. There are several anatomical and physiological features of the respiratory system in children that renders them susceptible to airway obstruction [3]. It is also due to these reasons that airway obstruction in children is much more rapid and life-threatening than in adults.

In children, the upper and lower airways are small, prone to occlusion by secretions, and susceptible to edema and swelling [3]. As stated according to Poiseuille's law, resistance to laminar airflow is inversely proportionally to the fourth power of the radius. Therefore, a small decrease in radius of the airway will result in a marked increase in airflow resistance and breathing.

The support components of the airway in children are less developed and more compliant than in the adult. The ribs are cartilaginous and perpendicular relative to the vertebral column, reducing the effect of the 'bucket handle' movement of the rib cage. In addition, the intercostal muscles and accessory muscles of ventilation are immature. As a result, children are more reliant on the diaphragm for inspiration [3].

A common presentation of airway obstruction in children is increased work of breathing evidenced by tachypnea, nasal flaring,

grunting, wheezing, stridor, recession of subcostal and intercostals. In severe cases, ineffective breathing may lead to agitation, irritability, pallor, decreased conscious level, silent chest and apnea [3].

In adults, however, the more common signs of airway obstruction are hoarseness of voice and foreign body sensation in throat. Difficulty in breathing or respiratory noises such as stridor usually develops much later, unless the problem is acute in origin.

It is also important to note that the common causes of stridor differ between children and adults. (Table 1) In children, infective causes are more common than in adult. Adult stridor, on the other hand, is usually caused by trauma or foreign bodies due to the larger airway diameter [7]. Croup remains the most common cause of stridor in children. The number of acute epiglottitis cases in children, on the other hand, has been in a decline over the past 20 years, particularly due to the effective vaccination programme [8,9].

However, in a recent retrospective study, 10% of children presenting with epiglottitis were found to have invasive *Haemophilus influenzae* type B infection, or HiB, despite of have been vaccinated. These findings highlight the importance of considering acute epiglottitis in the differential diagnosis of all children presenting with upper airway obstruction. This is particularly relevant because fewer doctors today are familiar with the symptoms and signs of the disease [8]. The similar trend is also reflected in the adult population as infective causes of stridor are recently emerging, especially acute epiglottitis [9]. Prompt recognition of this condition is vital as it totally alters the management of the patient. The presentation of infective causes of stridor in adults is very different from in children. Conventional teaching tells us that stridor is one of the early signs of the pathology but in adults, stridor is a late presentation due to larger airway caliber. We suggest few common and differentiating clinical features which can aid in establishing a diagnosis of croup or acute epiglottitis in children and adults (Table 2).

To aid the diagnosis of croup or acute epiglottitis, chest radiograph appears to be one of the most effective diagnostic studies. In epiglottitis, the lateral soft tissue neck film is the single most useful study. Patients with epiglottitis will exhibit thickening and rounding of the epiglottis ('thumb sign'), with loss of the vallecular air space (Figure 1). The aryepiglottic folds are thickened, and the hypopharynx is distended. AP views of the neck reveal a normal subglottis in contrast to the narrowed subglottis characteristic of croup [10].

In croup, the AP soft tissue neck film is more useful and classically shows narrowing of the subglottic area, or 'steeple sign' (Figure 2). Lateral neck films may show haziness in the subglottis and normal supraglottic structures in contrast to the findings present with epiglottitis (Figure 3) [10].

Early detection of worsening stridor is important to avoid the patient from deteriorating further. Some symptoms such as drooling, agitation and tripod position in children are important warning signs that the airway obstruction is severe enough to compromise the ventilation of the child [10].

	Children	Common clinical features	Adult
Croup	Barking cough is hallmark of croup in children, stridor develops early	Inspiratory stridor, cough, hoarseness	Hoarseness of voice more prominent, barking cough is less common, stridor develops late, some will present with neck pain and odynophagia
Acute Epiglottitis	Children classically sit up and lean forward to alleviate airway obstruction, toxic looking, irritability	High pyrexia, odynophagia, drooling, dyspnoea, muffled voice and stridor	Sore throat, odynophagia, pharyngitis

Table 2: Difference of acute epiglottitis and croup in children and adults.

There are several important signs and symptoms which a physician should look out for increasing severity of the airway obstruction. The 'red flags' of stridor are presence of drooling and agitation, tripod position, cyanosis, decreased conscious level, respiratory distress, silent chest, bradycardia and episodes of apnea [7].

Presence of these warning signs should alert all primary health care provider or doctors practicing in the ED on the probability of severe respiratory compromise in the patient. This warrants immediate management to secure the airway to prevent further deterioration of the patient.

Conclusion

A diagnosis of stridor due to infective causes is now no longer restricted to only children, but is getting more common in adults. It is important that a proper history taking and thorough physical examination remains as the important key in assisting the physician in the diagnosis and management of stridor in the ED. Delay or error in diagnosing the cause of the stridor may lead to mismanagement of the patient and causing serious morbidity.

References

1. Kuan WS, Quek LS (2009) Stridor in an adult: not just a child's disease. *Eur J Emerg Med* 16: 109-110.
2. Harold Ludman (1981) Hoarseness and stridor. *Br Med J* 28 282: 715-717.
3. Maloney E, Meakin GH (2007) Acute stridor in children. *Continuing Education in Anesthesia, Critical Care & Pain* 7: 183-186.
4. Morton NS, Barr GW (1989) Stridor in an adult: an unusual presentation of functional origin. *Anaesthesia* 44: 232-234.
5. Kryger M, Bode F, Antic R, Anthonisen N (1976) Diagnosis of obstruction of the upper and central airways. *Am J Med* 61: 85-93.
6. Valman HB (1981) ABC of 1 to 7: Stridor. *Br Med J (Clin Res Ed)* 283: 294-295.
7. Majumdar S, Bateman NJ, Bull PD (2006) Pediatric stridor. *Arch Dis Child Educ Pract Ed* 91: 101-105.
8. D'Agostino J (2010) Pediatric airway nightmares. *Emerg Med Clin North Am* 28: 119-126.
9. Sobol SE, Zapata S (2008) Epiglottitis and croup. *Otolaryngol Clin North Am* 41: 551-566.
10. Stroud RH, Friedman NR (2001) An update on inflammatory disorders of the pediatric airway: epiglottitis, croup and tracheitis. *Am J Otolaryngol* 22: 268-275.