

Clinical Epidemiology, paraclinical characteristics and treatment results of patients with acute laryngitis at Hai Phong Children's Hospital in 2022

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ABSTRACT

Objectives: A study with the following objectives: to describe some clinical, and subclinical characteristics and treatment results of acute laryngitis at Hai Phong Children's Hospital from January 1st, 2022, to December 31st, 2022. **Subjects and method:** A descriptive study using retrospective data from 111 medical records of inpatients with acute laryngitis. **Results:** This study showed that this disease was more common in children under 60 months of age, in boys than in girls, and in children from suburban areas more than in urban areas. The disease was popular in winter-spring with the most common symptoms such as hoarseness, barking cough, fever, stridor, and chest retraction. All the patients were cured or relieved with the use of nebulized adrenaline to relieve laryngeal dyspnea and corticosteroids in combination with injection, oral, and oral medications. **Conclusion:** The rate of children admitted to hospital with laryngeal dyspnea level II and III was still quite high in this study (36%). It is important to note the trend of increasing Influenza type B infection and decreasing RSV infection rates after the COVID-19 epidemic in children with acute laryngitis.

Keywords: acute laryngitis; children; stridor

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INTRODUCTION

Acute laryngitis is one of the most common diseases of the larynx, described as an inflammation of the laryngeal mucosa lasting less than three weeks, which can involve any area of the larynx, including the supraglottis, glottis and sublaryngeal areas. The occurrence of laryngitis is highest in children between six months and three years of age [1]. The disease is usually caused by an acute viral infection and is usually a mild and self-limited condition, lasting for a period of 3 to 7 days in healthy individuals [2]. One study found that among

the estimated 839 ± 89 thousand children reporting voice problems in the United States, acute laryngitis was the most common diagnosis [1]. The pathological changes of acute laryngitis can eventually cause respiratory failure in affected children [1].

Management of laryngitis varies depending on severity. In general, treatment is usually supportive, with voice rest, adequate hydration, and mucolytic and antibacterial medications if needed. However, in severe cases, especially those with laryngeal dyspnea, corticosteroids and adrenaline are needed [3]. Acute laryngitis

can lead to dangerous health problems, but the disease can be completely prevented and treated thoroughly if detected, diagnosed, and treated promptly. This raises questions about the current status of clinical and laboratory features of laryngitis in children as well as the results of treatment of these cases. Therefore, we conducted research with the following two objectives:

1. To describe the clinical epidemiology and laboratory characteristics of acute laryngitis in patients at the Respiratory Department - Hai Phong Children's Hospital from January 1st, 2022 to December 31st, 2022.

2. To comment on the treatment results of these reported patients.

SUBJECTS AND METHODS

Research subjects

All medical records of patients from 2 months to 15 years old who were diagnosed with acute laryngitis and were treated at the Respiratory Department - Hai Phong Children's Hospital from January 1st, 2022 to December 31st, 2022.

Inclusion criteria

Medical records of children admitted to the hospital and diagnosed with acute laryngitis with the following symptoms: children possibly had hoarseness or loss of voice, harsh breathing, dysphonia, stridor, and/or a painful cough [4].

Exclusion criteria

Patients whose medical records do not include complete data for evaluation. The patient's medical record shows other causes

of laryngeal stridor: soft laryngeal cartilage, benign laryngeal tumor, sublaryngeal stenosis, and vocal cord paralysis.

Methods

Research design: a case series study using retrospective data.

Sample size and selection: this study includes all medical records of patients meeting diagnostic criteria during the study period. In total, we collected 111 cases in this study.

Method of collecting information

Research data from medical records that met research criteria has been selected according to a pre-designed medical record form. The main research contents were demographic characteristics, clinical symptoms, paraclinical symptoms, therapeutic method, and outcome.

Data processing

Data was analyzed by using SPSS Statistics for Windows, Version 23.0 (IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp).

Research ethics

This research was conducted under the consent of the Science and Education Council of Hai Phong University of Medicine and Pharmacy (according to decision No. 01.712/QD-YDHP dated April 11th, 2023) and Hai Phong Children's Hospital (HCH). Patient information was collected anonymously, accurately, and honestly, in compliance with confidentiality principles, and was uniquely used for research purposes.

RESULTS

Through a survey of 111 cases of laryngitis at the Respiratory Department - HCH, we obtained several following research results.

Table 1. Some demographic characteristics of acute laryngitis (n=111)

Characteristics	No. of cases	Percentage (%)
Age	2 - <12-month-old	27
	12 – 59-month-old	77
	≥60-month-old	7
Geographic location	Suburban area	84
	Urban area	27
Sex	Male	76
	Female	35

Table 1 shows that acute laryngitis occurred mainly in children aged 12 - 59 months and mainly in boys more than girls. Assessing the distribution of cases according to geographical characteristics and time of hospitalization, we found that acute laryngitis mainly occurred in children from suburban areas of Hai Phong (including An Duong, An Lao, Kien Thuy, Tien Lang, Thuy Nguyen, Vinh Bao, Bach Long Vi and Cat Hai districts) with 84/111 cases accounting for 75.7% of the total cases) (Table 1).

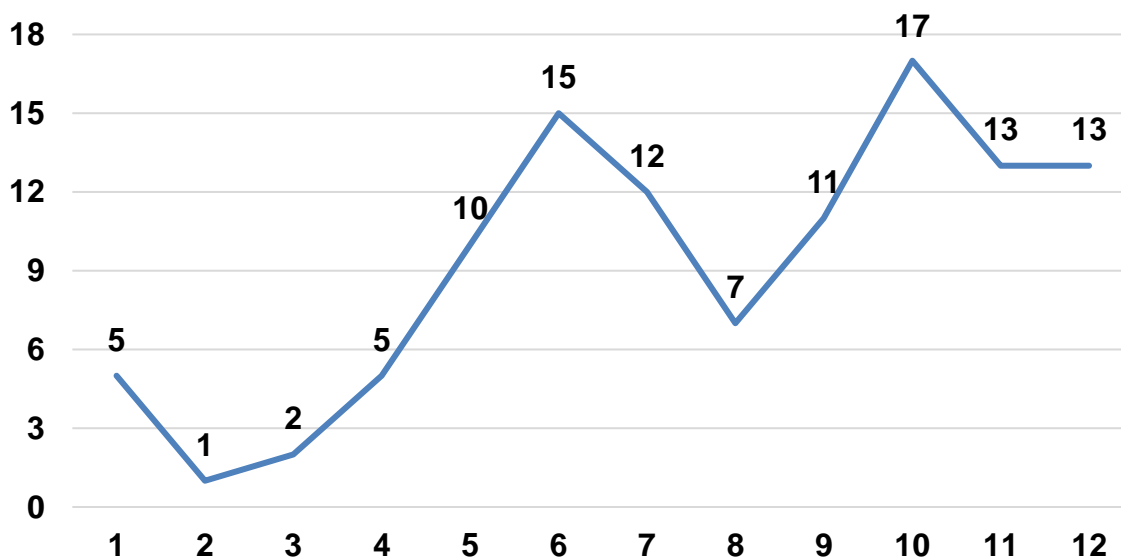


Figure 1. Distribution of cases by time of admission (n=111)

Figure 1 shows that the disease had a clear seasonal nature with a high concentration of cases in the winter-spring months (from September to February: 78.2%) (Figure 1).

Table 2. Reasons for hospital admission of children with acute laryngitis (n=111)

Reasons	No. of cases	Percentage (%)
Barking cough	52	46.8
Fever	35	31.5
Dyspnea	21	18.9

Stridor	22	19.8
Hoarseness	17	15.3
Dysphonia	2	1.8

Table 2 shows that the most common reasons for being admitted to the hospital were fever or barking cough. About 20% of patients are hospitalized because of dyspnea or wheezing.

Table 3. Clinical and paraclinical characteristics of acute laryngitis (n=111)

Symptoms		Characteristics	No. of cases	Percentage (%)	
Clinical symptoms		Excited state	8	7.2	
		Fever	48	43.2	
		Cyanosis (lips and/or extremities)	5	4.5	
		Tachypnea	82	73.9	
		Barking cough	66	59.5	
		Hoarseness	106	95.5	
		Dysphonia	5	4.5	
		Laryngeal dyspnea	Level I	71	64.0
			Level II	19	17.1
			Level III	21	18.9
		Respiratory muscle contractions	30	27.0	
		Stridor	40	36.0	
		Nasal flaring	4	3.6	
Paraclinical symptoms	Total leukocytes	Increased	56	50.5	
		Normal	50	45.0	
		Decreased	5	4.5	
	Neutrophil count	Increased	37	33.4	
		Normal	60	54.0	
		Decreased	14	12.6	
Serum CRP level	Increased	20	18.0		

	Normal	91	82.0
Viral test	RSV	9	8.1
	Influenza A virus	5	4.5
	Influenza B virus	34	30.6

Table 3 shows that: Clinical examination found that laryngeal dyspnea appeared in all 111 cases of acute laryngitis treated in patients at the Hospital. Among them, level II and level III laryngeal dyspnea accounted for 36% (Table 3). Common symptoms in most cases were hoarseness, tachypnea, and cough (95.5%, 73.9%, and 100%, respectively). Severe symptoms of acute laryngitis such as respiratory muscle contractions and laryngeal stridor were also seen in the majority of cases (73.4% and 60.9%). Besides, fever was also a common symptom in children with acute laryngitis (43.2%) (Table 3).

Paraclinical tests showed that the proportion of patients with acute laryngitis with changes in the number of white blood cells in peripheral blood accounted for 55%. The percentage of neutrophils increased by 33.4% and decreased by 12.6%. The CRP index increased only in a few cases (18%). Using rapid testing, we determined that the *Influenza B* virus was the most common viral agent, found in 30.6% of cases of acute laryngitis (Table 3).

Table 4. Treatment of acute laryngitis

Treatment		No. of cases	Percentage (%)
Corticoid	Dexamethasone + prednisone + budesonide	17	15.3
	Dexamethasone + prednisone	8	7.2
	Prednisone + budesonide	74	66.7
	Budesonide	12	10.8
Use of nebulized adrenalin (dose) $\bar{X} \pm SD$: 1.0 \pm 0.8 dose	0	33	29.7
	1	66	59.5
	2	5	4.5
	≥ 3	7	6.3
Hospitalization length (days) $\bar{X} \pm SD$: 5.06 \pm 2.86 days. Min: 1 day; Max: 8 days	1	12	10.8
	2	13	11.7
	≥ 3	86	77.5
Treatment outcome	Cured	47	42.3
	Partial remission	64	57.7
	Worsen or death	0	0

A significant proportion (23.5%) of cases of acute laryngitis required treatment with a combination therapy of dexamethasone (dexamethasone + prednisone \pm budesonide), while the majority of cases were treated with a combination therapy of oral prednisone and nebulized

budesonide. The number of times a patient used adrenalin aerosol to relieve laryngeal dyspnea during treatment is mostly 1 time (59.5%). Only 29.7% of children with acute laryngitis did not need this treatment method and 6.3% of cases needed to use at least 3 doses of adrenalin aerosol during treatment (table 4). Most of the patients with acute laryngitis were discharged after 3 days in the hospital. All the cases were totally cured or discharged with partial remission.

DISCUSSIONS

Our research on acute laryngitis in children treated at the hospital in 2022 showed that the disease occurred mainly in boys with a male/female ratio of 2.17/1. This result was quite similar to a study at the Children's Hospital I – Ho Chi Minh City showing that the ratio of male/female children in acute laryngitis was 2.7/1[5]. Research by author D.R. Lee in Korea also showed that acute laryngitis was more common in boys than in girls with a ratio of 1.9/1[6]. The majority of children with acute laryngitis were aged 12-59 months (69.4%) and the average age was 28.83 ± 23.02 months. This result was similar to D. R. Lee's research showing that the average age of children with acute laryngitis in Korea was 2.2 ± 2 years old [6]. Meanwhile, research at the Children's Hospital I showed that most children with acute laryngitis were under 2 years old (78%) [5]. Our study showed that about 3/4 of cases of acute laryngitis in children come from the suburbs of Hai Phong, which is a significant difference compared to a study at Hue Central Hospital that showed more than 2/3 of acute laryngitis cases came from children in inner-city areas. This showed the unique characteristics of this disease in children in each region [5]. It is important to note that further multi-centered study should be performed as there are different pediatric healthcare centers in Haiphong.

The most common reasons for hospitalization in this study were cough,

dyspnea, and fever. Our results were similar to a study in Korea that also showed that the three most common reasons for coming to the hospital for children with acute laryngitis were cough, fever, and dyspnea [6].

Medical examination of children with acute laryngitis showed that voice changes were found in all 111 children in the study, of which hoarseness was found in 95.5% of patients and voice loss was found in 4.5% of patients. Le Thi Minh Nguyet's research also showed similar results to ours. In addition, this author's study showed that the proportion of children with acute laryngitis with symptoms of cough at Hue Central Hospital (45.9%) was quite similar to our study (59.5%) [7]. Tachypnea was a symptom of dyspnea in children with acute laryngitis and occurred in 73.9% of children in our study, similar to the rate of children with dyspnea accounting for 76% in WC. Yang's study in China. In this study by Yang, it was also shown that the rate of children with acute laryngitis with laryngeal stridor was found in 99% of cases, higher than the rate in our study (60.9%) [8]. This might be due to the difference in the hospital admission criteria between the two studies, but it also somehow reflected that laryngeal stridor was a common symptom of acute laryngitis in children.

Paraclinical tests showed that the proportion of patients with changes in the number of white blood cells in peripheral blood accounted for 55.0%. The percentage of neutrophils increased by 33.4% and decreased by 12.6%. The CRP index only increased in a few cases. Le Thi Minh

Nguyet's research shows that the rate of increased white blood cell counts as well as neutrophil granulocyte count accounts for 30% of cases [7]. This rate in the study by Phan Huu Nguyet Diem and Tu Thi Mai Linh is higher than our results: 55.6% of children had increased white blood cell counts and 80% of children had increased granulocyte counts [5]. CRP only increased in 18.0% of acute laryngitis cases in our study, which is similar to Le Thi Minh Nguyet's study showing that most acute laryngitis cases have normal CRP levels (78.6%) [7]. The rate of RSV detected in children in this study tended to decrease compared to a study in 2021 at the same medical facility, but the rate of Influenza type B was found to increase after the COVID-19 epidemic [9].

Adrenalin is the first drug to relieve laryngeal dyspnea. Adrenalin aerosol was used in 70.3% of the cases in this study. Among them, the majority of cases only used 1 dose of this medicine (59.5%). According to Tyler A.'s research, 69% of acute laryngitis cases used adrenalin aerosol. All acute laryngitis patients in our study used steroids and the majority used the combined regimen of prednisone and budesonide (66.7%) [10]. According to She Caimei's research in China, up to 83% of children with disabilities received intravenous corticosteroids [11]. Up to 22.5% of children with disabilities only received inpatient treatment for less than 3 days. The average inpatient stay in our study was 5.06 ± 2.86 days (minimum: 1 day; maximum: 8 days). This result was a huge difference when compared with the results of acute laryngitis treatment in the US, which showed that up to 94% of cases have been treated as inpatients in less than 3 days [1]. All our acute laryngitis patients have been cured or clinically improved. There were no

cases of death or serious illness at the hospital.

CONCLUSIONS

Research on acute laryngitis in children in HCH showed that this was a disease mainly found in boys and children from suburban areas and mainly occurred in winter and spring. The most common clinical symptoms were hoarseness, cough, fever, and laryngeal stridor while paraclinical symptoms did not show significant pathological changes in acute laryngitis. Most patients had laryngeal dyspnea relieved with adrenaline aerosol and treated with corticosteroids. Our study also recorded a relatively high proportion of children with acute laryngitis admitted to the hospital with grade 2 and 3 laryngeal dyspnea (accounting for 36%). This showed that it is necessary to strengthen health education and communication work to help caregivers of children with acute laryngitis correctly and promptly detect signs of serious disease and promptly take the child to a medical facility. It is important to note the trend of increasing Influenza type B infection and decreasing RSV infection rates after the COVID-19 epidemic in children with acute laryngitis.

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