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Analysis of Early Clinical Characteristics and Key Points for Identification and Early Warning of Lobar Pneumonia in Children

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Abstract: *Objective:* To analyze the early clinical characteristics and identification and warning points of lobar pneumonia in children. *Methods:* 86 children with lobar pneumonia in our hospital from October 2023 to April 2025 were selected; their clinical symptoms, signs, and examination data were analyzed; the typical and atypical clinical features of the early stage of the disease were summarized; and early warning indicators and identification points were analyzed. *Results:* The early symptoms of 86 children were mainly fever and cough, including 61 children with persistent high fever, 58 children with irritating dry cough and atypical early lung signs, and 29 children with positive signs such as rales in the lungs. Laboratory tests show that the peripheral blood white blood cell count and C-reactive protein of early-stage children will be abnormally elevated. Imaging examination is the main basis for early diagnosis. Chest CT of children can show segmental uniform dense infiltrates in the lung lobes. Children with listlessness, shortness of breath, persistent high fever, and significantly elevated inflammatory indicators have a significantly higher risk of disease progression ($P < 0.05$). *Conclusion:* The early clinical symptoms of lobar pneumonia in children lack specificity and the pulmonary signs are hidden. During the early clinical identification of the disease, persistent high fever, stubborn dry cough, abnormal inflammatory indicators and imaging changes can be considered, and combined with systemic symptoms and respiratory status, high-risk children can be screened, and early warning intervention can be carried out to promote the improvement of the prognosis of children.

Keywords: Children; Lobar pneumonia; Early clinical features; Key points for identification and warning

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1. Introduction

Lobar pneumonia in children is a severe lower respiratory tract infection with a high incidence rate. Its main pathological feature is localized fibrous inflammatory infiltration in the lobes and segments of the lungs. The occurrence of the disease is closely related to infection by Gram-positive pathogenic bacteria, such as

Streptococcus pneumoniae, Staphylococcus aureus, etc. [1]. In recent years, the incidence of community-acquired pneumonia in children in my country has been increasing. Among them, the number of patients with lobar pneumonia has been increasing, and it is showing a trend toward younger ages. The onset of lobar pneumonia in children is relatively insidious and progresses rapidly. In the early stage, there will be no typical signs of pulmonary consolidation, only mild respiratory symptoms, which are not specific. It is very easy to be confused with ordinary upper respiratory tract infections, eventually leading to missed diagnosis and misdiagnosis. If standard anti-infective treatment cannot be carried out early, severe complications can easily occur when the inflammation spreads rapidly, such as pleural effusion, atelectasis, empyema, etc., resulting in prolonged disease course and even life-threatening consequences in children [2]. The anatomical structure of children's respiratory system is unique. They have fewer alveoli and weak airway mucosal barriers, which reduce their resistance to pathogenic bacteria, making them a high-risk group for lobar pneumonia [3]. At present, the diagnosis and treatment plan for the middle and late stages of the disease are relatively mature, but there are still great deficiencies in early identification and risk warning. Most children have already progressed to the middle and late stages when the disease is diagnosed, and early and effective intervention is not possible. Therefore, it is necessary to conduct in-depth exploration of early symptoms, signs and various examination results, summarize the key points of early identification and early warning, intervene in the condition in a timely manner, and improve the prognosis of children.

2. Materials and methods

2.1. General information

86 children with lobar pneumonia in our hospital from October 2023 to April 2025 were selected, including 45 males and 41 females, aged 3 to 14 (8.48 ± 1.40) years old, with a disease duration of 1 to 4 (2.74 ± 0.83) days.

2.2. Method

Collect early and complete clinical data of children, such as general information, clinical symptoms, pulmonary signs, examination results, etc., analyze early typical and atypical clinical features of lobar pneumonia in children, and calculate the proportion of occurrence of different symptoms, signs, and examination indicators. Track the progress of the disease in children, analyze high-risk factors for disease progression, and summarize the core points of early identification and clinical warning.

2.3. Observation indicators

(1) Early clinical symptoms; (2) Early pulmonary signs; (3) Laboratory indicators; (4) Imaging characteristics; (5) Disease progression.

2.4. Statistical methods

SPSS 26.0 software is used to process data. Measurement data are expressed as mean ± standard deviation (SD), t-test, and count data are expressed as n, %; χ^2 Test; $P < 0.05$ indicates a statistically significant difference.

3. Results

3.1. Distribution of early clinical symptoms

The early symptoms of children are mainly fever and cough, among which persistent high fever has the highest incidence, followed by irritating dry cough, systemic symptoms and gastrointestinal symptoms, as shown in **Table 1**.

Table 1. Distribution of early clinical symptoms

Group	n	Proportion (%)
Persistent high fever	61	70.93
Medium to low fever	15	17.44
No fever	10	11.63
Irritating dry cough	58	67.44
Expectoration	22	25.58
Wheezing, chest tightness	13	15.12
Listlessness and fatigue	42	48.84
Loss of appetite	45	52.33
Abdominal pain, vomiting	16	18.60
Sore throat, stuffy nose	19	22.09

3.2. Early pulmonary signs

The detection rate of positive pulmonary signs in the early onset of the disease was low in 86 children. 29 children (33.72%) had typical pulmonary signs, including 16 cases (18.60%) of pulmonary rales (18.60%), 9 cases (10.47%) of weakened or disappeared breath sounds, and 4 cases (4.65%) of dry rales. No children had early signs of pleural friction or pulmonary consolidation. The remaining 57 cases (66.28%) had no obvious abnormalities in early lung auscultation.

3.3. Analysis of early laboratory test results

The early abnormal increase in inflammatory indicators in children was obvious, with WBC increased in 65 cases (75.58%), neutrophil proportion increased in 70 cases (81.40%), and CRP slightly to moderately increased in 78 cases (90.70%). The inflammatory indicators in a small number of children are within the normal range, indicating that lobar pneumonia in children is mainly caused by bacterial infection in the early stage. Abnormal inflammatory indicators can be used as an important basis for early identification of the disease.

3.4. Early imaging examination results

All 86 children had uniform distribution of lobes or segments and dense patchy infiltration shadows, and the lesions were limited to a single lobe or segment. There were no obvious typical signs in the early chest X-ray examination of 12 children, but the lesions were confirmed by CT examination. Therefore, the application value of CT is higher in the early diagnosis of lobar pneumonia in children.

3.5. The relationship between early high-risk warning indicators and disease progression

Among the 86 children, 21 (24.42%) had disease progression. Children with high fever lasting for more than 48 hours, listlessness, shortness of breath, and CRP > 50 mg/L had a higher incidence of disease progression

than children with normal indicators, $P < 0.05$, **Table 2**.

Table 2. Relationship between early high-risk warning indicators and disease progression

High risk factors		n	Progress(n%)	χ^2	*P*
High fever	High fever lasts 48 hours	49	17(34.69)	6.515	0.011
	No persistent high fever	37	4(10.81)		
Mind and breath	Listlessness, shortness of breath	42	15(35.71)	5.675	0.017
	Good mental state and stable breathing	44	6(13.64)		
Inflammation markers	CRP ＞ 50mg/L	56	19(33.93)	7.867	0.005
	Mildly elevated/normal inflammatory markers	30	2(6.67)		

4. Discussions

Lobar pneumonia is a common disease in children, mainly caused by pathogenic bacterial infection, and is very common among school-age and preschool children [4]. Compared with lobar pneumonia in adults, lobar pneumonia in children occurs suddenly and progresses rapidly. Early and effective intervention is necessary, otherwise it will have a great impact on the children's health and growth and development [5]. For children, their respiratory and immune systems are not yet mature. Therefore, compared with adults, there are obvious differences in the early clinical manifestations of the disease. It is believed that their symptoms and signs lack typicality. During the diagnosis process of the disease, further differentiation from other diseases is needed to avoid missed diagnosis and misdiagnosis. Therefore, it is necessary to accurately analyze the early clinical characteristics of lobar pneumonia in children and clearly identify the early warning points to improve the quality of diagnosis and treatment further.

The results of this study show that the main early symptoms of lobar pneumonia in children are persistent high fever and irritating dry cough, and sputum symptoms are very rare. Children's airway mucosa is delicate, and pulmonary inflammatory exudation is mainly in the lung interstitium and alveolar walls in the early stage, and does not invade the airway in large quantities. Therefore, sputum symptoms appear relatively late, and the early symptoms are mainly an irritating dry cough. At the same time, some children have no typical respiratory symptoms and only show fatigue and loss of appetite. Some children also have symptoms such as abdominal pain and vomiting. The above atypical symptoms are important reasons for early misdiagnosis of the disease. Therefore, clinically, for children with unexplained persistent high fever and poor mental health, we must be alert to the risk of lobar pneumonia, and the condition cannot be judged solely by respiratory symptoms [6]. The most obvious feature of early-stage lobar pneumonia in children is the concealment of pulmonary signs. In this study, only 33.72% of children showed positive signs in the early stage, and most of the children had no abnormal lung auscultation. The reason for this analysis is that the main site of early inflammatory lesions of lobar pneumonia in children is deep in the lung lobes, which will not affect the bronchi and superficial lung tissue and will not show obvious typical signs. The relevant positive lung signs will gradually show up when the disease progresses and inflammatory exudation increases. This conclusion suggests that lung auscultation cannot be used as an important basis in the early diagnosis process, and comprehensive judgment needs to be combined with laboratory and imaging examinations. During laboratory examination, an important feature that assists in the early identification of lobar pneumonia in children is the abnormal increase in inflammatory indicators [7]. In this study, most

children showed an increase in the proportion of white blood cells and neutrophils and an increase in CRP. Compared with the blood routine, CRP has higher specificity and is a sensitive indicator that reflects the severity of bacterial infection and inflammation. It can effectively distinguish bacterial pneumonia from viral respiratory tract infection. Children with lobar pneumonia will have significant increases in the above indicators in the early stage, so they can be used as an important basis for differential diagnosis. This study shows that children with CRP >50 mg/L have a higher risk of disease progression. Therefore, the above indicators can be used as important early warning indicators for disease aggravation. In the early diagnosis of lobar pneumonia in children, imaging examinations are the gold standard. The results of this study show that chest CT in all children can detect characteristic dense infiltration shadows in the lung segments, while some children have no obvious abnormalities during chest X-ray examination. This result shows that in the early diagnosis of small and deep lesions, chest CT has a higher diagnostic detection rate and better accuracy. Therefore, during clinical diagnosis, for children who are highly suspected of lobar pneumonia and whose X-ray examination is negative, chest CT examination must be completed in a timely manner to prevent early misdiagnosis and missed diagnosis [8].

Through the analysis of early imaging features, it is believed that it is mainly a single lung lobe or lung segment with uniform patchy shadows and no diffuse lesions. This feature can effectively distinguish bronchopneumonia from interstitial pneumonia. In the process of early disease warning, this study believes that three important aspects need to be grasped. The first is symptom warning. It is believed that the high-risk symptoms of disease progression are high fever lasting for more than 48 hours, stubborn dry cough, lethargy, and shortness of breath. If the high fever persists and the mental state worsens, it indicates that the inflammatory response is continuously aggravating and the disease may progress rapidly. At the same time, laboratory warning signs are very important. The higher the CRP index, the higher the risk of complications, and a significant increase in the above indicators is an important sign of active bacterial infection and the spread of inflammation. Early imaging warning is also a very important aspect. If the early lesions are large in scope and involve multiple lung lobes, the risk of disease exacerbation will be significantly increased. Clinical attention must be paid to children with high-risk factors, and anti-infective and symptomatic supportive treatment must be further strengthened. During this period, attention should be paid to close observation of changes in inflammatory indicators, monitoring of vital signs, and timely intervention in the progression of the disease.

Therefore, the early signs of lobar pneumonia in children are hidden, and the specificity of symptoms is poor. Clinical diagnosis requires comprehensive diagnosis based on symptoms, inflammatory indicators and imaging examinations, and screening of high-risk children to achieve early identification, early warning, and early intervention, reduce the risk of complications, and promote the recovery of children.

About the author

Ma Tiantian (1991-), female, Han nationality, native of Xuzhou, Jiangsu Province, bachelor's degree, professional title of pediatric attending physician, research direction of clinical diagnosis and treatment of pediatric infectious diseases.

Disclosure statement

The author declares no conflict of interest.

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