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Case report

A case of severe pneumonia caused by legionella long beach combined with legionella pneumophila in children

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Abstract

The cases of severe pneumonia caused by legionella long beach combined with legionella pneumophila in children are very rare in China, with critical illness and high fatality rate. For children with severe pneumonia caused by the combined infection of these two legionella bacteria, azithromycin and levofloxacin have better anti-legionella treatment effect than single treatment effect.

Introduction

Legionella pneumophila is a pathogen widely found in artificial water environment conditions and is one of the main pathogens causing legionella pneumophila pneumonia, with a mortality rate of up to 30% [1]. Legionella long beach is mainly transmitted through fertile soil and compost. Currently, reported cases of legionella long beach are very rare in China, but it is the most common type of community-acquired pneumonia in Australia and New Zealand,of which clinical manifestations are not easily distinguishable from legionella pneumophila[2]. A case of severe pneumonia caused by aspiration of contaminated water source after drowning infected with legionella long beach and legionella pneumophila was reported, which provided reference for the related diagnosis and treatment of legionella pneumonella pneumonia in children.

Case

The patient, a 12-year-old female, was admitted to hospital on January 15, 2022, with body weight of 50Kg. She was admitted to hospital with the main complaint of "disturbance of consciousness with dyspnea for 2 days after drowning". He was sent to the hospital for emergency treatment and immediately given tracheal intubation ventilator assisted breathing (ventilator parameters VT 380ml, FiO2 50%, PEEP 4cmH2O, RR 25 times/min), stimulated breathing by nikosamil and aminophylline, chest CT showed massive lung consolidation, considering that there might be severe infection, so he was transferred to our hospital for treatment. Physical examination: sedation and analgesia after intubation, ventilator assisted breathing (SIMV (volume control)) : VT 380ml, FiO2 30% PEEP 4cmH2O, RR 15 times/min, body temperature :37.2°C, heart rate :121 times/min, blood pressure: 110/76mmHg, bilateral pupils are large and round, with a diameter of about 3mm, sensitive to light reflex, symmetrical aspirated sound in both lungs, audible sputum sound and moist rale in both lungs. Auxiliary examination: leukocyte count 10.22×109/L (normal value 3.5-9.5×109/L), neutrophil count 9.51×109/L (normal value 1.8-6.3×109/L), C-reactive protein 117.88mg/L (normal value 0-10mg/L), procalcitonin: 67.82ng/ml (normal value 0-0.05ng/ml), chest CT(Picture one): ground-glass density changes were observed in both lungs, and patchy high-density shadows were seen in both lungs, mainly in the lower lobe of the right lung.Preliminary diagnosis: respiratory failure, severe pneumonia, sepsis. On the second day of admission, he was successfully evacuated from the ventilator, and was given nasal catheter oxygen inhalation, mannitol to reduce brain pressure, methylprednisolone anti-inflammatory treatment,

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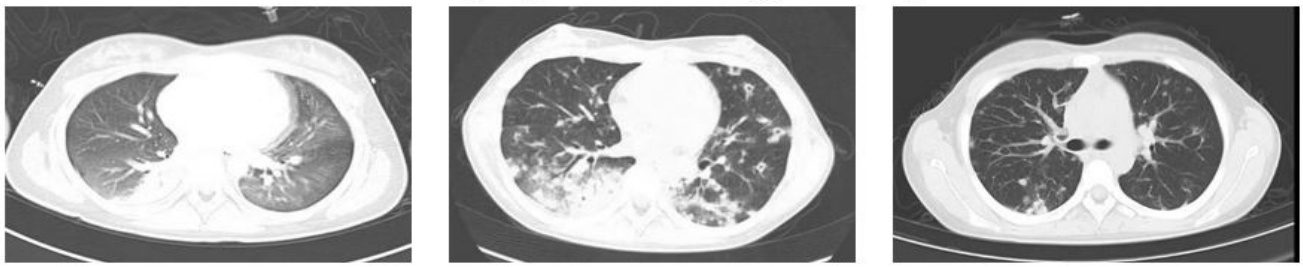
Change of chest CT in different days



Day 1 Day 23 Day 54

Day 1: The density of both lungs changed like ground glass, and patchy high-density shadows were seen in both lungs, mainly in the lower right lung;

Day 23, Multiple nodular high-density shadows were seen in both lungs, some nodular cavity shadows and local consolidation were seen in the lower lobe of the left lung, and patchy increased density shadows were seen in the lower lobe of the right lung.

Day 54: A small patchy shadow can be seen in the lower lobe of the right lung.

which was gradually stopped within 1 week, Cefoperazone and sulbactam (1.5g intravenous drip q8h) were given anti-infection therapy.

On the 7th day of admission, the patient began to have intermittent fever, with a heat peak of 39.3°C, 1-2 times/day. On the 11th day of admission, bronchoalveolar lavage was performed and mNGS reported: Legionella pneumophila (sequence number 1214) and Legionella Longicarba (2360). According to the opinions of pharmacists in our hospital, azithromycin (0.46g intravenous drip qd) was given for anti-legionella treatment; Meropenem (0.8g intravenous drip q8h) combined with vancomycin (0.5g intravenous drip q6h) was given for anti-coccal treatment;but the body temperature was easily repeated. On the 23rd day of admission, chest CT (Picture two) showed possible progression of infectious lesions in both lungs, and reexamination was conducted with Legionella pneumophila antibody IgM positive (+). Azithromycin resistance was considered, azithromycin was discontinued, and anti-legionella treatment was given to levofloxacin (0.5g intravenous drop qd). On the 32nd day of admission, the patient still had intermittent fever. Bronchoscopic pulmonary alveolar lavage fluid was re-examined for the detection of mNGS: Legionella pneumophila (sequence number 38) and Legionella Long Beach (143). Chest CT showed infectious lesions in both lungs, with more nodular cavity formation than before. After 6 days of treatment with levofloxacin (0.5g intravenous drip qd) combined with azithromycin (0.46g intravenous drip qd) against legionella, the body temperature of the child gradually stabilized, and the infection indicators and imaging images were improved after re-examination. Because bacterial and fungal infection could not be ruled out, After being transferred to the pediatric respiratory ward, the patient continued to receive anti-infection treatment with voriconazole combined with linezolid. On the 54th day of admission, the child's general condition was satisfactory. Chest CT (Picture three)showed that the double pneumonia was significantly reduced than before, and all infection indicators were basically reduced to normal.

Discussion

Studies have shown that 24 Legionella genera that can cause human diseases have been found so far, among which Legionella pneumophila is the most common Legionella infection species, accounting for 84% of the world's cases. It is widely found in water, air, air-conditioning cooling water and algae organisms, and is more pathogenic than other Legionella genera [3]. Besides Legionella pneumophila, Legionella Long beach has been widely studied and is mainly prevalent in countries such as Australia and Ireland. Unlike other forms of transmission of Legionella, it is not transmitted by water source, but mainly by dumping or applying compost or garden potting mixture with hands, and wearing gloves and masks cannot block its transmission [4]. In this case, the patient developed respiratory failure after contact with the fertile soil in the septic tank due to aspirated sewage disease. The patient began to show symptoms of fever and infection 7 days after admission, accompanied by headache, abdominal pain, nausea, vomiting, pleuritis and other symptoms during the latent period of legionella pneumophila and legionella long beach infection. The imaging findings were non-specific, combined with the results of mNGS. It can be diagnosed as legionella pneumophila pneumonia and legionella long beach pneumonia.

The diagnostic criteria for Legionella pneumophila pneumonia include positive bacterial isolation and culture, urine antigen detection, but the positive rate of these two methods is low, moreover negative results cannot exclude

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the diagnosis of legionella pneumonia [5]. However, these conventional detection methods are not suitable for legionella long beach, PCR or NGS from respiratory tract samples provide effective means for the detection of such non-pneumophilic Legionella [6]. Legionella pneumophila pneumonia caused by Legionella long beach and Legionella pneumophila are difficult to distinguish in clinical symptoms, including Pontiac fever, manifestations of pneumonia, and extrapulmonary manifestations [2]. These two types of legionella infection are not specific in imaging, and it is difficult to distinguish them from other children with community-acquired pneumonia. Patellar shadows can be seen in the early stage, and then they can turn into dense solid shadows, cavities, empyema and pleural effusion can appear in the later stage [7]. In this case, both lungs of the child showed ground-glass density changes after drowning, and patellar high-density shadows could be seen in both lungs. With the progression of inflammation, multiple nodular high-density shadows, cavity shadows in nodules and pleural effusion could be seen in both lungs. According to the imaging findings, the possibility of co-infection with coccus and fungus could not be ruled out.Considering the septic tank was seriously polluted, combined antimicrobial therapy is very important for disease treatment and improvement of prognosis.

The 2019 edition of the Guidelines for the Diagnosis and Treatment of Community-Acquired Pneumonia in Children recommends that risk assessment should be carried out for the early use of erythromycin or azithromycin, levofloxacin, and fluoroquinolone antibiotics for Legionella pneumonia [8]. Literature reports have shown that in the treatment of adult Legionella pneumonia, the initial diagnosis of Legionella pneumonia should be given respiratory quinolone antibiotics for anti-infection. After Legionella long beach infection has been identified, fluoroquinolones combined with macrolides for anti-infection treatment have achieved good efficacy [6,9]. In this case, exposure to Legionella infection should be considered as a result of inhalation of sewage sludge after drowning. After the broad-spectrum anticoccal and antifungal infection was given in the treatment, the children still had intermittent fever and poor control of pulmonary inflammation after sufficient treatment of azithromycin or levofloxacin alone, and the anti-infection treatment of levofloxacin combined with azithromycin achieved a good effect.

To sum up, routine blood culture, sputum culture and urine antigen cannot effectively detect the presence of Legionella. In the treatment of severe aspiration pneumonia caused by contaminated water sources, it is not only necessary to consider common gram-negative and positive bacteria, but also to be alert to the presence of Legionella infection in the early stage. NGS detection of sputum or blood should be performed early, and timely anti-legionella treatment should be performed. It can greatly improve the survival rate and prognosis of children.

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