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# The Efficacy Observation and Management Study of Azithromycin for Injection Combined with Ambroxol Hydrochloride Injection in the Treatment of Mycoplasma Pneumonia in Children

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## Abstract

**Objective:** To investigate the efficacy, observation, and management research of azithromycin for injection combined with ambroxol hydrochloride injection in children with Mycoplasma pneumonia. **Methods:** A total of 100 children with Mycoplasma pneumonia hospitalized in the Department of Pediatrics from January 2020 to December 2024 were selected, with 50 cases in each group. The two groups were given a low-salt, low-protein diet, and the research group was treated with azithromycin for injection combined with ambroxol hydrochloride injection, while the control group was treated with azithromycin for injection. The treatment period for both groups was 5 days, and both groups received high-quality management during the treatment period. The treatment effects, hospital stay, and adverse reactions of the two groups were observed and compared. After 5 days of treatment in both groups, blood routine tests, hypersensitive CRP, serum procalcitonin, and C-reactive protein were measured in the two groups. **Results:** After 5 days of treatment, the efficacy of the two groups of children was observed. The total effective rate of treatment in the research group was 94%, which was higher than that of the control group (80%), and the difference was statistically significant ($P < 0.05$). There were no adverse reactions in both groups. In the 50 children with Mycoplasma pneumonia in the research group, the PCT < 0.08 μg/L, CRP < 6 mg/L, and white blood cell count < 10 × 109/L after treatment were all lower than those of the control group ($P < 0.05$). The satisfaction, health knowledge mastering score, and hospital stay in the research group were higher than those in the control group ($P < 0.05$) after treatment and management; the incidence of complications in the research group 7 days after treatment and management was not statistically significant compared to the control group ($P > 0.05$). **Conclusion:** The use of azithromycin for injection combined with ambroxol hydrochloride injection in children with Mycoplasma pneumonia has a significant effect. High-quality management intervention during treatment helps to promote the recovery of patients and reduce the level of inflammatory factors, which is worth promoting.

## Keywords

Azithromycin for injection; Ambroxol hydrochloride injection; Mycoplasma pneumonia in children; High-quality management intervention; Inflammatory factors

Mycoplasma pneumonia is an interstitial pneumonia and bronchiolitis-like changes caused by Mycoplasma (MP) infection, accounting for 10% to 40% of community-acquired pneumonia in children, with pulmonary lesions showing confluent bronchopneumonia, interstitial pneumonia, and bronchitis [1, 2]. Mycoplasma pneumoniae can cause tonsillitis, rhinitis, otitis media, tracheitis, bronchiolitis, and pneumonia; young children often suffer from upper

respiratory tract infections; school-age children often suffer from Mycoplasma pneumonia [3, 4]. Pediatric Mycoplasma pneumonia poses a significant threat to human health, and early diagnosis and treatment have a direct impact on the prognosis. Pediatric Mycoplasma pneumonia is an invasive pathogen that stimulates the body to cause a severe inflammatory response, and activated mononuclear macrophages release inflammatory mediators, which are an important part of the inflammatory response. PCT, CRP, WBC, etc., are important biomarkers in this process [5, 6]. Studies have shown [7]: The use of azithromycin for injection combined with ambroxol injection in children with Mycoplasma pneumonia is ideal, and strengthening high-quality management intervention during treatment helps to improve the pulmonary function of patients and reduce inflammatory factors, but there are controversies in the results of different scholars' experiments. Therefore, this topic takes 100 children with Mycoplasma pneumonia who voluntarily came to the department for treatment from January 2020 to December 2024 as the research object, and explores the application of azithromycin for injection combined with ambroxol injection in children with Mycoplasma pneumonia, and the effect of implementing high-quality management for patients is reported as follows.

## 1. Data and Methods

### 1.1 Clinical Data

Children's Mycoplasma Pneumonia Grouping: Patients admitted to our hospital from January 2020 to December 2024 were selected, with 50 children with Mycoplasma pneumonia in the study group, including 26 males and 24 females, with an average age of 5.2 ± 2.8 years. The control group consisted of 50 children with Mycoplasma pneumonia, including 25 males and 24 females, with an average age of (5.9 ± 2.1) years. The clinical data of the two groups were collected, and there was no statistical difference in the general condition of the two groups, which was comparable.

Inclusion criteria for children with Mycoplasma pneumonia [3]: (1) Fever; (2) a. New respiratory symptoms (cough, expectoration), b. Existing respiratory symptoms worsening, chest pain (with or without); (3) Physical examination revealed signs of pulmonary consolidation, with moist rales auscultated; (4) WBC count > 10 × 109/L; (5) Chest X-ray showing pneumonia. Any one of (1) to (4) combined with (5), excluding other lung diseases. Identification of pathogens based on blood culture, sputum culture, pleural effusion culture, etc.

### 1.2 Methods

#### 1.2.1 Treatment Methods

Both groups of children with Mycoplasma pneumonia were given a routine low-salt diet and routine medication for cough and atomization therapy. The control group was treated with oral azithromycin. Children were injected with 0.25g of azithromycin (Beijing Huayuan Pharmaceutical Group Shenyang No.1 Pharmaceutical Co., Ltd., National Drug Standard H20000197) once according to their weight, once a day, mixed with 250mL of glucose injection solution, and the drug dosage could be increased for those with severe illness, and continuous intravenous infusion for 5 days. The study group was treated with an injection of ambroxol hydrochloride combined with oral azithromycin. First, intravenous infusion of azithromycin was given, the method was the same as above, and then ambroxol hydrochloride injection was given to children at a dose of 2ml/day according to their weight (Beijing Huayuan Pharmaceutical Co., Ltd., National Drug Standard H20054213) mixed with 250mL of glucose injection solution, once a day, and continuous intravenous infusion for 5 days.

#### 1.2.2 Management Methods

Both groups of children with Mycoplasma pneumonia were given excellent management during treatment. (1) Environmental management. Keep the ward air fresh during hospitalization, strengthen the patient's warmth work, actively and effectively prevent infection, and ensure that the indoor humidity is controlled at 50.0%, creating a good atmosphere for the patient to recover [8, 9]. (2) Psychological management. The course of children's Mycoplasma pneumonia is long, and the patients have large psychological fluctuations before and after the onset of the disease, strengthening the psychological assessment of patients during the treatment process, understanding the psychological changes of patients, and communicating with patients more. For patients in the acute attack period, it is necessary to instruct patients to rest in bed absolutely, avoid producing anxiety, uneasiness, and other psychological States, establish a good nurse-patient relationship with patients, and increase the secretion of gastric acid and pepsin to relieve the progression of the disease. (3) Medication guidance. All children with Mycoplasma pneumonia need to use drug intervention, strengthen the patient's drug intervention during treatment, ensure that patients take medicine on time and in the right amount, protect the gastric mucosa, and reduce the incidence of adverse reactions. (4) Dietary

intervention. Diet is very important for children with Mycoplasma pneumonia. Adjust the diet of patients during treatment according to their preferences, avoid eating raw and cold food, and after the condition is stable, let the patients eat food with high nutritional value, to promote the early recovery of patients [10,11].

### 1.3 Indicator of observation

(1)5ml of fasting venous blood was extracted from all children with Mycoplasma pneumonia using vacuum blood collection tubes, and then it was allowed to stand for 30 minutes. After coagulation, it was centrifuged at room temperature (3000 rpm × 5 minutes), and the serum was separated and stored at -20℃. The blood routine and serum procalcitonin (PCT), C-reactive protein (CRP), and white blood cells (WBC) were measured by an automatic biochemical analyzer, which are important indices of this process. (2) Management effect. The satisfaction of the 2 groups after management (total score of 100 points, the higher the score, the better the management effect), the health knowledge mastering score (total score of 100 points, the higher the score, the better the management effect), and the hospital stay [12] were observed. (3) Safety. The incidence of complications such as allergy, elevated blood pressure, dizziness, and constipation after treatment and management of the 2 groups was observed.

### 1.4 Criteria for the evaluation of the curative effect [13]

Markedly effective: symptoms and signs disappeared, the total blood leukocyte count was normal, and all shadows in the lung were absorbed. Effective: symptoms and signs basically disappeared, total and differential blood leukocyte count were normal, and most of the shadows in the lung were absorbed. Invalid: no significant improvement in symptoms and signs.

### 1.5 Statistical analysis

SPSS18.0 software was used for treatment, and the enumeration data were tested. Counting data line inspection $x^2$, expressed as n (%), and the measurement data were t-tested, expressed as ( $\bar{x} \pm s$ ), $P < 0.05$ was statistically significant.

## 2. Results

The total effective rate of treatment in the Mycoplasma pneumoniae pneumonia group in children was 94%, which was significantly higher than that of the control group (80%) ($P < 0.05$) (see Table 1 for details).

**Table 1. Comparison of clinical efficacy between the two groups of children with Mycoplasma pneumonia [n (%)]**

| Group | n | Significant effect | Effective | Ineffective | Total effective rate |
|---|---|---|---|---|---|
| Research group | 50 | 32 | 15 | 3 | 47 ( 94.00 ) |
| Control group | 50 | 29 | 11 | 10 | 40 ( 80.00 ) |
| $\chi^2$ value | | | | | 4.8649 |
| P value | | | | | 0.0274 |

### 2.1 Comparison of the Results of Each Index Determination in Children with Mycoplasma Pneumonia after Treatment

In 50 children with Mycoplasma pneumonia in the study group, PCT < 0.5 μg/L, CRP < 7 mg/L, and white blood cell count $<10\times10^9$/L. The values of serum PCT and CRP in the two groups are shown in Table 2.

**Table 2. The Results of Serum Each Index Determination in Children with Mycoplasma Pneumonia in 2 Groups**

| | Research group | Control group |
|---|---|---|
| Number of cases | 50 | 49 |
| PCT Score | 2.6±0.9 | 1.0±0.3[a] |
| CRP (mg/L) | 5.9±0.3 | 7.1±0.2[a] |
| WBC count ($\times10^9$/L) | 5.6±1.2 | 6.1±1.1[a] |
| Body temperature (℃) | 36.2±0.2 | 36.1±0.3[a] |

### 2.2 Comparison of the sensitivity and specificity of each index in the diagnosis of Mycoplasma pneumonia in children after treatment in two groups

The sensitivity of PCT, CRP, and WBC count was 82%, 90%, and 46%, respectively; the specificity of PCT, CRP, and WBC count was 87%, 63%, and 93%, respectively (see Table 3).

**Table 3. The sensitivity and specificity of each index in the diagnosis of Mycoplasma pneumonia in children**

| | Sensitivity | Specificity |
|---|---|---|
| PCT ( < 0.5μg/L) | 82% | 87% |
| CRP (1 < 8mg/L) | 90% | 63% |
| WBC ( < $10\times10^9$/L) | 46% | 93% |

### 2.3 Comparison of treatment, management outcomes, and hospital stay time in children with Mycoplasma pneumonia

The satisfaction and health knowledge scores after treatment and management in the study group were higher than those in the control group ($P < 0.05$); the hospital stay time in the study group was shorter than that in the control group ($P < 0.05$), as shown in Table 4.

**Table 4. Comparison of treatment, management outcomes, and hospital stay time in 2 groups of children with Mycoplasma pneumonia $\overline{x} \pm s$**

| Group | Number of cases | Satisfaction (score) | Health knowledge mastery (score) | Hospital stay (days) |
|---|---|---|---|---|
| research group | 50 | 93.26±6.71 | 91.74±5.63 | 10.83±1.21 |
| control group | 50 | 79.58±4.59 | 68.31±4.19 | 16.37±2.38s |
| t | / | 13.927 | 18.371 | 15.660 |
| P | / | <0.05 | <0.05 | <0.05 |

### 2.4 Comparison of the safety of children with Mycoplasma pneumonia treated and managed for 7 days in the two groups

There was no statistically significant difference in the incidence of complications between the study group and the control group after treatment and management for 7 days ($P > 0.05$), as shown in Table 5.

**Table 5. Comparison of the safety of two groups of children with Mycoplasma pneumonia treated and managed for 7 days [n (%)]**

| Group | Number of cases | Allergies | High blood pressure | Dizziness | Constipation | Incidence rate |
|---|---|---|---|---|---|---|
| Research group | 50 | 0 ( 0.00 ) | 0 ( 0.00 ) | 1 ( 6.67 ) | 0 ( 0.00 ) | 1 ( 6.67 ) |
| Control group | 50 | 0 ( 0.00 ) | 1 ( 6.67 ) | 0 ( 0.00 ) | 1 ( 6.67 ) | 2 ( 13.33 ) |
| $x^2$ | / | | | | | 0.481 |
| P | / | | | | | >0.05 |

## 3. Discussion

With the continuous development of antibiotics, it is not as difficult as before to control Mycoplasma pneumonia in children, but it still poses a serious threat to human health. According to the statistics, the mortality rate of outpatients treated was 1% ~ 5%, that of patients treated in general wards was 5.7% ~ 12.0%, and that of critical patients treated in the ICU was as high as 50% [3]. In the past, the basis for establishing the diagnosis of pulmonary inflammation included symptoms, signs, routine blood tests, bacterial culture, and chest X-ray, but the sensitivity and specificity were not high. In this study, the levels of PCT, CRP, and WBC in children with Mycoplasma pneumonia were

measured to investigate their significance in diagnosis, condition assessment, and prognosis. From this study, the sensitivity of PCT and CRP in the diagnosis of Mycoplasma pneumonia in children was higher than that of WBC. From the comparison of results, the specificity of WBC was the highest, but the sensitivity was low; the sensitivity and specificity of CRP were moderate; overall, the specificity and sensitivity of PCT were relatively high, suggesting that it is a good index for the diagnosis of Mycoplasma pneumonia in children.

In recent years, intravenous azithromycin in combination with ambroxol injection has been used in children with Mycoplasma pneumonia, and the effect is ideal. In this study, intravenous azithromycin is a commonly used injectable for children with Mycoplasma pneumonia, which is suitable for the following infections caused by sensitive pathogenic strains: Mycoplasma pneumonia that needs to be treated primarily with intravenous infusion, caused by Pneumocystis, Haemophilus influenzae, Legionella pneumophila, catarrhal morax, Mycoplasma pneumoniae, Staphylococcus aureus, or Streptococcus pneumoniae. Pelvic inflammatory disease and other effects that need to be treated primarily with intravenous infusion, caused by Chlamydia trachomatis, Neisseria gonorrhoeae, and human Mycoplasma [13]. In this study, the levels of PCT, WBC, and CRP in the research group were lower than those in the control group after treatment for 7 days ($P < 0.05$). Ambroxol injection is mainly used for chronic bronchitis and pneumonia. Clinically, the combination of intravenous azithromycin and ambroxol injection is effective in children with Mycoplasma pneumonia, which can play the advantages of different treatment drugs, achieve complementary advantages, and help promote the recovery of patients. At the same time, high-quality management intervention can be given to children with Mycoplasma pneumonia during drug treatment, starting from psychological, environmental, drug, and other aspects, which can fully play the subjective initiative of patients, improve compliance with treatment, and help patients recover [15]. In this study, the satisfaction, health knowledge score after treatment and management of the research group were higher than those of the control group ($P < 0.05$); the hospitalization time of the research group was shorter than that of the control group ($P < 0.05$); the incidence of complications in the research group after treatment and management for 7 days was not statistically significant with that of the control group ($P > 0.05$). Note: strengthening high-quality management during the treatment of intravenous azithromycin in combination with ambroxol injection is conducive to improving the treatment effect and has high safety.

In summary, the use of intravenous azithromycin in combination with ambroxol injection in children with Mycoplasma pneumonia is ideal, and high-quality management intervention during treatment is conducive to improving renal function in patients and reducing levels of inflammatory factors, which is worth promoting.

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