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Efficacy of Azithromycin sequential therapy combined with Tanreqing injection for treatment of children with mycoplasma pneumonia

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ABSTRACT

Objective: To study the effect of Azithromycin sequential therapy combined with Tanreqing injection on serum sTREM-1, CK, G-CSF, IL-10, CRP and TNF-α in children with mycoplasma pneumonia. **Methods:** A total of 80 children with mycoplasma pneumonia in our hospital from June 2014 to September 2016 were enrolled in this study. The subjects were divided into the control group (n=40) and the treatment group (n=40) randomly. The control group were treated with Azithromycin sequential therapy, the treatment group were treated with Azithromycin sequential therapy combined with Tanreqing injection. The two groups were treated for 2 periods. The serum sTREM-1, CK, G-CSF, IL-10, CRP and TNF-α levels of the two groups before and after treatment were compared. **Results:** There were no significantly differences of the serum sTREM-1, CK, G-CSF, IL-10, CRP and TNF-α levels of the two groups before treatment. The serum sTREM-1, CK, G-CSF, IL-10, CRP and TNF-α levels of the two groups after treatment were significantly lower than before treatment, and that of the treatment group were significantly lower than the control group. **Conclusion:** Azithromycin sequential therapy combined with Tanreqing injection can significantly reduce the serum sTREM-1, CK, G-CSF, IL-10, CRP and TNF-α levels of children with mycoplasma pneumonia, have good clinical efficacy, and it was worthy clinical application.

1. Introduction

Pneumonia is a pulmonary inflammatory reaction caused by various pathogenic microorganisms or other causes, whose typical clinical symptoms were cough, fever, dyspnea, shortness of breath, pulmonary rales etc. Severe patients will appear neurological, circulatory system disorder, with recurrent attacks, complications, long course and so on[1,2]. Mycoplasma pneumonia is a common respiratory disease, in recent years, with the change of living environment and the process of modern industrialization, the incidence of pediatric mycoplasma pneumonia rate showed a increasing trend, seriously affecting the quality of life and the growth and development of children[3]. At present, the clinical treatment of mycoplasma pneumonia in children mainly use macrolide antibiotics, however, drug resistance is increasingly serious, leading to worse clinical efficacy[4,5]. Therefore, clinical search for a safe and effective treatment for children with mycoplasma pneumonia treatment has important clinical significance. Azithromycin is a new generation of macrolide antibiotics, which has the advantages of high tissue permeability and high concentration in inflammatory sites[6]. Tanreqing injection is a traditional Chinese medicine injection, whose composition are goat horns, bear gall powder, honeysuckle, forsythia, Huang Cen, with the efficacy of detoxification, eliminating phlegm sedative[7,8]. This research was to study the effect of Azithromycin sequential therapy combined with Tanreqing injection on serum sTREM-1, CK, G-CSF, IL-10, CRP and TNF-α in children with mycoplasma pneumonia,and discuss its mechanism of action.The results are as follows.

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2. Information and Methods

2.1. General information

The study included 80 children with mycoplasma pneumonia in our hospital from June 2014 to September 2016. Case inclusion criteria: (1) Criteria for the diagnosis of mycoplasma pneumonia in children with "Zhu Futang Practical Pediatrics" (Seventh Edition) in the relevant standards; (2)Aged 7-60 months; Case exclusion criteria: (1) Children with other respiratory infections; (2) The patients with heart, brain, liver, kidney and other diseases; (3) Children with azithromycin; (4) Children with severe central nervous system injury. The 80 children in this study were randomly divided into control group and treatment group according to random number method, each with 40 cases. There were 24 males and 16 females in the control group, they were aged from 14 to 60 months, mean age 14-60 months, course of disease 4-16 d. In the treatment group, there were 23 males and 17 females in the control group, they were aged from 13 to 58months,mean age 13-58 months, course of disease 4-15 d. There was no significant difference in gender, age, course of disease between the two groups (P>0.05). All cases included in this study were informed and agreed to join the study, in addition, this subject was approved by the hospital medical ethics committee.

2.2 Experimental methods

All the children were given a cough, expectorant, fever, asthma and other symptomatic treatment measures. The control group was given Azithromycin Sequential therapy, 1 mg/(mg•d) was used to dissolve Azithromycin Injection (purchased from the Pfizer Inc, Specification 0.5 g/branch, approval number: H20120326) in glucose solution with 100 mL concentration of 5%, continuous medication time in more than 1 h, 1/d, for 3 d; Then give 1 mg/(mg•d) dose of Azithromycin (Purchased from Pfizer Inc, specification 0.1 g/bag, national drug quasi word H10960112) for Suspension, oral, 1 time/d, used 3 d, after discontinuation of 4 d, and then with the usage for Azithromycin for Suspension, given the continuous treatment of 2 courses. The treatment group was treated with sequential therapy of Azithromycin combined with Tanreqing Injection (Purchased from Shanghai Kai Bao Pharmaceutical Co., Ltd., specifications 10 mL/branch, national drug quasi word Z20030054), Azithromycin Sequential therapy administered with the control group, Tanreqing injection administration for specific: the dose of 5 mL/(mg•d) of Tanreqing injection diluted into 100 mL concentration of 5% glucose solution, intravenous drip, Duration of administration was above 1 H, daily dose was controlled in 20 mL range, 7 d was 1 courses, continuous treatment for 2 courses.

2.3. Detection index

Collected fasting elbow venous blood 5 mL of two groups of patients before and after treatment ,then serum separation for 10 min with a speed of 3 000 rpm. Detect and compare serum levels of sTREM-1, CK, G-CSF, IL-10, CRP and TNF-α in two groups.

The serum levels of G-CSF, IL-10 and TNF-α were detected by double anti sandwich enzyme-linked immunosorbent assay (ELISA). All the ELISA kits used in the test were purchased from Shanghai Ze Ye Biotechnology Co., ltd.; Detection of serum CK, CRP levels were used 7020 Hitachi automatic biochemical analyzer, the instrument was purchased from Shanghai mop Biotechnology Co. ltd..

2.4. Result analysis

We Used SPSS 19.0 software package to process the test result data, mean ± standard deviation (Mean ± SD) represents measurement data, the use of t test was to compare the difference between groups, with P<0.05 as a statistically significant.

3. Results

3.1. Comparison of serum sTREM-1, CK and G-CSF levels before and after treatment in two groups

Before treatment, the levels of serum sTREM-1, CK and G-CSF levels in the control group were (16.39±3.75) ng/L, (235.30±19.38) U/L and (162.48±19.30) pg/mL, Compared with the treatment group patients' serum sTREM-1, CK and G-CSF levels, there was no significant difference between the two groups (P>0.05); The levels of serum sTREM-1, CK and G-CSF in two groups were significantly lower than those before treatment, and the levels of serum sTREM-1, CK and G-CSF in the treatment group were (5.03±1.14) ng/L, (98.42±10.37) U/L and (46.33±7.21) pg/mL, significantly lower than that of the control group after treatment of each serum indicators (P<0.05), Please look at the table 1.

Table 1.

Comparison of serum sTREM-1, CK and G-CSF levels before and after treatment in two groups.

Group	n	Time	sTREM-1 (ng/L)	CK (U/L)	G-CSF (pg/mL)
Control	40	Before treatment	16.39±3.75	235.30±19.38	162.48±19.30
		After treatment	9.86±1.56*	154.41±12.33*	97.42±9.50*
Treatment	40	Before treatment	16.18±4.02	241.52±20.26	159.82±18.15
		After treatment	5.03±1.14*#	98.42±10.37*#	46.33±7.21*#

Note: compared with before treatment, *P<0.05; compared with the control group, #P<0.05.

Table 2.

Comparison of serum IL-10, CRP and TNF-α levels before and after treatment in two groups.

Group	*n*	Time	IL-10 (ng/L)	CRP (mg/L)	TNF-α (ng/L)
Control	40	Before treatment	39.50±4.26	24.60±3.81	46.37±4.69
		After treatment	9.48±2.31*	13.49±1.95*	25.65±2.83*
Treatment	40	Before treatment	40.15±3.87	25.12±3.77	47.02±4.84
		After treatment	3.26±1.15*#	7.35±1.68*#	13.30±2.15*#

Note: compared with before treatment, *P<0.05; compared with the control group, #P<0.05.

3.2. Analysis and comparison of serum inflammatory factors levels before and after treatment in the two groups

Before treatment, the levels of serum IL-10, CRP and TNF-α levels in the control group were (39.50±4.26) ng/L, (24.60±3.81) mg/L and (46.37±4.69) ng/L, compared with the treatment group patients' serum IL-10, CRP and TNF-α levels, there was no significant difference between the two groups (P>0.05); The levels of serum IL-10, CRP and TNF-α levels in two groups were significantly lower than those before treatment, and the levels of serum IL-10, CRP and TNF-α levels in the treatment group were (3.26±1.15) ng/L, (7.35±1.68) U/L and(13.30±2.15) pg/mL, significantly lower than that of the control group after treatment of each serum indicators (P<0.05). Please look at the table 2.

4. Discussion

Mycoplasma pneumonia in children has many complications, accumulation of respiratory tract, circulation and other characteristics of the system, serious harm to children's health[10]. Research reports show that mycoplasma pneumonia in children is the highest incidence and mortality of pediatric diseases, but also China's most antibiotic applications, the most frequent and most non-standard disease[11]. In recent years, Mycoplasma pneumoniae pneumonia indicators are mainly Streptococcus pneumoniae, A beta hemolytic streptococcus, mycoplasma and other pathogenic microorganisms[12]. The routine treatment of mycoplasma pneumonia in children is mainly used macrolide, but the effect is not ideal, and there is a rash, gastrointestinal symptoms, local pain, liver function damage, phlebitis and other complications, affect the compliance of children[13,14]. Azithromycin is a new macrolide antibiotic, compared with the traditional drugs, its inflammation in the site of tissue and intracellular concentrations were significantly higher, and half life reached 68H, less adverse reactions[15]. The ingredients of Chinese medicine Tanreqing injection have horns, bear gall powder, honeysuckle, forsythia, skullcap etc., among them: The horn is cold and salty, has the effect of sedation, heat, eyesight, detoxification; Bear gall powder cold, bitter taste, have the effect of expectorant, antispasmodic, heat, detoxification; Honeysuckle cold, salty taste, there are Xuan lung Xie table, Qingrejiedu efficacy; Scutellaria cold, bitter taste, has the effect of clearing heat and dampness Xiehuo detoxification; Forsythia micro cold, bitter taste, has the effect of dispelling wind, floating Sanjie, dispelling of qingrezhufeng; Various drugs use together, can play the role of phlegm calm, Qingrejiedu efficacy[16,17]. Modern pharmacological studies show that Tanreqing injection has antioxidant, anti-inflammatory, hepatoprotective, antiviral and other effects[18]. This research was to study the effect of Azithromycin sequential therapy combined with Tanreqing injection on serum sTREM-1, CK, G-CSF, IL-10, CRP and TNF-α in children with mycoplasma pneumonia, and discuss its mechanism of action, so as to select a safe and effective treatment program for clinical treatment of children with mycoplasma pneumonia to provide a certain clinical basis.

The results of this study showed that the serum levels of sTREM-1, CK and G-CSF before treatment in the two groups were not statistically significant (P>0.05); The levels of serum sTREM-1, CK and G-CSF in the two groups were significantly lower than those before treatment, and the levels of serum sTREM-1, CK and G-CSF in the treatment group were significantly lower than those in the control group (P<0.05). This suggests that sequential therapy of Azithromycin combined with Tanreqing can significantly reduce children with mycoplasma pneumonia serum sTREM-1, CK and G-CSF levels. STREM-1 in monocyte and neutrophil surface expression generation, can lead to the generation of inflammatory factors and increased secretion, is an important factor to induce the inflammatory reaction, serum levels of the level of the said level of inflammatory response[19]. CK is a kind of important myocardial enzymes, myocardial produces less under normal circumstances, when the pathogenic microorganism infection patients, myocardial cell damage, large amounts of CK released into the blood circulation, resulting in increased blood levels of CK[20]. G-CSF is an important cytokine that can regulate the survival, differentiation and proliferation of neutrophils. After the inflammatory reaction, the level of serum in the serum is significantly increased[21]. Sequential therapy of Azithromycin combined with Tanreqing injection can effectively kill pathogenic microorganisms, Azithromycin in vivo maintained at a high concentration of drugs, can achieve the purpose of completely kill pathogenic microorganisms, Tanreqing injection for various pathogenic bacteria also have inhibition or resistance, thereby significantly reducing the serum levels of sTREM-1, CK and G-CSF[22]. The results of this study showed that the serum levels of IL-10, CRP and TNF-α before treatment in the two groups were not statistically significant (P>0.05); The levels of serum IL-10, CRP and TNF-α in the two groups were significantly lower than those before treatment, and the levels of serum IL-10, CRP and TNF-α in the treatment group were significantly lower than those in the control group (P<0.05). This suggests that Sequential

therapy of Azithromycin combined with Tanreqing mycoplasma pneumonia can significantly reduce the level of serum inflammatory factor. The main complications of mycoplasma pneumonia in children are respiratory infection, respiratory inflammatory reaction caused a large number of inflammatory factors generated in the serum level was significantly increased[23]. The concentration of azithromycin in inflammatory site was significantly higher than non inflammatory site, up to 6 times, so as to completely kill pathogenic microorganisms. Tanreqing can inhibit the phagocytic function, inhibiting neutrophil infiltration, can inhibit the inflammatory transmitter release in Europe, so as to reduce the expression of inflammatory factors, so that the body function in children with respiratory tract and lung function recovery can be improved[24].

To sum up,Azithromycin sequential therapy combined with Tanreqing injection can significantly reduce the serum sTREM-1, CK, G-CSF, IL-10, CRP and TNF- α levels of children with mycoplasma pneumonia, have good clinical efficacy, and it was worthy clinical application.

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