

Research Progress on Combined Chinese and Western Medicine Treatment of *Mycoplasma pneumoniae* Pneumonia in Children

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Abstract: With the continuous development of medical technology, combined treatment of Chinese and Western medicine has gradually become a research hotspot. As a common disease in pediatrics, the treatment of *Mycoplasma pneumoniae* pneumonia (MPP) in children is also being explored and improved. This article summarizes the research progress of combined Chinese and Western medicine treatment of MPP in children in recent years, aiming to provide a useful reference for the combined treatment of MPP in children. The article firstly introduces the etiology and pathogenesis of MPP in children, thereafter briefly introduces the Western anti-infective treatment and traditional Chinese medicine (TCM) diagnosis and treatment of MPP in children, and lastly introduces the methods of combined treatment of TCM and Western medicine in detail. The article points out that the combination of Chinese and Western medicine can give full play to the overall regulation of Chinese medicine and the precise treatment advantages of Western medicine, improve the therapeutic effect, reduce the use of antibiotics, and lower the recurrence rate of the disease, which is worthy of further research and promotion.

Keywords: Children; *Mycoplasma pneumoniae* pneumonia; Combined Chinese and Western medicine; Research progress

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1. Introduction

Mycoplasma pneumoniae pneumonia (MPP) is a lower respiratory tract infection commonly seen in the pediatric population. It is caused by *Mycoplasma pneumoniae* (MP) and manifests as fever, dry cough, headache, and general malaise^[1,2], posing a serious impact on children's growth and family health. Traditional Western medicine treatment of MPP relies mainly on antibiotics, with penicillins as the first-line treatment. However, with the growing problem of drug resistance and the increase in the number of individuals who respond poorly to antibiotic treatment, relying solely on Western medicine has increasingly shown its limitations^[3,4]. In recent years, in the treatment of MPP in children, the combination of Chinese and Western medicine has received more and more attention from physicians and patients' families. This modality can not only take advantage of the clinical diagnosis and pathogenic treatment of Western medicine, but also give full play to the unique role of Chinese

medicine in adjusting the organism, treating the disease before it is diagnosed, and recognizing the symptoms for targeted treatment, so as to fundamentally adjust the physique of pediatric patients and improve the immunity of the organism, thus realizing the purpose of improving the cure rate and reducing the recurrence rate ^[5]. The purpose of this paper is to sort out and analyze the research progress on the combined Chinese and Western medicine treatment of MPP in children in recent years, aiming to provide clinicians with a more comprehensive treatment perspective and parents with more scientific treatment choices.

2. Etiology and pathogenesis

2.1. Causes

The causes of MPP in children vary, among which malnutrition is one of the most important causes. Malnutrition reduces children's immunity, which makes them unable to resist *Mycoplasma pneumoniae* infection effectively. Secondly, environmental pollution is also one of the critical causes of MPP in children. Harmful substances in the air, such as particulate matter and harmful gases, may damage the respiratory mucosa of children and reduce their immunity, thus increasing the risk of infection ^[6]. In addition, *Mycoplasma pneumoniae* is mainly transmitted through droplets. When a patient with MPP coughs or sneezes, the pathogen droplets spread into the air, thus leading to infection in the surrounding population ^[7].

2.2. Pathogenesis

The pathogenesis of MPP in children is relatively complex. After invading the human body, *Mycoplasma pneumoniae* mainly parasitizes the lower respiratory tract, such as the bronchial tubes and the lungs; during the parasitization process, *Mycoplasma pneumoniae* releases toxins and enzymes, which destroys the integrity of the respiratory mucosa ^[8]. *Mycoplasma pneumoniae* also directly invades respiratory epithelial cells and enters the cell for replication through proteins on its cell wall that bind to receptors on the cell membrane, a process that can lead to cell damage or even death, thus triggering an inflammatory response ^[9]. Meanwhile, when *Mycoplasma pneumoniae* invades the human body, the immune system initiates corresponding immune responses, such as the production of specific antibodies and cellular immunity. However, in some cases, the immune response may be too strong, which can lead to tissue damage and increased inflammation ^[10]. *Mycoplasma pneumoniae* can also directly invade lung tissues, leading to lesions such as inflammation and fibrosis in the lungs, which can affect the normal function of the lungs and lead to the development of symptoms such as dyspnea and cough ^[11].

3. Western medicine anti-infective treatment

Western medicine mainly uses anti-infective methods in the treatment of MPP. For MPP, the preferred antibiotics are macrolides, such as azithromycin and erythromycin, which can effectively inhibit the growth of mycoplasma, thus controlling the infection ^[5]. It should be noted that the use of antibiotics should follow the principles of early, sufficient amount, and adequate course of treatment to ensure that the pathogens are completely eliminated and prevent the recurrence of the disease.

Western anti-infective treatment of MPP in children can usually control symptoms and reduce the risk of complications in a relatively short period of time, and the rational use of antibiotics can effectively shorten the course of the disease and reduce the pain of the children and the economic burden of parents. However, long-term or inappropriate use of antibiotics may lead to the development of drug resistance, which decreases the therapeutic effect ^[12]. In addition, the side effects of antibiotics, such as gastrointestinal reactions and hepatic impairment, need to be considered ^[13].

4. Traditional Chinese medicine (TCM)

Chinese medicine believes that MPP in children is mainly due to the external wind-heat or wind-cold pathogens invading the lungs, leading to the disruption of lung qi, internal accumulation of heat pathogens, and the formation of phlegm-heat, which obstructs the airways and results in a series of symptoms^[14]. In addition, Children's organs are delicate, their physical form and energy are not fully developed, and their external defenses are weak, making them susceptible to external pathogens. Additionally, congenital deficiencies or postnatal malnutrition can lead to a deficiency in vital energy, reducing their ability to resist illness. These are the internal factors contributing to the occurrence of this disease. In TCM, the nature and stage of development of the disease are often recognized by observing the child's symptoms and signs such as tongue and pulse. According to the children's clinical manifestations and signs such as tongue and pulse, MPP is categorized into various types of symptoms, such as lung yin and qi deficiency^[15], and different types of symptoms require specific treatments.

TCM treatment of MPP can be based on a holistic approach, taking into account the child's constitution, condition, environment, and other factors to develop a personalized treatment plan, coupled with the relatively small side effects of TCM treatment^[16], which can treat both the symptoms and the root cause, and improve the overall health status of the child. However, there are certain shortcomings in the treatment of MPP with TCM. Firstly, the efficacy of TCM is relatively slow and may not be applicable to children with more severe conditions. Secondly, the identification and treatment plan of TCM requires an experienced TCM physician with a high level of professionalism.

5. Combination of Chinese and Western medical treatments

5.1. Combination of traditional Chinese medicine internal treatment and Western medicine treatment

5.1.1. Combination of traditional Chinese medicine decoctions and Western medicine treatment

The combination of TCM decoctions and Western medicine is effective in the treatment of MPP in children. Wang^[17] used the combination of self-made Tongfu Xiefei Decoction and erythromycin in the treatment of children with MPP, and found that, compared with the simple intravenous drip of erythromycin, the combined use of the two can be more effective in relieving the symptoms of coughing, sputum, and lung crackles, improving gastrointestinal function, decreasing the incidence of adverse reactions, and promoting the patient's recovery. Zhao *et al.*^[18] found that compared with the control group that received intravenous azithromycin, the observation group that used Moxing Shigan Decoction combined with azithromycin treatment could alleviate the adverse symptoms and accelerate recovery. After treatment, the white blood cells, high sensitivity-C reactive protein, and interleukin-6 levels of the observation group were significantly lower than those of the control group. Han^[19] pointed out that Compound Qinlan Oral Liquid combined with azithromycin had good therapeutic effects in the treatment of pediatric MPP, and compared with patients treated with azithromycin alone, the clinical signs of the patients who were treated with the combined therapy disappeared faster, the incidence rate of adverse reactions was lower, and the total clinical effective rate (95%) was significantly higher than that of patients treated with azithromycin alone (75.83%).

5.1.2. Combination of traditional Chinese medicine injections and Western medicine treatment

Xiyanping injection is a traditional Chinese medicine preparation, with its main ingredient being andrographolide sulfonate. The drug has the efficacy of clearing heat and removing toxins, relieving cough, and stopping dysentery, and is widely used in the clinical treatment of various infections caused by viruses^[20]. Li *et al.*^[21] used Xiyanping injection combined with azithromycin in the treatment of children with MPP and found that

compared with the control group treated with azithromycin, the total effective rate of treatment was higher in the observation group (93.33% > 66.67%), and the CD4⁺ (36.76 ± 8.43%), CD8⁺ (23.33 ± 4.17%), and CD4⁺/CD8⁺ (1.53 ± 0.54) were better than those of the control group, indicating that Xiyanping injection combined with azithromycin could not only achieve good therapeutic efficacy, but also promote the improvement of immune function of the children. Tanreqing injection is a traditional Chinese medicine injection. Its main ingredients typically include herbal extracts such as *Scutellaria baicalensis* (Huangqin), bear bile powder, goat horn, honeysuckle, and forsythia. It is effective in clearing heat, detoxifying, resolving phlegm, and relieving cough. Zhang^[22] compared the efficacy of simple azithromycin treatment with that of Tanreqing injection combined with azithromycin in the treatment of MPP in children, and found that the latter had a more pronounced efficacy. Danshen injection has been proven to have good efficacy in the treatment of MPP, and Zhang^[23] pointed out that Danshen injection combined with azithromycin treatment has more definite efficacy and a lower incidence of adverse events in treating MPP in children.

5.2. Combination of traditional Chinese medicine external treatment and Western medicine treatment

5.2.1. Combination of acupoint application and Western medicine treatment

Acupoint application is a common method of Chinese medicine treatment, in which drugs are applied on specific acupoints to achieve the purpose of dredging the meridians and collaterals, regulating qi and blood, as well as eliminating pathogens and strengthening vital qi^[24]. Yang *et al.*^[25] adopted traditional Chinese medicine acupoint application combined with azithromycin in the treatment of pediatric MPP, selected a self-made formula, and took children's Tiantu, Tanzhong, bilateral Feishu, and Gaohuang points for acupoint application, and found that the clinical effective rate of the patients in the combined treatment group (96%) was significantly higher than that of the single treatment group (66%). Xiong^[26] used self-made traditional Chinese medicine acupoint application combined with azithromycin to treat MMP patients whose traditional Chinese medicine diagnoses were excess-heat type of MMP, and found that relative to azithromycin treatment alone, this method was safer and more effective, and was able to reduce adverse reactions and increase the compliance of treatment.

5.2.2. Combination of tui na and Western medical treatment

TCM tui na, one of the external treatments of TCM, is an ancient and effective TCM therapy that stimulates specific parts of the human body through various techniques to adjust the physiological and pathological states of the body to achieve the purpose of dredging meridians and collaterals, harmonizing qi and blood, balancing yin and yang, and promoting recovery^[27]. Wan^[28] pointed out in his study that in the treatment of pediatric MPP, the use of tui na combined with azithromycin sequential therapy can improve clinical symptoms and restore lung function more quickly compared to azithromycin sequential therapy alone. Xu *et al.*^[29] also suggested that azithromycin + tui na therapy can improve the symptoms and inflammatory factor levels of MMP patients and reduce adverse reactions.

6. Conclusion

Chinese medicine, with its unique theoretical system and therapeutic means, combined with the advanced technology and drugs of Western medicine, has formed a comprehensive combination treatment model, which opens up a new path for the treatment of MPP in children. Looking into the future, we believe that the research on the combination of Chinese and Western medicine in the treatment of MPP in children will achieve even more remarkable results, and we also expect that Chinese medicine and Western medicine can better integrate and com-

plement each other, and jointly promote the development of medical science and make greater contributions to the health of mankind.

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