

Changes on serum myocardial enzyme of *Mycoplasma pneumoniae* pneumonia and clinical significance.

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Abstract

Purpose: To discuss on the difference of *Mycoplasma pneumoniae* pneumonia (MPP) combined cardiac damage on gender and age as well as the clinical significance.

Method: 210 child patients of *mycoplasma pneumoniae* pneumonia received and cured in the Department of Urology, the First Affiliated Hospital of Zhengzhou University during January 2013-August 2014 are taken as the research objectives. The serum Lactate Dehydrogenase (LDH), Creatine Kinase (CK) and Creatine Kinase MB (CK-MB) levels of the child patients are detected on the second day they are admitted to the hospital and the correlations on age and gender are analysed.

Results: Among the 210 MPP patients, there are 123 boys and 87 girls, with the proportion of 1: 1.41. The myocardial enzyme levels of MPP child patients are increased by various extents, in which the CK (249.14) and CK-MB (44.71) of girls are significantly higher than that of boys (219.85 and 32.87) (P<0.05); however, there is no difference on the serum LDH level between boys and girls. On the aspect of ages, the serum myocardial enzyme of all age groups increases. In which the serum CK and CK-MB levels increase more insignificantly in younger patients than that of older ones (P<0.05). With the increase in ages, the rise on CK and CK-MB levels declines, with a negative correlation with ages. However, there is no significant difference on serum LDH levels of various age groups (P>0.05).

Conclusion: The child patients of *mycoplasma pneumoniae* pneumonia suffer from cardiac damage to different extents in which girl patients and infant patients of *mycoplasma pneumoniae* pneumonia have severer extent on cardiac damage. The serum myocardial enzyme spectrum detection can be utilized to detect the cardiac damage in time, and intervention measures shall be adopted.

Keywords: *Mycoplasma pneumoniae* pneumonia, Infants, Serum, Myocardial enzyme, Clinical significance BD.

Accepted on October 14, 2017

Introduction

Pneumonia is a common disease and a frequently-occurring disease for children during the child stage especially the infant stage, in which *Mycoplasma pneumoniae* Pneumonia (MPP) is a common respiratory disease in pediatric department, occupying 15%-30% of the respiratory system infection [1]. In addition, it is an important factor for children death, especially infants. The morbidity is on a rise year after year [2,3].

210 child patients of *Mycoplasma pneumoniae* pneumonia received and cured in the Department of Urology, the First Affiliated Hospital of Zhengzhou University during January 2013-August 2014 are taken as the objectives. The retrospective analysis is made on the changes of serum myocardial enzymes and the characteristics, which is reported as follows.

Material and Method

Diagnostic criteria

Literature [4] was taken as the diagnostic criteria as the *Mycoplasma pneumoniae*. The Seroadia-mycoo kit produced by Japan FUJIREBIOLNC was adopted for the measurement of the MP-IgM antibody, and the specific immunity agglutination test was adopted for the detection on the serum IgM antibody. It was judged as positive if the titer \geq 1: 80, indicating recent *Mycoplasma* (MP) infection.

General data

210 hospitalized child patients of mycoplasma pneumonia, including 123 boys and 87 girls, with proportion of 1: 1.41 were taken as research objectives. They were at their ages of 18 d-13 y old, including 38 cases of under 1 y old, 61 cases of 1-3 y old, 78 cases of 3-6 y old and 33 cases of 6-13 y old.

Observation indexes and method

The myocardial enzyme indexes of 210 child patients of *Mycoplasma pneumoniae* pneumonia were observed, including serum Lactate Dehydrogenase (LDH), Creatine Kinase (CK) and Creatine Kinase MB (CK-MB). All the patients were extracted with blood on the second day after hospitalization with empty stomach, and the fully automatic biochemical analyzer was adopted to measure the myocardial enzyme indexes.

Statistical method

The SPSS13.0 software was applied for statistics and analysis, and mean \pm standard deviation was adopted to express the experimental data, and the t check was adopted; the difference had statistical significance if $P < 0.05$.

Results

The data of the group included 123 boys and 87 girls. According to the statistical results, the cardiac damage of girls was severer than that of boys, and the difference on cardiac damage degree of child patients between girls and boys had statistical significance ($P < 0.05$); especially, the rate of changes on CK-MB was especially significant ($P < 0.01$) (Table 1).

Table 1. Different gender in children with *Mycoplasma pneumoniae* myocardial enzyme ($\bar{x} \pm s$).

Group	N	CK (45-287)	LDH (109-245)	CK-MB (0-24)
Boys	123	219.85 \pm 11.43	296.76 \pm 28.46	32.87 \pm 8.37
Girls	87	249.14 \pm 36.47**	291.73 \pm 35.38	44.71 \pm 8.08**

The comparisons between boys and girls * $P < 0.05$, ** $P < 0.01$

Table 2. Different age children with *Mycoplasma pneumoniae* myocardial enzyme ($\bar{x} \pm s$).

Age (y old)	N	CK (45-287)	LDH (109-245)	CK-MB (0-24)
~1	38	303.27 \pm 12.71	291.34 \pm 42.82	46.48 \pm 7.21
~3	61	271.73 \pm 31.58**	284.48 \pm 37.23	40.29 \pm 6.34**
~6	78	180.56 \pm 23.49** $\Delta\Delta$	296.26 \pm 29.17	34.38 \pm 6.73** Δ
>6	33	181.74 \pm 27.63** $\Delta\Delta$	294.17 \pm 27.36	35.47 \pm 8.10** Δ

Compared with the group of under 1 y old, ** $P < 0.01$; compared with the group of under 3 y old, $\Delta P < 0.05$ and $\Delta\Delta P < 0.01$.

The child patients of *Mycoplasma pneumoniae* pneumonia in this group were at their ages of 18 d-13 y old, with different degrees of cardiac damage in different age groups (Table 2). The myocardial enzyme levels of the 4 age groups were compared, and the difference had statistical significance. The comparison was made between the age group of under 1 y old and that of 1-6 y old and that of older than 6 y old, and the difference had statistical significance ($P < 0.01$); the comparison was made between the age group of under 3 y old and that of 3-6 y old and that of older than 6 y old, the difference had

statistical significance ($P < 0.05$); the comparison was made between the age group of under 1 y old and that under 3 y old, the difference had no statistical significance ($P > 0.05$); the comparison was made between the age group of under 6 y old and that older than 6 y old, and the difference had no statistical significance ($P > 0.05$). It illustrated that the infants of *mycoplasma pneumoniae* pneumonia under 3 years old had severer cardiac damage, especially those under 1 y old during the infancy stage.

Discussion

The pulmonary complications induced by MPP have drawn more and more attention at present. It has the possible pathogenesis that MP antigen forms immune complex with multiple human body organ tissues such as heart, liver, lung, brain and kidney, leading to lesions in corresponding tissues and organs; at the same time, inflammatory medium, acidic hydrolytic enzyme, neutral proteolytic enzyme and lysosomal enzyme all participate in the multi-system immune injury process [5]. According to foreign literatures, the extra-pulmonary lesion damage induced by MP infection is as high as 45%, especially on the cardiovascular system and the digestive system [6]. Cardiovascular system complications mainly include cardiac damages. The serum myocardial enzyme level is an important index reflecting the cardiac damage commonly used in clinic, which is often utilized to observe and understand the myocardial lesions of child patients, and will lead to increase in serum LDH, CK and CK-MB levels [7]. In addition, it is in direct proportion to the degree of cardiac damage. Therefore, the detection on the serum myocardial enzyme level can directly reflect the cardiac damage degree, with relatively high specificity [8]. In which most Creatine Kinase-Myocardial Band (CK-MB) are distributed in cytoplasm of myocardial cells, and only a small trace of them exist in normal serum. Therefore, the serum CK-MB larger than 6% of the total activity is regarded as the specificity index for cardiac damage.

This research mainly analyses the difference on cardiac damage degrees of child patients of *Mycoplasma pneumoniae* pneumonia between different genders as well as among different ages. According to research findings, the cardiac damage of girls is severer than that of boys. In addition, according to cardiac damage degrees among different ages, the cardiac damage of age group under 3 y old is relatively severer, especially those infants under 1 y old. Although compared with the age group of under 1 y old, that of under 6 y old has more number of infections, with lighter cardiac damage degree. According to the comparison between the age group of under 3 y old and that of older than 6 y old, the MP infection leads to difference on myocardial enzyme rise. The IgG, IgM and Circulating Immune Complexes (CIC) levels of child patients after MP infection are significantly increased, and the addiment C3 and CH50 have sharp declines, indicating that the immune injury mediated by immune complex participates in MP infection. As the antigen, MP stimulates the human body to generate specific antibody, forming immune complex, and

the addiment activates the immune cells to generate larger immunological effect. Therefore, CIC level keeps a rise and accumulates in blood vessels of different viscera, generating inflammatory injury in corresponding viscera. It leads to multiple clinical symptoms and organ dysfunction, resulting in immune system damage and multi-organ injury, which is one of the reasons for the low MPP disease-resistant functions of infants.

In conclusion, infants usually have severer combined cardiac damage; therefore, it is necessary to detect the changes on myocardial enzyme in time and give myocardium nutrition medicine for treatment during the treatment of the protopathy, so as to avoid damages to myocardial cells of child patients to the maximum extent. The protection to functions of important organs is the important method to reduce infant fatality rate due to severe pneumonia and increase recovery rate.

Acknowledgement

This study was supported by Grants from the Natural Science Foundation of China (81570685) and the Youth Innovation Fund of the First Affiliated Hospital of Zhengzhou University.

References

1. Zhang T. Clinical analysis on treatment of 80 child patients of Mycoplasma pneumoniae pneumonia with azithromycin combined with erythromycin. *Local Med* 2011; 10: 34-35.
2. Shao X. Clinical comparative study on treatment of Mycoplasma pneumoniae pneumonia with azithromycin or erythromycin. *Health Care Chinese Women Child* 2012; 10: 73-74.
3. Zhang P. Analysis on 100 cases of cardiac damage caused by Mycoplasma Pneumoniae pneumonia. *Guide China Med* 2012; 19: 177-178.
4. Hu Y, Jiang Z. *Chu Fu Tang practical pediatrics (7th Vsn.)*. Beijing: Peoples Medical Publishing House 2010.
5. Dong Z. Correlation between pathogenic mechanism and treatment of Mycoplasma pneumoniae infection. *J Appl Clin Pediatr* 2007; 22: 243-245.
6. Kawatsu T. Mycoplasma pneumoniae pneumonias extrapulmonary complications. *Daetr Veal* 2003; 18: 160-164.
7. Wu Z. *Paediatric internal medicine (1st Edn.)*. Zhengzhou: Zhengzhou University Publisher 2003.
8. Checchia PA, Kulik TJ. Acute viral myocarditis: diagnosis. *Pediatr Crit Care Med* 2006; 7: 8-11.
9. Cardiovascular Group of Pediatric Branch of Chinese Medical Association. Diagnostic criteria of viral myocarditis (amendment). *Chinese J Pediatr* 2000; 38: 75.

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