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Clinical Analysis of 52 Cases of Benign Acute Childhood Myositis Associated with Influenza A Virus

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Abstract: ***Objective:*** *To investigate the clinical characteristics and treatment of benign acute childhood myositis (BACM) associated with influenza A virus.* ***Methods:*** *52 BACM children hospitalized in Rainbow Hospital of Xianyang City from March 1,2023 to June 1,2023 were selected. Their gender, age, etiology and clinical characteristics were collected, and their epidemiological characteristics were summarized. Blood biochemical results and the length of hospitalization of the children were collected, and the group using hormone was set as the observation group and the group without hormone as the control group to analyze the therapeutic effect of hormones on the children.* ***Results:*** *Fifty-two children, 37 male and 15 female, were included. Groups 4 to 5,5 to 6,6 to 7,7-8, and> 8 years, were 6,9,20,10 and 7, respectively. Clinical features: (1) Fever: a total of 52 cases, including 8 cases with low heat (37.3~38°C), 31 cases with medium (38.1~39°C), 13 cases with high fever (39.1~41°C), and 0 cases with ultra-high heat (> 41°C). (2) Fifty patients presented with calf muscle pain, and two children presented with calf combined with thigh muscle pain. (3) Respiratory symptoms: 45 cases, including 41 cough, 36 with nasal congestion and runny nose, and 1 case of wheezing. (4) Gastrointestinal symptoms: 12 cases, including 9 of vomiting and 5 of diarrhea. No levels of creatine kinase, myoglobin, lactate dehydrogenase, ALT, ALT, leukocytes, RBC cells, hemoglobin, platelets were present in the observation and control groupsSignificant difference (all P≥0.05). Creatine kinase, myoglobin, lactate dehydrogenase and hospital stay in the observation group after treatment were lower than those in the control group (P<0.05).* ***Conclusion:*** *BACM caused by influenza A mainly involves male children, mainly manifested as fever and calf muscle pain. The use of hormones has a significant effect on the decline of creatine kinase, myoglobin and lactate dehydrogenase, and can shorten the hospitalization of children.*

Keywords: Influenza A Virus, Benign Acute Childhood Myositis, Clinical Features.

1. Introduction

Acute benign myositis in children was first reported by Lundberg in 1957 as severe myalgia in the course of epidemic viral infection, and has been reported around the world [1]. This disease is caused by influenza virus, mainly involve lower limb muscle, with calf muscle group, followed by thigh muscle group, often occur suddenly at the beginning of sleep, can cause plantarflexion state and limp, serious person can cause rhabdomyolysis [2]. The etiology and mechanism are not clear. In order to explore the clinical characteristics of BACM caused by influenza A, 52 children with BACM caused by influenza A who were treated in the hospital from March 1,2023 to June 1,2023 were selected as the study objects, which are reported as follows.

2. Data and Methods

2.1 General Information

Retrospectively selected 52 children with BACM caused by influenza A hospitalized in Xianyang Rainbow Hospital from 1 March 2023 to 1 June 2023.

2.2 Inclusion Criteria:

1) The child tested positive for influenza A virus; 2) showed myalgia, limited limitation, abnormal walking gait; 3) significantly increased myocardial enzyme spectrum (creatine kinase>350U/L). Exclusion criteria: children with complicated neurological disease, infectious myocarditis, and progressive muscular dystrophy.

2.3 Observing Indicators

1) Fever, muscle pain sites, respiratory symptoms, and digestive tract symptoms were collected. 2) Auxiliary examination: blood biochemical results and hospital time of the children were collected, 24 children with hormones were set as the observation group, and 28 children without hormones were set as the control group to analyze the therapeutic effect of hormones on the children.

2.4 Statistical Methods

Data analysis was performed using the SPSS25.0 statistical software. Count data are presented as example (%); normally distributed measurement data as $x \pm s$, compared as t-test, non-normal distribution as median M (Q1, Q3), and non-parametric test for group comparisons.

2.5 Medical Ethics and Informed Consent

The study was approved by the Ethics Committee of Xianyang Rainbow Hospital (Approval No.: CHME20230122); the parents of the child were informed of the study content and written informed consent was obtained.

3. Results

3.1 Epidemiological Characteristics

37 males and 15 females. Groups 4 to 5,5 to 6,6 to 7,7-8, and > 8 years, were 6,9,20,10 and 7, respectively.

3.2 Clinical Characteristics

1) Fever: a total of 49 cases, including 5 cases with low heat (37.3~38℃), 31 cases with medium heat (38.1~39℃), 13 cases with high fever (39.1~41℃), and 0 cases with ultra-high heat (>41℃). 2) Fifty patients presented with calf muscle pain, and two children presented with calf combined with thigh muscle pain. 3) Respiratory symptoms: 45 cases, including 41 cough, 36 nasal congestion and runny nose, 1 wheezing, 4) Gastrointestinal symptoms: 12 cases, including 9 vomiting and 5 diarrhea.

3.3 Auxiliary Inspection

Among the cases, creatine kinase (CK) levels were less than 2000 U/L in 33 patients, between 2000 and 8000 U/L in 18 patients, and greater than 8000 U/L in 1 patient. Myoglobin levels were less than 200 ng/mL in 31 patients, between 200 and 1000 ng/mL in 15 patients, and greater than 1000 ng/mL in 6 patients. Lactate dehydrogenase (LDH) levels were less than 300 U/L in 11 patients, between 300 and 800 U/L in 39 patients, and greater than 800 U/L in 2 patients. Alanine aminotransferase (ALT) levels were less than 40 U/L in 32 patients, between 40 and 100 U/L in 11 patients, and greater than 100 U/L in 9 patients. Aspartate aminotransferase (AST) levels were less than 40 U/L in 4 patients, between 40 and 100 U/L in 23 patients, and greater than 100 U/L in 25 patients. White blood cell (WBC) counts were less than 4×10^9/L in 9 patients, between 4 and 10×10^9/L in 40 patients, and greater than 10×10^9/L in 3 patients. Red blood cell (RBC) counts were less than 3.5×10^{12}/L in 2 patients and between 3.5 and 5.5×10^{12}/L in 50 patients. Hemoglobin levels ranged between 110 and 160 g/L in all 52 patients. Platelet counts were between 100 and 300×10^9/L in 44 patients and greater than 300×10^9/L in 8 patients.

3.4 Therapeutic Effects of Hormones

The comparison of creatine kinase, myoglobin, lactate dehydrogenase, glutamate transaminase, ALT, transaminase, leukocytes, red blood cells, hemoglobin, and platelets was not significant (P> 0.05). After treatment, creatine kinase was 69 (54.50,91.75)U/L, myoglobin 18.45 (15,26)ng/mL, lactate dehydrogenase 194 (160.20,229.50)U/L, glutamate transaminase 24 (15,31)U/L, glutamate transglutamase 31 (28.25,35)U/L, leukocyte 5.47 (5.09,6.35) $\times 10^9$/L, red blood cells 4.66 (4.61,4.88)$\times 10^{12}$/L, hemoglobin 136.22 ± 8.40 g/L, and platelet 290.70 ± 69.58$\times 10^9$/L. The control creatine kinase was 159 (90,252.25) U/L, myoglobin 27.15 (23,39.95) ng/mL, lactate dehydrogenase 252.5 (232.25,297.00)U/L, ALT 21.50 (15.25,36.50)U/L, glutamate transaminase 33 (25.25,47.75)U/L, leukocyte 5.22 (4.69,6.41)$\times 10^9$/L, red blood cells 4.66 (4.52,4.88) $\times 10^{12}$/L, hemoglobin 129.71 ± 9.99 g/L, and platelet 247.58 ± 65.78 $\times 10^9$/L. Creatine kinase, myoglobin and lactate dehydrogenase were low compared to the control group, and were statistically significant (P<0.05). The hospital stay of 4 (4,5) days in the observation group and 6 (4,7.75) days in the control group was lower than that of the control group, which was statistically significant (P<0.05). The comparison of the two remaining indicators was not statistically significant (P>0.05).

4. Discussion

Influenza virus infection is one of the clinical diseases, mostly occur in spring and winter two seasons, the main manifestations of upper respiratory symptoms, a few patients can appear lower respiratory symptoms, even non-respiratory manifestations, such as myositis, myocarditis and encephalomyelitis [3-5]. Childhood BACM was first found to be a Swiss pediatric patient, which is a benign self-limiting disease, BACM can be divided into two types: autoimmune myositis and infectious myositis, the former is mostly caused by autoimmune reactions, including immune-mediated necrotizing myositis, polymyositis and dermatomyositis, which are relatively rare; the latter is mostly caused by inflammatory reactions after infection with pathogenic microorganisms, including parasitic myositis, viral myositis, pyomyositis and mycoplasma myositis, patients with mild symptoms, quick recovery, and good prognosis [6]. Once BACM occurs in children, myalgia symptoms can appear in the initial stage, often accompanied by fever, some may appear rash, abnormal gait and so on [7]. BACM often occurs after viral infection. This study aims to analyze BACM caused by regional influenza A virus infection, summarize clinical characteristics and laboratory characteristics, explore the treatment effect of hormone use on this disease, and summarize them, so as to lay a good foundation for future research in BACM. To improve the prognosis.

4.1 Epidemiology of Influenza A Virus

The influenza virus is a single-stranded RNA virus belonging to the Orthomyxoviridae family, comprising four types: A, B, C, and D. Types A and B primarily infect humans, causing seasonal epidemics. Humans lack innate immunity against these viruses, particularly children, with an annual infection rate of 20% to 30% [8]. Since the 2009–2010 H1N1 outbreak in China, only a minor epidemic was reported in 2014 [9]. Previous studies [10-12] have indicated that infection with the influenza B virus predominates among the etiologies of BACM. However, in this study, cases of BACM in children occurred in the context of the influenza season in the Xianyang region and were all secondary to influenza A virus infection.

4.2 Pathogenesis

The pathogenesis is not clear, which may be the highly reactive inflammatory damage or immune damage in the muscle after the virus infection, or the direct damage to the muscle tissue by the virus. A retrospective study found that the disease mostly occurred in preschool and school-aged male children. This study found 37 male cases, or 71.1%, with a mean age of 5.9 years, consistent with the above study [13].The reason may be related to the fact that male muscles are more developed than women, and the virus directly damages muscle tissue and replicates in muscle cells [14], So men are at greater risk of developing the disease, and it may also be related to genetic factors or other metabolic disorders [15].

4.3 The Findings of the Previous Studies

Myalgia formed by viral infection is more often seen in the

symptoms of respiratory tract infection, some of which can be caused by digestive tract infection. Its main symptoms are fever, cough, nasal congestion, and runny nose [16]. In this study, 52 children had fever, accounting for 100%, 45 children had accompanying respiratory symptoms, accounting for 86.5%, and 12 children had gastrointestinal symptoms, accounting for 23.1%. Consistent with the previous studies. In this study, it was found that creatine kinase in children increased to varying degrees, with creatine kinase up to 9066 U / L, and this study was consistent with the conclusions of previous studies [17, 18]. The study found that the use of hormone children compared with not use hormone children after treatment of creatine kinase, myoglobin, lactate dehydrogenase recovery level better, shorter hospitalization, the use of hormone drugs in virus infection caused by BACM treatment play a significant positive role, previous studies also showed in severe muscle pain caused by virus infection children after use of hormones, symptoms can ease significantly [19].

In conclusion, BACM caused by influenza A virus mainly involves male children, mainly manifested as fever and calf muscle pain, and respiratory symptoms and digestive tract symptoms are also common. The use of hormones has a significant effect on the decline of creatine kinase, myoglobin and lactate dehydrogenase, and can shorten the hospital stay of children.

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