



Clinical Analysis of Occurrence of Coronary Artery Aneurysm in 426 Children with Kawasaki Disease

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Abstract

Objectives: To analyze the clinical features of children with Kawasaki Disease (KD) complicated with coronary artery aneurysm.

Methods: The clinical data, laboratory examination, echocardiography and treatment of 17 children were retrospectively analyzed, who were diagnosed as coronary artery aneurysm in the 426 children with KD admitted to the Children's Hospital of Shaanxi Provincial People's Hospital from December 2013 to March 2018.

Results: 1). The 17 (4.0%) children of the 426 KD children had coronary artery aneurysm. The mean age of onset was 2.0 ± 2.5 years old, and the incidence of coronary artery aneurysm in children aged 1 to 3 was the highest, accounting for 29.4%. The morbidity of males was significantly higher than that of females, and the ratio of males to females was 4:1. 2). In the distribution of coronary artery involvement, bilateral coronary artery involvement was the most common (47.1%), left coronary artery involvement alone accounted for 23.5%, and right coronary artery involvement alone accounted for 29.4%. 3). The time of finding coronary artery aneurysm was mostly within 2 weeks, and the average time of finding coronary artery aneurysm was 9.9 ± 4.4 days. 4). There was no significant difference between the degree of increase of ESR within 1 week and 2 weeks of the course of disease. After admission, the CRP level in 8 cases was significantly higher than normal, and in 10 cases became normal at discharge, the CRP level at discharge was significantly lower than that after admission. Coronary artery aneurysms were detected by echocardiography mostly within 2 weeks; coronary artery aneurysms appeared to be mostly affected by both coronary arteries; the proportion of primary infusion of gamma globulin was the highest.

Conclusion: For males and 1 to 3 years old children with KD should be alert to the occurrence of coronary artery aneurysm, and Intravenous Gamma Globulin (IVIG) should be applied as soon as possible.

Keywords: Kawasaki disease; Coronary artery aneurysm; Echocardiography; Mucocutaneous lymphnode syndrome

Introduction

Kawasaki Disease (KD), also known as muco-cutaneous lymph node syndrome, is an acute febrile rash disease characterized by systemic vasculitis, which mainly occurs in children under 5 years old. Tomisaku Kawasaki first reported KD in Japan in 1967 by descriptive statistics of the clinical manifestations of 50 children and the etiology and pathogenesis of KD are still unclear. KD has been reported among children of almost all races and has increased year by year in recent years. Undiagnosed and untreated KD in childhood may affect health care delivery systems in developing countries in the long term [1]. Coronary artery damage is the most serious complication of KD, and the incidence of coronary artery injury in children with untreated or untimely treated KD is up to 20% to 25% [2]. In developed countries, KD has replaced rheumatic fever as the leading cause of acquired heart disease in children. This study retrospectively analyzed the clinical data of children with KD complicated with coronary artery aneurysm, summarized its clinical features to improve the clinician's understanding of KD with coronary artery aneurysm.

Materials and Methods

General information

A total of 426 cases of children with KD admitted to the Children's Hospital of Shaanxi

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Provincial People's Hospital from December 2013 to March 2018 was selected. Among them, 17 patients were diagnosed with coronary artery aneurysm by echocardiography (including the newly diagnosed children in our hospital and the children with coronary artery aneurysm diagnosed in other hospitals for further treatment in our hospital). Clinical data of KD children with coronary aneurysm were collected.

Methods

The age, gender, major clinical manifestations, laboratory findings (including CRP, ESR, PLT), ultrasound examination results (including coronary artery aneurysm detection time and coronary artery involvement), IVIG treatment methods and effects were retrospectively recorded and analyzed in KD children with coronary artery aneurysm.

Diagnostic criteria for KD and coronary artery aneurysm

The diagnosis of KD is based on the diagnosis, treatment and long-term management guideline for Kawasaki disease issued by the American Heart Association in 2004 [3], that is, clinical diagnosis can be made with at least 5 of the 6 main clinical manifestations; if 5 items are not satisfied, but echocardiography or cardiovascular angiography confirms coronary artery aneurysm or coronary artery dilatation, except for other diseases at the same time. Complete KD can also be diagnosed. Unexplained fever for 5 days or more combined with 2 or 3 typical KD clinical features may be considered incomplete KD. The diagnosis criteria for coronary artery aneurysm: The ratio of the inner diameter of the coronary artery expansion segment to the adjacent segment is greater than 1.5, among which, the inner diameter of the aneurysm <5 mm is a small coronary artery aneurysm, 5 mm to 8 mm is a medium coronary artery aneurysm and >8 mm is a giant coronary artery aneurysm [4].

Statistical processing

EpiDate software was used to establish a data base and the data was entered in parallel and checked. Statistical analysis was performed using SPSS 20.0 software and the significance test level was $P < 0.05$. The measurement data in accordance with the normal distribution were expressed as mean \pm standard deviation ($\bar{x} \pm s$) and the mean value was compared by t test. The counting data was expressed by the number of cases (percentage) and compared by χ^2 test.

Results

Basic information

There were 13 males and 4 females in 17 patients and the ratio of male to female was 4/1; the age of onset was from 3 months to 7 years old and the average age was 2.0 ± 2.5 years old, among which, 5 cases (29.4%) were less than 1 year old, 8 cases (47.1%) were 1 to 3 years old, 1 case (5.9%) was 4 to 5 years old, 3 cases (17.6%) were >5 years old.

Clinical manifestations

There were 13 cases of fever ≥ 5 days, 9 cases of bilateral conjunctival congestion (no exudates), 8 cases of lip and oral manifestations (labial redness and chapped, bayberry tongue, diffuse hyperemia), 7 cases of limb changes (redness of palm, plantar and finger tip, toe end nail bed and skin membrane like peeling during recovery), 9 cases of cervical lymph node enlargement, 11 cases of skin manifestation (pleomorphic erythema, scarlet fever rash and perianal skin redness, desquamation).

Laboratory test results

ESR: A 1 week after admission (50 to 100 mm/h 4 cases, >100

mm/h 2 cases) and within 2 weeks of the disease (50 to 100 mm/h 3 cases, >100 mm/h 1 case), the rest were not examined.

CRP: After admission <50 mg/L 3 cases, 50 to 100 mg/L 3 cases, >100 mg/L 5 cases and the rest were not examined. At the time of discharge <50 mg/L 10 cases and others were not examined.

Among the 17 children with Kawasaki disease with coronary artery aneurysm, there was no significant difference in the degree of increase of ESR between 1 week and 2 weeks. After admission, 8 cases of CRP were significantly higher than normal, 6 cases were not examined, 10 cases were normal at discharge and 7 cases were not examined. The CRP level at discharge was significantly lower than that after admission.

Ultrasound examination results

Time of detection of coronary artery aneurysm in the course of disease: 1 case within 1 week, 12 cases within 2 weeks and 4 cases more than 1 month. Coronary artery aneurysms were usually detected within 2 weeks of the course of disease. Coronary artery involvement: There were 8 cases of bilateral coronary aneurysms, 4 cases of left coronary aneurysm alone, 5 cases of right coronary aneurysm alone. Bilateral coronary artery involvement was the most common.

Treatment of gamma globulin

The 7 cases were injected with gamma globulin once, 5 cases were injected with gamma globulin twice, 3 cases were given glucocorticoids after the first dose of gamma globulin were insensitive and 2 cases were given glucocorticoids after the second dose of gamma globulin were insensitive. The proportion of primary infusion of gamma globulin was the highest.

Discussion

Kawasaki disease is a muco-cutaneous lymph node syndrome which commonly occurs in children under 5 years old, and more sick boys than girls, which may be related to the male specific FCGR2A susceptibility gene [5]. The essence of Kawasaki disease is systemic vasculitis which has not yet been diagnosed in developing countries [6]. The most serious and common complication of Kawasaki disease is coronary artery lesions and the incidence of coronary artery lesions in untreated KD is 20% to 25% [2]. Coronary artery dilatation and coronary artery aneurysm both belong to coronary artery lesions and coronary artery aneurysm is severe coronary artery dilatation. The incidence of coronary artery aneurysm decreased significantly after high dose Intravenous Gamma Globulin (IVIG) was used in the treatment of KD in the acute stage. According to the investigation data of KD epidemiology in Beijing from 2000 to 2004, the incidence of coronary artery aneurysm has decreased to 4.3% [3]. It has been reported in the literature that age ≤ 1 year old and male patients are risk factors for coronary artery lesions in Kawasaki disease [7]. Children with incomplete KD with a duration of fever >10 days are more likely to develop coronary artery aneurysm, which is consistent with the characteristics of coronary artery injury in KD children [8]. In 1993, a survey for children with Kawasaki disease in 652 hospitals in Japan found that children who received IVIG after 9 days of disease had a higher risk of cardiac sequelae [9], and there is constant research to confirm this point of view [10]. The 2017 AHA Guideline recommends that IVIG should be actively used to treat Kawasaki disease within 10 days of the course of disease [11]. This study showed that there were significantly more males than females in KD children complicated with coronary artery aneurysm, with a male to female ratio of 4:1. From the age of onset, children aged 1 to 3

were significantly more than other age groups. There were 17 children complicated with coronary artery aneurysm in 426 children with Kawasaki disease, accounting for 4% of the total. Most of the 17 cases of KD with coronary artery aneurysm were found within 2 weeks of the course of disease. Although the incidence of coronary artery aneurysm has significantly reduced after the application of IVIG in the acute phase of KD, once coronary artery aneurysm occurs, it will affect the physical and mental health of the child in different degrees. Identifying risk factors for coronary artery aneurysm early in the acute phase of KD will help prevent coronary artery aneurysm. Therefore, timely diagnosis and treatment of Kawasaki disease is one of the important means to reduce the occurrence of coronary artery aneurysm.

Conclusion

In summary, medical staff should improve their understanding of Kawasaki disease, improve the diagnostic procedure for Kawasaki disease and perform cardiac ultrasound early to determine coronary artery conditions. Special attention should be paid to the early identification and treatment of incomplete Kawasaki disease, which is one of the important means to reduce the occurrence of coronary artery aneurysm. There were few cases of coronary artery aneurysm in this study and the follow-up time was short. It is expected that large sample, multicenter, long-term follow-up clinical studies.

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