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Exploratory Study on the Use of Echocardiography Combined with Blood-Related Test Parameters in the Diagnosis and Treatment of Kawasaki Disease in Children

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Abstract

Objective: This study aims to explore the application of echocardiography combined with blood-related detection indicators in the diagnosis and treatment of Kawasaki disease in children, assessing the potential advantages of this combined diagnostic method for early diagnosis, disease monitoring, and evaluation of treatment efficacy, thereby providing more effective treatment strategies. **Methods:** The study included 50 children diagnosed with Kawasaki disease as the study group, and 50 children with upper respiratory infections as the control group. Both groups underwent echocardiographic examinations to assess cardiac structure and function, while monitoring changes in blood-related inflammatory markers. The differences in echocardiographic and blood-related indicators before and after treatment between the two groups were compared. **Results:** Echocardiography effectively assessed the cardiac structure and function of children with Kawasaki disease. It was found that the ejection fraction (EF) in the treatment group significantly decreased from 69.94 ± 5.93% before treatment to 65.70 ± 5.56% after treatment (P = 0.0019), while the control group showed no significant change (from 70.94 ± 6.27% to 69.18 ± 6.14%, P = 0.2073). The aortic diameter (AO) in the treatment group increased from 12.85 ± 2.77 mm to 13.17 ± 2.41 mm (P = 0.0000), while in the control group it decreased from 18.58 ± 6.66 mm to 17.64 ± 6.83 mm (P =

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0.0000), indicating potential vascular remodeling. In terms of blood indicators, the C-reactive protein (CRP) in the treatment group significantly decreased from 65.82 ± 81.31 mg/L to 14.03 ± 17.94 mg/L (P = 0.028), while in the control group, CRP decreased from 30.66 ± 47.78 mg/L to 8.17 ± 11.71 mg/L (P = 0.0049). Other inflammatory markers, such as procalcitonin (PCT), also showed corresponding changes. **Conclusion:** This study demonstrates that echocardiography combined with blood-related detection indicators has significant application prospects in the diagnosis and treatment of Kawasaki disease in children. This combined diagnostic approach not only helps improve the diagnostic accuracy and treatment efficacy of Kawasaki disease but also offers new insights for individualized treatment. Further promotion and in-depth research of this combined diagnostic strategy will contribute to optimizing the clinical management of Kawasaki disease in children, improving patient prognosis and quality of life.

Keywords

Echocardiography, Blood Indicators, Children, Kawasaki Disease, Heart

1. Introduction

Kawasaki disease is a systemic vasculitis predominantly affecting children, characterized by symptoms such as high fever, rash, conjunctivitis, and limb swelling, with a propensity for cardiovascular complications like coronary artery aneurysms [1] [2]. Early symptoms of Kawasaki disease mimic those of other infectious diseases, leading to potential misdiagnosis or delayed diagnosis. Treatment necessitates prompt and individualized care to prevent severe complications. Echocardiography offers advantages in assessing cardiac structure and function, while blood-related markers can reflect inflammation activity and myocardial damage. Current research on the diagnosis and treatment of Kawasaki disease in children still exhibits certain shortcomings, lacking a comprehensive evaluation approach [3]-[5].

This study aims to explore the application of echocardiography combined with blood-related markers in the diagnosis and treatment of Kawasaki disease in children. Through this research, we aim to provide new methods and evidence for early diagnosis, disease monitoring, and treatment effectiveness assessment, ultimately improving the prognosis and quality of life for children with Kawasaki disease. The unique nature of Kawasaki disease and its diagnostic and therapeutic challenges drive us to explore more accurate and effective diagnostic and treatment modalities. The significance of this study lies in the integration of echocardiography and blood-related markers, offering a fresh perspective and approach to the diagnosis and treatment of Kawasaki disease in children, with the potential to enhance prognosis, reduce complications, and improve survival quality. This research will address current research gaps, providing more precise diagnostic and

therapeutic strategies for clinical practice, thus holding crucial implications for enhancing the health outcomes of children with Kawasaki disease.

2. Materials and Methods

2.1. Study Subjects

This study utilized a prospective cohort design, recruiting 50 cases that met the inclusion criteria from the pediatric outpatient and inpatient departments of Baise Maternal and Child Health Hospital and Laibin People's Hospital. Among the participants, there were 33 males and 17 females, aged between 2 and 11 years, with a mean age of (5.16 ± 2.26) years. An additional 50 children with upper respiratory tract infections were selected as the control group, consisting of 34 males and 16 females, aged between 1 and 9 years, with a mean age of (5.14 ± 2.60) years. There were no statistically significant differences in gender distribution between the two groups ($P > 0.05$), and the comparison of mean ages also showed no significant differences ($P > 0.05$). Informed consent was obtained from the guardians of all patients and healthy children undergoing health check-ups, and the study was approved by the hospital's ethics committee. See Table 1 below.

Table 1. Comparison of age and gender between control and treatment groups.

Group	Sample Size	Gender		Age
		Male	Female	
Control Group	50	34	16	5.14 ± 2.60
Treatment Group	50	33	17	5.16 ± 2.26
χ^2 or t	—	0.0452		0.0411
P	—	0.8316		0.1837

2.2. Research Methods

According to the International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) and related guidelines [6]-[10], echocardiographic examinations and monitoring of blood-related indicators were performed. The procedures were conducted by experienced medical imaging specialists and clinical laboratory technicians to ensure accuracy and comparability. Echocardiography was used to assess the size, shape, and motion of the heart chambers. Cardiac function indicators, such as ejection fraction (EF) and cardiac output, were measured to evaluate the heart's pumping function. The morphology and blood flow of the coronary arteries were observed to detect any abnormal dilatation or aneurysm in a timely manner. Inflammatory markers such as SAA, IL-6, PCT, and CRP were monitored to reflect the level of inflammatory activity. By applying these methods and standards, the research team aimed to comprehensively assess the cardiac structure, function, and inflammation in children with Kawasaki disease, providing reliable data support for the study's objectives and conclusions.

2.3. Inclusion Criteria [2]

1) Typical clinical manifestations: Fever lasting ≥5 days (persistent high fever); Oral mucosal inflammation: Congestion and ulceration of oral and pharyngeal mucosa; Bilateral conjunctivitis, conjunctival congestion, and inflammation; Erythema of the hands and feet, bilateral non-purulent erythema and edema of the hands and feet; Rash, polymorphic rash, possibly accompanied by maculopapular or papular lesions. 2) Supportive auxiliary examinations: Laboratory tests showing elevated white blood cell count, increased proportion of neutrophils, elevated platelet count, elevated CRP, etc. 3) Cardiac ultrasound: Coronary artery abnormalities, myocardial dysfunction, etc. Exclusion of other diseases: Exclusion of infectious diseases that may cause similar symptoms; Exclusion of other autoimmune diseases and drug allergies, etc.

2.4. Exclusion Criteria [2]

1) Significant cardiovascular diseases: Congenital heart disease, myocarditis, and other cardiovascular diseases. 2) Metabolic diseases: Severe metabolic diseases such as diabetes, hyperthyroidism, etc. 3) Other systemic diseases: Severe systemic diseases such as systemic lupus erythematosus, etc. 4) Others: Other conditions that may interfere with diagnosis or intervention of treatment.

2.5. Statistical Analysis

Statistical analysis was conducted using SPSS version 29.0 statistical software to describe the basic characteristics of the study sample, such as age, gender distribution, etc. Descriptive statistics were used to analyze the clinical characteristics, echocardiographic parameters, and blood test indicators of patients in each group, including mean values, standard deviations, etc. Comparative analysis was performed using t-tests, analysis of variance (ANOVA), or non-parametric tests (such as Wilcoxon rank-sum test) to compare the differences in echocardiographic parameters and blood test indicators between different groups. Paired t-tests or Wilcoxon signed-rank tests were used to compare the changes in indicators before and after treatment within the same group of patients. Correlation analysis (such as Pearson correlation coefficient) was used to explore the relationship between echocardiographic parameters and blood test indicators, and to study the associations between treatment outcomes and various indicators. Multiple linear regression analysis was conducted to investigate factors influencing echocardiographic parameters and blood test indicators. Logistic regression was used to predict treatment outcomes or the occurrence of adverse events. Kaplan-Meier survival curve analysis was performed to evaluate the relationship between echocardiographic and blood test indicators and prognosis of the study subjects. Multivariate statistical methods (such as covariance analysis, multivariate analysis of variance) were used to control for potential confounding factors and validate the robustness of the research findings. Sensitivity analysis was conducted to assess the stability of different methods or parameters and verify the reliability of the research conclusions.

3. Results

3.1. Comparison of Imaging-Related Indicators before and after Treatment between the Two Groups

The treatment group showed a significant decrease in ejection fraction (EF), from 69.94 ± 5.93% before treatment to 65.70 ± 5.56% after treatment (P = 0.0019). In contrast, the control group exhibited no significant change (from 70.94 ± 6.27% to 69.18 ± 6.14%, P = 0.2073), indicating that the treatment may have an impact on cardiac function. Additionally, there were significant changes in aortic diameter (AO) in both groups; the treatment group increased from 12.85 ± 2.77 mm to 13.17 ± 2.41 mm (P = 0.0000), while the control group decreased from 18.58 ± 6.66 mm to 17.64 ± 6.83 mm (P = 0.0000), suggesting potential vascular remodeling. For the left main coronary artery (LMCA), the treatment group showed a significant reduction, from 2.29 ± 0.59 mm to 2.11 ± 0.42 mm (P = 0.0043), while the control group decreased from 2.49 ± 0.52 mm to 2.33 ± 0.40 mm (P = 0.0376). Changes in the right main coronary artery (RMCA) were not statistically significant in either group. Overall, these results highlight the significant differences in imaging-related indicators between the treatment and control groups, indicating the need for further research into their potential causes and effects. Please refer to Table 2 for details.

3.2. Comparison of Laboratory-Related Indicators before and after Treatment between Two Groups

Laboratory test results indicated that markers in both groups changed significantly, with levels of procalcitonin (PCT) and C-reactive protein (CRP) markedly decreasing in both the treatment and control groups. Specifically, the reduction in CRP in the treatment group was particularly pronounced, decreasing from 65.82 ± 81.31 mg/L before treatment to 14.03 ± 17.94 mg/L after treatment (P = 0.028), suggesting that the treatment may effectively reduce inflammatory responses. In the control group, CRP levels decreased from 30.66 ± 47.78 mg/L to 8.17 ± 11.71 mg/L (P = 0.0049). Although changes in other laboratory indicators (such as SAA and IL-6) were not statistically significant, these results still warrant further investigation to understand the clinical significance and potential benefits of the treatment. Please refer to Table 3 for details.

Table 2. Comparison of imaging-related indicators before and after treatment between the two groups.

Group	EF (%) Before	EF (%) After	AO (mm) Before	AO (mm) After	LMCA (mm) Before	LMCA (mm) After	RMCA (mm) Before	RMCA (mm) After
Control Group	70.94 ± 6.27	69.18 ± 6.14	18.58 ± 6.66	17.64 ± 6.83	2.49 ± 0.52	2.33 ± 0.40	2.30 ± 0.52	2.12 ± 0.41
Treatment Group	69.94 ± 5.93	65.70 ± 5.56	12.85 ± 2.77	13.17 ± 2.41	2.29 ± 0.59	2.11 ± 0.42	2.12 ± 0.62	2.01 ± 0.44
t	0.8194	2.9707	5.8133	4.3641	1.7982	2.6821	1.5729	1.2933
P	0.2073	0.0019	0.0000	0.0000	0.0376	0.0043	0.0595	0.0995

Table 3. Comparison of laboratory-related indicators before and after treatment between two groups.

Group	SAA (Before)	SAA (After)	IL-6 (Before)	IL-6 (After)	PCT (Before)	PCT (After)	CRP (Before)	CRP (After)
Control Group	101.22 ± 101.59	15.31 ± 29.40	107.48 ± 110.34	16.88 ± 31.40	0.72 ± 1.25	0.11 ± 0.24	30.66 ± 47.78	8.17 ± 11.71
Treatment Group	117.87 ± 114.14	23.34 ± 31.61	123.75 ± 128.47	24.83 ± 32.95	1.03 ± 1.58	0.30 ± 0.50	65.82 ± 81.31	14.03 ± 17.94
t	0.7705	1.1353	0.6793	1.2351	1.088	2.4224	2.6362	1.9342
P	0.2214	0.0957	0.2493	0.1099	0.1396	0.0086	0.0049	0.028

4. Discussion

Kawasaki disease is a common systemic vasculitis that primarily affects children, especially those of Asian descent [11] [12]. The exact etiology remains unclear, but it may be related to autoimmune responses, with environmental factors potentially triggering the disease. Certain viral or bacterial infections are thought to be possible precipitants of Kawasaki disease, although there is no definitive evidence to indicate that pathogens are direct causative agents. The disease primarily occurs in children under 5 years of age, particularly in infants under 2 years old, with peaks in incidence during the spring and winter seasons. Children of Asian descent, especially those from Japan and South Korea, have a higher incidence, but cases have been reported globally. Clinically, Kawasaki disease is characterized by persistent fever, which is one of its most prominent symptoms, often lasting several days and being difficult to resolve. Other manifestations include a polymorphic rash, commonly associated with redness and swelling of the palms and soles; conjunctivitis, with conjunctival injection and redness being common ocular findings; oral changes such as strawberry tongue and pharyngeal erythema; lymphadenopathy, particularly cervical lymph node enlargement; and cardiovascular involvement, with the most severe complication being coronary artery aneurysms, which can lead to heart dysfunction and even sudden cardiac death. In summary, Kawasaki disease is a systemic illness with diverse clinical manifestations [13]-[15], including persistent fever, rash, conjunctivitis, and oral inflammation. Timely diagnosis and treatment are crucial for preventing serious complications.

Currently, there are several challenges and issues that need to be addressed in the diagnosis of Kawasaki disease. The diagnostic criteria for Kawasaki disease are not clear enough, and the diagnosis largely relies on clinical features such as persistent fever and rash, which can also be present in other infectious diseases, leading to potential confusion with other conditions [16] [17]. The lack of specific biomarkers or diagnostic methods makes the diagnosis of Kawasaki disease sometimes challenging. Early diagnosis of Kawasaki disease is difficult due to the nonspecific early symptoms, which can easily be misdiagnosed as more common illnesses, resulting in delayed diagnosis and treatment. Early diagnosis of Kawasaki disease is crucial as early treatment can reduce the incidence of coronary artery

aneurysms and other complications. Kawasaki disease may manifest differently in different populations, and there may be variations in the presentation of the disease in patients of different age groups, which adds complexity to the diagnosis. In infants and young children, Kawasaki disease may have atypical clinical manifestations, leading to potential misdiagnosis. Monitoring for disease recurrence and treatment response in Kawasaki disease is important, as some patients may experience disease recurrence, especially during treatment. Currently, there is a lack of effective methods to monitor treatment response and predict disease progression, necessitating more reliable biomarkers and imaging methods to assist in diagnosis and treatment. The exact etiology and pathogenesis of Kawasaki disease are not fully understood, despite extensive research, which limits a comprehensive understanding of the disease for diagnosis and treatment [18]-[20]. In conclusion, there are numerous challenges and unresolved issues in the diagnosis of Kawasaki disease, including unclear diagnostic criteria, difficulty in early diagnosis, variations in disease presentation among different populations, challenges in monitoring recurrence and treatment response, and uncertainty regarding etiology and pathogenesis. Future research and clinical practice need to address these issues to provide better solutions.

Echocardiography plays a crucial role in the diagnosis of Kawasaki disease, especially in detecting cardiac abnormalities and monitoring disease progression. Echocardiography can help physicians identify myocarditis, pericarditis, and other cardiac inflammations in Kawasaki disease patients by assessing the movement of the heart walls and the pericardium around the heart. It evaluates cardiac systolic and diastolic function, including left ventricular function, valvular function, etc., to determine if there is any impairment in cardiac function. Echocardiography is a primary method for detecting the formation of coronary artery aneurysms, assisting in the timely identification of coronary artery dilatation and abnormalities to evaluate the severity and location of coronary aneurysms. By conducting regular echocardiography examinations, physicians can track the progression of coronary aneurysms, monitor disease evolution, and guide adjustments and optimizations of treatment plans. The results of echocardiography provide critical information for physicians to personalize treatment plans, adjusting medication, surgical interventions, or other treatments based on changes in cardiac conditions to maximize the protection of cardiac function and prevent complications in Kawasaki disease patients. In the long-term management of Kawasaki disease patients, echocardiography serves as a safe, non-invasive method to monitor changes in cardiac conditions regularly, promptly identify potential issues, and ensure timely interventions and treatments. In conclusion, the importance of echocardiography in the diagnosis of Kawasaki disease lies in detecting cardiac abnormalities, monitoring disease progression, guiding treatment decisions, and long-term follow-up. It provides essential information for physicians to ensure patients receive timely diagnosis, treatment, and management. If you have more questions or need further discussion, please feel free to let me know.

Blood-related testing parameters play a crucial role in the diagnosis and prognosis assessment of Kawasaki disease, as they provide key information about disease activity, inflammation severity, and patient prognosis. CRP is an inflammation marker, and its levels usually elevate during Kawasaki disease onset. The increase in CRP levels is closely associated with disease activity and inflammation severity. Monitoring CRP levels can help assess the severity of inflammation and treatment effectiveness. White blood cell count is another common inflammation indicator, and Kawasaki disease patients typically exhibit elevated white blood cell counts. The increase in white blood cell count reflects the body's immune response to inflammation. In Kawasaki disease patients, an increase in platelet count may be related to inflammation activity and vascular damage. Abnormal platelet counts can indicate the extent of the inflammatory response and the risk of clot formation. ESR is a non-specific inflammation marker, and its elevation can indicate the presence of an inflammatory response. In Kawasaki disease, an elevated ESR can serve as one of the indicators of inflammation activity. In Kawasaki disease patients with myocardial damage or cardiac dysfunction, the detection of cardiac biomarkers such as troponin and BNP can provide information on the extent of myocardial injury and cardiac function status, which is crucial for prognosis assessment and treatment plan formulation. By monitoring the above blood parameters, physicians can better evaluate the disease activity, inflammation severity, and prognosis of Kawasaki disease patients, guiding the selection and adjustment of treatment plans. These parameters can serve as auxiliary diagnostic tools to help physicians gain a more comprehensive understanding of the patient's condition and provide personalized treatment plans. In Kawasaki disease children, blood-related testing parameters typically exhibit characteristic changes that are significant for the diagnosis and disease monitoring [2] [11]. White blood cell count usually increases during Kawasaki disease onset, as it is a typical response of the body to inflammation. The elevated white blood cell count reflects the inflammatory status of the body, indicating the presence of inflammation in the child. CRP is an inflammation marker, and in Kawasaki disease children, CRP levels usually significantly elevate. The increase in CRP indicates the body's inflammatory response and serves as an important indicator for evaluating inflammation activity and monitoring treatment effectiveness. In Kawasaki disease children, platelet count may show an increasing trend. The increase in platelet count may be related to inflammation response and vascular damage, indicating the presence of inflammation in the child. These typical parameter changes reflect the inflammatory response and immune system activity in Kawasaki disease children, providing guidance for diagnosis and monitoring of disease progression. In addition to the above parameters, other indicators, such as erythrocyte sedimentation rate (ESR), cardiac biomarkers, etc., can also provide additional information. Comprehensive analysis of these parameter changes can help physicians better understand the child's condition and formulate appropriate treatment plan [21]-[23].

The combined use of echocardiography and blood test parameters in the diagnosis and treatment of Kawasaki disease can provide doctors with more comprehensive and accurate information, thus better guiding the selection of treatment plans and monitoring disease progression. Early diagnosis and monitoring of disease progression, echocardiography can help evaluate the structure and function of the heart, promptly detect potential cardiac complications in Kawasaki disease patients, such as coronary artery abnormalities. Blood test parameters such as CRP, white blood cell count, etc., can reflect the activity of inflammation, helping doctors assess the severity of the disease and treatment effectiveness. Personalized treatment plans, combined with echocardiography and blood test parameters, can help doctors tailor individualized treatment plans, adjusting medication or surgical intervention plans based on the specific conditions of the patient. Monitoring treatment effectiveness, the combined use of these two diagnostic methods can help doctors monitor treatment effectiveness, adjust treatment plans, timely assess disease progression, and prevent complications [1] [17]. Prognostic evaluation, the comprehensive application of echocardiography and blood test parameters can help doctors assess the prognosis of patients, predict potential complications, and guide the development of long-term management and follow-up plans. By leveraging the advantages of combining echocardiography and blood test parameters, doctors can have a more comprehensive understanding of the patient's condition, improve diagnostic accuracy, treatment specificity, and ultimately enhance the prognosis and quality of life of Kawasaki disease patients. This integrative approach helps achieve personalized treatment, improve treatment efficacy and minimize the risk of complications for patients.

Using the combined test results to guide the formulation of treatment plans and monitor treatment efficacy in Kawasaki disease is crucial as it helps doctors make more precise diagnostic and therapeutic decisions. In the diagnosis and evaluation stage, a preliminary assessment of Kawasaki disease is made based on clinical presentation, laboratory tests, and echocardiography results. A definitive diagnosis of Kawasaki disease is made based on typical clinical features and test results, evaluating the severity of the disease. Treatment plan formulation involves developing personalized treatment plans based on factors such as patient age, disease severity, and risk of complications. Adjustments in the dose and duration of anti-inflammatory medications are made based on changes in inflammatory markers like CRP and white blood cell count. Monitoring treatment efficacy involves regularly monitoring blood test parameters (such as CRP, white blood cell count, platelet count, etc.) to evaluate treatment efficacy and disease activity. Regular echocardiographic examinations are conducted to assess coronary artery abnormalities and cardiac function, allowing for timely adjustments in the treatment plan. Complication prevention involves assessing the risk of developing complications such as coronary artery aneurysms based on test results. Preventive measures are taken to reduce the occurrence of complications based on monitoring results. The comprehensive use of combined test results, particularly blood parameters and echocardiographic findings, can help doctors assess the patient's

condition and treatment effectiveness comprehensively, develop individualized treatment plans, and adjust treatment strategies promptly to improve treatment efficacy and reduce the risk of complications. This comprehensive approach to diagnostic and therapeutic decision-making is crucial for the treatment and management of Kawasaki disease patients.

The results of this study indicate that the treatment group experienced a significant decrease in ejection fraction (EF) compared to the control group, suggesting that the treatment may have a negative impact on cardiac function. Additionally, the significant changes in aortic diameter (AO) imply possible vascular remodeling. While there was a notable reduction in the left main coronary artery (LMCA) in both groups, the changes in the right main coronary artery (RMCA) did not reach statistical significance, indicating potential differences in the response of various coronary arteries. Regarding laboratory-related indicators, both groups showed changes in biomarkers, particularly with a more significant reduction in C-reactive protein (CRP) levels in the treatment group. This suggests that the treatment may effectively reduce inflammatory responses, highlighting its potential benefits in clinical applications. Overall, these results underscore the important differences in imaging and laboratory indicators between the treatment and control groups, emphasizing the need for further research into the underlying mechanisms and clinical significance of these changes.

The application of combined echocardiography and blood-related testing indicators in Kawasaki disease in children helps to improve diagnostic accuracy, develop personalized treatment plans, monitor treatment efficacy, prevent complications, and evaluate the prognosis of affected children. This comprehensive diagnostic and therapeutic approach is of significant importance for the treatment and management of Kawasaki disease in children.

5. Conclusion

This study found a certain correlation between echocardiographic parameters and blood test indicators in children with Kawasaki disease, which can be used to assess cardiac function and inflammation levels. The combined use of echocardiography and blood test indicators can provide a comprehensive disease evaluation, helping guide treatment decisions and monitor treatment efficacy. This comprehensive assessment method has potential clinical utility in the diagnosis, treatment, and prognosis evaluation of Kawasaki disease in children. The potential applications and importance of this study primarily include early diagnosis, as the combination of echocardiography and blood test indicators can help in early detection of Kawasaki disease, improving diagnostic accuracy. Personalized treatment, based on changes in echocardiographic and blood test indicators, doctors can develop personalized treatment plans to enhance treatment effectiveness. Disease monitoring, regular monitoring of these indicators can help doctors understand disease progression and adjust treatment measures in a timely manner. Prognosis assessment, this combined assessment method helps evaluate patient

prognosis, identify high-risk patients early, and intervene promptly. In conclusion, the exploration of echocardiography combined with blood test indicators in the diagnosis and treatment of Kawasaki disease in children demonstrates the significance and potential clinical utility of this comprehensive assessment method in diagnosis, treatment, and prognosis evaluation. Through further research and clinical practice, this method is expected to provide more valuable information and guidance for improving the diagnosis, treatment efficacy, and prognosis of children with Kawasaki disease.

6. Limitations and Future Directions of the Study

1) Limitations: ① Sample size and data quality: There may be issues with insufficient sample size or low data quality in the study, affecting the stability and reliability of the results. ② Study design: Some studies may have limitations in study design, such as lack of a control group or short follow-up time, leading to less comprehensive conclusions.

2) Future directions: ① Multi-center large-sample studies: Future studies can conduct larger-scale, multi-center research to validate the current research results and improve their reliability. ② Application of machine learning and artificial intelligence: By combining machine learning and artificial intelligence technologies, develop intelligent diagnostic and therapeutic tools to enhance the level of diagnosis and treatment of Kawasaki disease. ③ Long-term follow-up studies: Conduct long-term follow-up studies to explore the application and value of echocardiographic and blood test indicators in the long-term prognosis of children with Kawasaki disease. In conclusion, echocardiography combined with blood test indicators in the diagnosis and treatment of Kawasaki disease in children has potential clinical significance, but overcoming some limitations and continuously improving this diagnostic and treatment method through further research and technological innovations in the future.

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Conflict of Interest

The authors declare that there are no conflicts of interest in this study. All research

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