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Malimban JG, Garcia RDJ and Francisco-Mallari MR. A Comparative Study of Pediatric Patients with Complete vs. Incomplete Kawasaki Disease in a Tertiary Hospital: An Eleven Year Review
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ORIGINAL ARTICLE

A COMPARATIVE STUDY OF PEDIATRIC PATIENTS WITH COMPLETE VS. INCOMPLETE KAWASAKI DISEASE IN A TERTIARY HOSPITAL: AN ELEVEN YEAR REVIEW

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ABSTRACT

Introduction: Kawasaki disease (KD) is the leading cause of acquired heart disease in childhood, but its diagnosis remains challenging since a significant number of cases do not meet the diagnostic criteria (Incomplete KD). This may delay the diagnosis and initiation of treatment, and increase the risk of morbidity from coronary artery complications.

Objectives: This study compared the clinical profile and treatment outcomes of children with complete and incomplete KD.

Methods: This is a cross-sectional, retrospective study of pediatric patients diagnosed with KD and admitted in a tertiary hospital from January 1, 2010 to December 31, 2020. Demographics, clinical manifestations, laboratories, 2D echocardiography (2DE) findings and treatment outcomes were obtained by review of medical records and analyzed using descriptive statistics.

Results: Among 135 patients studied, 71% were classified as Incomplete Kawasaki Disease. Majority (89%) were children more than 1 year old and predominantly male (55%). Five classic features, other than fever, were more frequent in complete KD - bilateral bulbar conjunctivitis, mucosal changes in the lip and oral cavity, polymorphous exanthem, changes in extremities, and cervical lymphadenopathy. Fever (100%), conjunctivitis (100%), rashes (97%) and oral changes (90%) were the most common findings in complete KD, while fever (100%), rashes (56%), conjunctivitis (46%) and oral changes (35%) were noted in incomplete KD. Higher CRP (167 mg/L vs. 100 mg/L) and lower albumin levels (30 g/L vs. 38 g/L) were seen in complete KD. Coronary artery dilatation (56% vs. 48%) was frequently detected in both complete and incomplete KD. Majority (96%) of cases received only one dose of IVIG and 4% needed additional treatment with methylprednisone.

Conclusion: The five principal features of KD other than fever, elevated CRP and lower albumin levels were significantly more common in complete cases. No significant differences in the demographics and 2DE findings of children with complete and incomplete KD were observed.

KEYWORDS: *Incomplete and Complete Kawasaki Disease, Acquired Heart Disease, Coronary Artery Dilatation and Aneurysms*

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INTRODUCTION

Kawasaki disease (KD) is an acute febrile vasculitis that predominantly affects medium-sized arteries, such as the coronaries.[1] It is the leading cause of acquired heart disease in childhood, especially in developed countries such as Japan and the US; however, the underlying etiology remains incompletely understood. Various studies postulated the development of the disease and its relation to the combined effects of an infectious trigger, immune response and genetic susceptibility.[2] Since its etiology remains elusive, no specific laboratory test has been developed to aid in confirming the disease, hence, diagnosis of KD is based on internationally accepted criteria. This includes fever lasting for ≥ 5 days, with at least four of the five principal features: bilateral bulbar conjunctival injection without exudates, changes affecting the lips and oral cavity (erythema, redness and cracking of lips, strawberry tongue, diffuse injection of oral and pharyngeal mucosa), polymorphous exanthem, changes in peripheral extremities (erythema of palms and soles, edema of hands and feet and periungual peeling of fingers and toes) and cervical lymphadenopathy ≥ 15 mm^3.

A significant number of patients fail to meet the criteria. Patients with incomplete KD usually present with fever for more than 5 days, with two or three of the criteria for classic KD. Diagnosis of incomplete KD is based on the presence of 2D echocardiographic (2DE) findings suggestive of KD, such as coronary artery abnormalities complemented by laboratory results. In one study by McCrindle, *et al.*, the presence of more than three of the following laboratory findings, such as white blood count of ≥ 15,000 mm^3, platelet count of ≥ 450,000 mm^3, pyuria of 10 WBC/hpf, albumin of ≤3 g/dl, elevation of alanine aminotransferase (ALT) and anemia for age, support the diagnosis of KD.[3] Diagnosing a patient with incomplete KD is challenging, may lead to delays in treatment, and results in higher rates of cardiac complications.

Presence of coronary artery abnormalities, seen in about a quarter of patients who do not receive appropriate treatment, is an important complication of KD. This may lead to more severe sequelae, such as myocardial infarction and death, with the risk of mortality from coronary complications at approximately 2-3%.[3] Several studies prove that providing early treatment with high dose intravenous immunoglobulin (IVIG), combined with acetylsalicylic acid, leads to a lower incidence of coronary artery aneurysm; hence, this study compared the clinical profile and treatment outcomes of complete and incomplete KD to facilitate early recognition, diagnosis and management of the condition.[4]

MATERIALS AND METHODS

This was a retrospective cross-sectional study involving pediatric patients less than 18 years old, admitted with a diagnosis of KD in a private, urban, tertiary hospital from January 1, 2010 to December 31, 2020. A minimum sample size of 170 (24 complete KD cases and 146 incomplete KD children) were required for this study based on a confidence interval of 95% and 5% margin of error. The proportion of complete and incomplete cases was taken from a previous study by Behmadi, *et al.*[5] However, on review of records, only a total of 135 pediatric patients were obtained, which was below the desired sample size; thus, a total census approach was utilized.

Upon approval by the hospital's Institutional Review Board (IRB), the medical charts of children diagnosed with KD were retrieved and reviewed via the electronic medical records (EMR) system and ArchiveOne database. Eligible exposed case participants were patients diagnosed with KD based on internationally accepted criteria.[3]

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Unexposed case participants were those who did not meet the criteria, but who had 2D echocardiographic findings suggestive of KD, such as coronary abnormalities, complemented by laboratory abnormalities, such as a peripheral white blood count (WBC) of ≥ 15,000 mm^3, platelet count of ≥ 450,000 mm^3, pyuria of ≥ 10 WBC/hpf, albumin of ≤ 3 g/dl, elevated alanine aminotransferase (ALT) and anemia for age. Excluded were those who did not receive the standard treatment for KD and those who were lost to follow up with no repeat 2DE results.

Descriptive statistics were used to present the clinical profile of eligible participants. Categorical variables were reported by frequency and proportion. Shapiro-Wilks test was used to determine the normality distribution, while Levene's test was used to test the homogeneity of variance of continuous variables. Continuous quantitative data that met the normality assumption was summarized using mean and standard deviation, while those that did not were described using median and range. Continuous variables that satisfied the dual assumption of normality and homogeneity were compared using independent t-test. The non-parametric Mann-Whitney U test was used for non-Gaussian variables. Categorical variables were compared using Chi-square test. If the expected percentages in the cells were less than 5%, Fisher's Exact test was used. Null hypothesis was rejected at 0.05 α-level of significance. STATA version 15.0 (StataCorp SE, College Station, TX, USA) was used for data analysis.

Ethical Considerations

This study was conducted upon the approval of the hospital's Institutional Review Board (IRB). Since the study only required review of records with no direct interaction with eligible subjects, a waiver of informed consent was granted by the IRB. Data privacy and confidentiality were strictly preserved by anonymizing the case documents and results of the study.

RESULTS

A total of 154 patient records were extracted but 19 were excluded for the following reasons: not given standard KD treatment (n=6); diagnosis other than KD – acute gastroenteritis, infective endocarditis, pneumonia (n=3); transfer of hospital or discharged against medical advice (n=2); and missing charts (n=19). A total of 135 patient records were included in this study.

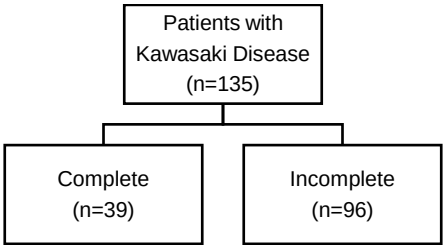

Table 1 presents the demographic profile of pediatric patients with KD. Only fifteen (11%) were less than 1 year old, with the rest falling in the 1-2 years (45%) or older age ranges (44%). Mean ages of patients with complete KD and incomplete KD were not significantly different. In terms of gender distribution, over half of patients (55%) were male with a 1.2:1 male to female ratio. A sibling history of KD was present in 2 patients. Age, sex, chief complaint and family history were comparable between the two groups.

Table 1. Demographic characteristics of pediatric patients with Kawasaki Disease

Parameter	All (n=135)	Complete (n=39)	Incomplete (n=96)	*p*
	Frequency (%); Median (Range)			
Age, years				.416*
<1	15 (11)	2 (5)	13 (14)	
1–2	61 (45)	19 (49)	42 (44)	
>2	59 (44)	18 (46)	41 (43)	
Age (years, mean± SD)	3.06	3.06 (±2.6)	2.71 (±2.1)	.460‡
Sex				.197†
Male	74 (55)	18 (46)	56 (58)	
Female	61 (45)	21 (54)	40 (42)	
Family history of KD, siblings	2 (1.5)	1 (2.6)	1 (1.0)	.496*

Statistical tests used: * - Fisher's Exact test; † - Chi-square test; ‡ - Mann-Whitney U test

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Table 2 compares the clinical characteristics of the two groups. Majority of patients presented with fever as the chief complaint in both complete (100%) and incomplete KD (91%). Children had fever for a median of 6 days (range 1 to 28) before consult and was not significantly different in frequency and duration between the two groups. Other than fever, five other presenting symptoms (bilateral bulbar conjunctivitis, changes in lip and oral cavity, polymorphous exanthem, changes in extremities, and cervical lymphadenopathy) were significantly more common in the complete KD group.

Table 2. Clinical characteristics of pediatric patients with Kawasaki Disease

Characteristics		All (n=135)	Complete (n=39)	Incomplete (n=96)	*p*
		Frequency (%); Median (Range)			
Chief complaint	Fever	126 (93)	39 (100)	87 (91)	
	Rash	2 (1.5)	0 (0)	2 (2.1)	
	Changes in extremities	1 (0.74)	0 (0)	1 (1.0)	
	Cervical lymphadenopathy	2 (1.5)	0 (0)	2 (2.1)	
	Swelling	3 (2.2)	0 (0)	3 (3.1)	
	Palpable mass	1 (0.74)	0 (0)	1 (1.0)	
Duration of chief complaint, days		6 (1 – 28)	7 (2 – 15)	6 (1 – 28)	.329‡
Presenting symptoms	Fever	135 (100)	39 (100)	96 (100)	1.0
	Bilateral conjunctival injection without exudates	83 (61)	39 (100)	44 (46)	**<.001**†
	Polymorphic exanthem	92 (68)	38 (97)	54 (56)	**<.001**†
	Changes in lips and oral cavity	69 (51)	35 (90)	34 (35)	**<.001**†
	Changes in extremities	35 (26)	23 (59)	12 (13)	**<.001**†
	Cervical lymphadenopathy	56 (41)	30 (77)	26 (27)	**<.001**†

Statistical tests used: * - Fisher's Exact test; † - Chi-square test; ‡ - Mann-Whitney U test

Table 3 cites the other clinical features among pediatric patients with KD. Three patients in the complete KD group had cardiovascular findings, such as systolic murmurs and chest pain, the frequency of which was significantly more common in the complete KD group. The proportion of other non-specific symptoms - respiratory (cough and colds), gastrointestinal (vomiting and diarrhea), musculoskeletal (neck and joint pains) and others, such as throat pain and epistaxis, were not significantly different between the two groups.

Co-infections were seen in 27% of patients, most commonly pneumonia. Others were: urinary tract infections (7%), 3 culture confirmed *E. coli* and 7 culture negative UTI, upper respiratory tract infections (7%), and acute gastroenteritis (4%).

Table 3. Other clinical findings of pediatric patients with Kawasaki Disease

Clinical Findings	All (n=135)	Complete (n=39)	Incomplete (n=96)	*p*
	Frequency (%); Median (Range)			
Cardiovascular	3 (2)	3 (8)	0 (0)	**.023***
Respiratory	39 (29)	7 (18)	32 (33)	.074†
Gastrointestinal	46 (34)	15 (38)	31 (32)	.490†
Musculoskeletal	4 (3.)	2 (5)	2 (2)	.579*
Others	9 (7)	3 (8)	6 (6)	.717*
With co-infection	37 (27)	7 (18)	30 (31)	.116‡
Pneumonia	12 (9)	4 (10)	8 (8)	.360*
Urinary Tract Infection	10 (7)	2 (5)	8 (8)	.460*
Acute Gastroenteritis	5 (4)	-	5 (5)	.176*
Upper Respiratory Tract Infection	10 (7)	1 (3)	9 (9)	.157*

Statistical tests used: * - Fisher's Exact test; † - Chi-square test; ‡ - Mann-Whitney U test

Laboratory profile of pediatric patients with KD showed that only the CRP level was significantly higher and the serum albumin was significantly lower in the complete KD group. The rest of the variables were not significantly different between the two groups.

Table 4. Laboratory profile of pediatric patients with Kawasaki disease

Laboratory Parameter	All (n=135)	Complete (n=39)	Incomplete (n=96)	*p*
	Median (Range); Mean ± SD			
Hemoglobin	11.6 (8.3–17.9); [n=131]	11.9 (8.3–13.7); [n=38]	11.5 (8.4–17.9); [n=93]	.531
Hematocrit	34.6 (24.8–49.7)	36.2 (24.8–39.3)	34 26.1–49.7)	.306
White blood cell	15.1 (2.7–34.7)	15.1 (8.6–34.7)	15 (2.7–32.1)	.944
Platelet	385 (167–905)	372 (250–697)	387 (167–905)	.664
C-reactive Protein	114 (1.4–364)	167 (45–364)	99 (1.4–347)	**.024**
ESR	86 (1–140)	111 (5–140)	83 (1–130)	.958
Serum sodium	133.7 ± 3.9; [n=19]	134.7 ± 2.6; [n=9]	132.6 ± 4.8; [n=9]	.264§
Albumin	37.2 (26–46); [n=29]	30 (26–43.6); [n=9]	38 (27.4–46); [n=20]	**.006**
ALT (SGPT)	39.7 (6–309.53); [n=60]	64.0 (12–309.53); [n=16]	33.8 (6–247.11); [n=44]	.072

Statistical tests used: If with section sign (§), Independent t-test. Otherwise, Mann-Whitney U test.

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As for the initial 2DE during admission, coronary artery dilatation was more common in the complete KD group (56% vs. 48%), but the difference was not statistically significant. Differences in other 2DE findings between the two groups were not significant.

Table 5. 2D Echocardiogram results of pediatric patients with Kawasaki disease on admission

2D Echocardiogram results	All (n=134)	Complete (n=39)	Incomplete (n=95)	*p*
	Frequency (%)			
Suggestive of KD	100 (75)	28 (72)	72 (76)	.629
On admission				
Coronary Artery Aneurysm/ Dilatation	68 (51)	22 (56)	46 (48)	.401
Pericardial Effusion	70 (52)	18 (46)	52 (55)	.366
Perivascular Brightness of the Coronary Artery	16 (12)	2 (5)	14 (15)	.150*
Left Ventricular Dysfunction	27 (20)	7 (18)	20 (21)	.684

Statistical test used: If with asterisk (*), Fisher's Exact test. Otherwise, Chi-square test.

Only 62 of 135 patients (62%) had a follow-up 2DE six weeks from illness onset with no significant differences between the two groups. Further analysis revealed that out of 68 patients who had coronary artery dilatation on admission, 21 (7 complete KD and 14 incomplete KD) showed normal 2DE by the 6th week, while six (1 complete KD and 5 incomplete KD) had normal results beyond the 6th week of illness. Length of recovery based on 2DE findings varied from as short as 1 month to as long as 15 months.

All patients received one dose of IVIG, except for one who required a second dose due to disease recurrence after 2.3 years. Four patients (10%) in the complete KD group and two (4%) in the incomplete KD group required additional treatment with methylprednisone due to persistent fever despite IVIG treatment.

Children with incomplete KD had a significantly longer (6.8 vs. 5.9 days) hospital stay.

One patient in each of the groups had fever recurrence after one dose of IVIG. One of these received additional treatment with methylprednisone, while the other received another dose of IVIG.

Table 6. Treatment and outcome of patients

Parameter		All (n=135)	Complete (n=39)	Incomplete (n=96)	*p*
		Frequency (%)			
Intravenous immuno-globulin	1st dose	135 (100)	39 (100)	96 (100)	-
	2nd dose	1 (0.74)	1 (2.6)	0 (0)	.289*
Methylprednisone		6 (4.44)	4 (10.3)	2 (4.1)	.058*
Treatment	IVIG alone	129 (95.6)	35 (89.7)	94 (97.9)	.058*
	IVIG + 2nd dose of IVIG	1 (0.74)	1 (2.6)	0 (0)	
	IVIG + Methylpred-nisone	5 (3.70)	3 (7.7)	2 (2.1)	
Length of fever before treatment		8 (3–29)	7 (3–14)	8 (4–29)	**.018**‡
Length of fever after treatment	Within 36 hours	124 (91.9)	36 (92.3)	88 (91.7)	.999*
	More than 36 hours	11 (8.1)	3 (7.7)	8 (8.3)	
Day of illness on admission			6.77 (±2.5)	6.80 (±4.0)	.3299
Length of hospital stay			5.92 (±3.7)	6.77 (±3.8)	**.0042**‡
Persistence of CAA		17 (12.6)	2 (5.1)	15 (15.6)	.151*
Recurrence		2 (1.5)	1 (2.6)	1 (1.04)	.496*
Additional treatment		2 (1.5)	1 (2.6)	1 (1.04)	.496*

Statistical tests used: *–Fisher's Exact test; †–Chi-square test; ‡–Mann-Whitney U test.

DISCUSSION

Timely diagnosis of Kawasaki Disease poses difficulties and challenges among pediatricians given the lack of a specific diagnostic test. Diagnosis depends on the presence of clinical criteria which may not be present all at the same time, which further contributes to delays. Early recognition of clinical, laboratory and echocardiographic findings that support the diagnosis of KD in a patient whose principal features do not meet clinical criteria, may not only result to timely diagnosis and initiation of appropriate treatment but may also limit the risk for coronary artery sequelae.

This retrospective study involving 135 children with KD compared the findings between complete vs. incomplete KD.

Patients affected in this study were children more than 1 year old, with a mean age of 3.1 (±2.6) years and 2.7 (±2.1) years for complete and incomplete KD, respectively. In this study, an older mean age for complete KD, although not significant, has also been reported, consistent with findings in other studies.[5-8] Younger children, particularly those aged six months and below, have been reported to present with incomplete and milder clinical features, making them prone to treatment delays and subsequent development of coronary artery abnormalities, hence the importance of considering KD in all infants with prolonged unexplained fever.[6-8] As to gender distribution, 55% of KD patients were male, similar to other local and foreign studies where male preponderance in both complete and incomplete KD has been reported.[5,9-11]

A family history of KD was reported in this study, with two siblings affected by the condition 2 years and 8 months apart. This is similar to a local study by Nable, *et al.* in 2002 on the profile of KD in children, where family history of KD was observed in nine percent of patients, with two siblings affected by the disease one month apart.[9] In another study by Fujita, *et al.*, the rate of the second-case of KD within a year after onset of the first case in a family was 2.1% for siblings, with a relative risk of approximately 10-fold compared to the general population. KD was diagnosed in half of the second cases within 10 days of the first case in the family.[12] Higher rates of the disease among children with family history of KD support the contribution of genetic factors in the susceptibility and etiology of the disease.

Co-infection was observed in 27% of patients, with pneumonia (9%) being most common in the two groups.

Several studies have postulated the association of infection with KD because of similar clinical presentations, marked seasonality, occurrence during epidemics, and a peak incidence among children 6 months to 2 years.[2] Chang, *et al.* found several viral agents, including enteroviruses, adenoviruses, human rhinovirus and coronavirus, isolated from KD patients during the acute course of illness.[13] Moreover, *Staphylococcus aureus*, *Streptococcus pyogenes* and *Mycoplasma pneumoniae* have also been identified.[2] In a recent systematic review by Goncalves, *et al.*, the COVID-19 pandemic resulted in a significant increase in the incidence of KD which suggests an association between COVID-19 and KD, especially the severe type.[14] Despite several studies attempting to define the etiopathogenesis of KD, no specific etiology has been identified and KD is believed to result from the combined effects of infectious agents, the host's immune response and a genetic susceptibility, which likely contribute to the development of the disease.[2]

Several studies reported the prevalence of incomplete KD to be from 15 to 36%.[6] Contrary to other studies, our study reported a higher incidence of KD with incomplete presentation (71%) at the time of diagnosis. Fever was the most common initial symptom, lasting an average of 6.8 and 6.9 days for complete and incomplete KD groups, respectively. Similar to previous studies, five principal features, apart from fever, were significantly more common in the complete KD group. Among the principal features, bilateral conjunctival injection without exudates, polymorphic exanthem and oral changes were the most common symptoms in both groups. Consistent with previous studies by Behmadi, *et al.*, Perrin, *et al.*, Manlhiot, *et al.*, Gorczyca, *et al.* and Giannouli, *et al.*, conjunctivitis, oral changes and rashes were most commonly seen in both complete and incomplete KD cases, and the frequency by which these were seen were higher in complete KD patients.[5,15-18]

However, in one study by Maric, *et al.*, these three clinical manifestations were found to be more frequent in the incomplete KD group.[19] Although the proportion of principal features were higher in the complete KD group, the clinical presentation of incomplete KD closely resembled that of complete KD. A high index of suspicion for KD is warranted in patients presenting with persistent fever accompanied by bilateral conjunctival injection without exudates, polymorphic exanthem and oral changes. Earlier studies also reported a longer interval between symptom onset and diagnosis in KD patients with incomplete presentation.[14] Incomplete KD in this study took one day longer between symptom onset and diagnosis, which also reflects the time required to rule out other diagnostic considerations.

Respiratory (cough and colds), gastrointestinal (vomiting and diarrhea), musculoskeletal (neck and joint pains) and other nonspecific symptoms (throat pain and epistaxis) were similar in frequency for both groups. However, cardiovascular manifestations (systolic murmurs and chest pain) were more common in the complete KD group, which may result from inflammation of the coronary arteries, pericardium, myocardium and endocardium, including the valves. In this study, two of the three patients with cardiac manifestations had valvular regurgitation (tricuspid valve) on 2DE. Valvular dysfunction may be seen in approximately 25% of patients which has been postulated to result from the same inflammatory mechanism as with other KD changes during the acute phase of the disease.[3] Cardiac symptoms are not common in KD patients even in those with severe coronary artery abnormalities (giant aneurysm) except when severe coronary artery flow disturbances or thromboses are present, resulting to myocardial ischemia; thus, children with cardiac manifestations should be closely monitored for the development of myocardial ischemia and infarction.[3]

As for laboratory findings, CRP was higher and albumin levels were lower in complete KD than incomplete KD. Several studies have identified CRP elevation and hypoalbuminemia as risk factors for coronary artery aneurysms and resistance to IVIG treatment.[16,18] These features may reflect disease severity and thus, require prompt echocardiographic assessment and initiation of treatment. Other laboratory features, such as anemia, leukocytosis, thrombocytosis, elevated ESR, elevated ALT and hyponatremia, were not significantly different between the two groups. Behmadi, *et al.* reported CRP and albumin levels as not significantly different between the two groups but found that hyponatremia and elevated alanine aminotransferase (ALT) to be more common in the complete KD group, while anemia and thrombocytosis were more common in the incomplete group.[5] Similar laboratory features in this study are shared by the two groups. Absence of a differentiating laboratory feature in this study contributes to the difficulty in identifying an appropriate diagnostic marker that can be used to assist in the diagnosis of the disease.

Previous studies, including the one by Perrin, *et al.*, documented that coronary artery abnormalities were more common in those with incomplete KD.[15] However, this study did not find any differences in the incidence of CAA between the two groups similar to Manlhiot, *et al.*[16] Behmadi, *et al.* also found no significant differences in the rates of coronary artery dilatation and aneurysms, myocarditis, valvular lesions, pericardial effusion and perivascular brightness between complete and incomplete KD patients; however, ectasia and lack of tapering of the distal coronary vessels were more frequent in the incomplete group.[5] In this study, coronary artery dilatation/aneurysm (51%) was the most common abnormality in the two groups, while perivascular brightness of the coronary artery (12%) was the least noted finding.

Short and long term coronary outcomes were similar among patients with complete and incomplete Kawasaki disease, consistent with the study by Shilvalingham, *et al.*[20]

Patients in both groups were treated with IVIG within the optimal time of 7-10 days of illness, which may have prevented the development of CAA and explained the similarities in the incidence of CAA between the two groups. It also suggests an increased awareness of the disease. A higher incidence of CAA in incomplete KD in most published studies may reflect a diagnostic bias because 2DE is required to support the diagnosis or may lead to underestimation of incomplete KD without 2DE findings of CAA.[15]

Given the similarities between the two groups, it is often the combination of clinical features, laboratory findings and 2DE results which prompt the clinician to label the case as incomplete KD. The high incidence of incomplete KD in this study showed that clinicians had a high index of suspicion of the disease and were able to recognize KD with incomplete presentation despite fewer clinical manifestations and lack of useful laboratory markers that differentiate complete vs. incomplete KD. This study was not able to meet the minimum sample size and was limited by the number of patients with follow up 2DE results, hence, a larger number of patients is recommended for futures studies.

CONCLUSION

This study found that five principal features of KD (conjunctival injection, rash, oral changes, extremity changes and cervical lymphadenopathy), elevated CRP and lower albumin levels were significantly more common in complete than incomplete KD. However, the demographic and other clinical features, laboratory and 2DE findings were similar between the two groups.

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