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CASE REPORT

First Case of Terminal Ileitis Coexisting with Incomplete Kawasaki Disease

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ABSTRACT

Kawasaki disease (KD), also referred to as mucocutaneous lymph node syndrome and infantile polyarteritis nodosa, is characterized by inflammation of small and medium-sized blood vessels across the body. It can manifest in various clinical features among pediatric patients admitted to general pediatric departments with fever, particularly those aged less than 5 years. Despite its relatively benign nature, it is crucial to promptly identify potential complications. We describe the case of a 10-month-old female patient admitted to the general pediatric department due to a 5-day history of fever peaking at 40.5°C, diarrhea, and irritability. Physical examination revealed no conjunctivitis, cervical lymphadenopathy, or rash, but notable irritability and edematous induration on the dorsum of her hands and feet. Initial laboratory investigations showed elevated acute phase reactants, and radiological assessment indicated terminal ileitis. Considering the presentation consistent with incomplete KD, characterized by persistent fever, ill appearance, ileitis, hypoalbuminemia, and elevated acute phase reactants, we pursued further evaluation. Echocardiography revealed ecstatic and prominent coronary artery without dilation of the main coronary arteries. It is important to recognize that not all KD patients will exhibit all typical features, and presentations may vary. While inflammatory changes in multiple systems have been documented in KD, terminal ileitis has not been previously reported in pediatric patients.

Keywords: Incomplete Kawasaki disease, terminal ileitis, persistent fever

INTRODUCTION

Kawasaki disease (KD), initially described by Tomisaku Kawasaki, is also recognized as mucocutaneous lymph node syndrome and infantile polyarteritis nodosa.[1,2] It predominantly affects children aged between 6 months and 5 years and stands as a significant cause of pediatric-acquired heart disease in developing countries. Diagnosis of KD relies on clinical criteria, as there is no specific diagnostic test available. The typical criteria encompass fever persisting for over 5 days, cervical adenopathy, bilateral nonpurulent conjunctival injection, changes in oral mucosa, hand-foot changes, and polymorphic rash. The presence of four out of five clinical criteria confirms the diagnosis.[3] However, some cases may present as "incomplete Kawasaki disease" (IKD), lacking fulfillment of all typical diagnostic criteria. Diagnosis of IKD can be challenging due to the absence or incomplete presentation of classic signs, such as prolonged fever, mucocutaneous changes, extremity changes, cervical lymphadenopathy, and cardiac involvement. Despite not meeting all criteria, patients with IKD remain susceptible to complications like coronary artery abnormalities. Hence, clinical judgment and a high level of suspicion are pivotal for timely diagnosis and initiation of treatment. This report presents an exceptional case of IKD in an 8-month-old girl, initially manifesting with fever and clinical features of ileitis.

CASE REPORT

The patient, a 10-month-old girl, was admitted to the General Pediatrics Clinic at Ege University's Children's Hospital with complaints of fever reaching 40.5°C and irritability persisting for 7 days prior to admission. Additionally, she had been experiencing non-bloody diarrhea, multiple episodes of vomiting, and chills. She had no notable medical or surgical history, was up-to-date on immunizations, and had no known

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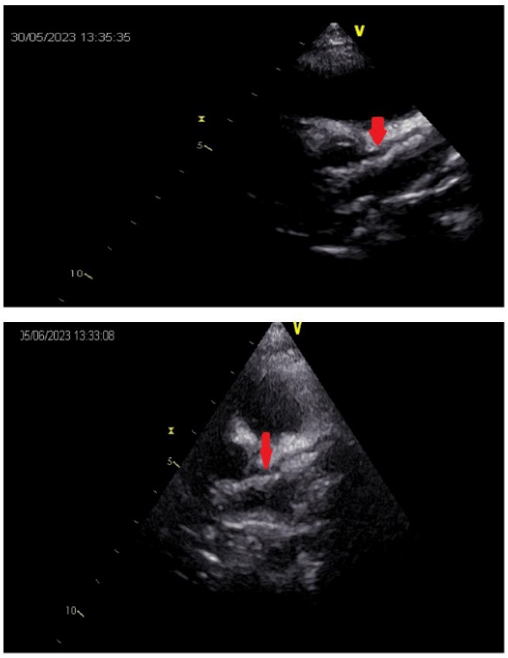
allergies. According to her medical history, she was exclusively breastfed for the first 6 months and was currently receiving supplementary foods alongside breastfeeding. The patient had no known exposure to COVID-19 or diagnosis of the virus. Initially, she was assessed at another hospital with suspicion of acute gastroenteritis and received intravenous hydration for this condition. Upon admission to our hospital, her vital signs were recorded as follows: temperature 38.6°C, heart rate 168 beats per minute, respiratory rate 20 breaths per minute, and blood pressure 96/55 mm Hg. Her height was measured at 72 cm (40.52nd percentile, −0.24 SD), and her weight at 10 kg (83.65 th percentile, 0.98 SD). Physical examination upon admission revealed no conjunctivitis, cervical lymphadenopathy, or rash; however, the patient exhibited notable irritability and edematous induration on the dorsum of her hands and feet. No abnormalities were observed in her lips, tongue, and other mucosal areas. The BCG scar from vaccination in the left deltoid muscle region appeared normal with no signs of hyperemia. Laboratory investigations upon admission showed a white blood cell count (WBC) of 27,400/mm^3 with 86% neutrophils, a platelet count of 461.000/mm^3, a hemoglobin level of 9.2 g/dl with normal mean corpuscular volume, an erythrocyte sedimentation rate of 93 mm/h, a C-reactive protein level of 5.4 mg/dL (normal range <0.5), and an albumin level just within the lower limit (2.7 mg/dl). Microscopic examination of the peripheral blood smear revealed cell ratios consistent with hemogram parameters (80% neutrophils, 15% lymphocytes, 6% eosinophils), with no atypical or blast cells detected. Renal profile, hepatic profile, amylase, and lipase levels were all within normal limits. Based on the preliminary diagnosis of systemic sepsis secondary to suspected invasive gastroenteritis, the patient was isolated, and treatment with intravenous ceftriaxone (100 mg/kg/day), metronidazole (30–40 mg/kg/day divided into three doses), and intravenous fluids was initiated. Urine culture, urine analysis, blood culture, and stool culture were conducted to evaluate the source of infection, all of which yielded negative results. Serologic tests for adenoviruses, mumps, enteroviruses, cytomegalovirus, and Epstein–Barr virus were negative, while testing for other respiratory viruses was not performed. On the ninth day of her illness, the patient's fever, edema in the hands and feet, irritability, and diarrhea worsened, accompanied by dermatitis in the diaper area. This prompted a reassessment of the diagnosis and an expansion of investigations. Abdominal X-ray revealed minimal dilatation in all segments of the intestine and mild enlargement of the intestinal wall. Initial abdominopelvic ultrasonography indicated an 8-mm diameter bowel loop at the terminal ileum level in the lower right quadrant, with increased echogenicity and minimal plastering fluids in the surrounding intermesenteric plans, leading to a radiological diagnosis of terminal ileitis. No hepatomegaly, splenomegaly, abdominal lymphadenopathies, or gallbladder hydrops were observed. Given the systemic features, multisystem inflammatory syndrome in children (MIS-C) was initially considered in the differential diagnosis. However, this diagnosis was ruled out based on negative SARS-CoV-2 PCR results from the patient's nasopharyngeal sample, negative anti-SARS-CoV-2 IgG serology results, and absence of leukopenia, microcytic anemia, thrombocytopenia, elevated liver enzymes, and elevated ferritin levels. The patient's symptoms, including irritation, persistent fever, ill appearance, extremity changes (edema of the palms and soles of the feet), clinic findings of ileitis, and laboratory values such as hypoalbuminemia, normocytic anemia, thrombocytosis, elevated erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP), supported a suspected diagnosis of pediatric systemic vasculitis. Initial echocardiographic measurements of coronary artery dimensions were within normal range according to predicted z scores (SDs from the predicted normal mean) for age and body surface area: left main coronary artery (LMCA) 2.5 mm +1.06 SD, proximal anterior descending coronary artery (LAD) 2 mm +1.46 SD, and proximal right coronary artery (RCA) 2.2 mm +1.81 SD. Furthermore, ectasia and prominent coronary arteries were detected, along with mild pericardial effusion, but without dilatation of the main coronary arteries (Figure 1). Treatment was initiated with intravenous immunoglobulin (IVIG) at a dosage of 2 g/kg and oral aspirin at 75 mg/kg/day. The patient's fever and irritability subsided 48 hours after commencement of treatment. Throughout hospitalization, fever and diarrhea gradually improved. However, on the fourth day post-treatment, she developed sheet-like desquamation in the periungual region of the hands and feet, and her platelet count increased from 461/mm^3 to 678.000/mm^3 without recurrence of symptoms during the follow-up period. Repeat echocardiography on the third day of treatment revealed consistent features. The patient remained clinically stable during follow-up. One week later, aspirin treatment doses were reduced to antiplatelet doses, and the patient was discharged without new symptoms. Three months post-discharge, follow-up echocardiograms indicated normal coronary artery dimensions (LMCA 2.3 mm +2.15 SD, LDA 1.7 mm +1.69 SD, RCA 1.9 mm +1.67 SD), with z scores calculated based on age and body surface area. Previously identified ectasia and prominent coronary arteries had fully resolved, leading to discontinuation of aspirin therapy.

DISCUSSION

KD stands as the primary cause of acquired heart disease among children and affects small and medium-sized vessels through systemic vasculitis. Typically observed in children aged 6 months to 5 years, it can lead to coronary artery aneurysms or ectasia, which in turn may result in myocardial infarction (MI), sudden death, or ischemic heart disease in 15–25% of untreated cases.[4] The case report discussed an 8-month-old girl, the first documented instance in literature, who presented with terminal ileitis associated with IKD, characterized by fever and gastrointestinal involvement (diarrhea, terminal ileitis without identifiable microbial agents), alongside laboratory findings indicating anemia, hypoalbuminemia, and elevated levels of CRP, ESR, and echocardiographic results.

Classical criteria for KD include fever lasting >5 days, unilateral cervical adenopathy, nonpurulent bilateral conjunctivitis, oral mucosal ulceration, hand and foot edema, and a polymorphic rash. Diagnosis typically involves the presence of fever and at



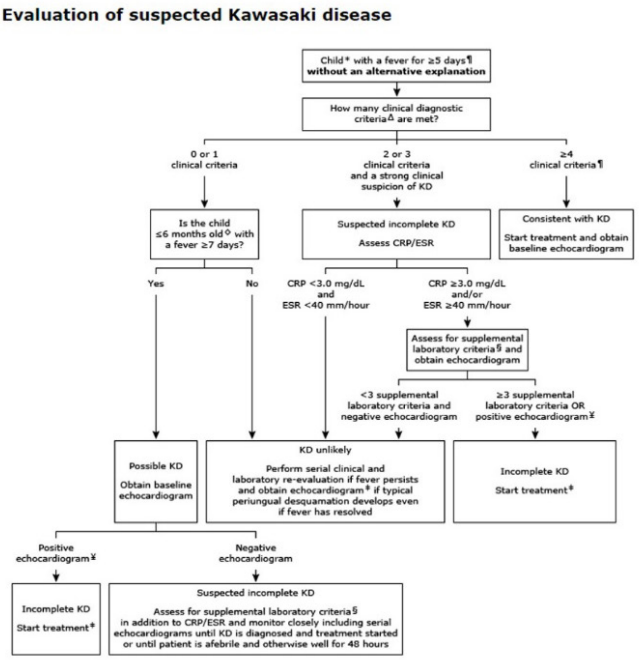
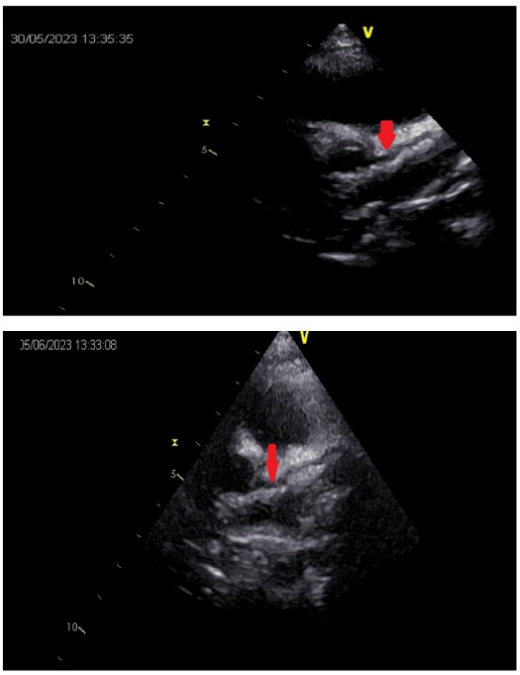


Figure 1: ECHO findings at the time of diagnosis: Left Anterior Descending (LAD) Coronary Artery is shown with an arrow. Proximal coronary artery lumen diameter is normal for the patient's length and weight (body surface area) but is minimal ectasia and prominent without dilation.



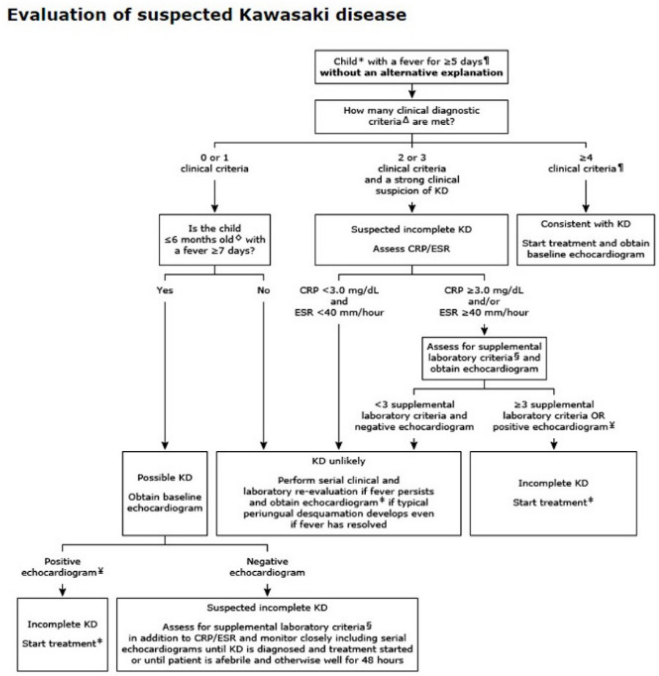


Figure 2: The algorithm for suspected Kawasaki Disease and Incomplet Kawasaki Disease.

least four of these five physical findings without an alternative explanation.[5] However, meeting these classic clinical criteria can sometimes be challenging in pediatric patients, especially among younger children. The American Heart Association has established criteria to define "IKD," which includes children with a fever lasting 5 or more days and fewer than four classical KD clinical characteristics, alongside at least three abnormal laboratory results (ESR ≥ 40, CRP ≥ 3, WBC ≥ 15,000/mm3, albumin ≤ 3.0 g/dL, normocytic anemia for age, elevation of alanine aminotransferase, platelets after 7 days ≥ 450,000/mm3, urine ≥10 WBC/high-power field) (Figure 2).[6,7] The patient described above presented with a combination of diarrhea

and fever, which typically is not associated with classical KD clinical findings. However, the patient experienced a wide array of symptoms in the days leading up to the diagnosis, including irritability, vomiting, decreased appetite, cough, diarrhea, rhinorrhea, weakness, abdominal pain, and arthralgia or arthritis, as reported in various studies and case reports on KD and IKD.[6,7] Gastrointestinal complaints during KD occur in approximately one-third of patients. In addition to severe systemic inflammation findings, gastrointestinal symptoms and involvement, notably diarrhea, abdominal pain, vomiting, and other conditions such as ischemic colitis, intussusception, hepatic necrosis, splenic infarct, intestinal pseudoobstruction, colitis, and colon edema, have been documented in the literature.[5] A study by Baker et al identified disease-related gastrointestinal symptoms in KD patients, such as diarrhea, vomiting, abdominal pain, jaundice, cholangitis, elevated liver enzyme levels, and gallbladder hydrops, occurring 10 days before diagnosis and present in 61% of subjects.[7]

Despite the common occurrence of gastrointestinal involvement in KD, affected terminal ileum has not previously been reported in association with the disease. Terminal ileitis refers to inflammation of the terminal end of the small bowel and is diagnosed based on histological evidence of inflammation on mucosal biopsies, often attributed to inflammatory changes and vasculitis affecting bowel vessels. Clinical manifestation of terminal ileitis include abdominal pain, with or without diarrhea, chronic bowel obstruction symptoms, and gastrointestinal bleeding. Various etiologies for terminal ileitis exist, including inflammatory bowel diseases (such as Crohn's disease), nonsteroidal anti-inflammatory drugs, intestinal ischemia, eosinophilic enteritis, neoplasms (such as lymphoma), spondyloarthropathies, and infectious agents like Mycobacterium tuberculosis, Yersinia, Salmonella, Clostridium difficile, Cytomegalovirus, and SARS-CoV-2 infection/MIS-C (multisystem inflammatory syndrome in children). Vasculitis has also been identified as a cause of terminal ileitis.[8,9] To the best of our knowledge, this case represents the first instance of KD associated with isolated terminal ileitis in children. The absence of other identified etiological factors through serologic and other laboratory tests, coupled with the persistence of fever and significant features of IKD, led to suspicion that terminal ileitis was an unexpected initial presentation of KD.

CONCLUSION

Terminal ileitis linked with IKD has not been documented in existing literature. A thorough medical history and comprehensive physical examination remain paramount for accurate diagnosis. IKD should be contemplated in the differential diagnosis for children exhibiting fever, hand/foot edema, presentation of ileitis, and unexplained elevation in inflammatory markers.

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