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Clinical Observations

Stroke by Carotid Artery Complete Occlusion in Kawasaki Disease: Case Report and Review of Literature

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ABSTRACT

BACKGROUND: Kawasaki disease is an acute and time-limited systemic vasculitis primarily affecting young children. **PATIENT:** We describe an 18-month-old girl with Kawasaki disease who developed cerebral infarction following complete occlusion of her right internal carotid artery. **RESULTS:** The occlusion occurred 10 days after the onset of fever, while she was on high-dose aspirin, and the day after she received intravenous immunoglobulin treatment. We present the first literature review on this very rare complication. **CONCLUSION:** Stroke is a rare neurological complication in Kawasaki disease. Optimal treatment should be begun as soon as possible after diagnosis. Intravenous immunoglobulins seem to reduce the cerebrovascular complications, but evaluation of hydration status is strongly recommended before performing such treatment.

Keywords: Kawasaki disease, infant, stroke, carotid artery occlusion, immunoglobulin

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Introduction

Kawasaki disease is an acute and time-limited systemic vasculitis primarily affecting young children.[1,2] Recent studies have suggested that an ubiquitous infectious agent, which is asymptomatic in most people, leads to Kawasaki disease in some genetically predisposed children.[2] Diagnosis is based on a set of clinical criteria: fever for at least 5 days; bilateral conjunctival injection; dryness of mucous membranes with fissured lips, strawberry tongue, injected pharynx; voluminous cervical adenopathy, polymorphous rash, peripheral erythema, peripheral edema, and desquamation.[1] The main complications are cardiac aneurysms. However, neurological complications, such as aseptic meningitis and facial palsy, have been described, in 1% to 30% of cases.[3,4] Very rare arterial strokes have been reported in the literature and only one symptomatic case has been reported since immunoglobulin treatment has become available (Table).

We describe a stroke occurring the day after immunoglobulin infusion in an 18-month-old girl with Kawasaki disease.

Case Report

An 18-month-old girl with an unremarkable medical history and up-to-date vaccinations presented with a prolonged fever, deterioration

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TABLE.
Literature review of cerebral infarction and intracranial hemorrhage associated with Kawasaki disease

Reference	Sex	Age	Type of Stroke	Stroke Onset*	Initial Treatment	Stroke Treatment
Hosaki (1978)	M	4 mo	Occlusion of the right middle cerebral artery	45 days	Corticosteroids and antibiotics	Anticoagulants
Lauret (1979)	F	5 yr	Occlusion of the right internal carotid artery	10 days	Antibiotics	Corticosteroids
Boespflug (1984)	F	9 mo	Occlusion of the left middle cerebral artery	25 days	Antibiotics	Anti-platelet
Laxer (1984)	F	26 mo	Stenosis of the right middle cerebral artery	18 days	?	Corticosteroids and antibiotics
Lapointe (1984)	M	4 mo	Occlusion of the distal branches of the left middle cerebral artery	45 days	Corticosteroids and antibiotics	Immunosuppressive therapy
Templeton (1987)	?	6 mo	Infarction of the whole territory of the right middle cerebral artery	3 weeks	?	?
Suda (2003)	M	8 mo	Irregular stenosis of the left middle cerebral artery	20 days	—	Aspirin, immunoglobulin, and intracoronary thrombolysis
Wada (2006)	M	3 yr	Infarction of territory of the left middle cerebral artery	10 days	Aspirin and immunoglobulin	—
Fujiwara (1992)	M	22 mo	Systematic discovery of infarction of the right middle cerebral artery's deep territory	59 days	Aspirin, immunoglobulin, and then anticoagulants	—
Muneuchi (2006)	M	4 yr	Systematic discovery of infarction of the right anteroinferior cerebellar artery occlusion	21 days	Aspirin, immunoglobulin, and then anticoagulants	—
Tanaka (2007)	M	3 yr	Meningeal hemorrhage by rupture of left posterior cerebral artery aneurysm	9 yr	?	Surgery
Ahn (2010)	M	6 mo	Intracerebral and meningeal hemorrhage by rupture of left middle cerebral artery aneurysm	7 mo	Aspirin (stopped 1 mo before hemorrhage) and immunoglobulins	Surgery

Abbreviations:
F = Female
M = Male
* Since the beginning of the disease.

of general status, and skin rash associated with peripheral edema. The blood tests revealed anemia (hemoglobin 7.5 g/dL), thrombocytopenia (platelets 107 G/L), hyponatremia, functional renal failure, hypoalbuminemia, and hypertriglyceridemia. Given the lipid abnormality and the presence of bicytopenia, a myelogram was obtained to rule out a macrophagic activation syndrome. The myelogram revealed a bone marrow reaction related to HHV6 primary infection (positive polymerase chain reaction gene amplification in bone marrow and blood). Lumbar puncture revealed lymphocytic meningitis (36 white cells/mm^3, high protein level 0.62 g/L, and normal glucose level). The inflammatory syndrome was major (C-reactive protein level 260 mg/L, hyperleukocytosis 20 G/L). Treatment with cephalosporins was started. The child also received a transfusion of red blood cells and two perfusions of albumin. Based on the presence of cervical lymphadenopathies associated with peripheral predominant eruption, edemas, fissured lips, and bilateral conjunctival injection, Kawasaki syndrome was finally diagnosed. Intravenous immunoglobulin (2 g/kg) and aspirin treatment were started 10 days after the onset of hyperthermia.

When she awoke the next morning, a right hemiplegia associated with a left ptosis was noted, but without other clinical signs of Claude Bernard-Horner syndrome. Blood tests showed thrombocytopenia (platelets at 113 g/L) without other signs of disseminated intravascular coagulation, elevated C-reactive protein, and high protein level (72 g/L). Brain magnetic resonance imaging showed an extended infarct in the territory of the left middle cerebral artery (Fig A). Magnetic resonance angiography revealed a complete ipsilateral occlusion of the internal carotid artery extending from its origin to the distal middle cerebral artery (Fig B-D). There was no sign of carotid dissection. Echocardiography was normal, without any coronary dilatation or intracavity thrombus. Search for constitutional thrombophilia was negative. Lipid analysis showed a decreased high-density lipoprotein cholesterol level (0.22 mmol/L) and ApoA1 (0.42 g/L). Thrombolysis could not be performed because of a lack of precise information regarding the time of stroke onset. The child received treatment with enoxaparin (1000 U anti-Xa per 12 hours) for a week, followed by aspirin (75 mg per day).

Three days later, brain magnetic resonance imaging showed recanalization of the middle cerebral artery, whereas carotid occlusion remained stable. C-reactive protein returned to normal (1 mg/L), but a thrombocytosis was noted (platelets 592 g/L). Hemoglobin electrophoresis, nuclear antibodies, complement assay, auto cytoplasmic antibodies, homocysteinemia, plasma amino acids chromatography, ammonemia, and lactate/pyruvate ratio were normal.

The girl recovered slowly and could walk without support and perform a palm grip after 2 months. One year later, she still exhibited right hemiplegia associated with right facial paralysis and right homonymous lateral hemianopia. Brain imaging was unchanged. After 18 months, brain and arterial imaging remained unchanged and aspirin was stopped.

Discussion

Only 10 examples of arterial ischemic stroke have been reported in pediatric patients with Kawasaki disease (Table).[5-14] Several potential mechanisms may explain the