

Dual-source CT imaging of multiple giant coronary and axillary aneurysms in a child with Kawasaki disease

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Abstract. – Peripheral arterial aneurysms are a feature of Kawasaki disease (KD), and very little information has been published on this feature. Failure to recognize this important complication can lead to severe consequences such as peripheral gangrene. We present the case of a 2-year-old girl, diagnosed with KD at 11 months of age, who developed multiple giant aneurysms in the bilateral axillary arteries and right coronary artery. Imaging findings from dual-source computed tomography are described in this report.

Key Words:

Dual-source CT, Kawasaki disease, Axillary, Aneurysms, Coronary artery.

Introduction

Kawasaki disease (KD) is a multi-systemic vasculitis of unknown etiology that primarily affects small- and medium-sized arteries. First described in 1967 by Tomisaku Kawasaki, the disease is known to occur in both endemic and epidemic forms and affects infants and young children of all races¹. The most common complication leading to morbidity and mortality is the development of coronary artery aneurysms that occur in approximately 15%-20% of untreated KD patients². Although less frequently (approximately 2% of untreated patients), KD also affects medium-sized, non-coronary vessels. Previous study suggests that these peripheral aneurysms occur in patients with more advanced disease that involves the coronary artery³. Here, we report the case of a 2-year-old girl diagnosed with KD who had multiple giant aneurysms in the bilateral axillary arteries and right coronary artery. Coronary angiography was performed using dual-source computed tomography (DSCT).

Case Report

At 11 months of age, the patient was referred to our Department for DSCT angiography for a huge pulsatile mass in the right axilla and was subsequently diagnosed with KD. In addition, a review of her medical history showed the presence of prolonged fever, conjunctival congestion, injected lips, generalized exanthema, cervical lymphadenopathy, and swollen hands and feet at 5 months of age. Thus, the patient met the complete diagnostic criteria for KD⁴. However, she was not diagnosed correctly at the peripheral hospital on initial presentation, and no standard therapy was given. Moreover, neither echocardiogram nor coronary angiography was performed at that time.

Upon referral, CT angiography was performed using a DSCT scanner (SOMATOM Definition, Siemens, Erlangen, Germany). The scanning parameters were as follows: tube voltage, 80 kV; tube current, 100 mAs; slice thickness, 3 mm; rotation time, 0.33 s delay, 18 s; and scan time, 6 s. Electrocardiographic gating was performed from the thoracic inlet to the lower border of the heart in the cranio-caudal direction. A bolus of 30 mL contrast medium (Omnipaque; iodine concentration of 350 mg/mL) was administered via the right antecubital vein at a flow rate of 2 mL/s, with a subsequent saline flush of 25 mL. The reconstruction algorithm used was reconstruction kernel B31f (medium smooth), with a slice thickness of 1 mm in 0.4-mm intervals. CARE Dose was applied to reduce the radiation dose for our pediatric patient; the effective dose was 0.62 mSv. Multiplanar reconstruction, maximum-intensity projection, and volume-rendering techniques were applied for three-dimensional reconstruction and visualization of the coronary arteries.



Figure 1. MIP image showing 2 fusiform aneurysms in each of the bilateral axillary arteries (*white arrows*).

DSCT angiography showed multiple giant aneurysms in the bilateral axillary arteries (Figure 1) and right coronary artery (Figure 2). The diameters of the 2 largest aneurysms in each of the following arteries were as follows: in the left axillary artery, 0.8 cm and 0.7 cm; in right axillary artery, 2.7 cm and 1.2 cm; and in the right coronary artery, 2.1 cm and 1.6 cm, respectively. The patient was referred to a pediatrician for anticoagulation therapy.



Figure 2. MPR image showing 2 giant aneurysms in the right coronary artery (*black arrows*).

A follow-up DSCT angiography was performed after 1 year (Figures 3, 4). There was no evidence of thrombosis. Moreover, the 2 aneurysms in the left axillary artery and the smaller aneurysm in the right axillary artery had resolved. However, the larger aneurysm in the right axillary artery and the 2 giant aneurysms in the right coronary artery showed poor regression.

Discussion

KD is the most common acquired coronary artery disease in childhood, occurring most frequently in children younger than 5 years of age⁴. It has been reported that 1.6%-2.2% of the KD patients show aneurysms in the peripheral arteries. Such aneurysms are relatively common in the axillary, iliac, and renal arteries. Moreover, they may occur in the brachial, splenic, mesenteric, pancreatic, and hepatic arteries⁵⁻⁹. A relationship between peripheral arterial aneurysm and peripheral gangrene has been reported¹⁰⁻¹². Axillary artery aneurysms are relatively common in patients whose systemic arteries are affected. Patients with axillary aneurysms are at a high risk for developing coronary artery aneurysm.

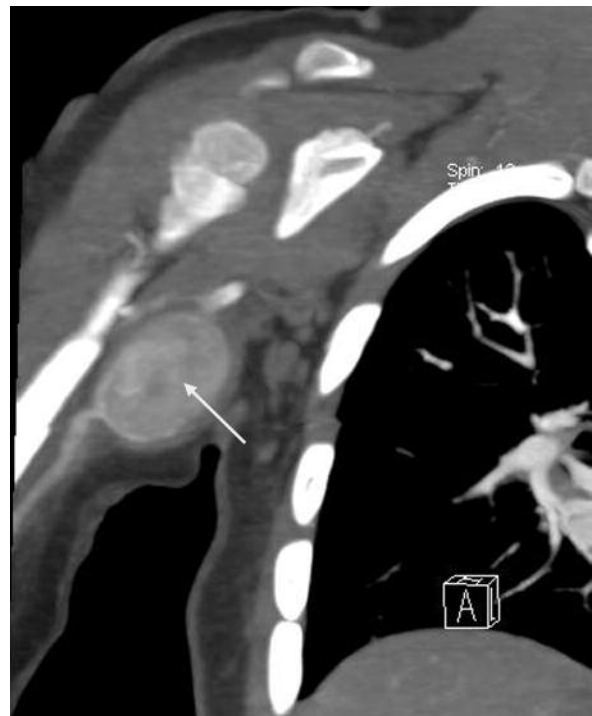


Figure 3. MPR image of the follow-up DSCT showing the larger aneurysm in the right axillary artery that showed poor regression.

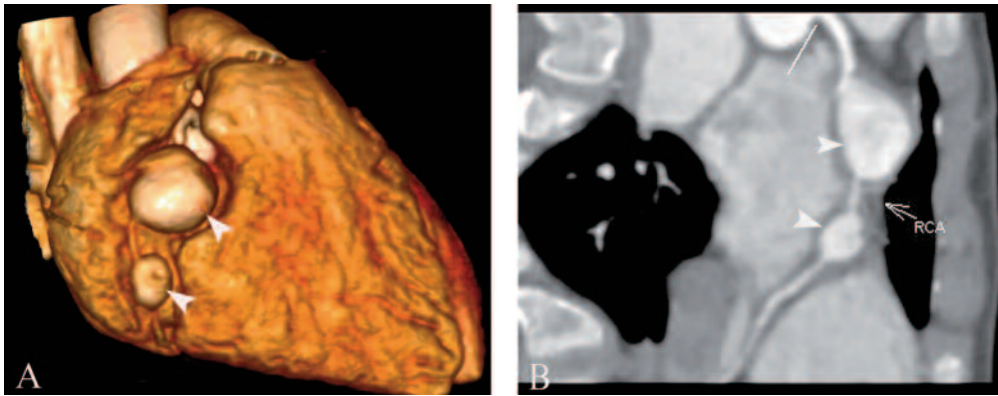


Figure 4. VRT (A) and MIP (B) images of the follow-up DSCT revealing sizes of the 2 giant aneurysms in the right coronary artery, which were similar to those in the prior scan (white arrow).

A long-term follow-up should be undertaken for patients with a history of coronary artery involvement to prevent potentially devastating consequences of progressive gangrene.⁶ Approximately 50% of coronary aneurysms regress within 5 years of medical therapy. Systemic artery aneurysms also have a tendency to regress, and their prognosis seems to be favorable. However, giant aneurysms are unlikely to resolve and may progress to arterial stenosis. Moreover, they can lead to the development of ischemic heart disease within years of the initial diagnosis^{6,7}. Small aneurysm size, fusiform morphology, and acute onset at a young age (less than 1 year) are positively associated with aneurysm regression⁴. Our patient's axillary aneurysms, which had resolved on the follow-up scan, showed the abovementioned features. However, the giant aneurysms in our patient showed poor regression. Routine follow-up of coronary artery imaging is essential for the clinical management of KD⁴. Noninvasive coronary imaging, due to rapid progress in its technology, is now widely used for pediatric patients. DSCT, a new-generation CT scanner equipped with 2 x-ray tubes and 2 detectors, provides high-quality images for the assessment of the coronary arteries and other peripheral arteries in KD patients. The 83-ms temporal resolution of DSCT allows the coronary arteries to be displayed clearly even at a rapid heart rate, making it useful for use in younger children¹³. DSCT exposes the patient to a very low radiation dose, due to prospective triggering protocols and low tube voltage. Using automatic software, DSCT can distinguish precise components of the target artery, such as thrombi, and provide additional anatomical information. In our patient, the multi-

ple bilateral axillary arterial aneurysms and multiple coronary artery aneurysms were very clearly defined in a single scan.

Conclusions

Limited information has been published on peripheral aneurysms in KD patients, involving the non-coronary arteries, in the literature. To our knowledge, this is the first report of multiple giant axillary and coronary aneurysms diagnosed by DSCT angiography in a KD patient. DSCT permits visualization of coronary and peripheral arteries with high image quality and low radiation exposure. This new, noninvasive modality may well replace conventional angiography and play an important role in the identification and follow-up of aneurysms in children with KD.

Conflict of Interest

The Authors declare that there are no conflicts of interest.

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