

Vascular Model Repository

Specifications Document



0108_0001

Species	Human
Anatomy	Coronary
Disease	Kawasaki Disease Aneurysm
Procedure	-

Clinical Significance and Background

Coronary

Coronary arteries supply blood to the heart muscle. Like all other tissues in the body, the heart muscle needs oxygen-rich blood to function. Also, oxygen-depleted blood must be carried away. The coronary arteries wrap around the outside of the heart. Small branches dive into the heart muscle to bring it blood. The two main coronary arteries are the left main and right coronary arteries.

The left main coronary artery (LCMA) supplies blood to the left side of the heart muscle (the left ventricle and left atrium). The left main coronary then divides into branches: The left anterior descending artery which supplies blood to the front of the left side of the heart and the circumflex artery which encircles the heart muscle supplies blood to the outer side and back of the heart.

The right coronary artery (RCA) supplies blood to the right ventricle, the right atrium, and the SA (sinoatrial) and AV (atrioventricular) nodes, which regulate the heart rhythm. The right coronary artery divides into smaller branches, including the right posterior descending artery and the acute marginal artery. Together with the left anterior descending artery, the right coronary artery helps supply blood to the middle or septum of the heart.

Kawasaki Disease

Kawasaki disease (KD), also known as Kawasaki syndrome, is an acute febrile illness of unknown cause that primarily affects children younger than 5 years of age. The disease was first described in Japan by Tomisaku Kawasaki in 1967, and the first cases outside of Japan were reported in Hawaii in 1976. Kawasaki disease causes swelling (inflammation) in children in the walls of small to medium-sized blood vessels that carry blood throughout the body as well as inflammation of the coronary arteries, which supply oxygen-rich blood to the heart. Inflammation of the coronary arteries can lead to weakening and bulging of the artery wall (aneurysm). Aneurysms increase the risk of blood clots, which could lead to a heart attack or cause life-threatening internal bleeding.

Children with Kawasaki disease might have high fever, swollen hands and feet with skin peeling, and red eyes and tongue. But Kawasaki disease is usually treatable, and

most children recover without serious problems if they receive treatment within 10 days of onset.

Aneurysm

An aneurysm is a bulge in a blood vessel caused by a weakness in the blood vessel wall, usually where it branches. As blood passes through the weakened blood vessel, the blood pressure causes a small area to bulge outwards like a balloon. Most aneurysms do not show symptoms and are not dangerous. However, at their most severe stage, some can rupture, leading to life-threatening internal bleeding.

Clinical Data

General Patient Data

Age (yrs)	10
Sex	Male

Specific Patient Data

BSA (m ²)	1.16
P sys SP unknown	105
P sys DP unknown	52
Heart Rate (beats/min)	59
Cardiac Output (L/min)	3.4
Stroke Volume (mL)	58

Notes

See below for information on the image data and boundary conditions associated with the model.

Image Modality: CT

Image Type: DICOM

Image Source: UCSD

Image Manufacturer: GE MEDICAL SYSTEMS

Publications

See the following publications which include the featured model for more details:

Sengupta, D., Kahn, A. M., Burns, J. C., Sankaran, S., Shadden, S. C., & Marsden, A. L. (2012). Image-based modeling of hemodynamics in coronary artery aneurysms caused by Kawasaki disease. *Biomechanics and modeling in mechanobiology*, 11(6), 915-932.

<http://www.doi.org/10.1007/s10237-011-0361-8>

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AND/OR

N.M. Wilson, A.K. Ortiz, and A.B. Johnson, "The Vascular Model Repository: A Public Resource of Medical Imaging Data and Blood Flow Simulation Results," J. Med. Devices 7(4), 040923 (Dec 05, 2013) doi:10.1115/1.4025983.

AND/OR

Reference the official website for this data: www.vascularmodel.com

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