

Vascular Model Repository

Specifications Document



0152_H_CORO_SVGD

Legacy Name: O145207

Model added: 16 Nov 2022

| | |
|------------------|------------------------------|
| Species | Human |
| Anatomy | Coronary |
| Disease | Saphenous Vein Graft Disease |
| Procedure | Coronary Artery Bypass Graft |

Clinical Significance and Background

Coronary

Just like every tissue in the body, the heart itself also requires oxygenated blood to function. The coronary arteries supply blood to the heart and stem from the root of the ascending aorta. The two main coronary arteries are the left main and right coronary arteries, and they wrap around the outside of the heart.

The left main coronary artery (LCMA) supplies blood to the left side of the heart muscle and divides into two branches: the left anterior descending (LAD) artery and the left circumflex (LCX) artery which supply blood to the front left and outer backside of the heart respectively.

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. Together with the left anterior descending artery, the right coronary artery also helps supply blood to the middle or septum of the heart.

Saphenous Vein Graft Disease

During coronary artery bypass graft surgery (CABG), doctors take a graft (usually another blood vessel) and attach it to the aorta and a region of the heart that is suffering from low perfusion. This is to help create a bypass for oxygenated blood to reach the heart. Currently, the most common graft material used for CABG is the saphenous vein graft (SVG). The saphenous veins are superficial veins found in your legs that run from your foot to your upper thigh. Unfortunately, SVGs are often susceptible to thrombosis formation and occlusion which leads to ischemic conditions. Officially saphenous vein graft disease (SVGD) is characterized by scholars where the SVG exhibits a 50% or greater level of stenosis.

Coronary Artery Bypass Graft

Coronary artery bypass graft surgery (CABG) is a procedure used to treat coronary artery disease. One way to treat the blocked or narrowed arteries is to bypass the blocked portion of the coronary artery with a piece of a healthy blood vessel from elsewhere in your body. Blood vessels, or grafts, used for the bypass procedure may be pieces of a vein from your leg or an artery in your chest. An artery from your wrist may also be used. Your doctor attaches one end of the graft above the blockage and

the other end below the blockage. Blood bypasses the blockage by going through the new graft to reach the heart muscle.

Clinical Data

General Patient Data

| | |
|-----------|---|
| Age (yrs) | - |
| Sex | - |

Specific Patient Data

Specific patient data is not available for this model. However, this model and the following models

0146_H_CORO_SVGD, 0147_H_CORO_SVGD, 0148_H_CORO_SVGD, 0149_H_CORO_SVGD, 0150_H_CORO_SVGD, 0151_H_CORO_SVGD, 0152_H_CORO_SVGD, 0153_H_CORO_SVGD, 0154_H_CORO_SVGD, 0155_H_CORO_SVGD, 0156_H_CORO_SVGD, 0157_H_CORO_SVGD, 0158_H_CORO_SVGD, 0159_H_CORO_SVGD

are all part of the same publication (<https://doi.org/10.1007/s12265-020-09982-7>) and the aggregate patient data between all 14 models can be found below.

| | |
|---|------------|
| Age, years | 71.5 ± 9.5 |
| Female, n (%) | 1 (7) |
| Years since CABG, years | 10 ± 6 |
| Body mass index, kg/m ² | 25.2 ± 2.2 |
| Diabetes, n (%) | 7 (47) |
| Hypertension, n (%) | 14 (100) |
| Hyperlipidemia, n (%) | 14 (100) |
| Smoking history, n (%) | 6 (40) |
| Family history of CAD, n (%) | 11 (73) |
| Previous MI, n (%) | 14 (100) |
| LVEF | 48% ± 15% |
| No. of SVGs per patient | 2.7 ± 0.7 |
| No. of patients with LIMA grafts, n (%) | 12 (80) |
| No. of patients with RIMA grafts, n (%) | 1 (7) |

Notes

Model of a patient who received a saphenous vein graft (SVG) for coronary artery bypass graft (CABG) surgery. Each model contains at least one healthy SVG and one diseased (stenosed) SVG. Simulation results only include a pre-stent version of the model. \nSee [paper](#) for more details. See below for information on the image data.

Image Modality: CT

Image Type: VTI

Image Source: Cardiovascular Research Foundation of Southern California

Publications

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

Khan, M.O., Tran, J.S., Zhu, H. et al. Low Wall Shear Stress Is Associated with Saphenous Vein Graft Stenosis in Patients with Coronary Artery Bypass Grafting. J. of Cardiovasc. Trans. Res. 14, 770 - 781 (2021).

<https://doi.org/10.1007/s12265-020-09982-7>

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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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