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Thomas Anger

Patricia Pabst

Svenja Linnemann

Eckhardt Scholtz

Constantin Mnz

*See next page for additional authors*

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## Coronary Arcade Visualized in 256 Sliced Multi- Detector Cardiac Computed Tomography

### Authors

Thomas Anger, Patricia Pabst, Svenja Linnemann, Eckhardt Scholtz, Constantin Mnz, and Martin Oberhoff

# Coronary Arcade Visualized in 256 Sliced Multi-Detector Cardiac Computed Tomography

THOMAS ANGER,<sup>1</sup> PATRICIA PABST,<sup>1</sup> SVENJA LINNEMANN,<sup>1</sup> ECKHARDT SCHOLTZ,<sup>2</sup> CONSTANTIN MÄNZ,<sup>2</sup> MARTIN OBERHOFF<sup>1</sup>

From <sup>1</sup>Department of Internal Medicine; <sup>2</sup>Department of Radiology, Klinikum Calw-Nagold, Germany

**THOMAS ANGER ET AL: *Coronary Arcade Visualized in 256 Sliced Multi-Detector Cardiac Computed Tomography***: A 52-year-old male patient presented to our Department of Internal Medicine with severe sustained chest pain for at least 18 hours, for ruling out acute myocardial infarction. We performed a cardiac 256 multi-sliced computed tomography to document a coronary arcade as the coronary abnormality. (*J HK Coll Cardiol* 2018;26: 90-93)

*Arcade, Coronary artery disease, Multi-sliced cardiac-ct*

## 摘要

爲了排除急性心肌梗塞，一名至少持續嚴重胸痛18小時的52歲男病人被送到內科，我們進行了256切面多斷層心臟電腦掃描，證明爲因冠狀動脈異常而致冠狀動脈拱廊。

關鍵詞：冠狀拱廊、冠狀動脈疾病、多斷層心臟電腦掃描

## Case Report

A 52-year-old male patient presented to our Department of Internal Medicine with severe sustained chest pain for at least 18 hours, for ruling out acute myocardial infarction. He had no definite cardiovascular risks, nor any history of any disease. He is in healthy conditions except the acute pain symptom in his upper chest spreading to the left arm / shoulder regions. Drugs or any oral medications were denied. There were no allergies nor any known intolerances.

We performed a 12-channel electrocardiogram (ECG) and blood tests, to demonstrate normal ECG tracing and normal levels for troponin T and creatinin kinase initially, as well as after 1h, in respect to rule out acute myocardial infarction. Further, we ruled out any structural heart disease using transthoracic echocardiography. We decided to perform a cardiac CT and send the patient to the Department of Radiology in our Hospital, as he still had severe chest pain although his circulatory conditions were stable.

The Cardiac-CT scan was performed using a Philips Brilliance 256 MDCT iCT system (0,6 mm x 256 collimation). The patient's heart rate was optimized (50-60/min) with administration of metoprolol succinat.<sup>1,2</sup> Contrast-enhanced scans were performed during held-inspiration, after an intravenous infusion of 80 ml contrast medium Iomeprol 350 mgI/mL (Imeron 350, Bracco Imaging Deutschland GmbH, Germany), using a tracking bolus system to commence scanning.<sup>3</sup> A cardiac step and shoot protocol was performed to reduce X-ray intensity for the patient (Philips, Amsterdam, The Netherlands<sup>©</sup>), and retrospective data

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Address for reprints: Dr. Thomas Anger  
Department of Internal Medicine, Klinikum Calw-Nagold, Germany

Email: th.anger@arcor.de

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collection was used in 0.6 mm slice thickness to establish coronary artery status. In order to create different reconstructions: (i) a 65% RR interval was chosen regardless of heart rhythm,<sup>4</sup> (ii) a 3D model was reconstructed (Figure 1), (iii) a curved analysis for the coronary arteries (Figure 2), and (iv) a linearized maximum intensity projection for specific coronary arteries (Figure 3) were assessed for coronary analyses.

Focusing primarily on the coronary arteries,<sup>5</sup> we ruled out any coronary calcifications (Agatston Score 0, data not shown) and moreover, no further non-calcified plaque formations in all demonstrated coronary arteries (Figure 1). In contrast, we visualized an accessory vessel with origin as the side branch of the right coronary artery connecting to the circumflex artery (Figures 2 and 3). To confirm this observation, we repeated the diagnosis-finding by a different observer with the same result.

What we found was a coronary arcade, a non-physiological coronary vessel collateralizing the right coronary artery to the circumflex artery.

Intercoronary communication or coronary arcade is a rare congenital coronary anomaly. The functional importance of this variant is not clear, but it may cause myocardial ischemia by coronary steal, or function as a natural bypass. In which case it may play a protective role in the myocardium if significant coronary atherosclerosis will develop.<sup>6</sup> Little information is known about coronary arcades and only few case reports have been reported.

In general, coronary arcades are documented using invasive coronary catheter examinations in the Cath.-Lab focusing on patients with unstable symptoms (angina pectoris<sup>6</sup>). Additionally, coronary fistula, or severe coronary artery disease are also documented by coronary angiography, both being ruled out here non-invasively by multi-sliced computed tomography.

Coronary artery fistulae are primarily congenital bypass abnormalities connecting coronary arteries with the pulmonary artery<sup>7</sup> or with the right ventricle,<sup>8</sup> will be commonly visualized by invasive angiography or by non-invasive cardiac computed tomography.<sup>9</sup> Coronary artery fistula may be late complications of coronary artery perforation during primary percutaneous coronary intervention.<sup>10</sup> Coronary artery fistula may also connect



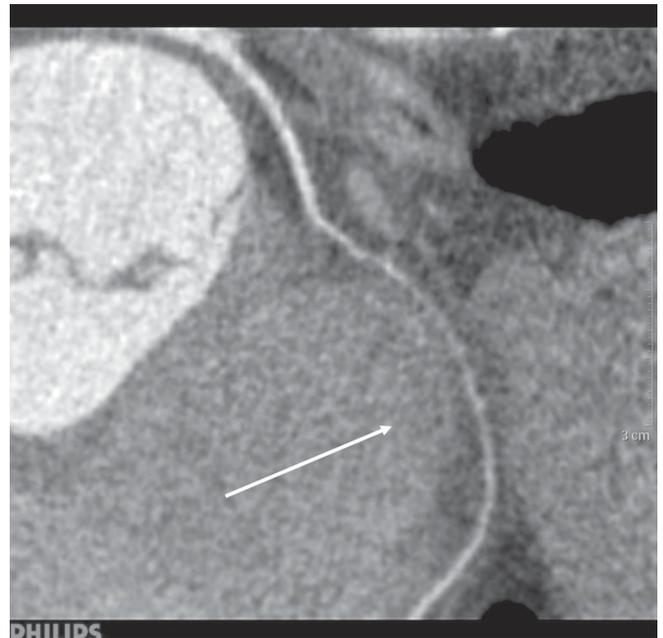
**Figure 1.** Cardiac 3D Scans of the Coronary Abnormality: The Coronary Arcade. Demonstrated here the 3D scans of the accessory arteriosus vessel with origin as side branch from the right coronary artery connecting with approach to the circumflex artery as marked with arrows.

to the coronary venous sinus.<sup>11</sup> The treatment of giant coronary fistula is the specific closure through different cardiac device approaches.<sup>12,13</sup> There are case reports cited offering co-existence of coronary artery disease with coronary artery fistula.<sup>14</sup>

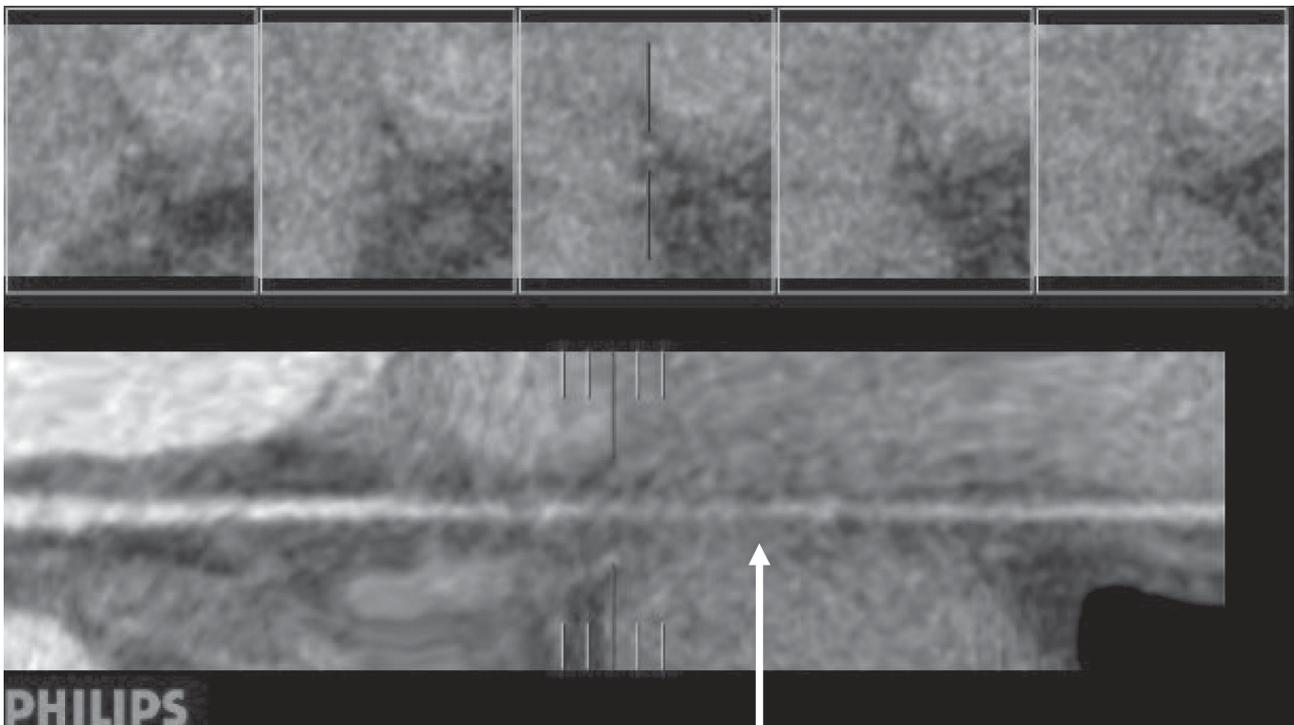
Here, we are focusing on non-invasive cardiac computed tomography which indeed documented a congenital coronary arcade. Since there is no further therapeutic approach to follow, we decided not to attach a coronary specific angiography in the Cath.-Lab. The cardiac CT revealed the aetiology his symptoms.

### Conclusion / Learning Objectives

Cardiac multi-sliced computed tomography documents coronary abnormalities as coronary arcades in patient with unstable angina pectoris. Unfortunately, on exploring the existing literature, no specific treatment options have been offered so far for these coronary abnormalities.



**Figure 2.** Cardiac Curved Scans of the Coronary Arcade. Demonstrated here the curved scans of the accessory arteriosus vessel with origin as side branch from the right coronary artery and connecting with the circumflex artery as marked with the white arrow. No significant calcification or non-calcified plaque was demonstrated (Agatston Score 0).



**Figure 3.** Maximum Intensity Projection to the Coronary Arcade. Demonstrated here the scans reconstructed to the maximum intensity projection of the accessory arteriosus vessel as marked with the white arrow.

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