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# Echocardiographic Visualization of Retroaortic Anomalous Coronary Artery

**Noemi Bruno, MD, Ilaria Ferrari, MD, Francesco Pelliccia, MD, Carlo Gaudio, MD, and Luca Monzo, MD, PhD**

Department of Clinical Internal, Anesthesiology and Cardiovascular Sciences, Sapienza University, Rome, Italy

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**Address for Correspondence:**
**Luca Monzo, MD, PhD**
Department of Clinical Internal, Anesthesiology and Cardiovascular Sciences, Sapienza University, Viale del Policlinico, 155, 00161 Rome, Italy.
Email: luca.monzo@uniroma1.it



**ORCID iDs**
Noemi Bruno
https://orcid.org/0000-0003-4847-9885
Ilaria Ferrari
https://orcid.org/0000-0002-7215-3757
Francesco Pelliccia
https://orcid.org/0000-0003-1260-1308
Carlo Gaudio
https://orcid.org/0000-0002-8265-5945
Luca Monzo
https://orcid.org/0000-0003-2958-943X

**Conflict of Interest**
The authors have no financial conflicts of interest.

A 65-year-old female was admitted to our clinic for sudden onset of typical chest pain at rest lasting few minutes. Her medical background included systemic hypertension, type 2 diabetes, dyslipidemia and mild obesity. Upon arrival in the emergency room, clinical examination was unremarkable and the electrocardiogram revealed sinus rhythm at 70 bpm without any sign of acute myocardial ischemia. Serial cardiac troponin T measurements were persistently negative. A transthoracic echocardiogram (TTE) was also performed showing mild ventricular hypertrophy, no regional wall motion abnormalities and a preserved left ventricular ejection fraction of 55%. A highly echogenic tubular structure, located slightly on the atrial side of the atrioventricular groove was noted (arrows) in apical 4-chamber (**Figure 1A**; **Movie 1**), 2-chamber (**Figure 1B**; **Movie 2**), and 3-chamber (**Figure 1C**; **Movie 3**) view. Its persistence in more than an echocardiographic plane excluded an artifact. Indeed, its tubular shape was suggestive of a vascular structure, but its location was atypical for a normal vessel.

According to patient's clinical history and her high cardiovascular risk profile she was referred for coronary angiography, which revealed no critical stenosis but the anomalous aortic origin of a coronary artery (AAOCA) from the inappropriate sinus of Valsalva (**Figure 1D**; **Movie 4**). In particular, we showed that the left main coronary artery (LMCA) arose, sharing the origin with the right coronary artery, from the right coronary cusp and then took a caudal posterior loop running posterior to the aortic root (**Figure 1E and F**). Hence, we could recognize the tubular structure seen at TTE as the retroaortic course of LMCA, a finding recently described as retroaortic anomalous coronary (RAC) sign.

Among AAOCA, the retroaortic course of the LMCA is an uncommon diagnosis in adults, and its association with a single coronary origin is extremely rare.[1] Although it has been usually considered a benign clinical entity, it may pose troubles during valve surgery[2] and some reports described an increased risk in morbidity and mortality.[3] In a recent study, the presence of RAC sign was demonstrated to be highly suggestive of an anomalous coronary artery (specificity 93.9%) and strongly associated with retroaortic LMCA course at computed tomography angiography exam.[4] Accordingly, it is of utmost importance for cardiologists to recognize the RAC sign and its significance, since it may provide key clues for a correct diagnosis. It should be acknowledged that the RAC sign may mimics other common TTE findings, such as image artifacts and annular or valvular calcifications, and therefore should be carefully differentiated from them.

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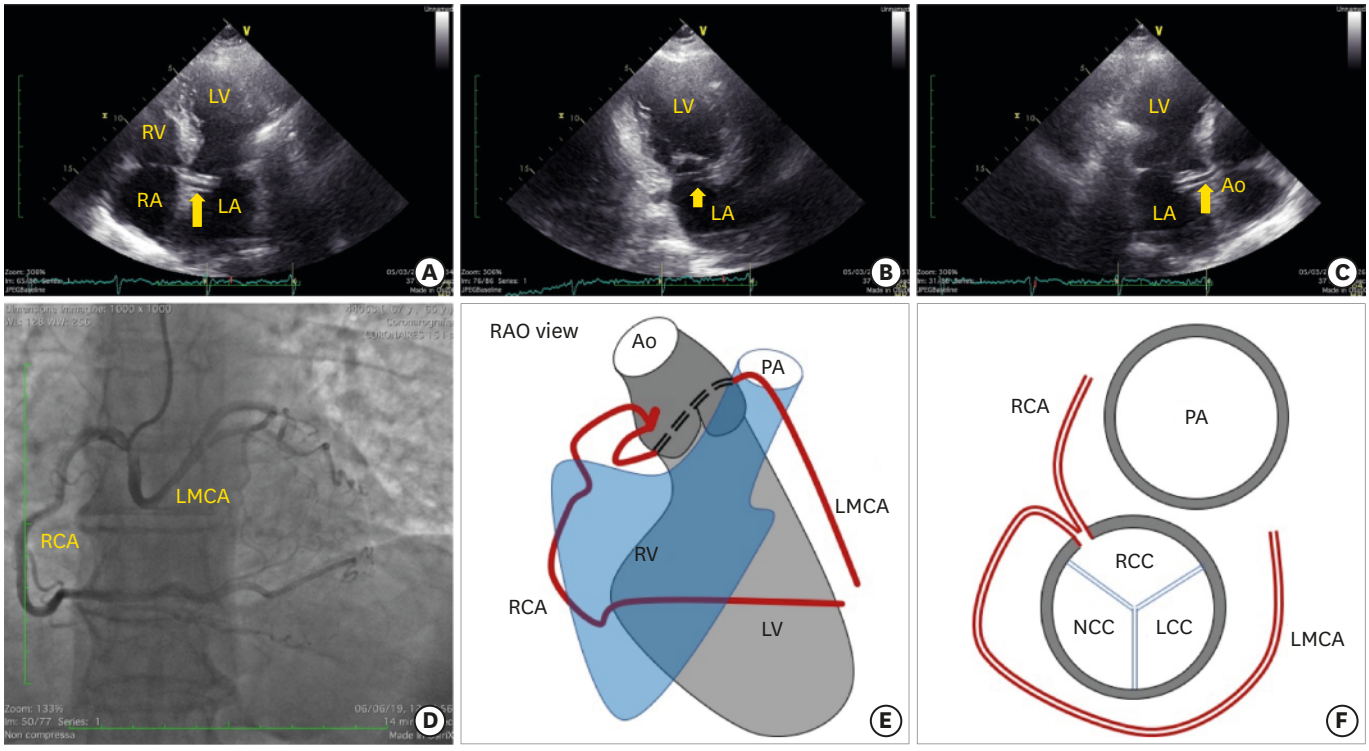


**Figure 1.** Transthoracic echocardiogram showing the RAC sign (arrow) in the apical 4-chamber (A), 2-chamber (B) and 3-chamber (C) view. Coronary angiography in the RAO view demonstrating the anomalous origin of the LMCA from RCC and its course (D). Diagrammatic illustrations of the course and origin of the anomalous LMCA in the angiographic RAO projection (E) and at sinuses of Valsalva (F).
Ao: aorta, LA: left atrium, LCC: left coronary cusp, LMCA: left main coronary artery, LV: left ventricle, NCC: non-coronary cusp, PA: pulmonary artery, RA: right atrium, RAC: retroaortic anomalous coronary, RAO: right anterior oblique, RCC: right coronary cusp, RCA: right coronary artery, RV: right ventricle.

### Author Contributions

Conceptualization: Pelliccia F, Gaudio C, Monzo L; Data curation: Bruno N, Ferrari I; Investigation: Bruno N, Ferrari I, Monzo L; Software: Ferrari I; Supervision: Pelliccia F, Gaudio C, Monzo L; Validation: Pelliccia F, Gaudio C, Monzo L; Visualization: Monzo L; Writing - original draft: Bruno N; Writing - review & editing: Pelliccia F, Gaudio C, Monzo L.

## SUPPLEMENTARY MATERIALS

### Movie 1

Ref. (A) RAC sign in the apical 4-chamber view.

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### Movie 2

Ref. (B) RAC sign in the apical 2-chamber view.

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### Movie 3

Ref. (C) RAC sign in the apical 3-chamber view.

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### Movie 4

Ref. (D) Coronary angiography in the right anterior oblique view demonstrating the anomalous aortic origin of the left main coronary artery.

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